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GENERAL INFORMATION

Introduction

Founded March 7, 1887, by the North Carolina General Assembly under the provisions of the national Land-Grant Act, North Carolina State University has provided more than a century of service to the state and nation. Sharing the distinctive character of land-grant universities nationwide, NC State has broad academic offerings, national and international linkages, and large-scale outreach, extension and research activities.

With more than 33,000 students and about 8,000 faculty and staff, NC State is a comprehensive university known for its leadership in education, research and economic development, and is globally recognized for its science, technology, engineering and mathematics strengths.

As one of the leading land-grant institutions in the nation, NC State is committed to playing an active, vital role in improving the quality of life for citizens of North Carolina, the nation and the world.

The university is consistently ranked among the nation’s top 50 public universities and ranked by The Princeton Review and Kiplinger’s as a national best value, a ranking that combines academic quality and cost. Beginning their freshman year, NC State students start work on their major right away — whether it is conducting research alongside faculty or starting a challenging co-op or internship. While the student population is large, faculty and staff are accessible, friendly and helpful; large classes are always paired with smaller discussion sections or labs.

Many students and faculty from around the globe call Raleigh home. The Research Triangle region surrounds the NC State campus where many of the country’s leading, Fortune 500 technology, research and pharmaceutical companies are located. NC State’s Centennial Campus is home to more than 130 corporate and government research partners, incubator companies and NC State research units. In 2007, Centennial Campus was named the world’s top science research park by the Association of University Research Parks.

Mission

The mission of North Carolina State University is to serve its students and the people of North Carolina as a doctoral, research-extensive, land-grant university. Through the active integration of teaching, research, extension and engagement, NC State University creates an innovative learning environment that stresses mastery of fundamentals, intellectual discipline, creativity, problem solving, and responsibility. Enhancing its historic strengths in agriculture, science, and engineering with a commitment to excellence in a comprehensive range of academic disciplines, NC State provides leadership for intellectual, cultural, social, economic and technological development within the state, the nation, and the world.

Campus

NC State University is located west of downtown Raleigh on 2,090 acres. The campus acreage includes Centennial Campus on 1,110 acres and West Campus at 470 acres. The College of Veterinary Medicine and the stadium/arena complex are located on the West Campus. Nearby are research farms; biology and ecology sites; genetics, horticulture, and floriculture nurseries and forests that comprise an additional 3,000 acres. Elsewhere across the state are research farms, 4-H camps and a research forest for a total of 106,900 acres.

The Research Triangle Park

NC State is one of the three Triangle area top-tier research universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30 mile triangle formed by the three universities is The Research Triangle Park, a 7,000-acre research park founded in 1959 by leaders from academia, business and government. Today, The Research Triangle Park is home to some of the most innovative and cutting-edge research based companies in the world.

Faculty

The university has approximately 7,982 employees, including 2,078 instructional faculty. Among the many honors and recognitions received by members of the faculty are eight memberships in the National Academy of Sciences and eight memberships in the National Academy of Engineering, four members of the Institute of Medicine, and over 536 members of the Academy of Outstanding Teachers.

Teaching and Research

The university is organized into ten colleges, the Graduate School, and the Division of Undergraduate Academic Programs. The colleges are Agriculture and Life Sciences, Design, Education, Engineering, Humanities and Social Sciences, Management, Natural Resources, Physical and Mathematical Sciences, Textiles, and Veterinary Medicine. These colleges offer students over 100 bachelor and master’s degrees in more than 100 areas of study, doctorate degrees in 61 disciplines, and a Doctorate of Veterinary Medicine. Together with more than 50 research centers and institutes, these colleges also support a broad spectrum of more than 3,700 sponsored scholarly endeavors.
Outreach and Extension Program

As North Carolina’s flagship research intensive, community engaged land-grant university, NC State has a unique mission to serve the citizens of this state through technical assistance, professional development, lifelong education, technology transfer, and other means of applying knowledge to real world issues and problems. Faculty, students, and staff from all ten academic colleges and other units engage in collaborative research, learning, and service partnerships with business, industry, government, and communities, in the Triangle region and across the state. Extension and engagement imperatives include economic development, environmental stewardship, K-12 education, leadership development, and entrepreneur support. NC State’s Office of Extension, Engagement, and Economic Development reaches over one million citizens annually through Cooperative Extension, Industrial Extension, McKimmon Center for Extension and Continuing Education, NC State’s Economic Development Partnership, the General Hugh Shelton Leadership Center, and the North Carolina Small Business and Technology Development Center.

Students

In the 2009 Fall Semester, the university’s head count enrollment totaled 33,819. Included in this number were 25,255 students in undergraduate degree programs, 8,564 in graduate degree programs, 312 First Professional and 2,755 non degree-seeking students. The combined undergraduate and graduate enrollments by college were: Agriculture and Life Sciences - 5,465; Design - 759; Education - 1,962; Engineering - 9,368; Natural Resources - 1,459; Humanities and Social Sciences - 4,948; Management - 3,196; Physical and Mathematical Sciences - 1,539; Textiles - 1,095; Veterinary Medicine - 403, and Undergraduate Academic Programs/First Year College - 1,417. The student population included 2,701 African American students, 2,907 other minority students and 15,042 female students. Students at the university come from 54 states and territories, and 106 foreign countries. The international enrollment is a distinctive feature of the institution as nearly 2,600 international students give the campus a cosmopolitan atmosphere.

Associations

The university is a member of the Association of Public and Land-grant Universities, the American Council on Education, the Association of Governing Boards of Universities and Colleges, the Association of American Colleges and Universities, the Oak Ridge Associated Universities, the Southern Association of Colleges and Schools, Campus Compact, and the Cooperating Raleigh Colleges.

Accreditation

NC State University is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award associate’s, baccalaureate, master’s and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call (404) 679-4500 for questions about the accreditation of NC State University. We are providing this contact information here to enable interested constituents (1) to learn about the accreditation status of NC State, (2) to file a third-party comment at the time of NC State’s decennial review, (3) to file a complaint against the institution for alleged non-compliance with a standard or requirement. Normal inquiries about NC State, such as admissions requirements, financial aid, educational programs, etc., should be addressed directly to the university and not the Commission’s office.

In addition, many of the university’s professional programs and departments are accredited by national professional associations, including:

### Specialized Academic Program Accreditation

[www2.acs.ncsu.edu/UPA/accreditation/programs.htm](http://www2.acs.ncsu.edu/UPA/accreditation/programs.htm)

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
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</thead>
<tbody>
<tr>
<td>College of Agriculture and Life Sciences</td>
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<tr>
<td><strong>Accredited through the College of Education</strong></td>
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<tr>
<td>Agriculture Education Teacher Education Program (BS)</td>
<td>National Council for the Accreditation of Teacher Education (NCATE)</td>
<td>2007</td>
<td>2012</td>
<td>5 years</td>
<td>2011</td>
</tr>
<tr>
<td><strong>Accredited through the College of Engineering:</strong></td>
<td></td>
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</tr>
<tr>
<td>Biological Engineering (BS)</td>
<td>Accreditation Board for Engineering and Technology (ABET), Engineering Accreditation Commission of ABET</td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>2010</td>
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</tbody>
</table>
### Specialized Academic Program Accreditation

**www2.acs.ncsu.edu/UPA/accreditation/programs.htm**

<table>
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<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
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<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
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<tr>
<td><strong>College of Design</strong></td>
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<tr>
<td>Landscape Architecture (BLA, MLA)</td>
<td>Landscape Architectural Accreditation Board</td>
<td>2009</td>
<td>2014</td>
<td>5 years</td>
<td>2013</td>
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<tr>
<td>Graphic Design (BGD, MGD)</td>
<td>National Association of Schools of Art and Design</td>
<td>2005</td>
<td>2010</td>
<td>First two terms every 5 yrs afterwards every 10 yrs</td>
<td>2009</td>
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<tr>
<td>Industrial Design (BID, MID)</td>
<td></td>
<td>2005</td>
<td>2010</td>
<td>First two terms every 5 yrs afterwards every 10 yrs</td>
<td>2009</td>
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<tr>
<td><strong>College of Education</strong></td>
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<tr>
<td>Counselor Education (PhD, MEd, MS)</td>
<td>Council for Accreditation of Counseling and Related Educational Programs (CACREP)</td>
<td>2005</td>
<td>2012</td>
<td>8 years</td>
<td>2010</td>
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<td>All teacher education programs, School Counselor (MEd, MS), School Administration (MSA) and School of Social Work (MR) at initial and advanced levels.</td>
<td>National Council for the Accreditation of Teacher Education (NCATE)</td>
<td>2007</td>
<td>2014</td>
<td>7 years</td>
<td>2012</td>
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<td><strong>College of Engineering</strong></td>
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<td>Aerospace Engineering (BS)</td>
<td>Accreditation Board for Engineering and Technology (ABET), Engineering Accreditation Commission of ABET</td>
<td>2005</td>
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<td></td>
<td>2005</td>
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<td>6 years</td>
<td>2010</td>
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<td>Biomedical Engineering (BS)</td>
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<td>2005</td>
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<td>Civil Engineering (BS)</td>
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<td>Computer Engineering (BS)</td>
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<td>2005</td>
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<tr>
<td>Computer Science (BS)</td>
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<td>2005</td>
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<tr>
<td>Construction Engineering and Management (BS)</td>
<td></td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>2010</td>
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<tr>
<td>Electrical Engineering (BS)</td>
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<td>2005</td>
<td>2011</td>
<td>6 years</td>
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<tr>
<td>Engineering - Mechatronics Concentration (BS)</td>
<td></td>
<td>2006</td>
<td>2011</td>
<td>6 years</td>
<td>2010</td>
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</table>
### Specialized Academic Program Accreditation

**www2.acs.ncsu.edu/UPA/accreditation/programs.htm**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Engineering (BS)</td>
<td>Accreditation Board for Engineering and Technology (ABET), Engineering Accreditation Commission of ABET</td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
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<td>Industrial Engineering (BS)</td>
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<td>2005</td>
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<td>Materials Science and Engineering (BS)</td>
<td></td>
<td>2005</td>
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<td>Mechanical Engineering (BS)</td>
<td></td>
<td>2005</td>
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<td>2010</td>
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<tr>
<td>Nuclear Engineering (BS)</td>
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<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>2010</td>
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<tr>
<td>Paper Science and Engineering (BS)</td>
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<td>2005</td>
<td>2011</td>
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<tr>
<td>Textile Engineering (BS)</td>
<td></td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>2010</td>
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<tr>
<td><strong>College of Humanities and Social Sciences</strong></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Social Work (MSW)</td>
<td></td>
<td>Initial Accred 2009</td>
<td>2013</td>
<td>4 years for initial accred*</td>
<td>2011</td>
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<tr>
<td>Ergonomics (MS, PhD) - Department of Psychology</td>
<td>Human Factors and Ergonomics Society (HFES)</td>
<td>1997</td>
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<td>HFES accreditation procedures are being revised; dates will be set once this is finished.</td>
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<td>Public Administration (MPA)</td>
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<td>7 years</td>
<td>2013</td>
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<tr>
<td>School Psychology (MS, PhD)</td>
<td>American Psychological Association - Commission on Accreditation (CoA)</td>
<td>2009</td>
<td>2014</td>
<td>5 years</td>
<td>2014</td>
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</tbody>
</table>

* Note: First accreditation is referred to as initial accreditation and is for a shorter period than in subsequent accreditation period, which is typically 8 years.

### College of Management

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting (BS, MAC)</td>
<td>Association to Advance Collegiate Schools of Business (AACSB International)</td>
<td>2010</td>
<td>2015</td>
<td>5 years</td>
<td>2014</td>
</tr>
<tr>
<td>Business Administration (BS, MBA)</td>
<td></td>
<td>2010</td>
<td>2015</td>
<td>5 years</td>
<td>2014</td>
</tr>
<tr>
<td>Master of Global Innovation Management (MGIM)</td>
<td></td>
<td>2010</td>
<td>2015</td>
<td>5 years</td>
<td>2014</td>
</tr>
</tbody>
</table>

### College of Natural Resources

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest Management (BS)</td>
<td>Society of American Foresters</td>
<td>2005</td>
<td>2015</td>
<td></td>
<td>Review at end of first 5 yrs after 10 yrs a full accred review</td>
</tr>
<tr>
<td>Program Name</td>
<td>Accrediting Body</td>
<td>Last Yr Accred</td>
<td>Next Yr Accred</td>
<td>Typical Cycle Length</td>
<td>Yr to Start Next Self-study to Prepare for Accred</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------</td>
<td>----------------</td>
<td>----------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Wood Products (BS)</td>
<td>Society of Wood Science &amp; Technology</td>
<td>2005</td>
<td>2015</td>
<td>Annual review reports required 10-yr accred cycle</td>
<td>2014*</td>
</tr>
<tr>
<td>Paper Science &amp; Engineering (BS)</td>
<td>Accreditation Board of Engineering &amp; Technology</td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>2010*</td>
</tr>
<tr>
<td>Professional Golf Management (BS)</td>
<td>Professional Golf Association</td>
<td>2005</td>
<td>2010</td>
<td>5 years</td>
<td>2010*</td>
</tr>
<tr>
<td>Parks, Recreation &amp; Tourism Management (BS)</td>
<td>National Recreation and Park Association</td>
<td>2007</td>
<td>2012</td>
<td>5 years</td>
<td>2011*</td>
</tr>
</tbody>
</table>

*Note: Since these programs all have ongoing program assessments required by their accrediting agency or by the university, their self-studies actually begin as soon as the most recent ended. However, the construction of the full document would normally occur the year prior to the accreditation visit.

**College of Physical and Mathematical Sciences**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry (BA, BS)</td>
<td>American Chemical Society (ACS)</td>
<td></td>
<td>Periodic Review</td>
<td>Periodic Review</td>
<td>2010</td>
</tr>
</tbody>
</table>

**College of Textiles**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textile Engineering (BS)</td>
<td>Accreditation Board for Engineering and Technology (ABET)</td>
<td>2005</td>
<td>2011</td>
<td>6 years</td>
<td>Continuous Assessment</td>
</tr>
<tr>
<td>Fashion and Textile Management: Fashion Development and Product Management (BS, MS, MR)</td>
<td>American Apparel and Footwear Association</td>
<td>2010</td>
<td>2015</td>
<td>5 years</td>
<td>Continuous Assessment</td>
</tr>
</tbody>
</table>

**Veterinary Medicine**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Veterinary Medicine (DVM)</td>
<td>Council on Education of the American Veterinary Medical Association</td>
<td>2007</td>
<td>2014</td>
<td>Maximum of 7 years</td>
<td>2013</td>
</tr>
</tbody>
</table>

**Athletics**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division I</td>
<td>The National Collegiate Athletic Association</td>
<td>2004</td>
<td>2011-12</td>
<td>10 years</td>
<td>2011</td>
</tr>
</tbody>
</table>

**Division of Undergraduate Academic Programs**

<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG Tutorial Center Program</td>
<td>College Reading and Learning Association (CRLA) CRLA's International Tutor Program Certification</td>
<td>2009</td>
<td>2014</td>
<td>5 years</td>
<td>2013</td>
</tr>
<tr>
<td>Academic Skills Enhancement Program within the Academic Support Program for Student Athletes</td>
<td>International Tutor Program Certification within the College Reading &amp; Learning Association (CRLS)</td>
<td>2009</td>
<td>2014</td>
<td>5 years*</td>
<td>2013</td>
</tr>
</tbody>
</table>

*Currently waiting for CRLS to accept its re-certification for 5 years.
<table>
<thead>
<tr>
<th>Program Name</th>
<th>Accrediting Body</th>
<th>Last Yr Accred</th>
<th>Next Yr Accred</th>
<th>Typical Cycle Length</th>
<th>Yr to Start Next Self-study to Prepare for Accred</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Health &amp; Public Safety</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campus Police</td>
<td>Commission on the Accreditation of Law Enforcement Agencies</td>
<td>2007</td>
<td>2010</td>
<td>3 years</td>
<td>On-going</td>
</tr>
<tr>
<td><strong>McKimmon Center for Extension &amp; Continuing Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Continuing Education and Training</td>
<td>International Association for Continuing Education and Training - Certificate to award Continuing Education Units (CEUs)</td>
<td>2007</td>
<td>2012</td>
<td>5 years</td>
<td>2011</td>
</tr>
<tr>
<td><strong>Student Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student Health Services</td>
<td>Accreditation Association for Ambulatory Health Care (AAAHC)</td>
<td>2007</td>
<td>2010</td>
<td>3 years</td>
<td>On-going</td>
</tr>
<tr>
<td>Student Health Services</td>
<td>Commission on Office Laboratory Assessment (COLA)</td>
<td>2008</td>
<td>2010</td>
<td>2 years</td>
<td>On-going</td>
</tr>
<tr>
<td><strong>College of Veterinary Medicine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veterinary Teaching Hospital</td>
<td>American Animal Hospital Association (AAHA) Performs accreditation inspections</td>
<td>Inspection 2008</td>
<td>Inspection 2011</td>
<td>3 years</td>
<td>N/A</td>
</tr>
<tr>
<td>Lab Animal Facilities</td>
<td>Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) Performs accreditation inspections.</td>
<td>Inspection 2009</td>
<td>Inspection 2012</td>
<td>3 years</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Equal Opportunity and Non-Discrimination Policy

It is the policy of the State of North Carolina to provide equality of opportunity in education and employment for all students and employees. Educational and employment decisions should be based on factors that are germane to academic abilities or job performance. Accordingly, North Carolina State University ("NC State") does not practice or condone unlawful discrimination in any form, as defined by this policy. 1

NC State hereby affirms its desire to maintain a work environment for all employees and an academic environment for all faculty and students that is free from all forms of prohibited discrimination. NC State strives to build and maintain an environment that supports and rewards individuals on the basis of such relevant factors as ability, merit, and performance; the prohibited behaviors of discrimination, harassment and retaliation are incompatible with the values and goals of NC State.

Discrimination, defined as unequal and unlawful treatment based upon race, color, religion, creed, sex2, national origin, age, disability, or veteran’s status, is a violation of this policy and will not be tolerated by NC State. Discrimination based on sexual orientation is also prohibited by this policy3. Harassment is unwelcome conduct based upon race, color, religion, creed, sex, national origin, age, disability, veteran status or sexual orientation that either 1) creates a quid pro quo situation, or 2) creates a hostile working or learning environment. Retaliation is an adverse action against a covered individual because that individual engaged in a protected activity.

NC State will respond promptly to all complaints of discrimination, harassment and retaliation. Violation of this policy can result in serious disciplinary action up to and including expulsion for students or discharge for employees.

Any individual with a concern, grievance or complaint of discrimination, harassment or retaliation should use the procedures outlined in the Resolution Procedures for Discrimination, Harassment and Retaliation Complaints.

For more information, please contact:

The Office for Equal Opportunity
231 Winslow Hall
Box 7530, NC State University
Raleigh, NC 27695-7530
phone: (919) 515-3148
fax: (919) 513-1428
TTY: (919) 515-9617
website: www.ncsu.edu/equal_op

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1. This policy reflects federal and state civil rights such as: Title VII of the Civil Rights Act, Title IX of the Education Amendments, the American with Disabilities Act, and the Age Discrimination in Employment Act, among others.

2. The policy’s prohibition against discrimination on the basis of sex includes actual or perceived gender identity and gender expression.

3. NC State does not allow discrimination nor harassment on the basis of sexual orientation with respect to internal university matters that do not contravene federal or state law and that do not interfere with NC State’s relationship with outside organizations, including the federal government, the military, ROTC, and private employers.
 ADMINISTRATION AND OFFICES

Office of the Chancellor
W. Randolph Woodson, Chancellor
PJ Teal, Assistant to the Chancellor and Secretary of the University
Kevin Howell, Assistant to the Chancellor for External Affairs/Interim Associate Vice Chancellor for Alumni Relations and Executive Director
Frances Milks, Assistant to the Chancellor
Stephanie Parker, Assistant to the Chancellor for Communications

Office of the Provost and Executive Vice Chancellor
Warwick A. Arden, Interim Provost and Executive Vice Chancellor
Betsy E. Brown, Vice Provost for Faculty Affairs
Marcia L. Gumpertz, Interim Vice Provost for Diversity and Inclusion
Joanne G. Woodard, Vice Provost for Equal Opportunity and Equity
John T. Ambrose, Interim Dean of Undergraduate Academic Programs
Susan K. Nutter, Vice Provost and Director, NCSU Libraries
Thomas K. Miller, Vice Provost for Distance Education and Learning Technology Applications
Louis D. Hunt, Jr., Vice Provost for Enrollment Management and Services and University Registrar
Bailian Li, Vice Provost for International Affairs

College of Agriculture and Life Sciences
Johnny C. Wynne, Dean and Executive Director for Agricultural Programs
Kenneth L. Esbenshade, Associate Dean and Director for Academic Programs
Jon F. Ort, Associate Dean, Cooperative Extension Service
W. David Smith, Associate Dean for Research and Director, NC Agricultural Research Service
Sylvia Blankenship, Associate Dean for Administration and Interim Director
Lisa Guion, Assistant Dean for Diversity, Outreach and Engagement
Paul Mueller, Interim Coordinator of International Programs
Barbara M. Kirby, Assistant Director of Academic Programs, Director of Agricultural Institute

College of Design
Marvin J. Malecha, Dean
Hernán Marchant, Associate Dean for Undergraduate Studies and Academic Support
Art Rice, Associate Dean for Graduate Studies, Research and Extension
Marva Motley, Assistant Dean for Student Affairs
Dottie Haynes, Assistant Dean for Budget and Administration
Carla Abramczyk, Assistant Dean for Development and External Relations

College of Education
M. Jayne Fleener, Dean
Gerald Ponder, Associate Dean, Academic Affairs
Samuel S. Snyder, Associate Dean, Research and Administration
Anona Smith Williams, Assistant Dean, Student Services

College of Engineering
Louis Martin-Vega, Dean
Richard F. Keltie, Associate Dean, Research and Graduate Programs
Jerome P. Lavelle, Associate Dean, Academic Affairs
Thomas K. Miller, Associate Dean, Distance Education and Information Technology
Christine Grant, Associate Dean, Faculty Development and Special Initiatives
Tony L. Mitchell, Assistant Dean, Engineering Student Services
David W. Parish, Interim Assistant Dean, Academic Affairs

College of Humanities and Social Sciences
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Edward T. Funkhouser, Associate Dean for Academic Affairs
Vicki Gallagher, Associate Dean for Graduate Studies
Mary Wyer, Interim Associate Dean for Research
Karen Young, Interim Assistant Dean and Undergraduate Programs
Mary Wyer, Assistant Dean, Interdisciplinary Studies
Traciel Reid, Director of Diversity
Heidi Hobbs, Director, International Programs
Dara Leeder, Director of Student Recruitment and Retention

**College of Management**
Ira R. Weiss, Dean
K. Shannon Davis, Associate Dean, Undergraduate Programs
Steve Allen, Associate Dean, Graduate Programs and Research
Mitzi Monroya, Assistant Dean, Research

**College of Natural Resources**
Robert D. Brown, Dean
Adrianna G. Kirkman, Associate Dean, Academic Affairs
Dan Robison, Associate Dean, Research
Don E. Patty, Assistant Dean, Finance and Business

**College of Physical and Mathematical Sciences**
Daniel L. Solomon, Dean
Raymond E. Fornes, Associate Dean, Research
Jo-Ann D. Cohen, Associate Dean, Academic Affairs
Christopher R. Gould, Associate Dean, Administration
Jamila S. Simpson, Director of Multicultural Affairs and Student Services
Michael C. Smith, Director of Enrollment

**College of Textiles**
A. Blanton Godfrey, Dean
Harold S. Freeman, Associate Dean for Research
Behnam Pourdeyhimi, Associate Dean for Industry Research and Extension
William Oxenham, Associate Dean for Academic Programs

**College of Veterinary Medicine**
David G. Bristol, Interim Dean
Keven Flammer, Acting Associate Dean and Director, Academic Affairs
David C. Dorman, Associate Dean and Director, Graduate Studies and Research
Michael G. Davidson, Associate Dean and Director, Veterinary Medical Services
Jeffrey Huckel, Director of Student Services

**Distance Education and Learning Technology Applications (DELTA)**
Thomas K. Miller, Vice Provost for DELTA
Lou Harrison, Associate Vice Provost, Educational Technology Services
Donna Petherbridge, Associate Vice Provost, Instructional Support Services
Christine Hare, Assistant Vice Provost for Finance & Business
Rebecca Swanson, Associate Vice Provost for Distance Education
Kay Zimmerman, Associate Vice Provost for Marketing & Partnership Development

**Diversity and Inclusion**
José A. Picart, Vice Provost for Diversity and Inclusion
Keith Powell, Interim Director and Associate Director

**African American Cultural Center**
   Keith Powell, Associate Director

**Student Diversity**
   Jo-Ann Robinson, Assistant Vice Provost

**Faculty and Staff Diversity**
   Marcia Gumpertz, Assistant Vice Provost
Division of Enrollment Management and Services

Registration and Records
Louis D. Hunt, Jr., Vice Provost for Enrollment Mgmt and Services; and University Registrar

Scholarships and Financial Aid
Julia R. Mallette, Associate Vice Provost for Enrollment Mgmt and Services; and Director of Scholarships and Financial Aid

Summer Sessions and Visitation Programs
Cindy DeLuca, Assistant Vice Provost for Enrollment Mgmt and Services

Recruitment, Retention & Student Success
Monica Terrell Leach, Assistant Vice Provost for Enrollment Mgmt and Services; Assistant Professor of Social Work

Undergraduate Admissions
Thomas H. Griffin, Director of Undergraduate Admissions

Division of Student Affairs

Thomas H. Stafford Jr., Vice Chancellor
Jerry W. Barker, Associate Vice Chancellor
Tim R. Luckadoo, Associate Vice Chancellor
N. Alexander Miller III, Associate Vice Chancellor
Evelyn Q. Reiman, Associate Vice Chancellor
Lisa P. Zapata, Associate Vice Chancellor

Arts Development
Amy B. FitzGerald, Director

Budgets and Finance
Sandy Jones, Director

Campus Activities
Deb Luckadoo, Director

Campus Recreation
Chris Morris, Director

Carmichael Facilities and Operations
Matt Miller, Director

Center for Student Leadership, Ethics and Public Service
Michael Giancola, Director

Center Stage/Arts Outreach
Sharon Moore, Director

Chaplains’ Cooperative Ministry
Ann Pearce, Director

Counseling Center
M. Lee Salter, Director

Crafts Center
George Thomas, Interim Director

Dance Program
Robin Harris, Director

Educational Talent Search
Marsha Boyd Pharr, Director

Gregg Museum of Art & Design
Roger Manley, Director

Gay, Lesbian, Bisexual, Transgender Center
Justine Hollingshead, Director

Greek Life
John Mountz, Director

Multicultural Student Affairs
Tracey Ray, Director

Music Department
J. Mark Scearce, Director

National Student Exchange Program
Sean Cassidy, Associate Director

Parents and Families Services
Jennifer Bell, Associate Director

Physical Education
Tom Roberts, Department Head

Planning, Assessment, Research and Retention
Carrie Zelna, Director

ROTC Units
Air Force: Chris Froeschner, Commander
Army: Kenneth Ratashak, Commander
Navy & Marine Corps: Stephen Matts, Commander

Student Conduct
Paul Cousins, Director
Student Government
  Eileen Marin Coombes, Assistant Director

Student Legal Services
  Pam Gerace, Director/Attorney

Student Health Services
  Jerry Barker, Director
  Marianne Turnbull, Director, Health Promotion

Student Media
  Bradley Wilson, Coordinator

Technology Services
  Leslie Dare, Director

University Career Center
  Carol Schroeder, Director

University Housing
  Susan Grant, Director

University Scholars Program
  N. Alexander Miller III, Associate Vice Chancellor

University Student Centers Business and Planning
  Holly Durham, Director

University Theatre
  John McIlwee, Director

Upward Bound
  Marsha Boyd Pharr, Director

Women’s Center
  Shannon Johnson, Director

Division of Undergraduate Academic Programs

Academic Support Program for Student Athletes
  Philip Moses, Executive Director
  Carrie Leger, Director

Cooperative Education
  Arnold Bell, Executive Director

First Year College
  Carrie McLean, Director

First Year Inquiry
  Richard Slatta, Interim Director

New Student Orientation Program
  Gabe Wical, Director

Office of Advising Support, Information, and Services
  Roxanna McGraw, Director

Office of Assessment
  Allen Dupont, Director

Office of Short-Term Experiential Partnership
  Kelly Laraway, Director

Transition Program
  Frankye Artis, Director

Undergraduate Course and Curricula
  Catherine Freeman, Coordinator

Undergraduate Tutorial Center
  Barbie Windom, Director

Undergraduate Research
  George T. Bartholomus, Director

University Honors Program
  Richard L. Blanton, Director

Equal Opportunity and Equity
  Joanne Woodard, Vice Provost for Equal Opportunity and Equity

Harassment Prevention & Equity Programs
  Amy Circosta, Assistant Vice Provost

Employment Programs
  Carson Cook, Assistant Vice Provost
Disability Services
   Cheryl Branker, Associate Vice Provost and Director, Disability Services Office

Outreach and Education
   Beverly Williams, Coordinator

The Graduate School
   Duane K. Larick, Dean
   Rebeca C. Rufty, Associate Dean
   Michael Carter, Associate Dean
   Lis Borbye, Assistant Dean
   David Shafer, Assistant Dean
   Rick Liston, Assistant Dean
   George Hodge, Interim Assistant Dean
   Daniel Willits, Interim Assistant Dean

Intercollegiate Athletics
   Lee G. Fowler, Director

International Affairs
   Bailian Li, Vice Provost for International Affairs
   Ingrid R. Schmidt, Associate Vice Provost for International Affairs
   Michael J. Bustle, Associate Vice Provost for International Affairs
   Susan Herrera, Associate Vice Provost for International Affairs

Office of International Services
   NC Global Training Initiative
      Michael J. Bustle, Director
   Study Abroad Office
      Ingrid R. Schmidt, Director
   North Carolina Japan Center
      John Baugh, Director
   Confucius Institute at NC State University
      Anna Lamm, Deputy Director

Legal Affairs
   Eileen s. Goldgeier, Vice Chancellor and General Counsel

McKimmon Center for Extension and Continuing Education
   Alice Warren, Assistant Vice Chancellor for Extension, Engagement, and Economic Development

The Collaborative at Gateway Technology Center
   Marilynn Anselmi, Director

Center for Urban Affairs and Community Services
   Yevonne Brannon, Executive Director

Continuing and Professional Education
   Judson Hair, Executive Director

Encore Program for Lifelong Enrichment
   Tricia Inlow-Hatcher, Director

Upper Coastal Plain Learning Council
   Kathy Lawson, Student Success Outreach Specialist
   Karen Roddy, Teacher Outreach Specialist

The NCSU Libraries
   Susan K. Nutter, Vice Provost and Director of Libraries

Office of Finance and Business
   Charles D. Leffler, Vice Chancellor for Finance and Business
   Barbara Carroll, Associate Vice Chancellor for Human Resources
   Michael Harwood, Interim Associate Vice Chancellor for Centennial Campus Development
   Kathryn S. Hart, Associate Vice Chancellor for Finance and Business and University Treasurer
   Steve Keto, Associate Vice Chancellor for Resource Management
   Kevin MacNaughton, Associate Vice Chancellor for Facilities
   Ernest Murphrey, Associate Vice Chancellor for Financial Services
David Rainer, *Associate Vice Chancellor for Environmental Health and Public Safety*

Dan Adams, *Associate Vice Chancellor for Campus Enterprises*

**Benefits**

Yvette McMillan, *Director*

**Bookstores**
Richard A. Hayes, *Director*

**Budget Office**
Barbara Moses, *Director*

**Campus Police**
Tom Younce, *Director/Chief*

**Capital Project Management**
Carole Aquesta, *Director*

**Cashier and Student Accounts Office**
Bruce Forinash, *Director*

**Classification and Compensation**
Deborah Wright, *Director*

**Contracts and Grants**
Julie Brasfield, *Director*

**Design and Construction Services**
Andy Sneed, *Director*

**Employee Relations**
Marc Okner, *Director*

**Employment Services**
Kathy Lambert, *Director*

**Environmental Health and Public Safety**
David Rainer, *Associate Vice Chancellor*

**Facilities Operations**
Jack Colby, *Assistant Vice Chancellor*

**Foundations Accounting and Investments**
Jill Tasaico, *Director*

**HR Information Management**
Brian Simet, *Director*

**Insurance and Risk Management**
Jim Semple, *Director*

**Materials Support**
Jim Hansen, *Assistant Director*

**Purchasing**
Robert Wood, *Director*

**Real Estate**
Ralph Recchie, *Director*

**Strategic Debt Management**
Lori Johnson, *Director*

**Transportation**
Tom Kendig, *Director*

**Training and Org. Development**
Kevin Rice, *Director*

**University Accounting Office**
Cliff Flood, *Controller*

**University Architect**
Lisa Johnson, *Interim*

**University Dining**
Randy Lait, *Director*

**University Payroll Office**
Franki Senter, *Director*

---

**Office of Information Technology**

Marc I. Hoit, *Vice Chancellor for Information Technology and Chief Information Officer*

**Advanced Computing**
Eric Sills, *Director*

**Communication Technologies**
Greg Sparks, *Director*

**Enterprise Application Services**
Gwen Hazelhurst, *Director*

**Infrastructure, Systems & Operations**
John Black, *Director*

**Outreach, Communications & Consulting**
Stan North Martin, *Director*
North Carolina State University

Security and Compliance
   Mardecia Bell, Director
Technology Support Services
   Susan Klein, Director

Office of Research and Graduate Studies
   Terri L. Lomax, Vice Chancellor
   Lisa Currin, Director, Communications
   Steven Lommel, Assistant Vice Chancellor for Research Development - Kannapolis
   Matt Peterson, Director, Federal Research Affairs

Centennial Campus Partnerships
   Dennis Kekas, Associate Vice Chancellor for Centennial Campus Partnerships

Graduate School
   Duane Larick, Dean of the Graduate School and Associate Vice Chancellor for Research

Office of Technology Transfer
   Billy Houghteling, Director, Office of Technology Transfer

Research and Development
   Chris Brown, Associate Vice Chancellor for Research Development

Sponsored Programs and Regulatory Compliance Services
   Matthew Ronning, Associate Vice Chancellor for Research Administration

University Advancement
   Nevin E. Kessler, Vice Chancellor
   John H. Taylor, Associate Vice Chancellor for Advancement Services
   Kevin Howell, Interim Associate Vice Chancellor for Alumni Relations
   Joe Hice, Associate Vice Chancellor for University Communications
   Ken Sigmon, Associate Vice Chancellor for University Development

University Planning and Analysis
   Karen P. Helm, Director
### ACADEMIC CALENDAR

#### 2010 Fall Semester

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Day</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>18</td>
<td>Wednesday</td>
<td>First day of classes</td>
</tr>
<tr>
<td>September</td>
<td>6</td>
<td>Monday</td>
<td>Holiday (Labor Day); university closed</td>
</tr>
<tr>
<td>October</td>
<td>7 - 8</td>
<td>Thur - Fri</td>
<td>Fall break; no classes</td>
</tr>
<tr>
<td>November</td>
<td>24 - 26</td>
<td>Wed - Fri</td>
<td>Thanksgiving vacation; no classes</td>
</tr>
<tr>
<td>November</td>
<td>27 - 28</td>
<td>Thur - Fri</td>
<td>Thanksgiving holiday; university closed</td>
</tr>
<tr>
<td>December</td>
<td>3</td>
<td>Friday</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>December</td>
<td>6 - 7</td>
<td>Mon - Tues</td>
<td>Reading Days</td>
</tr>
<tr>
<td>December</td>
<td>8 - 16</td>
<td>Wed - Thurs</td>
<td>Final examinations</td>
</tr>
<tr>
<td>December</td>
<td>18</td>
<td>Saturday</td>
<td>Fall graduation exercises</td>
</tr>
<tr>
<td>December</td>
<td>24 - 31</td>
<td>Fri - Fri</td>
<td>Winter holiday; university closed</td>
</tr>
</tbody>
</table>

#### 2011 Spring Semester

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Day</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>10</td>
<td>Monday</td>
<td>First day of classes</td>
</tr>
<tr>
<td>January</td>
<td>17</td>
<td>Monday</td>
<td>Holiday (Martin Luther King, Jr. Day); university closed</td>
</tr>
<tr>
<td>March</td>
<td>7- 11</td>
<td>Mon - Fri</td>
<td>Spring break; no classes</td>
</tr>
<tr>
<td>April</td>
<td>21 - 22</td>
<td>Thurs - Fri</td>
<td>Spring holiday; no classes</td>
</tr>
<tr>
<td>April</td>
<td>29</td>
<td>Friday</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>May</td>
<td>2 - 3</td>
<td>Mon - Tues</td>
<td>Reading Days</td>
</tr>
<tr>
<td>May</td>
<td>4- 12</td>
<td>Wed - Thurs</td>
<td>Final examinations</td>
</tr>
<tr>
<td>May</td>
<td>14</td>
<td>Saturday</td>
<td>Spring commencement</td>
</tr>
</tbody>
</table>

#### 2011 First Summer Session

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Day</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>May</td>
<td>23</td>
<td>Monday</td>
<td>First day of classes</td>
</tr>
<tr>
<td>May</td>
<td>30</td>
<td>Monday</td>
<td>Holiday (Memorial Day); university closed</td>
</tr>
<tr>
<td>June</td>
<td>24</td>
<td>Friday</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>June</td>
<td>27 - 28</td>
<td>Mon - Tues</td>
<td>Final examinations</td>
</tr>
</tbody>
</table>

#### 2011 Second Summer Session

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Day</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>June</td>
<td>30</td>
<td>Thursday</td>
<td>First day of classes</td>
</tr>
<tr>
<td>July</td>
<td>4</td>
<td>Monday</td>
<td>Holiday (Independence Day); university closed</td>
</tr>
<tr>
<td>August</td>
<td>3</td>
<td>Friday</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>August</td>
<td>4 - 5</td>
<td>Thurs - Fri</td>
<td>Final examinations</td>
</tr>
</tbody>
</table>

#### 2011 Fall Semester

<table>
<thead>
<tr>
<th>Month</th>
<th>Date</th>
<th>Day</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>August</td>
<td>17</td>
<td>Wednesday</td>
<td>First day of classes</td>
</tr>
<tr>
<td>September</td>
<td>5</td>
<td>Monday</td>
<td>Holiday (Labor Day); university closed</td>
</tr>
<tr>
<td>October</td>
<td>6 - 7</td>
<td>Thur - Fri</td>
<td>Fall break</td>
</tr>
<tr>
<td>November</td>
<td>23 - 25</td>
<td>Wed - Fri</td>
<td>Thanksgiving vacation; no classes</td>
</tr>
<tr>
<td>November</td>
<td>24 - 25</td>
<td>Thur - Fri</td>
<td>Thanksgiving holiday; university closed</td>
</tr>
<tr>
<td>December</td>
<td>2</td>
<td>Friday</td>
<td>Last day of classes</td>
</tr>
<tr>
<td>December</td>
<td>5 - 6</td>
<td>Mon - Tues</td>
<td>Reading Days</td>
</tr>
<tr>
<td>December</td>
<td>7 - 15</td>
<td>Wed - Thurs</td>
<td>Final examinations</td>
</tr>
<tr>
<td>December</td>
<td>17</td>
<td>Saturday</td>
<td>Fall graduation exercises</td>
</tr>
<tr>
<td>December</td>
<td>26 - 30</td>
<td>Mon - Fri</td>
<td>Winter holiday; university closed</td>
</tr>
</tbody>
</table>

**Note:** Dates in this publication are those that have been approved by appropriate agencies of the university at the time of printing (May 2010). Changes may be announced in official university publications subsequent to this printing and maintained online.
ACADEMIC DEGREES AND PROGRAMS

Undergraduate Degrees

College of Agriculture and Life Sciences
agricultural business management; agricultural and environmental technology; agricultural and extension education; agronomy;
animal science; applied sociology; molecular and structural biochemistry; biological engineering; biological sciences; biomedical
engineering; criminology; environmental sciences; food, bioprocessing and nutrition sciences; horticultural science; microbiology;
natural resources; plant biology; poultry science; turfgrass science; zoology; Preprofessional Programs - pre-dental, pre-medical, pre-
optometry and pre-veterinary

College of Design
architecture (fifth year program); environmental design in architecture; art and design; design studies; graphic design; industrial
design; landscape architecture

College of Education
business and marketing education; elementary education; mathematics education; middle grades education with concentrations in
language arts and social studies or mathematics and science; science education; technology education

College of Engineering
aerospace engineering; biological engineering; biomedical engineering; chemical and biomolecular engineering; civil engineering;
computer engineering; computer science; construction engineering and management; electrical engineering; engineering-
mechatronics; environmental engineering; industrial engineering; industrial engineering furniture manufacturing; materials science
and engineering; mechanical engineering; nuclear engineering; paper science and engineering; textile engineering

College of Humanities and Social Sciences
Africana studies; anthropology; arts applications; communication; criminology; English; English education option; French; French
education option; history; interdisciplinary studies; international studies; philosophy; political science; psychology; religious studies;
science, technology and society; social studies education options; social work; sociology; Spanish; Spanish education option;
women’s and gender studies

College of Management
accounting; business administration; economics

College of Natural Resources
environmental science hydrology; environmental technology; fisheries and wildlife; forest management; natural resources; parks,
recreation, and tourism management; professional golf management; paper science and engineering; sport management; wood
products

College of Physical and Mathematical Sciences
chemistry; environmental sciences; geology; marine sciences; mathematics; meteorology; natural resources; physics; statistics

College of Textiles
polymer and color chemistry; textile engineering; fashion and textile management; textile technology

Pre-professional Programs

Pre-Law Services
Office of Advising Support, Information and Services
Law schools neither prescribe nor recommend a particular undergraduate curriculum for prospective candidates. A student may
prepare for law school within any of the majors offered by the nine undergraduate colleges. The University Coordinator of Pre-Law
Services, in conjunction with the student’s academic adviser, assists any student with an interest in attending law school and provides
information and planning strategies to prepare for this process. This can include: what needs to be considered in the academic record;
the selection of appropriate electives and concentrations; law schools to consider; as well as, where to look for financial information.
The Coordinator also works with the Pre-Law Students Association (PLSA), which is open to all interested students. During the year
the PLSA provides programs that have included: NC State Law School Fair, local attorneys, panel of Law School students, Law
School Directors of Admission, information on the admissions process. At this time, the Pre-Law Advising Program is
administratively housed in the Office of Advising Support, Information and Services within the Division of Undergraduate Academic
Programs. For further information, contact the University Pre-law Coordinator Mary A. Tetro, 211P Park Shops, (919) 513-0912.
You may also visit the website: www.ncsu.edu/prelaw.

Pre-Professional Healthcare Programs and Advising: Pre-Med, Pre-Dent, and Pre-Opt, Pre-Pharm, Pre-PT/OT, Pre-PA, etc.
Many NC State undergraduate students are planning a career in the health professions and will apply to dental, medical, optometry or
other health care graduate schools prior to graduation. NC State provides a variety of services to help students explore the health
professions as a possible career and to enhance a student’s competitiveness for admission into a health professions school. These
services include the CALS Health Professions Advising Center or Health PAC (see the information below and website link). The
center assists with the healthcare career planning and advising, mentoring, letters of evaluation, internship and clinical opportunities,
as well as numerous programs and resources to help students achieve their educational and career goals in human healthcare. In
addition to the above services, the center also assists in the actual application process including personal statement development, interview preparation and more, all targeted at developing the most competitive, well rounded applicants.

Health professional schools do not require students to obtain a designated “pre-health” degree. Instead, they seek students who have demonstrated academic success and who also have excelled in other areas including clinical and service experience as well as social development. Like most schools, NC State does not offer a dedicated “pre-health” curriculum. Instead we recommend that students interested in health professions select the academic major that is of greatest interest to them while ensuring that they select courses that provide a strong foundation in the natural sciences required by most professional programs for admission. These include biology, chemistry, physics, and calculus. It is also recommended that students select courses that improve communication and writing skills as well as provide a strong foundation in the humanities. Students interested in a program that focuses on Human Biology should visit the following link on the Biological Sciences website: http://harvest.cals.ncsu.edu/biology/index.cfm?pageID=1190.

For further information on Health PAC, contact Anita Flick, MD at health_pac@ncsu.edu or visit the Health PAC website at www.cals.ncsu.edu/health_pac.

The Health Professions Advising Center and the Health Professions Review Committee
In addition to a student’s departmental academic adviser who will assist in selecting courses and program options, the College of Agriculture and Life Sciences also provides a Health Professions Advising Center to further assist students interested in health careers. Housed in 2720 Bostian Hall and administered by the Department of Biology, this center is dedicated to mentoring students throughout their college career, helping them to prepare their application for post-graduate studies. The Center assists pre-health students by answering questions and helping them explore health career options, locate and obtain clinical and service experience, and develop future career skills (such as technical writing, research review, etc.). The Center also helps students compile an Achievement Portfolio which provides an accounting of their academic, clinical, service/community, and social achievements for incorporation into their application to their selected health programs and for the subsequent interview process.

Once students are ready to submit applications for a medical, dental or optometry program, the Center is available to assist in this process as well. The NC State Health Professions Review Committee is available to students to review their applications and prepare a university committee recommendation, which is submitted to each of their selected schools. The composite includes not only each student’s individual letters of recommendation but also a university recommendation of the applicant along with a detailed letter from the Review Committee Chair, on behalf of the university highlighting each student’s strengths and accomplishments. Many professional programs rely heavily on these university recommendations as component of their application screening process.

For more information on the Health Professions Advising Center and Review Committee, please contact Anita Flick, MD at health_pac@ncsu.edu or visit the website at www.cals.ncsu.edu/health_pac.

Pre-Veterinary Program
This area of study is a non-degree option offered by the College of Agriculture and Life Sciences. This option is available to students majoring in animal science, poultry science, zoology, or biological sciences as well as in many other science curricula, such as biochemistry or chemistry. If a student is accepted to veterinary medical school before completion of their undergraduate degree, some course credits may be transferable from the veterinary program toward completion of the Bachelor of Science degree. Arrangements for this procedure should be made with the degree granting school or department prior to entering veterinary college. For further information, contact the Academic Programs Office of the College of Agriculture and Life Sciences, (919) 515-2614, or the Admissions Office for Veterinary Students of the College of Veterinary Medicine, (919) 513-6205, for general information concerning admission to the Doctor of Veterinary Medicine program at NC State.

Undergraduate Minors
Some departments at NC State offer undergraduate minors for students wishing a systematic program of study in an area outside their major. All minors require at least 15 credit hours and may be either departmental or interdepartmental. Courses within the minor program may be used to satisfy any of the general requirements, including free electives, of a major curriculum. Minors are completely optional, the only requirement being that a student may not minor in the same discipline as their major. Students pursuing a minor must consult with a minor adviser on a plan of work and must file a copy of this plan with their major adviser at least one semester before graduation. Satisfactory completion of the minor will be noted on the final transcript following graduation. For an up-to-date listing of minors available at NC State, please see the following website: www.ncsu.edu/advising_central/minors.html.
North Carolina State University

Agricultural Institute
Admission to this two-year program requires the completion of a North Carolina State University Undergraduate Admissions application, a high school diploma or equivalent, a minimum high school grade point average of 2.0, and one letter of recommendation from a responsible citizen, not a relative, attesting to the prospective student’s integrity and character. An Associate of Applied Science degree is awarded. Fields of study are:

<table>
<thead>
<tr>
<th>Field 1</th>
<th>Field 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture Management</td>
<td>Livestock and Poultry Management</td>
</tr>
<tr>
<td>Agribusiness Management (Horticulture Concentration)</td>
<td>Ornamentals and Landscape Technology</td>
</tr>
<tr>
<td>Field Crops Technology</td>
<td>Pest Management Technology (Agricultural and Urban Concentrations)</td>
</tr>
<tr>
<td>General Agriculture</td>
<td>Turfgrass Management</td>
</tr>
</tbody>
</table>

Arts Studies
NC State offers a rich variety of courses in the history, analysis, and production of the arts - dance, film, music, theatre, and visual arts. Many of these courses are open to students without prerequisite, and are offered by 13 departments in four different colleges of the university.

In addition to these courses, most of which focus on a single art form, the Arts Studies Program offers courses which deal with several arts media or with the arts in connection with science and technology; these courses are listed in the back of this catalog and the schedule of courses each semester under the ARS prefix.

For students who want to concentrate in Arts Studies, a major in Arts Applications is available. It is administered by the Arts Studies Program in the College of Humanities and Social Sciences. In addition, there are minors in Arts Studies, Music, Theatre, Design and Film Studies.

Opportunities for students to participate in arts activities offered by ARTS NC STATE include many instrumental and choral semester student productions in University Theatre, craft instruction in the Craft Center, courses and concerts by the Dance Program, and the exhibitions. For these activities, many of which are integrated with academic courses, see Student Activities in this section of the catalog.
The Arts Studies Program together with the Music Department sponsors the Arts Now Series. The Series includes performances of and lectures about contemporary performance works that include music. Guest performers, composers, dancers, and video artists appearing in the series range from regionally based artists to international guests from Europe and South America.

Graduate Degrees

For information about graduate programs at NC State, including admissions information, deadlines, international applications, financial support, and a list of graduate programs and their requirements, consult the NC State Graduate School website at www.ncsu.edu/grad/future-students. Also, please refer to the Graduate Catalog at www.ncsu.edu/grad/catalog

ADMISSION

The “Early Action” freshman application deadline is November 1. “Early Action” applicants will receive a response by January 31 but still have until May 1 to confirm enrollment plans. The freshman application priority deadline for the fall semester and summer sessions is February 1; the transfer student priority deadline is April 1. Freshmen are strongly encouraged to apply during the fall of the senior year in high school. Applications for the spring semester should be submitted prior to November 1. All applicants for the College of Design must submit complete applications by November 1. The College of Design does not admit students in the spring. We highly recommend that prospective students apply online: admissions.ncsu.edu. A hardcopy application may be obtained by writing to:

Director of Undergraduate Admissions
Box 7103 North Carolina State University
Raleigh, North Carolina 27695-7103

Freshman Admission

Admission to the university is highly competitive, and it is possible to be admitted to some programs but not all programs at NC State. Applicants are asked to indicate their first and second choices for a curriculum, including undeclared majors within a college, or, if undecided, to indicate their choice of participating in the First Year College. Applicants not admitted in their first curriculum choice will be reviewed for admission in their second curriculum choice. Transfer between programs after a successful first year may be possible. The admissions decision is based on a holistic review of the complete application. Of primary importance is the high school record, including the level and difficulty of the courses taken, the overall grade point average, rank in class, and scores on the SAT or the ACT. Extracurricular involvement, leadership, and many other factors are also considered.

In addition, the Board of Governors of the University of North Carolina System has determined that the minimum undergraduate course requirements for all constituent institutions, including NC State, shall include a high school diploma or its equivalent and the following course units taken in high school:

1. Six course units in language, including
   • Four units in English
   • Two units in a language other than English
2. Four course units of mathematics in any of the following combinations:
   • Algebra I and II, Geometry, and one unit beyond Algebra II,
   • Algebra I and II, and two units beyond Algebra II or
   • Integrated Math I, II, III and one unit beyond Integrated Math III
3. Three course units in science, including
   • At least one unit in a life or biological science, and
   • At least one unit in physical science, and
   • At least one laboratory course
4. Two course units in social studies, including
   • One unit in U.S. history
   • One other unit in social studies

It is recommended that every student take a foreign language course and a mathematics course in the senior year. These are minimum course requirements. Competitive applicants will typically exceed these minimum courses.

An interview is not required and does not weigh in the admissions decision; a prospective student is always welcome to visit the Undergraduate Admissions Office. Freshmen information sessions are held Monday through Friday. Campus tours led by students are also available Monday through Friday. Prospective students should register for the information session and tour online: admissions.ncsu.edu.

Two-Year Agricultural Institute

Requirements for admission to the Agricultural Institute, a two-year terminal program, include graduation from high school with a 2.0 minimum grade point average or successful completion of the high school equivalency examination administered by the State Department of Public Instruction, and one letter of recommendation. SAT scores are not required. Course work is not transferable to the four-year degree programs. Completion of course work in the Agricultural Institute leads to an Associate of Applied Science (A.A.S.) degree. (See College of Agriculture and Life Science).
North Carolina State University

Standardized Test Scores
Applicants for admission as freshmen must submit scores from the SAT or the ACT Assessment. The ACT Assessment must include the Writing Test. Applicants are accepted on either junior or senior test scores, although senior scores are recommended. Applicants’ scores must be sent directly from the testing service to NC State. (SAT Code #5496, ACT code #3164) Prospective students may find more information and applications for the tests online: www.collegeboard.com or www.act.org. Hardcopy application forms may be obtained from school counselors or by writing directly to the testing services:

SAT address: The College Board AP
Box 592
Princeton, New Jersey 08541

ACT address: ACT Registration
P.O. Box 414
Iowa City, Iowa 52243-0451

SAT Subject Tests
Although not required for admission, freshman students should present SAT Mathematics Subject Test scores to ensure proper math placement at NC State. Students should take the Mathematics Level 2 test.

Advanced Placement (AP)/International Baccalaureate (IB)
A student may qualify for advanced placement by one or more of the following means: (1) by passing a proficiency examination administered by a teaching department at NC State; (2) by meeting a specific minimum score on certain of the Advance Placement Program (AP) or International Baccalaureate (IB) examinations; and (4) by attaining a minimum score on certain of the College Level Examination Program (CLEP) subject tests. For advanced placement policies, visit admissions.ncsu.edu/placemen.htm.

Out-of-State Students
Undergraduate applicants from outside North Carolina may be required to meet more competitive standards for admission than North Carolina residents. NC State is limited to enrolling not more than 18 percent of total new undergraduate students from outside the state.

Transfer Students
NC State welcomes transfer applicants, and in recent years, more than 25 percent of our graduates started their college programs at other institutions. A transfer student should present at least 30 semester hours (or 45 quarter hours) of "C" or better college level work, including an English class and a college level math class applicable to the degree program. Additional specific course work is required for most programs. Transfer admission is highly competitive, and the grade point average required for consideration varies depending on the requested program of study. Transfer students must be eligible to return to the last institution previously attended and must submit individual transcripts from each institution.

Students who graduated from high school since 1990 must submit a high school record to verify that they have met minimum admissions requirements for course work as outlined in the Freshman Admissions section of this catalog. Exceptions to this requirement are students who will have earned an A.A., A.S., or A.F.A. degree before enrolling at NC State. Individuals who do not have the minimum admissions requirements at the high school level must complete at the college level six semester hours or nine quarter hours each of English, foreign language, mathematics, science, and social science to be eligible to transfer.

Previous college transcripts are evaluated for credit that is transferable to the university as part of the admission application review. A grade of "C" or better is required before a course may be considered for credit. The college to which the application is made will determine the exact amount of credit applicable toward a degree at NC State.

International Students
NC State welcomes international student applications and has a long history of enrolling outstanding international students. Applicants who are not citizens of the U.S. must apply online: admissions.ncsu.edu. International applicants must demonstrate evidence of English language proficiency, adequate financial resources and academic credentials before a visa certificate can be issued.

TOEFL
Applicants whose native language is other than English must submit TOEFL (Test of English as a Foreign Language) scores as evidence of their ability to use English at a level of competence necessary for university course work. A minimum score of 79 is required on the internet based TOEFL exam (213 is required for the computer-based TOEFL exam.) Applicants may also submit certain other English assessment scores (e.g. IELTS, ELPT, APIEL, etc.) in lieu of the TOEFL (see the Admissions website for more information). Some departments may have higher score requirements. (See www.ets.org for information on test dates and localities.)

Financial and Immigration Information
All accepted applicants will receive a letter of provisional acceptance and a Certificate of Financial Responsibility (CFR). In addition, accepted applicants who are already in the U.S. will also receive a Visa Clearance Form (VCF). Those applicants seeking an F-1 or J-1 student visa (or transfer) must complete the CFR. The purpose of this form is to certify financial solvency for the student throughout his/her program of study - this is a federal requirement that must be met before we can issue any visa certificates.

International applicants already in the U.S. will indicate their current nonimmigrant or immigrant status on the VCF. This includes those individuals who are Permanent Residents of the U.S. (Once the university receives proof of the permanent residency, Permanent Residents will no longer be considered international students.) International applicants who are already in the United States in a nonimmigrant visa category other than F-1 or J-1 (ex: H-4, F-2, J-2, E-2, etc.) must submit a VCR, but are not required to complete and return the CFR, unless they plan to change to F-1 or J-1 student status (if eligible). Applicants currently in the U.S. in
another nonimmigrant status who wish to change to F-1 or J-1 status will need to consult with an adviser in the university’s Office of International Services (OIS) to discuss change of status options and procedures. Please do not send financial statements or immigration documents to the Admissions Office or OIS before they are requested. Please consult the Admissions website for the published deadlines by which all CFR and VCF forms must be submitted. Both the CFR and the VCF (as well as supporting documentation like bank statements or photocopies of immigration documents) must be sent directly to the Admissions office – not OIS. International applicants who cannot submit the CFR and VCF by the deadline or who are not able to obtain a visa and enter before the academic term begins may have to defer to a later term.

The Admissions office will review the CFR and, if appropriate, the VCF, upon receipt. If the information provided by the applicant is incomplete or not duly supported by current and acceptable documentation (e.g. sponsor and bank official signatures, bank statements, etc.), the applicant will be notified that his/her documents were not approved and why. Initial notification is done via e-mail, then regular airmail if necessary. The applicant will then have an opportunity to correct the problem(s) and resubmit the form(s). Applicants can check the status of their applications directly with the Admissions Office. An Admissions officer (OIS staff member will prepare the appropriate Certificate of Eligibility (Form I-20 for an F-1 visa or Form DS-2019 for a J-1 visa) and mail it to the applicant, along with the full Admission Letter, and other important pre-arrival information. The applicant at this point is considered fully admitted to the university. New international students must check-in with OIS upon arrival to campus and attend the New International Student Orientation, which is scheduled a few days before the semester begins.

New international students who are accepted to NC State have the opportunity to participate in a summer Start program during the month of July before fall classes begin. This cohort program is limited in number and is designed to assist new international students improve their English fluency, academic preparedness, and settling in before the busy fall term. Summer Start students enroll in FLE 201 and GTI 401 and will receive six credit hours. Summer Start students live in the same dorm, have access to all campus programs and services, and have special workshops and activities designed just for them. For more information, contact the Summer Sessions website at www.ncsu.edu/summer/bridge/international.html or the Admissions office, OIS, or the Global Training Initiative (GTI).

For more information regarding the issuance of visa certificates or obtaining a visa, changing nonimmigrant status, transfer for international students, SEVIS, etc., please contact OIS, e-mail: ois@ncsu.edu; phone: (919) 515-2961; website: www.ncsu.edu/ois; 320 Daniels Hall, 101 Lampe Drive, Campus Box 7222, Raleigh, NC 27695-7222.

Unclassified Students

Unclassified students are those working for credit within a college but not enrolled in a degree-granting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirement to continue. If, at a later date, unclassified students wish to change to regular status, their credits will be evaluated in terms of the requirements of their intended curriculum.

Non-Degree Students

The Non-Degree Studies program is designed for individuals who have not been formally admitted into a degree program at the university but who wish to enroll in courses offered by the university. Non-degree students are limited to a maximum course load of two courses plus one physical education course each semester or summer session.

Those interested in the Non-Degree Studies program should apply online at www.ncsu.edu/nds. If non-degree students wish to become undergraduate degree candidates, they must apply online through the Office of Undergraduate Admissions at admissions.ncsu.edu. Students are encouraged to make an appointment with that office to discuss entrance requirements. These students may use undergraduate courses to fulfill transfer admission requirements. Non-degree students wishing to become graduate degree candidates must apply online through The Graduate School at www.ncsu.edu/grad. These students should consult the Director of Graduate Programs in the chosen field of study for advice or clarification of information.

For more information on Non-Degree Studies at NC State, visit www.ncsu.edu/nds.

College Level Examination Program (CLEP)

The College-Level Examination Program® or CLEP is a national credit-by-examination program administered by The College Board. CLEP exams provide students with the opportunity to demonstrate college-level achievement through a program of proficiency exams in undergraduate college courses. By proving satisfactory knowledge of a particular area of study, credit for corresponding college courses can be granted.

There are approximately 1,400 CLEP test centers across the United States. You should select the test center most convenient for you and contact that center directly for information regarding registration, fees, test dates, parking, etc. For detailed information about CLEP, available exams and test center locations contact the College Board at:

The College Board phone: 800-257-9558
P.O. Box 6600 fax: (609) 771-7088
Princeton, NJ 08541-6600 website: www.collegeboard.com/student/testing/clep/about.html

For information about the exams and required scores accepted by NC State and the corresponding NC State course credit granted, please refer to the following website: admissions.ncsu.edu/placemen.htm.
Graduate Students

Regulations governing graduate admission are outlined in the Graduate Handbook. To view the Graduate Handbook, go to the NC State University Graduate School website at www.ncsu.edu/grad/handbook.

Required Immunization Documentation

Verified proof of immunization against rubella, measles, mumps, tetanus, pertussis, and diphtheria (and polio for students under age 18) must be presented to Student Health Services by May 30 for fall semester or within 30 days of acceptance. Meningococcal vaccine is recommended, especially for freshmen living in residence halls, and for others wishing to lessen their risk of meningococcal meningitis. A PPD skin test within 12 months of the first day of class is required for international students and non-U.S. citizens. Please note that under North Carolina regulations, a student must be dropped from his or her classes if immunization requirements are not met and a $150 charge levied for re-enrollment. Please review immunization information at our website: www.ncsu.edu/student_health. Click on Immunizations.

Dates of required immunizations and documentation of your medical history must be entered online at healthweb.ncsu.edu. For assistance, contact Student Health Services, (919) 515-7233 or (919) 513-4302. You may e-mail questions or scanned documents to immunizations@ncsu.edu. Proof of immunizations may also be mailed to CB 7304, Raleigh, NC 27695 or faxed to (877) 221-6278, however you still must enter the information online at healthweb.ncsu.edu

Unclassified students and students enrolled as non-degree seeking (NDS), those taking less than four (4) credit hours, enrolled in evening classes are exempt from immunization requirements.

TUITION AND FEES

Note: Since tuition and fees for the 2010-2011 school year were not approved by the publication date, the rate schedules listed below represent estimated rates. These rates are subject to change. For the most current tuition and fee information available, please see the following website: www.fis.ncsu.edu/cashier/tuition.

North Carolina Resident - $2,914.65 per semester (effective 2010-2011 academic year)
Nonresident - $9,157.15 per semester (effective 2010-2011 academic year)

A statement of tuition and fees is posted on each student’s account that registered during a normal registration period. Students are notified via e-mail (eBILL) when a new statement has posted. The statement must be returned with full payment or approved financial aid information by the due date appearing on the statement. The due date is approximately two weeks before classes begin. Students registering during a late registration period will be required to pay their tuition and fees at the time of registration and may be subject to a late registration fee. Fees are the same for both residents and nonresidents and are required of all students. Nonresident students are required to pay an additional $6,242.50 per semester for tuition.

Estimated Annual Undergraduate Expenses
(Independent Student)

<table>
<thead>
<tr>
<th>NC Residents</th>
<th>First Semester</th>
<th>Second Semester</th>
<th>Full Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Out of State</td>
<td>$2,914.65</td>
<td>$2,914.65</td>
<td>$5,930.00</td>
</tr>
<tr>
<td>Health Insurance</td>
<td>372.00</td>
<td>372.00</td>
<td>744.00</td>
</tr>
<tr>
<td>Room Rent</td>
<td>2,488.00</td>
<td>2,488.00</td>
<td>4,976.00</td>
</tr>
<tr>
<td>Meals</td>
<td>1,589.00</td>
<td>1,589.00</td>
<td>3,178.00</td>
</tr>
<tr>
<td>Books and Supplies</td>
<td>500.00</td>
<td>500.00</td>
<td>1,000.00</td>
</tr>
<tr>
<td>Personal Expenses</td>
<td>625.00</td>
<td>625.00</td>
<td>1,250.00</td>
</tr>
<tr>
<td>Transportation - in state</td>
<td>375.00</td>
<td>375.00</td>
<td>750.00</td>
</tr>
<tr>
<td>Transportation - off campus/out of state</td>
<td>575.00</td>
<td>575.00</td>
<td>1,150.00</td>
</tr>
</tbody>
</table>

Total Estimated Expenses

| NC Residents | $8,863.65 | $8,863.65 | $17,828.00 |
| Out of State Residents | $15,306.15 | $15,306.15 | $30,612.30 |

NOTE:

1. Tuition and fees are fixed items of cost. The rates listed above are for on-campus courses only, tuition and fee rates for Distance Education courses are billed separately from on-campus courses.
3. Room rent is shown as main-campus, double occupancy rate
Expenses Other than Tuition and General Fees

Application Fee: A nonrefundable fee $70 U.S. must accompany each application for admission. Applicants may pay the fee online using their WolfPAW account.

Room Rent: New incoming students receive instructions on how to apply for housing with the letter of acceptance. Continuing students receive room reservation information each January at their residence hall rooms. The 2010-2011 residence hall room rent ranges from $2,330.00 to $2,650.00 per semester and plus a mandatory $100.00 ResNet (internet) charge. The Wolf Village Apartments charge $2,650.00 per semester plus mandatory charges for ResNet ($90.00) and cable television ($48.13) for the living room per semester.

Meals: During their first academic year, new freshmen electing to reside on campus are required to participate in one of the university’s available meal plans. Meal plans are available to all registered students and costs for 2010-2011 range from $705.00 to 1,285.00. Students may also pay for meals individually at the various dining facilities available both on and near campus.

Books and Supplies: Books and supplies are usually purchased during the first week of classes directly from the NCSU Bookstores. Allow approximately $500 per semester for purchasing books and supplies.

Personal Expenses: Personal expenses vary widely among students but the estimate of $625 is based on what students report that they spend on these items.

Cooperative Education Program Fee: Required of all participating co-op students for each semester in which they are enrolled in an off campus work assignment. This fee, set at $430 for the 2011 Fall Semester, the 2011 Spring Semester, or the combined 2011 Summer Sessions, is used for partial support of the Cooperative Education Program staff in job development and placement activities. Students paying this fee are entitled to all university services, facilities, and programs during the semester or combined summer sessions for which they are enrolled.

College of Engineering Computing Fee: All students enrolled in the College of Engineering, both graduate and undergraduate, will be billed a $45 per semester fee to support the Engineering Computing Facility. Payment of the fee will provide students with access to standalone workstations that comprise the Engineering Computing Facility. Engineering students who enroll in a co-op work session will not be billed for the computing fee unless they also enroll in an NC State course.

Professional Golf Management Fee: Students enrolled in the Professional Golf Management program (PGM) will be charged $200/semester. The fee pays for golf play and practice privileges at several area golf courses.

Required Fees

Required fees are levied for services, facilities, and programs available to all students whether or not the student takes advantage of them. Students are assessed fees based on the course load they are taking. An itemization of required fees and other detailed information concerning expenses or related data can be obtained at the following website: www.fis.ncsu.edu/cashier/tuition, by contacting the University Cashier’s Office, NC State, Box 7213, Raleigh, North Carolina 27695-7213, (919) 515-2986, or via e-mail at studentaccounts@ncsu.edu.

Refund Policy

Reduction in Hours: The last day to reduce hours and receive a refund or reduction in rates is the same as the last day to register or add hours, typically the 10th day of a fall or spring term and the 3rd day of a summer session. Tuition and Fees are not prorated after this date for reduced course loads. Specific dates are posted on the Cashier’s website and in MyPACK Portal.

Withdrawal: Dropping all courses for which you are registered constitutes a Withdrawal from the University. Refunds for official withdrawals from NC State University are prorated based upon the percentage of the enrollment period attended. No refunds are made for official withdrawals after 50 percent of the enrollment period has passed. The prorated withdrawal schedule for each semester is publicized on the Cashier’s website and through university media after it is established. In some instances, circumstances justify the waiving of rules regarding refunds. An example might be withdrawal for medical reasons. Students have the privilege of appeal to the Fee Appeals Committee when they believe special consideration is merited. Applications for such appeals may be obtained online at www.fis.ncsu.edu/cashier.

Residence Status for Tuition Purposes

The basis for determining the appropriate tuition charge rests upon whether a student is a resident or a nonresident for tuition purposes. Each student must make a statement as to the length of his or her residence in North Carolina, with assessment by the institution of that statement to be conditioned by the following.

Residence. To qualify as a resident for tuition purposes, a person must become a legal resident and remain a legal resident for at least twelve consecutive months immediately prior to classification. Thus, there is a distinction between legal residence and residence for tuition purposes. Furthermore, twelve months legal residence means more than simple abode in North Carolina. In particular, it means maintaining a domicile (permanent home of indefinite duration) as opposed to “maintaining a mere temporary residence or
abode incident to enrollment in an institution of higher education.” The burden of establishing facts which justify classification of a student as a resident entitled to in-state tuition rates is on the applicant for such classification, who must show his or her entitlement by the preponderance (the greater part) of the residenciary information.

**Initiative.** Being classified a resident for tuition purposes is contingent on the students seeking such status and providing all information that the institution may require in making the determination.

**Parents’ Domicile.** If an individual, irrespective of age, has living parent(s) or court appointed guardian of the person, the domicile of such parent(s) or guardian is, prima facie, the domicile of the individual; but this prima facie evidence of the individual’s domicile may or may not be sustained by other information. Further, non-domiciliary status of parents is not deemed prima facie evidence of the applicant child’s status if the applicant has lived (though not necessarily legally resided) in North Carolina for the five years preceding enrollment or registration.

**Effect of Marriage.** Marriage alone does not prevent a person from becoming or continuing to be a resident for tuition purposes, nor does marriage in any circumstance insure that a person will become or continue to be a resident for tuition purposes. Marriage and the legal residence of one’s spouse are, however, relevant information in determining residenciary intent. Furthermore, if both a husband and his wife are legal residents of North Carolina and if one of them has been a legal resident longer than the other, then the longer duration may be claimed by either spouse in meeting the twelve month requirement for instate tuition status.

**Military Personnel.** Any active duty member of the armed services qualifying for admission to an institution of higher education but not qualifying as a resident for tuition purposes shall be charged the in-State tuition rate and applicable mandatory fees for enrollments while the member of the armed services is abiding in this State incident to active military duty in this State. In the event the active duty member of the armed services is reassigned outside of North Carolina or retires, the member shall continue to be eligible for the in-State tuition rate and applicable mandatory fees so long as the member is continuously enrolled in the degree or other program in which the member was enrolled at the time the member is reassigned. In the event the active duty member of the armed services receives an Honorable Discharge from military service, the member shall continue to be eligible for the in-State tuition rate and applicable mandatory fees so long as the member establishes residency in North Carolina within 30 days after the discharge and is continuously enrolled in the degree or other program in which the member was enrolled at the time the member is discharged.

Any dependent relative of a member of the armed services who is abiding in this State incident to active military duty, as defined by the Board of Governors of The University of North Carolina and by the State Board of Community Colleges while sharing the abode of that member shall be eligible to be charged the in-State tuition rate, if the dependent relative qualifies for admission to an institution of higher education. The dependent relatives shall comply with the requirements of the Selective Service System, if applicable, in order to be accorded this benefit. In the event the member of the armed services is reassigned outside of North Carolina or retires, the dependent relative shall continue to be eligible for the in-State tuition rate and applicable mandatory fees so long as the dependent relative is continuously enrolled in the degree or other program in which the dependent relative was enrolled at the time the member is reassigned or retires. In the event the member of the armed services receives an Honorable Discharge from military service, the dependent relative shall continue to be eligible for the in-State tuition rate and applicable mandatory fees so long as the dependent relative establishes residency within North Carolina within 30 days after the discharge and is continuously enrolled in the degree or other program in which the dependent relative was enrolled at the time the member is discharged.

A person charged less than out-of-state tuition rate solely by reason of this section shall not, during the period of receiving that benefit, qualify for or be the basis of conferring the benefit of G.S. 116-143.1.

**Grace Period.** If a person (1) has been a bona fide legal resident, (2) has consequently been classified a resident for tuition purposes, and (3) has subsequently lost North Carolina legal residence while enrolled at a public institution of higher education, that person may continue to enjoy the in-state tuition rate for a grace period of twelve months measured from the date on which North Carolina legal residence was lost. If the twelve months ends during an academic term for which the person is enrolled at a State institution of higher education, the grace period extends, in addition, to the end of that term. The fact of marriage to one who continues domicile in North Carolina and if one of them has been a legal resident longer than the other, then the longer duration may be claimed by either spouse in meeting the twelve month requirement for instate tuition status.

**Minors.** Minors (persons under 18 years of age) usually have the domicile of their parents, but certain special cases are recognized by the residence classification statute in determining residence for tuition purposes.

a) If a minor’s parents live apart, the minor’s domicile is deemed to be North Carolina for the time period(s) that either parent, as a North Carolina legal resident, may claim and does claim the minor as a tax dependent, even if other law or judicial act assigns the minor’s domicile outside North Carolina. A minor thus deemed to be a legal resident will not, upon achieving majority before enrolling at an institution of higher education, lose North Carolina legal residence if that person (1) upon becoming an adult “acts, to the extent that the person’s degree of actual emancipation permits, in a manner consistent with bona fide legal residence in North Carolina” and (2) “begins enrollment at an institution of higher education not later than the fall academic term following completion of education prerequisite to admission at such institution.”

b) If a minor has lived for five or more consecutive years with relatives (other than parents) who are domiciled in North Carolina and if the relatives have functioned during this time as if they were personal guardians, the minor will be deemed a resident for tuition purposes for an enrolled term commencing immediately after at least five years in which these circumstances have existed. If under this consideration a minor is deemed to be a resident for tuition purposes immediately prior to his or her eighteenth birthday, that person on achieving majority will be deemed a legal resident of North Carolina of at least twelve months duration. This provision acts to confer in-state tuition status even in the face of other provisions of law to the contrary; however, a person deemed a resident of twelve months duration pursuant to this provision continues to be a legal resident of the State so long as he or she does not abandon North Carolina domicile.
Lost but Regained Domicile. If a student ceases enrollment at or graduates from an institution of higher education while classified as a resident for tuition purposes and then both abandons and re-acquires North Carolina domicile within a twelve month period, that person, if he or she continues to maintain the reacquired domicile into re-enrollment at an institution of higher education, may re-enroll at the instate tuition rate without having to meet the usual 12-month durational requirement. However, any one person may receive the benefit of this provision only once.

Change of Status. A student admitted to initial enrollment in an institution (or permitted to enroll following an absence from the institutional program which involved a formal withdrawal from enrollment) must be classified by the admitting institution either as a resident or as a nonresident for tuition purposes prior to actual enrollment. A residence status classification once assigned (and finalized pursuant to any appeal properly taken) may be changed thereafter (with corresponding change in billing rates) only at intervals corresponding with the established primary divisions of the academic year.

Transfer Students. When a student transfers from one North Carolina public institution of higher education to another, he or she is treated as a new student by the institution to which he or she is transferring and must be assigned an initial residence status classification for tuition purposes.

Tuition of certain teachers. Any teacher or other personnel paid on the teacher salary schedule who (1) has established legal residence (domicile) in North Carolina and (2) is employed full-time by a North Carolina public school, shall be eligible to be charged the in-state tuition rate for courses relevant to teacher certification or to professional development as a teacher.

UNC System Employees. A person who is a full-time employee, in a permanent position, of The University of North Carolina, or is the spouse or dependent child of a full-time employee, in a permanent position, of The University of North Carolina, and who is a legal resident of North Carolina, qualifies as a resident for tuition purposes without having maintained that legal residence for at least 12 months immediately prior to his or her classification as a resident for tuition purposes.

Note: General Statue 116-143.1 is the main statute governing residence status classification. Copies of the applicable law and of the implementing regulations are available for inspection in the Office of Undergraduate Admissions, 203 Peele Hall. This information is subject to change.

FINANCIAL AID

www.ncsu.edu/finaid

To be considered for financial assistance by the Office of Scholarships and Financial Aid, a student must complete the federal government’s Free Application for Federal Student Aid (FAFSA). Typically submitted online at www.fafsa.ed.gov, this form must be submitted to the federal student aid processing center to evaluate the family’s ability to pay for educational expenses. Students who submit FAFSAs to the federal processor by March 1 are given first priority for need-based scholarship and grant consideration.

By completing the FAFSA, students are considered for all forms of federal financial aid, as well most types of state and institutional aid. Some academic scholarships may require separate applications. Determination of the applicant’s need is based on estimated educational costs as established by the Office of Scholarships and Financial Aid and a consideration of the family’s financial strength, as determined by the analysis of the FAFSA.

Aid is available on a non-discriminatory basis to all qualifying students based on the applicant’s financial need. Financial aid awards are usually made in the form of “packages,” which combine aid from all sources including the federal government, state and institutional funds, and private entities.

Award packages typically include gift aid (scholarships and grants), student loans, and/or employment through the Federal Work-Study program. Students must reapply for aid each year, and renewal is based on continued financial need as well as satisfactory academic progress as defined by the Policy on Satisfactory Academic Progress for Financial Aid Eligibility.

Please visit the Office of Scholarships & Financial Aid website at www.ncsu.edu/finaid for more detailed information regarding types of aid and how to apply.

Pack Promise

NC State’s mission has always been to extend a quality education to the broadest range of deserving students, regardless of income or financial need. Pack Promise is a formal extension of that mission, reaffirming NC State’s historical commitment to access, affordability, student success, and encouraging first-generation college students to attend college. Pack Promise is a program that guarantees to meet 100% of the demonstrated financial need for students whose family incomes are at or below 150% of the federal poverty level. Financial need is met through a combination of scholarships, grants, Federal Work-Study employment, and a maximum need-based loan of $2,500 per year. Students who submit the FAFSA are automatically considered for Pack Promise.
North Carolina State University

SCHOLARSHIPS

NC State offers a variety of need-based scholarships for both incoming first-year students and those who are continuing at NC State. Consideration for these awards is given to students who are academically competitive, exhibit special talents or characteristics and demonstrate financial need. To apply for these scholarships, simply complete the FAFSA by March 1. Additionally, there are a limited number of academic scholarships for incoming freshmen which are awarded without regard to financial need. Consideration for these scholarships is based solely on a student’s application for admission.

In addition to these university-wide scholarships, many colleges and departments offer specific awards to students enrolled in their academic programs. These scholarships, funded by alumni, friends of the university, foundations, and industry, are available to both incoming freshmen and to continuing students. Consult the college or department websites for specific criteria, application materials, and important deadlines.

NC State encourages students to search for private scholarships offered by agencies affiliated with the university. Many organizations offer awards based on place of residence, background, professional affiliations and/or field of study. Students should use the many free online scholarship search websites to search and apply for outside scholarships. A listing of some of these search services is available at www.ncsu.edu/finaid.

University Academic Scholarships for Entering Freshmen

Park Scholarships. “America’s greatest resource is the youth of the land. An investment in the development of the talents and capabilities of highly motivated young men and women is an expression of faith in the future of the State and Nation; it is also a public service of untold value, through the provision of successive generations of first-rate scientists, scholars, and leaders to serve the State and Nation.” - excerpt from proposal to establish the Park Scholarships

The Park Scholarships was established in 1996 at NC State University with the splendid vision and significant financial commitment of the Park Foundation of Ithaca, New York. The scholarships celebrate the life of Roy H. Park, one of the University’s most distinguished alumni, and provide the full cost of education and related expenses, enrichment activities, and a stipend for a personal computer. The scholarship is awarded to entering freshmen from all over the country for undergraduate study in any discipline at NC State. The first class of scholars began in the fall of 1996 with 25 freshmen. There are now about 200 Park Scholars on campus each year. The Park Scholarships has become one of the most prestigious undergraduate scholarships in the United States, with over $50 million committed to date by the Park Foundation.

Park Scholars are selected on the basis of merit, exemplary character, exceptional potential for leadership and the sense of promise that they may one day make contributions of enduring importance to the betterment of the human condition. The goal of the selection process is to identify young people with demonstrated high achievement and leadership as well as those with unusual aptitudes, uncommon talents, and special gifts of creativity or entrepreneurial acumen.

Currently about 50 Park Scholarships are awarded per year, totaling close to $4 million. Two-thirds of the scholarships are awarded to North Carolina residents and one-third to residents of other states. The awards are renewable contingent on high standards for the Scholars’ academic achievement, commitment to the program ideals and personal conduct. Candidates must be U.S. citizens to be eligible for a Park Scholarship; permanent residents are ineligible. The Park Scholarships application is delivered online. For more information on how to apply, visit www.ncsu.edu/park_scholarships.

The Caldwell Fellows. Caldwell Fellow scholarships are the oldest merit-based scholarship at NC State and the only university-wide program of its nature to first year students on campus. The Caldwell Fellows fill the unique niche of identifying and developing talented students with a proven record of academic success, leadership and service at NC State. A select group of new Caldwell Fellows become part of a comprehensive leadership development program with a financial award that includes three years of an annual tuition stipend, as well as self-development stipends for experiences in study abroad, professional development, leadership development and service. The fellowship value is approximately $20,000 over three years. The award is renewable contingent on meeting participation expectations and an academic standard of 3.25 cumulative GPA; note the average GPA for recipients, however, is 3.8.

The application period for selection begins in January of each year, after a student’s initial semester(s) at NC State is complete. The program actively seeks applicants from all colleges at NC State. The rigorous selection process begins with a student’s academic eligibility (a minimum 3.25 NC State GPA) and completion of application materials, available at the website: http://ncsu.edu/caldwellfellows. Application reviews by campus faculty and program alumni determine the finalists who are invited to interviews in February.

The Caldwell Fellows program was created to honor the legacy of John T. Caldwell and to carry out his spirit and ideals. As Chancellor of NC State for 16 years, he presided over the university as a servant leader: inspiring excellence, modeling moral behavior and marshaling the strengths of the entire campus to further the common good. Guided by a deep respect for the potential inside every individual, he held a vision of NC State as a place where young people could find and refine their unique capabilities and potential. The Caldwell endowment is the university-wide merit-based scholarship funded by alumni and supporters of NC State. The endowments are held by the NC State Alumni Association.

The program also derives from the NC Fellows program, originally known as the Richardson Fellows program, established in 1968 by Smith Richardson of the Richardson Vicks Corporation. Concerned for the state’s future leadership, Mr. Richardson established Fellows Programs on North Carolina campuses and charged them with developing leadership in their promising students. Caldwell
Fellows and UNC-CH Fellows maintain close ties and are affiliated with the internationally acclaimed Center for Creative Leadership, also created by the Smith Richardson Foundation.

The Caldwell Fellows program has a rich 40+ year history with more than 1,000 distinguished alumni.

ENROLLMENT (REGISTRATION)

Enrollment is conducted using MyPack Portal, Registration and Records’ online student services application. MyPack Portal is available from the Registration and Records’ website www.ncsu.edu/registrar. This website contains all the necessary instructions for completing enrollment. A Schedule of Courses for each semester is also available online prior to the beginning of the enrollment period.

Enrollment consists of three steps: (1) meeting with advisers to determine course requirements and to have their Advising Hold released; (2) enrolling in courses using the MyPack Portal system; and (3) paying tuition, fees, and all other debts to the university by the established deadlines. Advising and general enrollment start dates and deadlines are published on the web each semester. Students must check the specific day and time they will access Enrollment in the Enrollment Dates menu of MyPack Portal.

For more information, contact:

Department of Registration and Records  phone: (919) 515-2572
1000 Harris Hall  fax: (919) 515-2376
Box 7313, NC State University  website: www.ncsu.edu/registrar
Raleigh, NC 27695  For questions, go to http://www.ncsu.edu/registrar/faq

Cooperative Registration Programs

Two enrollment programs were developed for the purpose of fostering cooperative educational activities. Under these programs students have the opportunity to register for courses at other institutions and to participate in cooperative library arrangements and joint student activities. For more information, contact the Inter-Institutional Coordinator at (919) 515-1496 or crc@ncsu.edu or visit www.ncsu.edu/registrar/inter-institutional/crc/index.html.

Inter-institutional Registration Program

The Inter-Institutional Registration Program is a voluntary organization comprised of NC State, Duke, North Carolina Central University, University of North Carolina at Chapel Hill, University of North Carolina at Charlotte, and University of North Carolina at Greensboro for the purpose of developing and conducting cooperative educational activities. The program provides the opportunity for students to enroll at another institution for a course accepted for their program of study and not offered on their home campus. Distance education courses are not eligible to be used for Inter-institutional registration. Other activities include a cooperative library arrangement, joint student activities, and faculty cooperation and interchange. Interested students should contact the Inter-institutional Coordinator at (919) 515-1496 or crc@ncsu.edu or visit www.ncsu.edu/registrar/inter-institutional/ii/index.html.

UNC Online

The Inter-Institutional Registration Program is a voluntary organization comprised of NC State, Appalachian State University, East Carolina University, Elizabeth City University, Fayetteville State University, NC Agricultural and Technical State University, North Carolina Central University, NC School of Arts, University of North Carolina at Chapel Hill, University of North Carolina at Charlotte, University of North Carolina at Greensboro, University of North Carolina at Asheville, University of North Carolina at Pembroke, University of North Carolina at Wilmington, Western Carolina University, and Winston-Salem University for the purpose of developing and conducting cooperative educational activities. The program provides the opportunity for students to enroll at another institution for a course accepted for their program of study and not offered on their home campus through Distance Education courses only. Students should contact the Inter-Institutional Coordinator at (919) 515-1496 or crc@ncsu.edu or visit http://courses.northcarolina.edu/iic/index.php.

Cooperating Raleigh Colleges

The Cooperating Raleigh Colleges Program (CRC) is a voluntary organization comprised of NC State, Meredith College, Peace College, St. Augustine’s College, and Shaw University for the purpose of developing and conducting cooperative educational activities within the Raleigh area. The course taken at the visited school must be a course that is required but not offered through NC State. Men may not register for courses at Peace College. Interested students should contact the Inter-institutional Coordinator at (919) 515-1496 or crc@ncsu.edu or visit www.ncsu.edu/registrar/inter-institutional/crc/index.html.

Veterans Affairs

NC State University is approved to administer veterans benefits to eligible students. The Veterans Affairs Office is located in Registration and Records, 1000 Harris Hall. Students who are eligible to receive veterans benefits should contact the NC State Certifying Official at (919) 515-3048 or veterans_affairs@ncsu.edu. For more information see the VA website at www.ncsu.edu/veterans.
Schedule Revision (drops and adds)

Note: NC State University policies, rules and regulations are updated and reviewed as the need arises. For the most current information regarding this section, please visit the following website: www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.3.php.

Courses may be added during the first week of a regular semester without permission of the instructor and during the second week with the permission of the instructor. For specific deadlines, visit www.ncsu.edu/registrar/calendars.

Courses may be dropped without regard to course load during the first two weeks of a regular semester. During weeks three through six of a semester, full-time undergraduate students who wish to drop courses at any level and whose academic load would thereby fall below the twelve hour minimum course load may do so only for documented medical reasons or other verified, unforeseen grounds of personal or family hardship.

Exceptions to the drop policies require the recommendation of a student’s adviser, the departmental coordinator of advising or the departmental head, and approval by the student’s dean.

Students who wish to drop all courses for which they are enrolled, must withdraw from the university for the remainder of the semester or summer session in which they are enrolled. A degree student who finds it necessary to drop all courses will initiate withdrawal from the university at the Counseling Center, Student Health Center, 2815 Cates Avenue, second floor.

UNIVERSITY HOUSING

University Housing provides on-campus residential facilities for more than 8,000 students. From traditional residence halls and apartments for upper division students to family housing, we offer a variety of residential options to accommodate diverse student interests and needs. Each facility is different, with such amenities as computer labs, Internet, laundry rooms, kitchens, mini-fridge/microwave and optional local phone and cable TV service. Specific information, along with virtual tours of each facility, can be found on the University Housing website at www.ncsu.edu/housing.

Undergraduate students must be enrolled in at least nine credit hours to be eligible to live in University Housing during the fall and spring semesters. Students who must drop below these minimum requirements during the semester should contact University Housing to request an exception. During the summer sessions, housing is provided for any enrolled student as space permits.

University Housing maintains self-help listings of off-campus apartments, rooms and houses for rent. These listings are available in the University Housing office, located at 1112 Pullen Hall, during the hours of 8:00 a.m. - 5:00 p.m., Monday through Friday.

Specific and up-to-date information pertaining to University Housing policies, regulations and rules may be viewed online at www.ncsu.edu/housing/general/index.php.

For more information about housing on campus, contact University Housing by e-mail at housing@ncsu.edu, stop by the office at 1112 Pullen Hall, Raleigh NC 27695-7315, or call (919) 515-2440. You can also stay connected with Housing through Facebook (www.tinyurl.com/housing); Twitter (www.twitter.com/ncstatehousing); iTunes U. (www.itunes.ncsu.edu) and ‘On the Go’ (www.ncsu.edu/housing/otg), an application designed for smartphones/web-capable devices.

Living and Learning Villages

University Housing believes that learning doesn’t take place solely in the classroom, and that we have a responsibility to enhance and facilitate our students’ educational opportunities. Our Living and Learning Villages provide an environment in which students can pursue their academic goals in close partnership with mentors, professors and others who share the same interests. Following are brief descriptions of our Villages. For more information on each Village, please visit at www.ncsu.edu/housing/villages.
Alexander Global Village
The Alexander Global Village introduces international students to American culture, exposes American students to other cultures and makes the entire community aware of global issues. Students who choose to live in the Alexander Global Village are interested in living and interacting with people from differing backgrounds, experiences, countries and viewpoints. For additional information, visit www.ncsu.edu/housing/villages/avg.

Arts Village
A partnership between University Housing and Arts NC State, the Arts Village unites students from various personal and academic backgrounds and exposes them to theatre, visual arts & crafts, music and dance. Students are provided with significant and exciting opportunities to develop their creativity, engage with the arts on campus and in the community, interact with NC State faculty and staff, and serve as a creative resource for the campus community as a whole. For additional information, visit www.ncsu.edu/housing/villages/arts.

First Year College Village
The First Year College (FYC) enables students to enter the University without immediately declaring a major, allowing a year for guided inquiry and exploration before a major is declared. This Village offers a close-knit, supportive environment, as well as opportunities for friendships, academic development and recreation within an intellectually challenging community. Visit: www.ncsu.edu/housing/villages/fyc/ or www.ncsu.edu/fyc/prospective/village_for_more_information.

Students Advocating for Youth (SAY) Village
The Students Advocating for Youth (SAY) Village, located in Syme Residence Hall, is a partnership between the College of Education and University Housing. Here, students can help better the lives of young people, regardless of career interest. Advocating for youth spans many fields of study, and SAY students learn about the social, political, multi-cultural and technological issues that impact the lives of children both locally and globally. For additional information, visit www.ncsu.edu/housing/villages/say.

Honors Village
Live. Create. Inquire. Discover. Learn. The philosophy of the Honors Village demonstrates the exceptional blend of academic and student life at NC State. A partnership between the Honors Program and University Housing, the Honors Village is housed in the Quad residence halls of Bagwell and Becton. Upper division Honors Village Fellows serve the residents of this Village, assisting with all aspects of Village life. More information about the Honors Village can be found online at www.ncsu.edu/housing/villages/uhv.

University Scholars Village
Centered in Sullivan Hall and based on a partnership between the University Scholars Program (USP) and University Housing, the Scholars Village offers students access to a range of social, cultural and educational activities, all designed to help them become informed citizens, ethical leaders and active contributors to our campus and community. For more information, visit www.ncsu.edu/housing/villages/usv or www.ncsu.edu/univ_scholars.

Women in Science and Engineering Village (WISE)
The Women in Science and Engineering (WISE) Village is a living and learning community designed especially for first- and second-year women in the colleges of Agriculture & Life Sciences, Engineering, Natural Resources, Physical & Mathematical Sciences, and Textiles. These women represent a variety of disciplines within the five colleges. WISE provides women mathematicians, scientists and engineers the opportunity to network with each other in the classroom and beyond. For more information, please visit www.ncsu.edu/housing/villages/wise.

IMPACT Leadership Village
The IMPACT Leadership Village is an interdisciplinary leadership-based living and learning community created for first- and second-year students. The Village provides students with the opportunity to live in a community of emerging leaders who desire to learn about leadership models, organizational development, ethics in leadership and global leadership. The Village helps students identify and develop their leadership strengths and provides participants with the opportunity to engage in practical application of leadership to real world issues. For more information, visit www.ncsu.edu/housing.

Women Of Welch (WOW)
The Women Of Welch (WOW) pilot Village, scheduled to debut in fall 2010, was created to enhance women’s leadership outside the classroom through empowerment, leadership development, self-awareness, and diversity/social justice. The WOW Village strives to create a holistic community that fosters individual women’s growth and development while challenging residents to act as citizens of a global community. The WOW Village is located in the first and second floors of Welch Hall in East Campus.
HONORS AND SCHOLARS PROGRAMS

University Honors Program

The University Honors Program (UHP) is a highly selective program of great expectations. The program exists to encourage and enable outstanding students to engage in research and scholarship in their chosen discipline. It is an opportunity for motivated students to craft for themselves a unique undergraduate education that draws on the full range of opportunities that exist at a major research, land-grant university such as NC State. Undergraduates can pursue research and scholarship in any discipline. In fact, there are students from every undergraduate college at NC State in the UHP.

Application to the University Honors Program is by invitation only. Incoming freshmen are invited to apply after they have been accepted to the university. All invitations are issued on a rolling basis throughout the university’s admissions process (typically mid-December through February). If you do not receive an invitation, but believe you are a strong candidate for the University Honors Program, you can contact us and request an invitation to apply. Admission is competitive and based on evidence of motivation to pursue research and scholarship in the discipline, academic achievement, extracurricular activities, and our desire to maintain an Honors community that includes students who apply to the university by early admission deadline. Current NC State students may also be invited to apply following the first and second semesters of their freshman year.

University Honors Program students are required to take four HON seminars (generally one per semester in their first two years), which feature inquiry-guided learning and cross-disciplinary approaches, and are taught by some of the most innovative professors at NC State. These seminars are designed to help students see how knowledge is generated, to think about the ethical, historical, and societal implications of new knowledge, and to think across disciplinary boundaries. The UHP also offers experimental learning courses that enable them to earn credit for activities such as working with a faculty member on a project or with a local museum to create educational materials for a new exhibit. All UHP students culminate their undergraduate careers with a two-semester capstone project—working with a faculty member or other campus or local professionals to pursue an independent project in their discipline.

The University Honors Program cooperates with University Housing to offer the University Honors Village, a living-learning community located in the historic and recently renovated Quad residence halls on East Campus. The Honors Village gives our students the opportunity to live with other highly motivated students, to participate in informal learning activities such as trips, group discussions, and social events, and to benefit from the advice and guidance of the Honors Village Fellows, experienced UHP students who work with the incoming students.

The Honors experience at NC State includes Honors programs located in the colleges and departments. Students are invited to participate in these programs at various times, depending upon the specific program (generally the second semester of the sophomore year or first semester of the junior year). Many of the students in the University Honors Program are also participants in one or more of the college or departmental Honors programs.

University Scholars Program

“Twenty years from now you will be more disappointed by the things you didn’t do than by the ones you do. So throw off the bowlines, sails away from the safe harbor. Catch the trade winds in your sails. Explore. Dream. Discover.” -Mark Twain. For over thirty years, the USP has encouraged talented, creative and sharp young men and women to leave the safe harbor, to pursue their dreams, and to explore the beauty and the challenges of the world around them. How? Through opportunities to participate in the Scholars Forum, to enroll in special courses and to join the community of the Scholars Village. SCHOLARS FORUM: University Scholars enroll in the Scholars Forum, a destination for dreamers who are doing, who have thought big and worked hard to understand, explain, and often change, the world we live in. Among our guests in 2009-10 were:

• Mark Plotkin, an ethnobotanist who works with indigenous groups in the Amazon to understand their use of local medicines and to help them preserve their lands and traditions. (Plotkin was named an Environmental Hero for the Planet by TIME magazine and as one of the "35 Who Made A Difference," by Smithsonian magazine.)
• Blake Mycoskie, who founded TOMS Shoes based upon the simple premise: For every pair of shoes sold, TOMS gives a pair to a child in need. (Mycoskie, a runner-up on the Amazing Race, received the 2009 Award for Corporate Excellence presented by the U.S. State Department.)
• Daniel Bernard Roumain (DBR), a Haitian-American artist, teacher and composer whose music is a stunning blend of classical, hip-hop and Caribbean influences. (DBR, who recently collaborated and performed with Lady Gaga on FOX's American Idol, was spotlighted as the "New Face of Classical Music" in Esquire Magazine.)

The Scholars Forum also offers an extraordinary range of cultural, educational and outdoor leadership opportunities, all provided free through the program. Take part in special tours of NC State’s Nuclear Reactor, the Duke Lemur Center, or the “CSI” lab of the State Bureau of Investigation; participate in rafting and hiking trips led by field naturalists; and attend locate theatre, music and dance performances and museum exhibitions. You choose what you wish to do, and the options are amazing!

SPECIAL COURSES: University Scholars have the opportunity to enroll in honors sections of academic courses that are taught by the very best faculty at NC State.

SCHOLARS VILLAGE: Special activities, fun people, and a close interaction with faculty and staff make the Scholars Village, located within Sullivan Residence Hall, a very special place to live. To learn more, visit http://www.ncsu.edu/housing. University Scholars may choose to live in Sullivan but outside of the Village as well.
SPECIAL ACADEMIC PROGRAMS

National Student Exchange Program
The National Student Exchange (NSE) Program at NC State offers students a wonderful and economical opportunity to study at another university in the United States, while retaining full-time status at NC State University. Over 190 campuses are available for exchange, from Hawaii to Maine. Depending upon the college where students choose to study, tuition and fees may be paid directly to NC State or to the host campus at the host campus in-state rate. Students may participate in the exchange for a semester or academic year, but not summer sessions only. Eligible students must be full-time undergraduates with a minimum 2.50 grade point average, enrolled full-time the semester before the exchange and be selected by a screening committee. For further information, contact the NSE office in 102 Sullivan Hall, (919) 515-2353, or visit the National Student Exchange website: www.ncsu.edu/nse and www.nse.org.

Non-Degree Certificate Programs
Non-degree certificate programs are prescribed sets of regular academic courses that offer limited but structured non-degree opportunities. Many are designed expressly for Non-Degree Studies students. The issuing of a certificate from the department or college that offers that program recognizes satisfactory completion of the prescribed courses. Some programs utilize on-campus instruction, while others utilize Internet or videocassette delivery. The inventory of available programs changes over time in response to changing continuing education needs. The following is a sample of available programs: Computer Programming, Geographic Information Systems, Training and Development, Professional Writing, and Textiles. Several programs are designed for students who already possess a bachelor’s degree.

For information concerning enrollment requirements and prescribed courses for a particular certificate program, consult the department or college offering that program or visit the Certificate programs website at www.mckimmon.ncsu.edu/certificateprograms.html.

The Peer Mentor Program
The Peer Mentor Program (PMP) is a student advisory program that targets first-year African American, Native American, and Hispanic students. The program, founded in 1982, recognizes the challenges first-year students face as they embark upon this new and vastly different segment of their lives. PMP acknowledges the complexity of this situation for minority students, particularly on a predominately white campus. The primary objective of the Peer Mentor Program is to ease this situation by contributing to and aiding in the adjustment of these students to the academic, emotional and social aspects of college life. From a broadened perspective, the program aims to increase and maintain the enrollment and retention of minority students, ensuring that each student maximizes his/her potential.

African American, Native American, and Hispanic upperclassmen are selected as mentors through an application and interview process and are subsequently paired with one to three first-year students. In general, the mentor maintains close contact throughout the year with his/her mentee(s) and acts as a “big brother/sister,” advisor and oftentimes, as a friend. Whenever possible, freshmen are paired with upperclassmen enrolled in the same major and/or college. Through training seminars, a mandatory course and personal experience, peer mentors are prepared to assist first-year students with problems, questions and situations that may arise, or refer them to the appropriate university resources. Ultimately, the peer mentor works to ensure a smooth transition from high school to the college environment. Though it is impossible to determine all of the many benefits of the program for each individual, the Peer Mentor Program remains rewarding, both intrinsically and extrinsically, for first-year students as well as mentors.

This program is coordinated by The Department of Multicultural Student Affairs, call (919) 515-3835 for more information.

Supplemental Instruction
Supplemental Instruction (SI) is a series of weekly review sessions for students in selected sections of historically difficult courses. SI is provided for all students who want to improve their understanding of course material and improve their grades. At each session, students are guided through material by an SI leader, a competent student who has previously taken the course. Three or four sessions are offered at various times each week, usually during the late afternoon and early evening. Attendance is voluntary. A schedule of sessions can be found on the SI website www.ncsu.edu/si.
INTERNATIONAL PROGRAMS AND ACTIVITIES

International Students

The Office of International Services (OIS) is charged with meeting the immigration advising and cross-cultural programming needs for the university's 2,400 international students and 350 J-1 Exchange Visitor scholars who come from more than 110 different countries. Services provided by OIS include advising students and scholars on immigration regulations and university policies; authorizing certain types of on or off-campus employment authorization for F-1 and J-1 visa holders; and providing cultural programs designed to enrich the cultural and academic experience of international community: New International Student Orientation, Culture Corps, I-SSERV volunteer program, English Conversation Club, cultural diversity workshops, and other programs. The Study Abroad Office administers approximately $150,000 in campus-based scholarships for study abroad each year, in addition to national scholarship competitions such as NSEP, IIE and Gilman. Students may also use their financial aid to study abroad. New international students are required to participate in New International Student Orientation and to check-in with OIS upon arrival. OIS also provides opportunities for U.S. students to get involved in the international community at NC State by inviting participation in various cross-cultural programs such as volunteering at orientation, English Conversation Club, International Friendship Program, etc.

International applicants must apply to the Admissions Office by the stated deadlines and must meet all the necessary requirements for admission. In addition, international applicants must meet certain language and financial criteria (see the TOEFL and Financial Information sections under Freshman Admission).

The North Carolina Global Training Initiative (GTI) sponsors several short-term certificate, internship, and research programs that international students may be interested in. These full-time non-degree study programs allow international students to study at NC State for one semester in order to learn about U.S. culture and education, improve their conversational English, take undergraduate courses in their field of study back home or in preparation for admission to a degree program here in the U.S., and experience life in the U.S. The GTI also co-sponsors the Summer Bridge program for international students. Please call 919.513.0105 or visit us on the web at www.ncsu.edu/gti for more information.

Outline of minimum immigration requirements for F-1 and J-1 students:

- Keep all immigration documents current (passport and I-20 or DS-2019)
- Maintain full-time enrollment every semester (12 hours/semester for undergraduates)
- Make good academic progress toward your degree
- Do not work or intern off campus without prior written approval from OIS
- Do not work on campus more than 20 hours in any one week during the semester
- Update any address change in MyPack Portal within ten days of moving
- Update OIS immediately of any change in name, visa status, or marital status
- Consult with an OIS adviser BEFORE changing curriculum/majors, withdrawing, dropping below full-time, transferring to another school/program, etc.
- Purchase and maintain the NC State University approved Health and Accident Insurance
- Be sure to keep your passport and recently signed visa certificate (I-20 or DS-2019) with you when you travel abroad. Consult with an OIS adviser about visa and travel questions

Further information about immigration requirements, employment and travel questions, cultural opportunities, and other critical information designed to assist newcomers to the U.S. are detailed on the OIS website. For individual advising, please call (919) 515-2961 to make an appointment with an adviser or stop by during our walk-in hour of 2-3 every afternoon.

Office of International Services (OIS)  
320 Daniels Hall, 101 Lampe Drive  
Campus Box 7222  
NC State University  
Raleigh, NC 27695-7222

e-mail: ois@ncsu.edu  
website: www.ncsu.edu/ois/

Summer Institute in English for Speakers of Other Languages

The Summer Institute in English for Speakers of Other Languages is a five-week, intensive English language program for students from other countries. It is especially good for students from other countries who intend to pursue university studies or specialized training programs in the United States in the fall. The institute, which is jointly sponsored by the Department of Foreign Languages and Literatures and the Division of Continuing Education, is held from early July to early August each summer. It is designed to provide students with intensive instruction and practice in the use of the English language. Emphasis is on developing integrated oral and written skills in English.

The institute also offers orientation to American life and institutions to give students insight into life in the United States and to help them to adjust to the new environment. There are films and field trips to places of historic, cultural, and scenic interest. Prospective students usually have studied English and have some experience with spoken English prior to enrolling in the institute. However, all
levels from beginners to advanced are welcome. Admission to the institute does not imply admission as a degree candidate at NC State or any other campus of the University of North Carolina System.

The TOEFL (Test of English as a Foreign Language) is administered to students who wish to take it at the end of the program. Since this is an institutional administration of the test, scores are only accepted by the Admissions Office and Graduate School at NC State. For information, contact Dale Mackey at (919) 513-0886 or dale_mackey@ncsu.edu.

Alexander Global Village
The Alexander Global Village (located in Alexander Residence Hall) is a residential option for students who wish to live in a diverse and exciting environment. The community is comprised of students from more than 20 countries with diverse backgrounds, experiences, and viewpoints. The overall focus is one of global awareness, understanding and experience. It is common to find students cooking native foods in the community kitchen and conversing in native languages while educating others about their cultures. Resident Advisors (RAs), Alexander Ambassadors (AAs) and Hall Council members are active in planning programs and activities that develop the community (such as cultural dinners, international movie nights, topical discussions with faculty, and excursions around Raleigh and beyond).

Alexander Global Village (AGV) strives to introduce international students to American culture, expose American students to other cultures, and make sure the entire community is aware of global issues. Space is limited to 163 beds, so students must complete an application for acceptance into AGV. Any NC State student may apply to live in AGV; assignments are made on a first-come, first served basis, with a number of beds held for our International Study Abroad students. Our aim is to have equal representation of the international student population and the American student-population living in AGV. To enhance the experience, international students and American students are paired to live together as roommates. The majority of residents in AGV are upper division students, although freshmen are welcome to apply (and will be paired with other non-international freshmen).

Students choosing to live in AGV are expected to be active participants, to initiate activities, and to be supportive of the program goals. Students interested in applying or wanting additional information should visit www.ncsu.edu/housing/villages/av.

Study Abroad
The Study Abroad Office assists students who would like to study in another country. Opportunities are available for the summer, semester, or year. Many programs cost about the same as studying at NC State. The Study Abroad Office administers approximately $100,000 in campus-based scholarships for study abroad each year, in addition to national scholarship competitions such as NSEP, IIE, and Gilman. Students may also use their financial aid to study abroad.

Study Abroad Programs
Study abroad allows students to take course work overseas in their major and/or minor field, and/or fulfill general education requirements. Spring break options are occasionally available for one credit, or integrated into a semester length course on campus. Most programs have no foreign language requirement. The Study Abroad Office will also assist students who wish to study on a program sponsored by another university or organization to obtain academic credit for such programs. NC State sponsored study abroad options include:

- Exchanges sponsored by NCSU, The University of North Carolina Exchange Program (UNCEP), and the International Student Exchange Program (ISEP) are available in Asia, Australia, Europe, North, Central, and South America, and the West Indies. Students on these exchanges pay regular NC State tuition. Room and board costs vary, depending on the study abroad location. Requirements include a GPA of at least 2.75 (some exchanges require a 3.00) and at least intermediate level (through 202) language proficiency for programs in which the language of instruction is not English.

- Non-exchange study abroad programs are available as individual or group programs. Non-exchange - individual programs offers students full immersion in the host culture where one enrolls directly into a foreign partner university through its study abroad office. Students pay the host university’s tuition and fees, which may be most cost-effective for out-of-state students. Examples include direct enroll at some partner schools in Australia and at USFQ in Ecuador.

- Non-exchange - group programs are arranged so that a group of students from NCSU go abroad and take classes together, often led by a faculty member. Examples of Non-exchange group programs include Semester in Spain, Semester in Florence, and Semester in Prague. Some programs offer homestays for increased cultural immersion, others place students in apartments or student residences with U.S. and international students. Requirements include a GPA of at least 2.75 (check NC State Study Abroad website for specific program GPA requirements) and completion of at least the 202 level of Spanish for the Spain program.

- NC State Group Summer or Break Study Abroad Programs, directed by NC State faculty, are offered during the summer every year, and sometimes during spring/fall breaks. There are over 40 NC State sponsored programs offered each summer. Students on these programs pay a set program fee, which generally covers tuition, housing, some meals, and excursions, although the details vary from program to program. Eligibility requirements vary, but many programs are open to students in good academic standing (2.0 GPA) who have completed their freshman year. Students typically earn 3 or 6 hours of credit on summer programs. The programs below are scheduled for summer and spring break 2010. For the full list of programs for the current year contact the Study Abroad Office at study_abroad@ncsu.edu or see the website http://studyabroad.ncsu.edu.
Africa
Accra, Ghana, West Africa (Spring Break). During this 11-day program, students will explore the past, present, and future of the African experience through service-learning opportunities and visits to historical sites. This program includes day trips to Ho, Kumasi, Accra, and Cape Coast/Elmina. Students will earn 1 Africana Studies credit: AFS 491 - Exploring History and Culture in the Motherland.

Ghana/Togo/Benin, West Africa. This intensive five-week summer program in West Africa is offered through the Africana Studies Program at NC State University. It focuses on an exploration of history and culture across three West African countries. Home stays instruction in an African language and service-learning will be key components of the program.

Windhoek, Namibia. This three-week summer program allows students to discover the spectacular desert landscapes of Damaraland, observe diversity of wildlife and experience the natural wonder of Etosha National Park, and learn about cheetah conservation in Namibia. Students will spend time in the oldest desert in the world, the Namib. Upon successful completion of the program, students earn 3 credit hours of FW 465 or FW 565: African Ecology and Conservation.

America
Cuernavaca, Mexico. Students have the opportunity to study Spanish and Mexican culture at the Universidad Internacional en Cuernavaca, and immerse themselves in the culture and language of Mexico by living with a family. The program includes multiple day trips to places of historic and contemporary interest. Students earn up to 6 credits beginning to advanced in Spanish language and literature classes.

Cuzco/Lima, Peru. This six-week program begins with a twelve-day travel study focusing on the Incan and colonial heritage of Peru, including visits to Macchu Picchu and Cuzco. The travel study is followed by four weeks of study in Lima. There, students will live with local families and make several field trips to surrounding areas. Up to six credit hours are available in advanced Spanish language, Hispanic literature and Latin American studies courses.

Lake Atitlan, Guatemala: Anthropology. This is a seven-week program of intensive ethnographic fieldwork focusing on the problems of sustainable eco-tourism in Guatemala. During the program, students spend time living with Guatemalan families in the Lake Atitlan area of the Western Highlands. The focus is on ethnographic methods and learning about the socio-cultural and economic issues surrounding Guatemala’s tourism industry. Service learning opportunities are available. Students earn up to six credits Anthropology course credit. Courses are taught in English.

Lake Atitlan, Guatemala: Social Work. Students will enhance their provision of social work services to Latino clients through learning Spanish language, culture and social service responses and solutions in Guatemala. During the program, students live with a Guatemalan family in the Panajachel area. In addition to course work earning six credit hours, students spend time each week in a hands-on service learning/research experience working in a governmental, neighborhood or community organization. Course is taught in English.

Nevis & St. Kitts: Archaeology. Designed for undergraduate Anthropology majors and minors, this program will teach students the fundamental skills required of archaeologists when conducting survey and excavation. Students will work closely with Dr. Scott Fitzgerald and archeologists and students from Great Britain and the Netherlands to collect, examine, and record the cultural remains from the Coconut Walk site on the island of Nevis. Students will enroll in two three-credit Anthropology courses for a total of six credit hours.

Costa Rica: Sustainability of Tropical Agroecosystems. This program will provide a valuable hands-on experience in examining the environmental, economic, and socio-cultural aspects of tropical agricultural production systems. Students will travel from the Central Valley to both the Atlantic to Pacific oceans, exploring all of the major ecosystems and major agricultural areas of Costa Rica. During the three weeks, students will visit numerous sites such as Irazu Arenal volcanoes, EARTH and CATIE agricultural universities, Tortuguero, Monteverde, and the University of Georgia’s Ecolodge in San Luis. Students will earn three credits in Crop Science. Course is taught in English.

Costa Rica: Tropical Plant Pathology. This class introduces students to agriculture in the tropics and diseases on tropical crops including cacao, potato, root vegetables, and coffee. Trade issues relevant to U.S. and Central American farmers are discussed. Students learn about diseases and social and political issues facing farmers in the developing world.

Canada: Sustinable Use of Natural Resources. This course explores multiple factors determining societal use of resources: terrain, climate, vegetation communities, faunal assemblages, social structures and technologies implemented. Communication across cultures and genders, as it affects understanding of differing perspectives is an important sub-theme of the course.

Valdiva, Chile: Forestry Study Tour (Spring Break). This spring break program is sponsored by the College of Natural Resources and the Department of Forestry and Environmental Resources and is designed for students with an interest in native forest and watershed management and conservation. Dr. Susan Moore will lead the study tour focused on the conservation of native forests in the Valdivian Ecoregion. Students will visit experimental forests, national parks, wetlands, the 2000 year-old Alerce forests, private protected areas and botanical gardens.

Mexico City, Mexico: Doing Business Internationally (Spring Break). This program provides a first hand look at global business in action while learning about a foreign culture and business environment. Student participants on this program will travel with a business delegation from North Carolina as part of the Export Ready Program to attend the EXINTEXT Expo
textile trade show. This program was developed in conjunction with the U.S. Department of Commerce and the NC Department of Commerce and an ongoing program with Wake Tech Community College’s Small Business Center.

San Ramon, Nicaragua: Tropical Wildlife Study Tour (Spring Break). This special tropical forest program provides an opportunity to visit the permanent bird banding station at Finca Experanza Verde (Green Hope Farm) outside of San Ramon, Nicaragua. The program is offered through a partnership among Eco Quest Travels, Guilford College, the NC Museum of Natural Sciences, Audobon, NC, and NC State University. Students will participate in collection of long-term data on bird use of a shade-grown coffee plantation. The tour also will visit several tourist destinations in Nicaragua, including two volcanoes, two shade-grown coffee plantations, both high elevation tropical forest and dry tropical forest and three different nature reserves. Class discussions will center on human influences on tropical forest ecosystems.

Asia
Hangzhou, China: Plant Resources & Ecology. Through lectures and field trips to nearby mountains for the collection and identification of plants, students will examine natural plant resources, people and religion in Hangzhou and adjacent areas of China. Students from Zhejiang University will join the group during lectures and fieldwork to enhance cross-cultural exchange during this 3 week Plant Biology program.

Hangzhou, China: Traditional Chinese Medicine. Students will have lectures on Traditional Chinese Medicine, medicinal plants, the history of Chinese medicine and tour TCM hospitals. There will also be opportunities for cultural tours to famous Hangzhou and regional tea plantations (Longjing tea), museums, markets, temples and parks (West Lake), in addition to cross-cultural exchange with students at Zhejiang University.

Hangzhou, China: Business & International Relations. This program at Zhejiang University in Hangzhou, China provides the perfect balance of coursework and cultural immersion. Classes are taught in English by NC State faculty. Students can fulfill general education, business and political science requirements. The program includes special cultural and class activities, planned excursions (including three days in Shanghai) and scheduled interaction events with Chinese students.

Hangzhou, China: Mechanical Engineering Design. The core educational activity of this six week summer study abroad program will be participation in a mechanical design project with Chinese students at Zhejiang University in Hangzhou, China. Students will earn six hours of NCSU degree credit while visiting and studying in China’s most beautiful city at one of its preeminent universities and working on a real industrial design problem in a design engineering/team project course with junior/senior level Chinese Mechanical Engineering students. An optional post program tour of Beijing will also be available.

Hangzhou, China: Physical Chemistry. The focus of this program is a physical chemistry course, with a main lecture series complemented by breakout sessions to permit students in Biochemistry, Chemistry or Engineering to obtain credit for CH 331, CH 433, or CH 437, respectively. In addition, a research project in computational chemistry will permit students to work with Chinese graduate students in a project that will train them in current methods while learning how research is conducted at one of the top universities in China.

Nanjing, China: Chinese Language. This program is sponsored by the Confucius Institute at NCSU and is designed for students interested in studying Chinese language and culture. During the five week program, run in cooperation with Nanjing Normal University, experienced teachers who are specialized in teaching Chinese as a second language will teach an intensive Chinese language course. Various cultural activities such as lectures on topics of Chinese culture, attendance at Chinese art performances and excursions to Beijing, Shanghai and Suzhou will also be arranged.

Bangkok, Thailand: Anthropology Field School. Students will be primarily based in Bangkok where they will be immersed in Thai culture while simultaneously learning to conduct anthropological research in the field. This 4-week program will also involve excursions to such places as the ancient capital of Ayutthaya and the beach resort of Hua Hin, allowing students to gain exposure to different areas of the country.

Lopburi & Bangkok, Thailand: Archeological Field School. This program begins in Bangkok for a few days of cultural adjustment and then moves to Lopburi, where students will learn about the prehistory of Thailand while excavating and analyzing archeological and skeletal materials from the Iron Age site of Promtin Tai (ca. 2000 - 2500 BP). Students will also have the opportunity to visit the Bronze Age site of Ban Prasat and to take a wildlife tour of Khao Yai National Park, home to wild elephants, gibbons, monkeys, and a wide variety of colorful birds.

Middle East
Cairo, Egypt. This program will be situated in Cairo, where students will explore the richness of Egypt’s Pharaonic, Coptic and Islamic past, as well as experience contemporary life in the largest city of the modern Middle East. In addition to using lecture-based materials to learn about Egypt’s history, students also will visit examples of Egyptian material culture. This five-week experience will deepen the students’ knowledge of exposing them to the complexities of Arab culture, society, religion, economy and policy. It will humanize this knowledge by providing them with the opportunity to encounter people behind the histories, statistics and headlines they have studied at NC State.

Australia and New Zealand
New Zealand. Students on this program provides students the opportunity to spend 3.5 weeks in New Zealand examining the natural history, related social history, and resource conservation of New Zealand’s South Island. New Zealand’s isolation, after its separation from the ancient Gondwanaland millions of years ago, has left this island nation with a unique...
natural heritage. The plants and animals that have evolved here are unknown elsewhere in the world. This program will focus on topics related to sustainable development (sustaining human societies and the natural environment) through educational travel, field trips, active participation, lecture presentations and seminars, and coursework exercises. The goal of this course is using the New Zealand case to integrate the different perspectives of diverse natural, biological, and social science disciplines to improve understanding of relationships between human societies and the natural environment.

Queensland, Australia. This program have the opportunity to spend four weeks in Australia studying Australian culture, wildlife, vegetation and agriculture. The program begins with two weeks at the University of Queensland’s Gatton Agricultural Campus where students will be introduced to a variety of livestock and agricultural farming practices. In addition to a variety of farm visits, students will learn about Koala conservation, as well as see first-hand the practices of a major trading partner of the U.S. Students will spend the final two weeks of the program at the University of Queensland’s main campus, one of the most scenic campuses in Australia. Here, students will continue to learn about the Australian farming system, farm animals, wildlife and vegetation. In addition, they will be introduced to Australian history, aboriginal culture, politics and art.

North Queensland, Australia. This unique program provides students the opportunity to spend three in a half weeks in North Queensland, Australia examining the natural history, related social history, and environmental conservation of the area. The Queensland region boasts some of the most diverse and remarkable natural resources in the southern hemisphere. The five days of this program are based in Townsville and Magnetic Island in Tropical Far Northeast, with classes held on the campus of James Cook University in nearby Townsville and in the field with several trips to local points of interest. Students will then spend over two weeks on travel-study through Northern Queensland, exploring the network of national parks, reserves, an outback cattle station, and coastal area.

Australia: Equine Industry. Students are introduced to the Australian equine industry in this program by traveling for two weeks to Hunter Valley in New South Wales and in southern Queensland to several unique equine facilities. Students will experience the racing industry and get hands-on experience with the training and handling techniques used for young horses at the University of Queensland’s (UQ) Equine Unit at the UQ Gatton Campus, in addition to working in the stables and taking part in seminars and lectures at the campus and visiting racetracks, thoroughbred stud facilities, polo and polocrosse training facilities and equine hospitals.

Adelaide & Brisbane, Australia: Civil Engineering. This program will be conducted at the University of Adelaide in South Australia and at the Queensland University of Technology in Queensland in northeast Australia. The program will begin with a tour of Sydney, Australia’s largest city and business center, and them move on to Adelaide & Brisbane for several weeks in each city. Classes in civil engineering will be taught by NC State instructors, with guest lectures and field trips planned to explore Australian themes.

Europe

Burgundy & Paris, France. Spending one week in Burgundy and one week in Paris, students will study and experience French culture, art, architecture, and cuisine in the City of Light and one of the most famous and beautiful regions of France. The week in Burgundy includes visits to regional capital Dijon, Côte d'Or wine region, UNESCO World Heritage Sites at Fontenay, and Vézelay, Musée Gorgline, Château de Bussy-Rabutin, Château d'Ancy-le-Franc, and Flavigny. The week in Paris includes guided visits to Notre-Dame, Sainte-Chapelle, Louvre, Musée d'Orsay, Opera, Palais-Royal, and surrounding arcades, and Grands Boulevards entertainment and shopping district, with many other optional visits.

Florence, Italy. This program is sponsored by the University Scholars Program. The magical, historic city of Florence is the backdrop for students to explore topics in history, architecture, philosophy, politics, artistic movements and civic life of the Italian Renaissance period. Six credits are available through a variety of courses including art history, studio art, and Italian language, taught in English by the outstanding faculty at the Lorenzo de Medici Institute. The course “Italian Renaissance Civilization and Culture” is required for all participants.

Lille & Paris, France. The Lille program is designed for students interested in studying French language and culture, plus arts, politics, or business and management while immersing themselves in the French environment. The program begins with an eight-day study tour in Paris and Normandy. Visits include bike and boat tours of Paris, the major museums and monuments, and day trips to Giverny and Vaux-le-Vicomte, and visits to Mont St. Michel, the Bayeux Tapestry, the American Military Museum at Omaha Beach, and Honfleur. After completing the travel study tour, the group will travel to Lille for the remaining four weeks of the program. The academic program is located at the Université Catholique de Lille. Classes are held during the week and will be taught by local faculty and supervised by the NC State Faculty Director, and the Lille Summer Program Coordinator.

London, England & Paris, France: London-Paris Experience. This program combines academic study with an opportunity to explore in depth some of the history, literature, architecture, visual and performing arts of two of the world’s greatest cities. Students will spend two weeks in each city and take two three-credit courses, one in History and one in Arts Studies, both of which can meet NCSU GER requirements.

Paris, France (Spring Break). The class will focus on language, history, and art/architecture. Students will keep a reading/viewing journal throughout the semester responding to instructor prompts in the U.S. and abroad. They will also complete a 15-page research paper on some aspect of French culture including art, architecture, literature, or history, earning three credits upon completion of the course.
The NC State sponsored Study Abroad Group Summer Programs vary by year and some programs may not be listed here as they are offered every other year. For the most up to date information, please visit our website at studyabroad.ncsu.edu.

Oxford, England. The Oxford summer program provides students the opportunity to study and live at Oxford University while enjoying places of historic interest in the city of Oxford. The program goal is to provide students an opportunity to study academic subjects, which most readily benefit from being taught in England, such as Shakespeare, Art Treasures of Oxford, and British history since 1930. These courses can meet NCSU GER requirements. The program brings together a diversity of students to live at Oxford college and to study in a way, which exemplifies the Oxford tradition of academic life, through British tutors and lectures from the University of Oxford. Over 700 students have participated in the Oxford program over the last 28 years. Day trips include London, Wells, Glastonbury, and Stonehenge. Students earn up to six NCSU credits.

Edinburgh, Scotland: Writing Workshop. The two-week Edinburgh Writing Workshop will focus on three facets: one third will be cultural, touring the historical sites and museums of this important and renascent world capital; another third will be the reading and discussions of Scots Literature, from centuries back as well as hot off the press; and the final third is the writing workshop, where the students are expected to bring original stories on a theme (this year stories must involve an international location) and develop and improve them in the workshop practicum.

Ireland. Students on this program will study Irish literature and film and experience first-hand the beautiful landscapes and ancient heritage that inspired such poets as Yeats, O’Casey and Joyce. Designed as a traveling program, students will travel to Galway, Sligo, Dublin and Cork, and will experience many other locations in Ireland as well. Visiting Trinity College and the Book of Kells, cruising Lough Gill, touring the Cliffs of Moher, and dining at a historic castle are only a few of the experiences students have to look forward to on this program.

Perugia, Italy. This program is for students from NC State who are attending or will attend courses in Italian at every level with the main goal of improving their fluency in the Italian language while living in Italy and attending courses at the University for Foreigners in Perugia, which specializes in Italian as a second language. Italian university classes are taught by Italian faculty and supervised by an NC State faculty director on site. Students can earn up to 6 credits for each level. On this program, students can fulfill the GER foreign language requirement.

Poznan, Poland. The Poznan, Poland program is sponsored by the College of Agriculture and Life Sciences (CALS) and is designed for students interested in biotechnology or pre-med. In Poznan, students will utilize the city and surrounding area to explore science, history, and culture. The program will be housed at Adam Mickiewicz University (AMU) and students will have the unique opportunity to interact with local English-speaking Polish university students. The classes, excursions, and field trips offered will encourage the students to learn more about this new member of the European community but the oldest country and culture in Europe.

Prague, Czech Republic. Prague, one of Europe’s most beautiful and historic cities, offers several summer programs in different fields of discipline. The following are the 6-week programs offered at the Prague Institute: Education, Fibers and Surface Design Studio, General Studies, and Industrial Design Studio. In addition to these six-week programs, the following shorter programs are also offered at the Prague Institute: International Studies (three weeks), Accounting (three weeks), and Management (three weeks). All courses are taught in English.

Segovia, Spain. The Segovia program is designed for engineering majors/minors. Segovia, a small city 55 miles northwest of Madrid, has a unique historical mix of diverse cultures. It is an ideal setting for students who are considering the relationship between technology and culture and in finding their place in our global society. Classes encourage the ability to use the Spanish language in authentic settings and allow students to study and experience the rich culture of Spain. Students take two courses for a total of six credit hours.

Valencia, Spain. This is a Spanish language and culture program sponsored by the Department of Foreign Languages & Literatures. Students will live in the homes of Spanish families throughout the program while attending classes during the week at the Servicios de Programas Universitarios program office, which is centrally located in Valencia. The classes are all 300- or 400-level Spanish classes and will be taught by Spanish professors. Students will earn up to six NC State credits.

Vienna, Austria. The Vienna program is sponsored by the College of Humanities and Social Sciences (CHASS) and the Department of Foreign Languages and Literature. Students will have the opportunity to spend 4 weeks in one of the cultural centers of Europe. The program offers one German Language Course (any level) and one course on arts and culture of Vienna around 1900. The program is run in conjunction with IKI (Internatinales Kulturinstitut), and all courses will take place at the IKI center in the heart of Vienna. The program will include a walking tour of the old town of Vienna and a city tour. We will do an overnight trip to Salzburg, the birthplace of Mozart. Prague, capital of the Czech Republic, with its famous castle and its historic down town is another destination of a weekend trip. Students will have time to explore Vienna and Austria on their own.

The NC State sponsored Study Abroad Group Summer Programs vary by year and some programs may not be listed here as they are offered every other year. For the most up to date information, please visit our website at studyabroad.ncsu.edu.
STUDENT SERVICES

Bookstores
NC State Bookstores is the official bookstore serving North Carolina State University. The bookstore operates for the convenience of NC State University students, faculty, administration, staff and campus visitors. All monies generated through the bookstore are returned to the university for need-based financial aid programs. The main bookstore is located next door to the Talley Student Center on main campus.

The bookstore offers a variety of cost cutting programs to help students save money on the cost of textbooks including Guaranteed Buyback, eBooks, a huge selection of used textbooks and textbook rentals.

Accessing your online textbook list:
Students may now view and print their personalized textbook list directly from the online course catalog in MyPack Portal.

Online Textbook Ordering:
Online textbook ordering will open just prior to NC Sales Tax Holiday in August so that everyone has the opportunity to save the cost of sales tax. If you need to place an order early, you may also use the Ger Booked Early Textbook Reservation program, which is available during New Student Orientation and may also be eligible for Sales Tax Holiday. For the spring semester, online ordering typically opens in early December.

Sales Tax Holiday:
Students can shop in-store or online to receive tax holiday savings. The law changes slightly each year, so check the bookstore’s website prior to ordering your textbooks, computers and school supplies before the beginning of the fall semester.

Student Owned Laptops:
NC State Bookstores partners with the College of Engineering and several major computer manufacturers to offer select computer configurations at special academic pricing. Each model meets the university’s computer hardware purchasing recommendation and cab be customized to meet individual college requirements. If purchasing a laptop prior to the fall semester, check the bookstore’s website for Sales Tax Holiday ordering deadlines.

New Students: Please visit the bookstore’s website for helpful information: www.ncsu.edu/bookstore/welcome.html

Campus Recreation
The mission of Campus Recreation is to provide diverse programming, intentionally creating an environment that fosters leadership and social development, healthy active lifestyles and lifelong wellness for the NC State community. Our commitment to student development and student empowerment is reflected through providing experimental learning opportunities and utilizing collaborative partnerships with academic programs, student organizations, and other university resources to complete the college experience. Recreating today. Preparing for tomorrow.

Club Sports
Club Sports offer students, faculty and staff the opportunity to participate in competitive sports at a high level. NC State offers more than 54 competitive club sports, all of which are student-led and student-managed. The student leaders provide a fun and competitive atmosphere allowing participants to continue playing the sports they love, giving them the opportunity to meet new people and try new activities. Club Sports are the perfect way to stay active, learn new skills and network on- and off-campus.

Fitness
Fitness provides diverse opportunities for students, faculty and staff to meet their health and fitness needs. Fitness programming offered includes 70 group fitness classes each week, indoor group cycling, meditation, mind and body classes, one-on-one and group personal training, fitness assessments, massage therapy, and body fat and blood pressure screenings, which are available to members of the Carmichael Complex.

Intramural Sports
Intramural Sports offers a wide variety of structured activities for students, faculty, and staff. The program offers individual, dual, and team sports for men, women, coed teams in a variety of seasonal league and tournament formats. All participants are affiliated with NC State University.
Outdoor Adventures
Outdoor Adventures offers adventure-based trips, workshops, open pool sessions, belay clinics, rental equipment, a freshmen wilderness orientation program, a bicycle rental program and open climbing on the Rock Wall. Additionally, Outdoor Adventures offers a team building and leadership development program in conjunction with our Challenge Course, comprised of a high and low ropes program.

Special Events
Campus Recreation offers numerous special events for students, faculty and staff that provide increased participation opportunities in alternative activities and promote community interaction in a variety of activity settings and locations. Activities can range from golf tournaments and clinics to CPR and First Aid classes, and all are guaranteed to be fun and exciting!

The Department of Campus Recreation is located in Carmichael Gymnasium, Room 1000. For more information, please see the following website: www.ncsu.edu/stud_affairs/campus_rec.

The University Career Center
The University Career Center’s mission is to assist students in developing their career goals, to help them achieve those goals by providing internship and job resources, to teach students effective job search skills, and thus instill in them a sense of career confidence.

Career Center services are designed to meet the needs of all students, from freshmen to graduate students, in their various stages of career development. Career counselors meet with students one-on-one and also present career related information to student groups and academic classes on topics such as choosing a career path, resume development, and interview strategies.

The Career Center’s online student resume/job and internship resource (ePACK) allows students to post resumes, to view and apply for internships and jobs, and to sign up for interviews with employers. A wealth of career information is available on the Career Center’s website at www.ncsu.edu/career.

The Career Center is located in 2100 Pullen Hall. Phone (919) 515-2396

Chaplains’ Cooperative Ministry
Ann Pearce, Director
3106 Talley Student Center
Box 7306, NC State 27695
(919) 515-2414; e-mail: acpearce@ncsu.edu

The Chaplains’ Cooperative Ministry at NC State is an interfaith organization which both supports individual campus ministries and plans jointly sponsored interfaith programs for students, faculty, and staff. Its members, both ordained and non-ordained, strive to be leaders within the university as inquiry and dialogue are engaged with trust at all levels. The office has a prominent location on the third floor of the Talley Student Center. Ministries within member groups support the spiritual and emotional growth of students through scriptural studies, worship, meals, socials, various outings, retreats, mission trips, counseling, service projects, and opportunities for leadership. Following is a list of current phone numbers and addresses:

University Liaison
Michael Giancola
3115 Talley, Box 7306, Raleigh, NC 27695
515-9248; e-mail: mike_giancola@ncsu.edu
www.ncsu.edu/cslcpcp

Baptist Student Union
Charity Roberson
2702 Hillsborough Street, Raleigh, NC 27607
834-1875; e-mail: raleighbsu@gmail.com
www.raleighbsu.org

Campus Christian Fellowship
Joe Blanchard
2525 Hillsborough Street, Suite #202,
Raleigh, NC 27650
910-599-3002; e-mail: joe@ccf-ncsu.org
www.ccf-ncsu.org

Campus Crusade for Christ
Mike Mehaffie
1912 Myron Drive, Raleigh, NC 27607
539-3039; e-mail: michael.mehaffie@uscm.org
www.ncsucrusade.com

Campus Outreach Raleigh
Bryan Bender
1017 West Peace Street, Raleigh, NC 27605
803-5978; e-mail bbender@campusoutreach.org
www.campusoutreach.org

 Catholic Campus Ministry
(Doggett Center for Campus Ministries)
Fr. Alex Gonzalez
600 Bilyeu Street, Raleigh, NC 27606
833-9668; e-mail: ccminterns@gmail.com
www.catholic-ncsu.org
<table>
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<tr>
<th>Ministry</th>
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| **Chi Alpha Christian Fellowship (Assemblies of God)** | Brian Hargett  
17 Enterprise Street, Raleigh, NC 27607  
821-9823; e-mail: ncsuxa@aol.com  
www.xa-ncsu.com |
| **Disciples Student Fellowship** | Rev. Luke Miles  
718 Hillsborough Street, Raleigh, NC 27603  
832-3953; e-mail: luke@hillyerchurch.org  
www.hillyerchurch.org |
| **Episcopal Campus Ministry** | Rev. Deborah Fox  
2208 Hope Street, Raleigh, NC 27607  
834-2428; e-mail: deborah.fox@ecm-raleigh.org  
www.ecm-raleigh.org |
| **Grace Community Church** | Rev. Berk Wilson  
201 Coorsdale Drive, Cary, NC 27511  
467-7670; e-mail: graceforyou@juno.com  
www.graceforstate.org |
| **Hillel - Jewish Student Life** | Geoff Brown  
201 West Cameron Ave; Chapel Hill, NC 27516  
942-4057; e-mail: geoff@nchillel.org  
www.nchillel.org |
| **InnerWeave Ministries (St. John’s M.C.C.)** | Rev. Belva Boone  
805 Glenwood Avenue, Raleigh, NC 27605  
834-2611; e-mail: moc@stjohnsmcc.org  
www.stjohnsmcc.org |
| **InterVarsity Christian Fellowship** | Amy Phillips  
116 Burkwood Lane, Raleigh, NC 27609  
673-5317; e-mail: amy_phillips@ivstaff.org  
www.angelwolfiv.com |
| **Lutheran Campus Ministry (ELCA)** | Rev. Beverly Alexander  
2723 Clark Avenue, Raleigh, NC 27607  
828-1433; e-mail: balexander@htelc.org  
www.ncsu.edu/stud_orgs/luth |
| **The Navigators** | Todd Harrison  
228 Mediate Drive, Raleigh, NC 27603  
274-5532; e-mail: th0707@gmail.com  
www.ncsunavigators.org |
| **Presbyterian Campus Ministry (USA)** | Rev. Scott Philips  
27 Horne Street, Raleigh, NC 27607  
834-5184; e-mail: scott@wrpc.org  
www.ncsu.edu/stud_orgs/pcm |
| **Reformed University Fellowship (PCA)** | Rev. Chuck Askew  
PO Box 10095, Raleigh, NC 27605  
559-2762; e-mail: caskew@ruf.org  
www.ncsu.ruf.org |
| **Wesley Foundation (United Methodist)** | Rev. Kirk Oldham  
2503 Clark Avenue, Raleigh, NC 27607  
833-1861; e-mail: office@raleighwesley.org  
www.raleighwesley.org |
Interfaith Coalition

The Interfaith Coalition is sponsored by the Chaplains’ Cooperative Ministry and is made up of leaders who represent registered religious groups at NC State. All members are proponents of inquiry, dialogue, and truth, and while not denying the truths of their own traditions, willingly cooperate with and support the other members in the development of their communities.

Baha’i Club
Dominic Scimeca
2370 Wolf Village Way, Raleigh, NC 27607
630-8585; e-mail: dsscimec@ncsu.edu
www.ncsu.edu/stud_orgs/bahai

Buddhist Student Association
Padmini S. Hands
7404 Chapel Hill Road, Raleigh, NC 27610
859-3433; e-mail: phands@gmail.com
www.sgi-usa.org

Latter-day Saints Institute of Religion
Eric Marlowe
6 Enterprise Street, Raleigh, NC 27607
833-3484; e-mail: marloweek@ldsces.org
www.ldsces.org/institutes

Muslim Student Association
Sara Haddad
2412 Bryarton Woods Drive, Raleigh, NC 27606
946-4060; e-mail: sshaddad@ncsu.edu
www.ncsumsa.org

Self Knowledge Symposium
Jennifer Peeler
4030 Alexander Hall, Raleigh, NC 27695
828-380-0316; e-mail: info@selfknowledge.org
www.selfknowledge.org

Unitarian Universalist Fellowship of Raleigh
Rev. Tom Rhodes
3313 Wade Avenue, Raleigh, NC 27607
781-7635, e-mail: minister@uufr.org
www.uufr.org

Counseling Center

The Counseling Center assists individuals in gaining a better understanding of themselves. Psychologists, professional counselors, and psychiatrists are available to work with students who desire assistance with concerns such as choosing a career, academic planning, identifying and overcoming educational difficulties, developing greater self-understanding, developing more satisfying personal relations, and coping with stress or emotional crisis. All counseling is strictly confidential.

In addition to individual counseling, workshops and support groups are offered throughout the year in a variety of areas such as time management, stress reduction, study skills, and relationship skills.

The Counseling Center is located in the Student Health Center, 2815 Cates Avenue, 2nd Floor. Appointments may be scheduled by coming to the Counseling Center or, if that is not possible, by calling (919) 515-2423. Additional information about Counseling Center services can be found at: www.ncsu.edu/student_affairs/counseling_center.

Disability Services

The Disability Services Office (DSO) facilitates accommodations and services for individuals with documented disabilities and serious medical conditions. Accommodations and services are rendered based on the individual’s documented needs and are determined through an interactive process. DSO will maintain appropriate confidentiality of records and communication regarding disability. To receive accommodations and services, please contact the DSO as far in advance as possible. The DSO office is located on the third floor of the FYC Commons, 2751 Cates Avenue, Suite 1900, phone: voice - (919) 515-7653, TTY - (919) 515-8830, fax: (919) 513-2840, website: www.ncsu.edu/dso.

Food Service

University Dining, offers more than 20 locations to eat across campus, including three all-you-can-eat dining halls, two food courts, five Port City Java Cafes, an ice cream shop, and eight C-Stores, as well as a host of vending machines conveniently located across campus.

We pride ourselves on offering a wide variety of options, including vegan and vegetarian. Our registered dietitian is available to assist with dietary restrictions and to provide nutritional or diet counseling.

Meal Plans

While only first-entry students living in University Housing are required to participate in a meal plan for two semesters, almost all upper-class, on-campus residents choose to stay on our plans because we serve great food and offer flexible, affordable options.
North Carolina State University

Meal plans are built around a Meals Component, which is a set number of meals per week or semester that you can use to access the dining halls or toward meals at our quick-service eateries and cafés. It is augmented by Board Bucks, which is the “no-rules” part of the plan that gives you extra buying power at our quick-service eateries and cafés. You can also use Board Bucks to make C-Store and vending-machine purchases.

University Dining takes pride in offering quality food and services designed specifically to meet the wants and needs of students. For information go to www.ncsudining.com or call (919) 515-3090.

Health

The university seeks to safeguard the health of the students in every way possible. Student Health Services, located in the Student Health Center, offers medical care to students on an outpatient basis. The facility is staffed by full time Board certified physicians, physician extenders, registered nurses, and other medical support personnel.

Health Services is open for outpatient medical care from 8 a.m. to 9 p.m., Monday through Friday (open 9 a.m. Tuesdays), and 8:30 a.m. to 11:30 a.m. on Saturdays (for urgent care) during fall and spring semesters (excluding breaks). Physicians maintain regular office hours Monday through Friday (8 a.m. - 4:30 p.m.) and are on call at other times. A nurse staffed clinic is operated during weekday evenings (4:30 p.m. - 9 p.m.). Patients are seen by appointment (919) 515-7107; Women’s Health (919) 515-7762. Summer session hours are Monday through Friday, 8 a.m. to 4:30 p.m. with no after hours services. The main number is (919) 515-2563 or visit www.ncsu.edu/student_health.

All registered students pay a health fee which covers outpatient professional services; i.e. visits to a nurse or physician, some laboratory procedures, some medications available in the pharmacy, visits to the Counseling Center and to Health Promotion. There is a charge for x-rays, most lab tests, allergy injections, prescription medications and special clinics. Students are responsible for the cost of medications in the student pharmacy, and expenses incurred when referred to an off-campus laboratory, physician, hospital, or pharmacy. All health and medical information is confidential and is not divulged to anyone without the written consent of the patient.

Health Educators offer a variety of information, programs, and services to students. Health topics include weight control, alcohol and drug education, stress management, sexually transmitted diseases, women’s issues, violence prevention, and more. Call (919) 515-WELL (9355) for information. A health minor is offered jointly with the Physical Education department. Healthy State focuses on “eat smart & move more” with a resourceful website at www.ncsu.edu/healthystate.

Medical Insurance

The university offers students a medical insurance program to purchase. The insurance covers the surgical, accident, and hospital needs of participating students as a supplement to Student Health Services. Each year complete information is available to students at the start of the fall and spring semesters. Students are strongly encouraged to have medical insurance protection of some type.

Transportation

Permit

All students (including Freshmen) living on or off campus may purchase a parking permit until all available student parking space is sold. Demand for permits does exceed supply. A nine-digit student ID is required; permits are purchased online at www.ncsu.edu/transportation beginning in early July based on credit hours; first-come, first served. Permits are mailed to the address provided at time of purchase. Freshmen are most likely sold a perimeter/storage lot permit served by the university bus service, Wolfline. Instructions on the homepage above will guide you through the purchase process.

Parking Enforcement

Appropriate parking permits must be displayed between the hours of 7 a.m. - 5 p.m., Monday through Friday (resident zones are enforced until midnight, Monday through Thursday). Permits are not required after 5 p.m. in any unreserved space/lot. Never park in “24-hr. reserved,” accessibility spaces, fire lanes, or “no parking at any time” areas. Students are strongly encouraged to join the Packparking Listserv for the latest news and information about parking permits, construction projects, road closings and more.

Wolfline (Buses)

All Wolfline buses are accessible and equipped with the Transit Visualization System (TVS) which allows you to see your real-time bus location online. No fare is required. Service frequency varies, but generally daytime service is available every 10 - 15 minutes, as well as evening service. Wolfline buses operate every day classes are held and during exams. They provide intra-campus service, service to the McKimmon Center, park and ride lots, storage lots and surrounding areas along the routes. There is no bus service on official university holidays. A special holiday/break shuttle service operates the evening before classes resume after holidays and provides continuous shuttle service connecting storage lots and residence halls. Rt. 6 Carter Finley, Rt. 7 Wolflink Shuttle, and Rt. 8 Southeast Loop continue to operate every day that faculty and staff report to work. Please visit the Wolfline website www.ncsu.edu/wolfline for the most up-to-date information about park and ride lots and locations, and bus routes and schedules. Free parking is provided (no permit required, but no overnight parking) in park and ride lots. For the latest Wolfline news, join the Wolfline Listserv, become a fan of NCSU Wolfline Facebook, contact (919) 515-WOLF or the Transportation Office, (919) 515-3424.
City/Regional Buses
The GoPass program allows students to ride the city buses, Capital Area Transit (CAT) and the regional buses, Triangle Transit (TT), for no fare. All that is needed to travel to your favorite Raleigh or Triangle destination is a GoPass swipe card (available from the Transportation Office with a valid student ID).

Bicycles/Walking
Bicycling is also an inexpensive, healthy and environmentally-friendly way to travel to, from and around campus. Bike racks are conveniently located throughout our three campuses. Students are strongly encouraged to register their bicycles on-line at the website above or at Campus Police and Transportation Offices. For more information on bicycling and walking on campus (including a WalkTimes map), please visit WolfTrails at www.ncsu.edu/wolftrails.

Transportation is located in Administrative Services I, 2721 Sullivan Drive, 7 a.m. - 5 p.m., (919) 515-3424.

STUDENT ACTIVITIES
The university makes every effort to provide surroundings that are pleasant and conducive to intellectual and personal growth. In addition, a wide variety of athletic, cultural and social opportunities are available to students. Through the services and activities affiliated with campus life, as well as through extracurricular organizations and functions, students at NC State may acquire experience in group leadership and community living to supplement and enrich their education.

Student Government
Every NC State student is a member of a community that exercises executive, legislative and judicial authority in matters of student life. Students have a voice in government through participation in campus-wide elections of officers and legislators and may apply to serve in the judicial branch. For more information please visit http://students.ncsu.edu.

Greek Life (Fraternities and Sororities)
There are over 40 Greek letter organizations at NC State University, and four pillars guide each: Leadership, Scholarship, Service, and Sisterhood/Brotherhood. While the fraternal values of each organization are similar at the core, each organization expresses itself through its unique membership. At State, we have social fraternities and sororities, historically African-American and Multicultural Greek letter organizations, and fraternities and sororities that recruit by academic focus or common interest.

Regardless of affiliation, being Greek means more that just wearing Greek letters, attending meetings, and participating in social events. Being in a fraternity or sorority is about making friendships that will last far beyond your college years while enhancing your personal development by committing to ideals of scholarship, leadership, and service. It is being respected for your individuality while being part of a brotherhood or sisterhood with individuals who share the same goals and values. Your brothers or sisters are there to support you, making your transition to college easy and fun.

Membership is a solemn commitment. Joining a fraternity or sorority means a lifelong dedication to the ideals and principals of Greek life. Greek men and women are successful in life because they put into action the values they learn during the undergraduate years of affiliation.

For more information on membership, educational programming or service opportunities, visit the Department of Greek Life’s website at www.ncsu.edu/greek_life, the office in 1104 Pullen Hall, or call (919) 513-2910.

Student Media
NC State students have the opportunity to produce and manage a variety of student-oriented media. By working with these media, students gain valuable cocurricular experience in journalism, broadcasting, production, design, leadership and management. There are five media staffed by students and supported in large part by non-academic fees. Many staff positions are paid.

Agromeck, the university’s yearbook, provides a record in words and pictures of student and campus activities during the past year. Student staff members include photojournalists, writers, designers and editors, all with a common mission—to document the history of the university. The Agromeck has received some of the nation’s highest awards for general excellence and photography as well as national Pacemaker and Crown awards. website: www.ncsu.edu/agromeck

Nubian Message provides news and features about the African-American community at NC State. website: www.ncsu.edu/nubian

Technician, the university’s oldest student newspaper, is published daily when school is in session during the fall and spring semesters and weekly during the summer. With a circulation of more than 10,000 and an online circulation of 4,000 daily, the broadsheet newspaper, funded almost solely through advertising income generated by a student business staff. The Technician has been recognized nationally with a CSPA Crown award and numerous national awards for design and photography. The Technician maintains a significant online presence, including audio and video presentations. website: www.technicianonline.com
community and make a difference. Through your involvement you will be able to explore career opportunities and gain experience, learn and practice leadership skills, and have a lot of fun! In addition, your involvement in group activities will help you find balance.

Boredom is not an option at North Carolina State University. With over 500 student organizations in the organization network, there is something for everyone. These organizations exist because they play a key role in your success and the enjoyment of your overall experience at NC State. Participation in organizations allows you to meet new people and develop friendships, contribute to your community and make a difference. Through your involvement you will be able to explore career opportunities and gain experience, learn and practice leadership skills, and have a lot of fun! In addition, your involvement in group activities will help you find balance.

The Student Media Board of Directors is a way for students to get involved in the management of a large business operation with a budget of about $1 million. The Board of Directors is the governing arm for all the media that use student fee monies. Elections to the Board are held in the spring. Student Media offers student employment selling ads and sponsorships. website: www.ncsu.edu/sma.

Center for Student Leadership, Ethics & Public Service

The center’s mission is to provide unique learning experiences that embody the value of leadership, service, responsible citizenship, and ethics. We envision leaders with wisdom, compassion, and integrity who will promote a lasting commitment to the betterment of society.

The center offers the Leadership Development Series (LDS), which consists of over 40 workshops each semester that focus on different aspects of leadership. Students can also participate in the Leadership in Action Program, a 4-year leadership development program. Students have the opportunity to earn a Visionary Leaders Certificate and a Leadership Transcript, a dynamic resume supplement that informs employers and graduate admissions officers of a commitment to developing personal leadership skills. Students can also participate in The LeaderShape Institute - a six-day leadership development experience designed to help participants learn to “lead with integrity” and work towards developing visions for positive change.

We encourage students to become a part of the Service-Leadership Team (SLTs). These are students who are trained to provide dynamic leadership development and training experiences to individuals and organizations.

Each year the Role Model Leaders’ Forum honors an outstanding regional, national, or international leader who inspires us with their personal view of leadership and the challenges today’s ethical leaders encounter. The Leadership Library contains over 300 leadership reference materials available for checkout (books, audio cassettes, videotapes, and newsletters).

Students can participate in domestic and international Alternative Fall, Winter and Spring Break Service-Learning trips that challenge them to help those in need while relating what they have learned in the classroom to the outside world. Students may also participate in one-time service through announced volunteerism projects as well as on-going service with the Campus Pals program. We also have a comprehensive list of over 150 service opportunities available on our website.

For further information and a complete listing of our offerings, please stop by 3115 Talley Student Center, (919) 515-9248 or visit www.ncsu.edu/csleps.

Department of Campus Activities

The Department of Campus Activities includes the Union Activities Board and Campus Cinema, Parents & Families Services, the Student Organization Resource Center (SORC) and the Gay, Lesbian, Bisexual, & Transgender (GLBT) Center.

The Union Activities Board (UAB) is a student-directed programming network of committees that plan and implement a variety of programs for the campus community, including the Films Committee (that schedules films for Campus Cinema), Leisure & Entertainment Committee, Issues & Ideas Committee, the Diversity Activities Board, and the Black Students Board. The Publicity Committee designs and distributes posters, fliers, handbills, and other advertising for UAB events.

The Campus Cinema, located in Witherspoon Student Center, presents films ranging from independent works to the latest Hollywood blockbusters in 35mm with Dolby® Digital Surround Sound. The Cinema is a fully functional movie theatre with 460 seats and a concession stand. Showings cost $1.50 for NC State students, faculty and staff and $2.50 for non-students. There are also many opportunities to see free movies and sneak previews throughout the year.

The Office of Parents & Families Services provides resources and programming for families of NC State undergraduate students such as Parents’ Orientation, Parents & Families Weekend, PICK Parents newsletters, Spring Fling and Siblings Weekend and the Parents’ Helpline.

The Student Organization Resource Center (SORC)

The Student Organization Resource Center (SORC)
in your life and allow you to develop an appreciation for diversity. For more information about student organizations visit http: www.ncsu.edu/sorc.

The GLBT Center

The mission of the NC State GLBT Center is to create, maintain, and strengthen an inclusive and safe campus environment for people of all sexualities and gender identities. This is accomplished through awareness and educational programs, individual consultation and referral, student organization advisement, advocacy, and community outreach on and off campus. The Center supports the mission of the university and student success by working to create a campus that is both diverse and inclusive. The main functions of the Center are to:

• provide a safe and welcoming space for the GLBTQI and ally communities.
• serve as a resource center.
• educate the GLBTQI and larger university communities.
• represent the GLBTQI community and serve as its advocate

Our programs and services are available to all members of the NC State community regardless of sexual orientation and gender identity. Additionally, we aim to facilitate cross-cultural dialogue in an effort to break down the barriers that are responsible for discrimination. Some of the programs we offer include: Coffee Talks, Speakers Bureau Program, Project SAFE ally training, Brown Bag Lunch Series, Resource Library, Mentoring Program, networking functions, and various events throughout the year. For more information stop by our office located in 3101 Talley Student Center, call (919) 513-9742, or visit our website: www.ncsu.edu/glbt.

Multicultural Student Affairs

The Department of Multicultural Student Affairs (MSA) researches, designs and implements unique programs that promote the pursuit of academic success, retention and graduation of students, with an emphasis on African American, Native American and Hispanic students. Many of the programs and services expand students’ cultural horizons while honoring their respective cultural experiences. Multicultural Student Affairs works in conjunction with a number of university departments and colleges to conduct programs related to recruitment, orientation, retention and graduation in addition to academic, personal, professional and cultural development, which foster skills and strategies for being successful at NC State. Some of the programs and services include the following: African American Symposium, Native American Symposium, Peer Mentor Program, Hispanic/Latino Heritage Month Programming, Native American Heritage Month, SABA- Academic Enrichment Program, Kwanzaa Celebration, Freshman Honors Convocation, annual POW WOW, Student Leadership Development and Student Organization Advising. Target populations for Multicultural Student Affairs are determined by differences in retention and graduation rates for historically underrepresented groups as well as demographic shifts regionally and nationally. Any NC State student can access programs and services through Multicultural Student Affairs. For further information and a complete listing of our offerings, please stop by 1107 Pullen Hall, call (919) 515-3835 or visit www.ncsu.edu/msa.

The Women’s Center

Celebrating women 365 days a year through support, empowerment, education, and leadership development, the NC State Women’s Center challenges and motivates the hearts and minds of both women and men to achieve inclusivity and gender equity. Known for a warm and welcoming atmosphere, the Women’s Center is open to everyone and provides a supportive environment for individuals and groups. Through programming that reflects a wide range of viewpoints about gender-related issues, the Women’s Center works to enhance the quality of life and learning for all students in the NC State community. Emphasis is placed on empowering women as leaders and all students as agents of change on campus and beyond. Some of the better known initiatives offered through the Women’s Center include the Chocolate Festival (breast cancer awareness), Take Back the Night (sexual violence awareness), The Movement (peer education), Student Bridges (women’s leadership development), and The Vagina Monologues (sexual violence awareness). The office advises two student organizations — the NCSU sexual and relationship violence peer education group, The Movement: Ending Interpersonal Violence on Campus, as well as Men Against Rape. Staff also teach a three-credit course offered each fall semester through the Counselor Education program, ECD 222, for student interested in being sexual and relationship violence peer educators in The Movement and facilitating prevention education workshops across campus. Ultimately, the Women’s Center strives to create a safe space for women to explore, learn, and reach their maximum potential in a more equitable society while promoting personal growth and encouraging a positive gender identity.

Informal advising and advocacy on various issues as well as referrals to campus and community resources are among the services offered. The Women’s Center provides confidential support, information, advocacy, and referrals to students who have experienced interpersonal violence such as sexual violence, rape, relationship violence, stalking, and cyberstalking. The Women’s Center operates the Molly Hays Glander Rape and Sexual Assault Response Line, which serves as a resource for NC State students and members of their support network. This 24-hour hotline can be reached at (919) 618-RAPE (7273) and is staffed by trained volunteers who offer confidential support, information specific to campus resources, and referrals. Additionally, the Center’s lending library has a selection of books that may be helpful for survivors and their supporters during the healing process or for class assignments. Programs such as Take Back the Night help give voice to the survivors while also educating the campus.

Housed administratively in the Division of Student Affairs, the NC State Women’s Center is located in 3120 Talley Student Center. For more information, please stop by our office, visit our website at www.ncsu.edu/womens_center or call us at (919) 515-2012.
**North Carolina State University**

**Facilities**

**Carmichael Complex** consists of Carmichael Gym, Carmichael Recreation Center, Willis R. Casey Aquatic Center, Miller Fields, 12 tennis courts, and 8 basketball courts, which offer a wide variety of indoor and outdoor fitness choices for students. Students may use the pools, indoor track, courts, cardio equipment, the outdoor fields, and tennis courts unless otherwise reserved for classes, events or maintenance. The Carmichael Complex is home to Campus Recreation and the Department of Physical Education. For more information, please visit our website www.ncsu.edu/carmichael or call (919) 515-PLAY (7529).

**Price Music Center** is the location for the Music Department and its programs.

**Talley Student Center** (TSC) is home to a variety of restaurants, programs, services, and cultural resources. Students seeking on-campus dining options can choose from The Wolves Den, Taco Bell and Lil’ Dinos, all located within the building. Students looking for a quick snack, convenience items or NC State Ice Cream can visit the Emporium C-Store located on the 1st floor. Also located within Talley are Stewart Theatre and the Gregg Museum of Art & Design. Various lounge areas are available throughout the building for those looking to relax or study. Eighteen meeting and activity rooms, two gallery spaces and a ballroom can be reserved in advance through Reservations and Events Management (REM). To reserve room in Talley Student Center, please visit www.ncsu.edu/student_center or contact REM at 515-2249.

Program offices and service areas found in Talley Student Center include Arts Development; Campus Activities; Center Stage Performing Arts Series; Center for Student Leadership, Ethics & Public Service; Chaplains’ Cooperative Ministry; Dance Program; Gregg Museum of Art & Design; Parents & Family Services; Student Legal Services; Student Organization Resource Center (SORC); Union Activities Board; University Theatre; Women’s Center; REM offices, Information Desk, Ticket Central, and University Dining administrative and catering offices.

**Thompson Hall** is the location for University Theatre and The Crafts Center. Built in 1925 as a gymnasium, Thompson Hall reopened in Fall 2009 after an extensive renovation that was an extraordinary partnership between NC State students, private citizens, businesses and the extended NC State community.

Thompson Hall houses University Theatre’s full production activities, performance, and classes. Facilities include the Titmus Studio Theatre, the Kennedy-McIlwee Studio Theatre, the costume shop, the scenic construction and paint shop, lighting and sound facilities, as well as rehearsal and classroom spaces. The renovation brought state-of-the-art technologies and improved accessibility to the building that now returns to its purpose as a hub of student activity.

The Crafts Center, located on the ground floor of Thompson Hall, specializes in crafts classes and workshops in art, pottery, sculpture, weaving, fiber arts, photography, woodworking, glass, jewelry, lapidary, and more. For more than forty years, The Crafts Center has provided a friendly learning environment for students and craftspeople of all levels. NC State’s Crafts Center is one of the finest university crafts programs in the country. Classes and studio use are available to NCSU students, alumni, employees, and the general public.

For more information on these two programs, please visit www.ncsu.edu/arts.

**Witherspoon Student Center (WSC)** houses the African-American Cultural Center, Student Government and Student Media which includes the offices of five student-run media organizations: Agromeck (yearbook); The Nubian Message and Technician (newspapers); Windhover (literary magazine); and WKNC FM 88.1 (radio station). Witherspoon includes two accessible balconies; one meeting room available by reservation through REM; the African-American Cultural Center’s Sankofa Room, Gallery and Library; and Campus Cinema, used for films, lectures, classes and special events.

**ARTS NC STATE**

The six visual and performing arts programs of ARTS NC STATE - Center Stage, The Crafts Center, the Dance Program, the Gregg Museum of Art & Design, the Music Department and University Theatre - provide opportunities for our students and our community to explore, learn, create, and grow. Whether through academic courses, cutting-edge performances or the preservation of traditional crafts, ARTS NC STATE educates our students for the 21st century while providing a living link to our rich cultural heritage. Our most recent highlight was the reopening of the Frank Thompson Hall in Fall 2009. Frank Thompson Hall, which houses The Crafts Center and University Theatre, was completely renovated and the result is an amazing “state-of-the-art” performance and production space. For additional information about ARTS NC STATE, please visit the following website: www.ncsu.edu/arts.

**Center Stage Performing Arts Series**

Experience live, world-class performances at Center Stage, NC State’s professional performing arts series. Most shows take place in Stewart Theatre, located inside the Talley Student Center, or in the two theatres of Thompson Hall. A typical Center Stage season features outstanding artists from a wide range of disciplines, including jazz, world music, modern dance, drama and comedy. Discounted tickets are available to NC State students, faculty, and staff, as well as parents of current NC State students and members of the NCSU Alumni Association. Contact: (919) 513-3030 or www.ncsu.edu/centerstage

**The Crafts Center**

Learn new skills while crafting your own art. The Crafts Center functions as an art school specializing in craft classes and workshops in art, pottery, sculpture, weaving, fiber arts, photography, woodworking, glass, jewelry, lapidary, and more. It is one of the finest
university crafts center programs in the country. The Crafts Center provides a friendly and informal learning environment for students and craftspeople of all levels. Whether used for personal expression or in support of academic projects, dedicated students are well-equipped with cutting edge technology. Professional staff and crafts instructors provide quality technical advice and materials support.

The Crafts Center actively supports student life. The Center partners with fraternities, residence halls and professional NC State student organizations to enhance the collegiate experience through the making of art. Participation in associated crafts guilds that routinely meet at The Crafts Center provides NC State students a creative platform at the university and beyond.

For answers to your questions about The Crafts Center, please call 515-2457 or visit www.ncsu.edu/crafts for our upcoming programming, calendar information, map & directions.

Dance Program
The NC State Dance Program gives students the opportunity to study dance through direct experience in choreography and performance. Through two student performance companies—the NCSU Dance Company and the DanceVisions Repertory Company—dance technique classes, the study of choreography, and the Professional Projects Program, the Dance Program provides a creative environment rich in imagination, reflection, and the embodiment of ideas. As undergraduate and graduate students pursuing degrees in various fields, the dancers at NC State bring their diverse insights and experiences into the artistic process and contribute meaningfully to the quality of the art. The Dance Program’s three major concert are describes below:

• **Dance Program Fall Concert:** The Dance Program Fall Concert showcases the Movement Studies Project (an annual teacher-guided, student-choreographed, collaborative project) and the choreography of current students who create work through independent study. Professional projects are also presented on the Fall Concert, including the work of invited alumni.

• **DanceVisions Repertory Company Concert:** Continuing and building upon the rich history of DanceVisions, founded in 1997, the DanceVisions Repertory Company performs variety of Agrocentric dance styles in choreographic works by invited guest artists and student company members.

• **NCSU Dance Company Concert:** Nationally acclaimed by the American College Dance Festival Association, the NCSU Dance Company performs a distinguished collection of modern dance for their annual concert. The program features premiere and repertory work created by the dance program directors and invited guest artists.

• **Panoramic Dance Project Concert:** For their annual spring concert, the Panoramic Dance Project performs a variety of Afrocentric and world dance styles in choreographic works by invited guest artists and student company members.

Gregg Museum of Art & Design
The Gregg Museum of Art & Design is NC State’s museum and houses a substantial collection of contemporary and historical examples of ceramics, textiles, glass, furniture, photography, folk and outsider art, and works on paper by artists from every continent. The collection provides the context and inspiration for an annual series of changing exhibitions of regional, national and international significance. The collection, exhibitions and associated interpretative programs give the NC State community and the state unique access to work in these media.

The museum is located on the second floor of the Talley Student Center (2610 Cates Avenue). Exhibitions in the Foundations and Cannon Galleries are free and open to the public. The collection database is accessible through the museum website. Student internships for course credit are offered each semester. Faculty, student groups and the public may schedule tours or arrange visits to the permanent collection by calling the museum’s administrative offices. Contact: (919) 515-3503 or www.ncsu.edu/gregg.

Music Department
The Music Department offers both performing ensembles and academic courses for the music minor program, GEP and elective credit. Academic courses include the history and theory of Western art music, special topics such as Women in Music and Introduction to African American Music, and introductory music appreciation courses. For full descriptions of the academic courses, consult the NC State University Course Catalog. (Also see Music Department, pg 203) Contact (919) 515-2981 or www.ncsu.edu/music.

• **Performing Ensembles.** A wide variety of performing ensembles provide opportunities for students to develop both artistically and intellectually through applied music. Through performance, the ensembles play an important role in campus life, presenting public concerts and performing at official functions (both on and off campus) and athletic events. Performing ensembles receive one academic credit that may be used to satisfy free elective requirements in any academic major. Membership in all ensembles requires an audition with the instructor.

• **Choral Ensembles.** The Choral program offers students from all academic areas an opportunity to participate in the exploration and performance of the highest quality choral repertoire from all eras. The ensembles include State Chorale, Men’s Choir, Women’s Choir, and Madrigal Singers. Performance highlights have included concerts every semester, tours and occasional collaborations with other ensembles.

• **NC State Pipes and Drums.** Students may learn to play the bagpipes, an instrument known to many of North Carolina’s earliest settlers, in order to represent the university through this unique and distinctive medium. Pipes, drums, and other equipment are furnished. Beginning pipe and drum lessons are available to students without previous experience.

• **Orchestras.** The Raleigh Civic Symphony and Chamber Orchestra combine student and community musicians with professional leaders to present concerts of innovative programming on campus and in other Triangle Area venues. Area professionals serve as concertmaster, principal cellist, and guest coaches, to provide high-level instruction and leadership to community and student players. Both orchestras are on the same artistic level and require an audition with the conductor.
Jazz Ensembles. The wind program includes the Wind Ensemble, Marching Band and Pep Band. The Marching Band is active during football season and the Pep Bands are active during basketball season. Other bands and ensembles usually meet both semesters. Placement in a band or ensemble is through audition and according to student ability and interest.

Jazz Ensembles. The jazz program includes Jazz Ensemble I, Jazz Ensemble II and Jazz Combo. The jazz groups perform both on and off campus during the fall and spring semesters. Placement in a jazz ensemble or combo is through audition and according to student ability and interest.

Piano. Beginning piano classes are offered to students from all academic areas for credit. No previous experience is required. Honors sections of class piano are available for beginning piano students who are music minors, or who qualify by departmental approval. Applied lessons are offered to advanced piano students who have passed an audition and are admitted to the music minor program in piano performance.

Voice. A Vocal Techniques class is offered to beginning voice students for credit with instructor approval. Previous voice study is not required. Applied voice lessons are offered to advanced voice students who have passed an audition and are admitted to the music minor program in vocal performance.

University Theatre

University Theatre is the university’s volunteer student theatre, housed within the Division of Student Affairs. Each season, in our main-stage shows, summer Theatrefest, and other special productions, the sold-out audiences see on stage the result of hours of work, weeks of exploration, and months of preparation. Guided by a professional staff, students on stage and behind stage present shows that garner the highest praise from loyal audiences and enthusiastic reviewers. University Theatre offers a blend of student volunteer productions and academic theatre training. Productions are open to all NC State students, whether or not they are enrolled in theatre courses. Classes are available in acting, directing, introduction to theatre, and all areas of technical theatre, including stagecraft, costume, make-up, lighting, and scenic design. Student theatre organizations, which include Alpha Psi Omega and Black Repertory Theatre, are open to all students. Contact: (919) 515-2405, 515-3927 or www.ncsu.edu/arts.

Ticket Central

Ticket Central serves as the centralized box office for the Visual and Performing Arts programs at NC State. Ticket Central tickets events in a variety of performance venues including Stewart Theatre, Thompson Hall, the Campus Cinema, and the Talley Student Center.

In addition to serving the six ARTS NC STATE programs, Ticket Central provides ticketing services on a fee basis for many campus and community organizations. The box office is located on the second floor of the Talley Student Center. Normal hours of operation are Monday–Friday 10a.m.-6p.m. If there are performances during the week, the box office will remain open until curtain. On weekends with performances, the box office will open one hour prior to curtain. Hours vary during university holidays and during the summer. Tickets may be purchased in person, over the phone by calling (919) 515-1100, or online by visiting our website at www.ncsu.edu/arts.

Intercollegiate Athletics - Go Pack!

The university's “Wolfpack” athletics teams are nationally recognized and enjoy a tradition of excellence as they compete in the prestigious Atlantic Coast Conference. The men's basketball team won national championships in 1974 and in 1983 and holds 10 ACC titles. The Pack, under fourth-year head coach Sidney Lowe, notched its fourth straight 20-win season in 2006-07 and appeared in the ACC championship game for the third time in five years. The football team began a new and exciting era in 2007 with head coach Tom O'Brien taking over a storied program that has been the Atlantic Coast Conference champion five times and co-champion twice. NC State has played in 24 bowl games, including six in the past 10 years.

The Wolfpack women's cross country team won national championships in 1979 and 1980 along with 21 ACC crowns, while the men's cross country team has won the ACC title 15 times. The women's basketball team, now under the direction of former University of Tennessee point guard and three-time national champion Kellie Harper, advanced to the NCAA “Sweet 16” for the 12th time three years ago under former head coach Kay Yow. The program reached the NCAA “Final Four” in 1998.

The men's and women's soccer teams have both advanced to the NCAA's “Final Four,” the women in 1988 and 1989, and the men in 1990, while the wrestling team won its 14th ACC title in 2007. The cheerleading squad has been recognized three times as national champions and Ms. Wuf was named the top collegiate mascot in the country in 2007. NC State student-athletes have won numerous conference, NCAA and All-America athletic and academic honors, including medals in seven Olympic Games.

The 2008-09 school year saw three NC State student-athletes win individual national championships. On the night of March 21, Darrion Caldwell won the national championship at 149 pounds at the NCAA Wrestling Championships. Less than an hour later, diver Kristen Davies won the national championship in the 10-meter platform diving competition at the NCAA Swimming and Diving Championships. In June, golfer Matt Hill capped a storybook season by winning the NCAA Golf Championship, his eighth tournament win in 12 tries in 2008-09.
North Carolina State University

The Department of Athletics conducts the university’s intercollegiate athletics program, which includes 23 varsity sports, 12 men's, 11 women's. The athletics program is administered by the Director of Athletics, Lee Fowler. The Council on Athletics is appointed by the Chancellor and serves in an advisory capacity to the Director of Athletics and the Chancellor.

The athletics program is self-supporting and is operated primarily through gate receipts, radio and television revenues, NCAA distributions, and student fees. Funds for athletics grants-in-aid are provided through the North Carolina State Student Aid Association (Wolfpack Club).

Men’s varsity sports include soccer, cross country, and football in the fall; basketball, swimming, indoor track, and wrestling in the winter; and outdoor track, golf, tennis, and baseball in the spring. Varsity sports for women include soccer, cross country, and volleyball in the fall; basketball, indoor track, swimming, and gymnastics in the winter; and track, golf, softball and tennis in the spring. The co-ed rifle team competes during the winter.

A $100+ million facilities development plan reached its completion in 2008. Carter-Finley Football Stadium’s permanent seating was increased to 55,600 while the state-of-the art 106,000-square-foot Murphy Football Center was completed in 2003. Vaughn Towers, a 117,000 square-foot structure along the west grandstand of the stadium, opened for the 2005 season and houses 955 Club-level seats, 51 private luxury suites, a University Suite for the Chancellor, and a state-of-the-art press box that seats up to 112 members of the media. The final phase of the Carter-Finley Stadium renovations, the enclosure of the north end zone, was completed prior to the beginning of the 2006 campaign.

The men’s basketball team plays in the RBC Center, which seats 19,700. Reynolds Coliseum (9,500) is used for women’s basketball, wrestling, women’s gymnastics and volleyball competition.

A $5 million renovation of Doak Field at Dail Park (2,500), the university’s baseball stadium, was completed in June 2004 as well as construction the J.W. Isenhuor Tennis Center with four indoor courts. Paul Derr Track Stadium (3,000) has been redesigned to accommodate men’s and women’s soccer and an adjacent women’s softball complex. That facility opened in the spring of 2008.

The Case Athletics Center has been converted to house Academic Support Services for Student-Athletes. Wolfpack athletics administrative offices and coaches’ offices are primarily housed in the Weisiger Brown General Athletics Facility with coaches offices also located in Reynolds Coliseum, the Murphy Football Center, the Wolfpack Tennis Complex and Doak Field.

The fundraising offices of the Wolfpack Club and the athletic department marketing and ticket offices are located near Carter-Finley Stadium at 5400 Trinity Rd. (Suite 500), Raleigh, NC 27607. For ticket information call (919) 865-1510 or 1-800-310-Pack. The main athletic department receptionist: (919) 515-2101. Visit the official athletic department website for complete information: gopack.com.
Academic Advising

Most regularly enrolled students are assigned for academic advising to a faculty member who is normally a member of the department, which is, or is most likely to become, the student’s major department. Students who are admitted into programs such as the First Year College, the Transition Program, etc. will be advised by professional advisers in those programs who will aid the students in the process of selecting an appropriate major.

Responsibilities of the Student

Students have the primary responsibility for planning their individual programs and meeting graduation requirements. This involves keeping up-to-date with university, college, and department curricular requirements through materials available from the advisers or departmental coordinators of advising; keeping informed of academic deadlines and changes in academic policies; and consulting with the adviser or departmental coordinator of advising during each registration period, following notification of academic warning status, and at other times as needed and required by academic policy; and attending class and meeting class objectives and assignments.

Responsibilities of the Adviser

Although students have the primary responsibility for planning their programs, advisers are expected to: be available for conferences at appropriate times and places about which their advisees have been informed; provide accurate information about academic regulations and procedures, course prerequisites, and graduation requirements; assist students in planning academic programs suited to their interests abilities and their career objectives; discuss with their advisees appropriate course choices in fulfilling curriculum requirements as well as possible consequences of various alternative course choices; inform their advisees when the advisee’s proposed course selections conflict with university academic or curricular regulations; assist advisees with following proper procedures for such things as Progress Toward Degree, exceptions to the course drop deadlines, auditing a course before or after taking it for credit, taking a course under the credit by examination policy, registering for 19 or more credit hours, registering for interinstitutional courses, the availability and rules for the First Year Course Repeat Policy, and referring their advisees for special testing or counseling as needed; assist their advisees in considering the appropriateness of academic adjustments where these become necessary in cases of serious injury or illness, or unforeseen personal hardships.

Responsibilities of the Coordinator of Advising

Each college or department has a coordinator of advising and teaching who is responsible for: assigning, training, and supervising faculty and professional advisers; providing up-to-date, printed course and curriculum information for advisers and students; reassigning to another adviser any student who requests reassignment, assisting any student who wants to major in the coordinator’s area of study but is ineligible at the time to transfer into it. Students in this category keep their adviser in the department in which they are enrolled, but consult additionally with the coordinator of advising and teaching for the department offering the curriculum in which they wish to enroll. Whenever appropriate, the coordinator will advise students that they should consider alternative curricula and refer the students to DUAP’s Office of Advising Support, Information and Services.

Progress Toward Degree

The objective of NC State University’s Progress Toward Degree Regulation is to encourage timely matriculation into a degree program and reasonable progress toward graduation. This regulation applies to all NC State undergraduate degree-seeking students who entered as first time freshmen or transfer students beginning fall semester 2002 and to all students readmitted to NC State beginning with the fall semester 2002.

Each student in consultation with their adviser will develop a plan of study that serves as a planning tool for completing degree requirements for the major(s) in which the student is matriculated. Students in the First Year College and other undeclared or undesignated programs will develop a plan of study for the major(s) in which the student expects to matriculate. The Plan of Study can include plans for tailoring the academic majors, minors, and other specialized academic opportunities.

Enrollment in course work should be consistent with the student’s Plan of Study. The Plan requires a minimum enrollment of 12 credit hours during consecutive semesters until graduation, and the successful completion of at least 24 credit hours of planned NC State or transferable course work each academic year, unless otherwise justified by an approved Plan of Study. All students must be in or matriculate into a degree program by the beginning of classes in the first semester that the student has junior status (i.e. 60 credit hours earned at NC State or transferred to NC State University - criteria established in Classification of Undergraduate Students regulation).

In order to meet the requirements for satisfactory progress toward degree completion, a full-time undergraduate student classified as a freshman must:

- by the end of the first year of enrollment (including summer sessions), have on file a registered Plan of Study that serves as a planning tool for completing degree requirements for the major(s) in which the students is matriculated, or expects to matriculate or transfer, and
- successfully earn at least 24 credits of NC State or transferable course credit that is included in the approved Plan of Study each academic year.
Comparative requirements exist for students in their sophomore, junior, and senior years. Students who enter NC State as part-time students or transfer students are also required to develop a Plan of Work in cooperation with their adviser.

Students who fail to meet the requirements for Progress Toward Degree will be placed on Progress Warning Status and will have one semester to work with their adviser to develop a specific plan of action that restores ‘satisfactory progress’ status in their current major or to transfer or matriculate into an alternative major. Students who fail to meet the requirements for satisfactory progress toward degree after one semester on Progress Warning status will not be permitted to enroll as an undergraduate degree-seeking student. Such students will be required to apply through the readmission process if they wish to return to degree seeking status.

For complete details and explanation of the Progress Toward Degree Regulation see the following website: www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.20.php.

Graduation Requirements

Students are eligible for graduation when they have completed satisfactorily all the academic requirements of their degree program as specified by their major department, their college, and the university.

NC State requires that, in addition to other university, college, and departmental requirements, all students must have a grade point average of at least 2.000, based on all courses attempted at NC State, in order to be eligible to receive a baccalaureate degree.

Minimum Hours Required for Graduation

Minimum credit hours required in a baccalaureate curriculum that has not been designated a five-year program range from 120 to 128. These are shown for each curriculum. Students may take more hours than the required minimum.

Length of Time to Graduation

The normal and expected length of time to graduation is four years (eight semesters) provided the student completes an average of slightly more than 16 credit hours each semester (for most curricula) and/or attends one or more summer sessions.

By action of the N.C. General Assembly, effective with the 1994 Fall Semester, new students entering any of the campuses of the University of North Carolina system (including NC State), will be assessed a 50 percent tuition surcharge once they have attempted more than 140 degree credit hours. (Degree programs at NC State require 120-128 hours or less for graduation.) Courses taken in summer school at any UNC-System campus do not count towards the 140-hour limitation. Questions about this policy should be directed to the Department of Registration and Records, (919) 515-2572.

In order to make continuous progress toward graduation, students are encouraged to take full advantage of the university’s advising and support services. Effective career decision-making and early, deliberate, long-range semester-by-semester planning of courses and careful selection of extra-curricular commitments can provide direction and motivation necessary for effective use of time towards graduation.

Additional factors that may assure a student’s continuous progress toward graduation include good academic performance in first year and basic prerequisite courses, advanced placement for introductory courses, and enrollment in summer sessions. Students are discouraged from taking unrealistic course loads as a means to accelerate their progress toward graduation as this may result in poor academic performance.

Students may take more than eight semesters to complete an undergraduate program at NC State. In some cases this is the result of effective decision-making on the part of the student for such things as participation in cooperative education or study abroad programs; a decision to be a part-time student with a reduced course load for reasons of health, necessary outside employment, or parental responsibilities; or attempting dual degrees, double majors, or academic minors.

In other cases the length of time to graduation may be prolonged beyond the eighth semester as a result of incomplete or inadequate secondary school background requiring some additional compensatory, developmental, or prerequisite courses. Poor academic performance in the freshman year or early semesters, or late changes in curriculum could also impact time to graduation.

Semester-by-Semester Displays

The requirements for curricula throughout this section are set forth in semester-by-semester displays. One purpose for these displays is to illustrate how certain sequences of courses and prerequisites may be scheduled. Another purpose is to reflect whether courses are normally offered in the fall or the spring semester. Otherwise, the semester-by-semester displays are merely advisory and not mandatory. The typical semester schedule shown in the displays may not be the appropriate one for some students. Students are required to consult with their faculty advisers prior to registration each semester. Semester-by-semester displays are available online: www.ncsu.edu/registrar/curricula.

Limited D Grades

Some colleges and departments have established limitations on the use of D grades in certain courses or categories of courses for satisfying graduation requirements. Check with your adviser if you have any questions.

Grade Point Average in Major

Some departments have established graduation requirements of a grade point average of 2.000 on all courses attempted in the major at NC State or a “C-” or better in some or all major courses. Such a requirement is in addition to the university grade point average total requirement of 2.000 for all courses attempted at NC State. Students are encouraged to inquire about specific requirements in majors of interest.
Residence Requirements
To be eligible for a bachelor’s degree, a student must be enrolled in a degree program at NC State, must have completed at least 25 percent of credit hours required for graduation through courses offered by NC State, and must have earned at least 30 of the last 45 hours of credit through NC State courses. In no case shall the proportion of credit hours taken at NC State and applied towards a bachelor’s degree be less than 25 percent. Individual departments and/or colleges may have additional residence requirements. Be sure to ask your adviser about any special requirements.

Note: The College of Engineering has a policy that transfer students normally must earn at least 48 of their last 60 hours of credit at NC State while enrolled as degree candidates. The College of Management has a policy that Accounting and Business Management majors normally must earn at least 30 credit hours while officially enrolled as a degree candidate in either the ACC or BUS curriculum. Students in the Economics majors (EC/ECS) must earn at least 1/2 of their required economic credits while enrolled in the EC or ECS curriculum. Check with your adviser to see if such additional requirements apply to your major.

Free Electives
All schools and colleges are encouraged to include free electives in their curricula to satisfy their educational objectives. Moreover, students who would like to take courses beyond those required for their degree are encouraged to do so.

Classification of Students
Undergraduate degree students are classified according to the number of completed credit hours. The required number of hours of each classification is:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Semester Hours of Earned Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman (FR)</td>
<td>Fewer than 30</td>
</tr>
<tr>
<td>Sophomore (SO)</td>
<td>30 or more, but fewer than 60</td>
</tr>
<tr>
<td>Junior (JR)</td>
<td>60 or more, but fewer than 92</td>
</tr>
<tr>
<td>Senior (SR)</td>
<td>92 or more</td>
</tr>
</tbody>
</table>

Agricultural Institute students are designated as first (01) year if they have earned fewer than 30 semester credits and second (02) year if they have earned 30 or more semester credits.

Unclassified Students (UN) are those working for college credit but not enrolled in a degree-granting program. Admission as an unclassified student requires the recommendation of the dean of the school in which the student wishes to enroll. Unclassified students must meet the same entrance requirements as regular degree students and must meet the same academic requirements to continue. If, at a later date, unclassified students wish to change to regular degree status, their credits will be evaluated in terms of the requirements of their intended curriculum.

The Special Student (SP) classification includes Undergraduate Studies (UGS) and Post-Baccalaureate Studies (PBS) students:

Undergraduate Studies (UGS) students are United States citizens who have not obtained a baccalaureate degree and who take courses but who are not currently admitted to a degree program. To be eligible to register as a UGS student, a person should either:
(a) have acquired a high school diploma or a GED certificate; not have been suspended from any college or university (including NC State) within the last three years; and not be a degree candidate at NC State; or
(b) be a high school student who has been recommended by his/her school and approved by Credit Programs to take lower level courses.

Post Baccalaureate Studies (PBS) students are United States citizens who take courses beyond the baccalaureate degree but who are not currently admitted to a degree program. This classification is closed to international students with the following exceptions: (a) spouses of regularly enrolled NC State degree students; or (b) students enrolled in special programs such as AID or FAO who are approved in advance by the International Student Office and the Graduate School.

All UGS and PBS students must register online at www.ncsu.edu/nds or through Registration and Records, located in 1000 Harris Hall. Persons found eligible to study as UGS or PBS students are not to assume that they have received formal admission to the university as either undergraduate or graduate degree candidates. To become a degree candidate, formal application must be made through the Undergraduate Admissions Office or the Graduate School. The maximum course load for all UGS and PBS students is two courses plus one physical education course each semester or summer session. They may enroll in any course offered by the university, provided they have satisfied any required prerequisites and space is available. The academic standards applicable to undergraduate degree candidates at the university, including the Continuation of Undergraduate Enrollment Policy, apply to UGS and PBS students.

For the most current information regarding this regulation, please visit the following website:
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.6.php

Course Load
The maximum course load for undergraduate degree students is 21 credit hours a semester and two courses plus a physical education course in a summer session. Undergraduate students who wish to register for more than 18 hours during the fall or spring semester must have their adviser complete the Course Load Waiver Form and return it to Registration and Records. Students who wish to
register for more than 21 hours during the fall or spring semester must complete a Schedule Revision Form. Schedule Revision
Forms are available from the student’s departmental office. First semester freshmen with admissions indices less than 2.000 and
continuing students with a grade point average less than 2.000 should be advised to carry no more than 16 credit hours in a semester.
For Undergraduate Students (UGS) and Post-Baccalaureate Studies (PBS) students the maximum course load is two courses plus a
physical education in a regular semester or summer session.

The minimum course load for full-time undergraduate degree students is 12 credit hours, except in their final semester when a lesser
number may be taken if that is all the student needs to fulfill the requirements for a degree. In order to receive financial aid a student
must meet the minimum course load requirements of the appropriate funding agency. In addition, students who drop below 12 credit
hours may not be eligible for medical and dental insurance on their parent’s insurance policies. The number of hours for which a
student is officially enrolled is that number in which the student is enrolled for credit at the end of the second week of classes (i.e., the
last day to withdraw or drop a course with a refund).

For the most current information regarding this regulation, please visit the following websites:
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.8.php
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.6.php

**Grading Scale and Grade Points**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition</th>
<th>Grade Points per Credit Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>Excellent</td>
<td>4.333</td>
</tr>
<tr>
<td>A</td>
<td></td>
<td>4.000</td>
</tr>
<tr>
<td>A-</td>
<td></td>
<td>3.677</td>
</tr>
<tr>
<td>B+</td>
<td>Good</td>
<td>3.333</td>
</tr>
<tr>
<td>B</td>
<td></td>
<td>3.000</td>
</tr>
<tr>
<td>B-</td>
<td></td>
<td>2.677</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>2.333</td>
</tr>
<tr>
<td>C-</td>
<td>Satisfactory (“Passing” for graduate students)</td>
<td>2.000</td>
</tr>
<tr>
<td>C</td>
<td></td>
<td>1.677</td>
</tr>
<tr>
<td>D+</td>
<td>Marginal</td>
<td>1.333</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>1.000</td>
</tr>
<tr>
<td>D-</td>
<td></td>
<td>0.677</td>
</tr>
<tr>
<td>F</td>
<td>Failing</td>
<td>0.000</td>
</tr>
</tbody>
</table>

A grade of a C- satisfies a “grade of C or better” prerequisite and other “C-Wall” requirement, unless a “C Wall” is specifically identified as a C not a C- in a course syllabus.

For the most current information regarding this regulation, please visit the following website:
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.13.php

**Grade Point Average**

The number of credit hours attempted in a semester or summer session (for which grades of A, B, C, D (including plus/minus), or F are received) is divided into the total number of grade points earned to arrive at the Grade Point Average (GPA). The Grade Point Average will be calculated to three decimal points to a maximum of 4.000.

For example, if a student takes 16 credit hours, earning an A in two 3-credit courses, a B in one 3-credit course, and a B in one 2-credit course, a C in a 3-credit course, and an F in a 2-credit course, the grade point average would be:

**Example GPA Calculation**

\[
\begin{align*}
&6 \text{ (credits of A)} \times 4 \text{ (grade points per credit hour)} = 24 \\
&5 \text{ (credits of B)} \times 3 \text{ (grade points per credit hour)} = 15 \\
&3 \text{ (credits of C)} \times 2 \text{ (grade points per credit hour)} = 6 \\
&2 \text{ (credits of F)} \times 0 \text{ (grade points per credit hour)} = 0 \\
&\text{Total} = 45
\end{align*}
\]

The total number of grade points earned (45) divided by the number of credit hours attempted (16) equals the grade point average, in this case 2.813.

**Grading Guidelines**

All instructors at NC State use the plus/minus grading scale in their courses. The plus/minus grading scale does not apply to courses that are taken on a pass/fail basis.
Students enrolled in any section of a multiple section course in which the material, the sequencing of its treatment, and the examination are common to all sections should be graded on the same scale.

The following grades are not used in the calculation of grade point averages.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Satisfactory (Credit-only and certain other courses)</td>
</tr>
<tr>
<td>U</td>
<td>Unsatisfactory (Credit-only and certain other courses)</td>
</tr>
<tr>
<td>CR</td>
<td>Credit by Examination or Advanced Placement</td>
</tr>
<tr>
<td>IN</td>
<td>Incomplete</td>
</tr>
<tr>
<td>LA</td>
<td>Temporarily Late</td>
</tr>
<tr>
<td>AU</td>
<td>Audit</td>
</tr>
<tr>
<td>NR</td>
<td>No Recognition Given for Audit</td>
</tr>
<tr>
<td>W</td>
<td>Withdraw or Late Drop</td>
</tr>
</tbody>
</table>

Description of Letter Grades

**D - Marginal.** This grade is used to recognize that a student’s performance was marginal but clearly better than that of students who receive an F.

**F - Failing.** This grade is used to indicate that the student has failed the course and will not receive any credit for the course.

**S - Satisfactory.** This grade is used as a passing grade to be awarded only when the quality of the student’s work is judged to be C- or higher level. It is used as the passing grade for students who are taking free elective courses under the credit-only option, and for courses designated as pass/fail courses for grading purposes. It may also be used for certain courses such as orientation courses, seminars, and research problems, in which regular grades are not appropriate. Students should check with their adviser before changing a course to S/U status as it may affect graduation requirements.

**U - Unsatisfactory.** This grade is used to indicate that the student is not to receive credit for a credit-only or other course for which the passing grade would be S (Satisfactory).

**CR - Credit.** This grade is used by the registrar to indicate course credit received by examination or advanced placement as certified by appropriate departments or colleges. This grade shall be awarded only when the advanced placement testing indicates that the quality of the student’s work in the course would have been expected to be of C- or higher level.

**IN - Incomplete.** This grade is used as a temporary grade. At the discretion of the instructor, students may be given an IN grade for work not completed because of a serious interruption in their work not caused by the student’s negligence. An IN must not be used, however, as a substitute for an F when the student’s performance in the course is deserving of an F. An IN is only appropriate when the student’s record in the course is such that the successful completion of particular assignments, projects, or tests missed as a result of a documented serious event would enable that student to pass the course. Work undertaken to make up the IN grade should be limited to the missed work.

An IN grade must be made up by the end of the next regular semester (not including summer sessions) in which the student is enrolled, provided that this period is not longer than twelve months from the end of the semester or summer session in which the work was due. In the event that the instructor or department offering the course is not able to provide a student with the opportunity to make up the incomplete work by the end of the next regular semester in which the student is enrolled or within twelve months, whichever is shorter, the instructor or department offering the course must notify the Department of Registration and Records of the date of the extended deadline for removing the IN grade.

Any IN grade not removed by the end of the next regular semester in which the student is enrolled or by the end of twelve months, whichever is shorter, or by the extended deadline authorized by the instructor or the department offering the course and recorded by the Department of Registration and Records will automatically become a Failing (F) grade and will count as a course attempted.

Students should not register again for courses in which they have IN grades; such registration does not remove IN grades, and the completion of the course on the second occasion will automatically result in an F for the incomplete course.

When a graduating senior received an IN, the following procedures apply: (1) if the course is needed for graduation, the student will not be allowed to graduate until the work has been made up, and (2) if the course is not needed for graduation, the college dean must notify, in writing, the Department of Registration and Records either (a) that the course and the IN grade are to be deleted from the student’s records; or (b) that permission has been given for the IN to remain and that a deadline has been established for the completion of the course. In the event that the course is subsequently not completed satisfactorily, the college dean shall notify, in writing, the Department of Registration and Records that the course and the IN grade should be deleted from the student’s record or that the IN should be changed to F.

**LA - Temporarily Late.** An emergency symbol to be used only when grades cannot be reported on time by the teaching department or the instructor. The LA differs from the IN grade in that the student receiving the LA has completed the work of the course including the examination.
The LA should not be used by a teaching department or the instructor unless it is absolutely necessary. When it is used the following procedure applies:

1. Grade Submission must be entered at the regularly scheduled time with the LA clearly indicated; and
2. A Grade Change Report form must be secured from the Department of Registration and Records, completed, and returned at the earliest possible time and not later than 15 days after the final examination.

The semester grade reports of those students who receive an LA will not be complete. This situation often causes students to be uninformed as to their academic eligibility and as to the correctness of their schedule for the following semester.

**Audits (Undergraduate)**

**AU**- Audit. Given in recognition of successful completion of a course audit.

**NR**- No Recognition. Given for unsuccessful completion of a course audit.

Students wishing to audit a course before or after taking it for credit must have the approval of their adviser and of the department offering the course. Auditors are expected to attend class regularly. The degree to which an auditor must participate in class beyond regular attendance is optional with the instructor; any such requirements should be clearly explained in writing to the auditor at the beginning of the semester. Should the instructor conclude that poor attendance has resulted in an auditor’s gaining little from the course, the instructor should mark NR (no recognition will be given for an audit) on the final grade report. Students who have taken a course for audit may, with their adviser’s approval, enroll in the course for credit during a subsequent semester or summer session. For tuition cost purposes, audits are treated as full credit value. For all other purposes, hours of audit do not count in calculating undergraduate course loads.

**Note:** Veteran’s benefits are governed by Veterans Administration regulation concerning audits. Public Law 94502 (G.I. Bill) and Public Law 64 (sons and daughters of deceased or disabled veterans) consider only courses being taken for credit when determining a student’s course load for benefit purposes. For information, contact the Veterans Affairs Office, 1000 Harris Hall, (919) 515-3048.

**W**- Withdrawal/Late Drop. Used on student’s grade reports and transcripts to indicate all courses for which they have received official approval to drop or from which they have received official approval to withdraw after the deadlines for dropping.

**Credit by Examination**

Undergraduate students currently registered at NC State (degree, unclassified, or non-degree) may request an examination for course credit in a course whether enrolled in that course or not, under the conditions described below. Students must initiate a request with their adviser (except when a teaching department awards credit based upon group testing for placement purposes). Should the adviser approve, the student must arrange for the examination with the department offering the course. The department may administer the examination in any manner pertinent to the materials of the course. Departments are encouraged to offer credit by examination in all courses but have the prerogative of excluding certain courses, which are demonstrably unsuited for credit by examination.

The academic standards for credit by examination will be commensurate with the academic standards for the course. If a student’s performance on the examination is judged to be of “C-” or higher quality, the department will notify the Department of Registration and Records on a Grade Change Report that the student has received Credit by Examination for the course. The Department of Registration and Records will enter the appropriate number of credit hours on the student’s permanent academic record. Credits earned through Credit by Examination are not used in the computation of a student’s grade point average.

The Department of Registration and Records will post course credit by examination to a student’s permanent academic record only if that student is currently registered at NC State. However, if the course credit by examination would enable a student to complete the requirements for a degree, that student would not have to be registered in order to receive the credit.

If a student fails to achieve “C-” or higher quality work on an attempted credit by examination, no action is required other than the department’s notifying the student. However, that student is not eligible for another such examination in the same course.

Once a student has failed a course or has completed credit or audit for more than fifty percent of a course, the student may not attempt credit by examination for that course. Under unusual circumstances, exceptions may be made upon the written recommendation of the student’s adviser and the approval of the department offering the course. A student who receives credit by examination in a course in which that student is currently enrolled must officially drop that course no later than mid-semester.

**Credit by Examination Through Independent Studies**

Persons who are not currently enrolled on campus and who have gained through study or experience, knowledge of the content of undergraduate credit courses offered through Independent Studies may (with the approval of the Independent Studies staff and the academic department offering a course) receive credit for that course by special examination. Students may request approval to attempt credit by examination by completing and submitting a form available from Independent Studies, The University of North Carolina, Box 1020, The Friday Center, Chapel Hill, North Carolina 27599-1020, (919) 962-1104.

Currently enrolled students are not eligible for credit by examination through Independent Studies. These students should go directly to the appropriate academic department to request credit by examination under the regular procedures in effect on campus.
Credit Only Option for Free Elective Courses

Each undergraduate student has the option to count toward graduation requirements a maximum of 12 semester hours in the category of credit-only courses (exclusive of physical education activity courses and other courses authorized to be graded on Satisfactory/Unsatisfactory basis). The student may select as credit-only any course offered by the university except those in Military Science, Naval Science, and Aerospace Studies. Students should check with their adviser before taking a course in their major, minor, GER/GEP or similar categories in the credit only status to determine if the course will count towards the major, minor, or GER/GEP. The selected courses must be included under the free elective category of the specific curriculum in which the student is enrolled. The student will be responsible for attendance, assignments, and examinations.

The student’s performance in a credit only course will be reported as S (satisfactory grade for credit-only course and given when course work is equivalent to C- or better) or U (no credit grade for credit-only course). The grade for a credit only course will have no effect on the student’s Grade Point Average. The course and its grade will be counted in the cumulative hours attempted. Credit-only courses do not count in the calculation of eligibility for the Semester Dean’s List, which requires either twelve hours or fifteen hours of course work for which grade points are earned.

Non-degree students may take on a credit-only basis any course for which they satisfy prerequisites. Students should be aware that many graduate and professional schools evaluate credit-only courses for which “U” grades were awarded as failing grades.

Transfer Credit

Transcripts of college course credit for new transfer students and for NC State students who have taken course work at another institution are evaluated by the Office of Undergraduate Admissions in consultation with the deans of the NC State colleges to determine how the work applies to fulfilling the graduation requirements of each student’s intended major. Only courses where the student receives a grade of C- or better will be considered for transfer credit. Students admitted to an NC State undergraduate degree program who wish to take courses at another institution must obtain prior endorsement from their academic department and prior written approval from their college’s associate dean (or dean’s office) in order to insure that the transfer credits will apply toward specific graduation requirements. Transfer credit is not recorded on former students’ permanent records until after they have been readmitted and have re-enrolled at NC State.

Credit accepted for transfer from another institution is shown only as credit hours and is not included in the computation of the grade point average. To see a list of courses and how they transfer to NC State from other institutions, please see: http://admissions.ncsu.edu/transfer.htm. Please note this website speaks only to the general transferability of the course work. How transfer credit applies to a student’s degree is determined by his/her academic department and college associate dean’s office.

For the most current information regarding this regulation, please visit the following website: www.ncsu.edu/policies/academic_affairs/pols_regs/REG230.01.2.php

Academic Honors

High ranking students in their freshman year are eligible for membership in Phi Eta Sigma and Alpha Lambda Delta. Both of these national scholastic honoraries require a 3.5 semester grade point average or better during the first semester or a cumulative average of 3.5 for both semesters during the freshman year. Juniors ranking in the top three percent of their class, seniors ranking in the top six percent of their class, and outstanding graduate students are eligible for election to membership in Phi Kappa Phi, the university’s most prestigious campus-wide scholastic honor society. Outstanding undergraduate and graduate students majoring in the arts and sciences are also eligible for election to membership in Phi Beta Kappa.

For the most current information regarding this regulation, please visit the following website: www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.1.php

Semester Dean’s List.

A full-time undergraduate student who earns a semester average of 3.5 or better on 12 to 14 hours of course work for which grade points are earned or a semester average of 3.250 or better on 15 or more hours of course work for which grade points are earned will be placed on the Dean’s List for that semester. Students are not eligible for the Dean’s List in any semester in which they receive an F or IN grade. When IN grades are resolved, however, students who are otherwise eligible shall be added retroactively to the Dean’s List for that semester. Dean’s List recognition shall be noted on the student’s semester grade report and permanent academic record.

Graduation with Honors.

Undergraduate degree honor designations are:

- Cum Laude- for GPA 3.25 through 3.499
- Magna Cum Laude- for GPA 3.5 through 3.749
- Summa Cum Laude- for GPA 3.75 and above

To be eligible for degree honor designations students must have completed at least two semesters and at least 30 credit hours at NC State.

Valedictorian, Salutatorian, and Highest Ranking Scholar in a College.

To be eligible for consideration as valedictorian, salutatorian, or highest ranking scholar in a college, an undergraduate student must have received at least 100 academic credits at NC State (including credit by examination, advanced placement credit, and S/U courses). These 100 credits may include no more than 20 transfer credits through programs officially sponsored by NC State. Specifically, these programs are Cooperating Raleigh Colleges,
Grade Reports

Grades are posted online when instructors submit them in MyPack Portal or to the Department of Registration and Records. Students may access term grades via MyPack Portal: www.ncsu.edu/registrar - Requires your Unity ID and password.

Students may come in person to the Department of Registration and Records, 1000 Harris Hall, and request a printed copy of grades for their last enrolled term. The student must show a picture ID to receive grades. Office hours are 8:00 a.m. to 5:00 p.m., Monday through Friday.

Transcripts of Academic Records

Official Transcripts

Official NC State University transcripts are a complete record of a student’s academic work at the university. Transcripts are issued on official “SCRIP-SAFE” paper and carry the pre-printed signature of the University Registrar, the date of issue, and the pre-printed seal of the university. Sealed transcripts are also stamped with the Registrar’s signature on the outside of the envelope.

An official transcript is issued only at the authorization or written request of the student concerned. There are three different ways to request official transcripts.

1. Order a transcript online. Use the transcript service provided by the National Student Clearinghouse to request an official transcript online 24 hours a day. Online orders can be placed at www.getmytranscript.com.
2. Fax or mail a request to Registration and Records for an official transcript. A transcript request form may be obtained online at www.ncsu.edu/registrar/forms.
3. Visit Registration and Records in person at 1000 Harris Hall and receive an official transcript.

Notes:

• The charge for official transcripts processed at Registration and Records is $10.00 for the first transcript and $5.00 for each additional transcript per order. Transcripts ordered through the National Student Clearinghouse are $10.00.
• There is an additional charge of $5.00 for transcripts faxed from Registration and Records. Registration and Records does not fax transcripts internationally.
• Official transcripts are not issued for those people who are indebted to the university until such indebtedness is paid or satisfactorily adjusted.
• Transcript requests will normally be processed within 24-48 hours. However, a longer period of time may be required for processing at the beginning and end of each semester.

Unofficial Transcripts

Currently registered students may obtain an unofficial transcript by accessing MyPack Portal and selecting Transcript from the Student Information menu.

Change of Name, Address, or Telephone

It is the student’s responsibility to notify the Department of Registration and Records of any changes in name, address, or telephone. Failure to do so may prevent prompt delivery of important university correspondence and correct notification of hometown newspapers of honors received. International students are required by law to notify the university of any change or correction in name or address within 10 days. Updating address changes in MyPack Portal system fulfills international students’ federal requirements for maintaining status in SEVIS.

Name changes can only be completed in person at Registration and Records, 1000 Harris Hall by providing a picture ID and proof of the name change (i.e. driver’s license, social security card) or by written authorization along with proof.

Changes of address or telephone can be completed in one of the following two ways:

• MyPack Portal: www.ncsu.edu/registrar - Requires Unity ID and password
• In Writing: The Change of Address form at www.ncsu.edu/registrar/forms/pdf/addresschange.pdf should be completed and sent to the Department of Registration and Records, Box 7313, NC State University, Raleigh, NC 27695 and must include your name, student ID number, new address and signature.

Double Degrees

Students who have satisfactorily completed the requirements for more than one bachelor’s degree may, upon the recommendation of their deans, be awarded two bachelor’s degrees at the same or at different commencement exercises. To earn two degrees, students register in one school or department and, with the cooperation of the second school or department, work out their program to cover the requirements for both. Students must file an approved Curriculum Change Form with Registration and Records, 1000 Harris Hall. An Application for Degree Form must be submitted for each degree.
Intra-Campus Transfers (Plan Change—formerly Curriculum Change)

Regulation
1. A student who has attempted fewer than twelve credit hours at NC State may transfer to another curriculum provided that the student meets the admission requirements of the intended new plan (curriculum).
2. A student who has attempted twelve or more credit hours at NC State may transfer to another plan (curriculum) provided that the student is eligible to do so under the intra-campus transfer policy which pertains to the intended plan.

Procedures for Intra-Campus Transfers
Undergraduate students wishing to change from one plan (curriculum) to another must report to the dean’s office of the college offering the plan in which entrance is desired and request acceptance into the new college or plan. International students must meet with an Office of International Scholar and Student Services adviser and change their plan in SEVIS before submitting the Plan Change Form (formerly Curriculum Change Form) to the Department of Registration and Records.

If acceptance is approved, a Plan Change Form will be issued, bearing the signature of the accepting dean.

If the former plan was in a different college, the Plan Change Form should be submitted for the signature of the releasing dean with the request that all records be transferred to the new college and department.

From the standpoint of advising, pre-registration, and adding and dropping courses, the student is considered to be in the new plan as soon as the Plan Change Form is completed and filed with the Department of Registration and Records and the records of the student have been transferred to the new department. (See also “Readmission of Former and Suspended Degree Students” and “University Policies and College/Departmental Policies”)

For the most current information regarding this regulation, please visit the following website:
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.16.php

Academic Status

Continuation of Undergraduate Enrollment
Since the beginning of the Fall 2009 Semester, all undergraduate students (including all non-degree seeking students), regardless of when they first enrolled in NC State University, are subject to this regulation.

Minimum Eligibility Standard
The minimum eligibility standard for continued enrollment for any undergraduate student is defined as achieving the required cumulative grade point average for the total number of credit hours attempted at NC State plus transferred credit hours according to the Schedule of Performance Requirements for Continuing Undergraduate Enrollment, referred to hereafter as the Continuation Schedule.

<table>
<thead>
<tr>
<th>Credit Hours Attempted at NC State Plus Credit Hours Transferred</th>
<th>Minimum Required Cumulative Grade Point Average on all Courses Taken at NC State</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-59</td>
<td>1.8</td>
</tr>
<tr>
<td>60 or more</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Undergraduate students who, at the end of any spring semester, do not meet the minimum standards shown in the Continuation Schedule will not be allowed to continue their enrollment at the university during subsequent fall and spring semesters, with the following exceptions:

- students will be eligible to continue their enrollment until they have received final grades for in at least 12 hours at NC State;
- no student with a cumulative GPA of 1.0 or higher will be subject to suspension until the end of the student’s second regular semester at NCSU;
- students who have received final grades for at least 12 credit hours at NC State and have earned a cumulative GPA of less than 1.0 will be suspended immediately (at the end of the semester or summer session) and will be assigned Academic Suspension Status. A student suspended under this policy will be required to take a break in enrollment for one regular semester and will not be permitted to take additional courses (including distance education courses, summer school courses, and independent study courses) offered by NC State prior to or during the break.

Academic Warning
Every student who whose cumulative grade point average is less than 2.00, the minimum for graduation, will be on Academic Warning Status. Every student with a cumulative GPA above a 2.0 who earns a semester GPA below 1.0 will be placed on Academic Warning Status for the following semester. The Timely Advising Requirement applies to students on Academic Warning Status.

Academic Suspension
Academic Suspension Status is assigned immediately at the end of any semester or summer session to any student who has received final grades for at least 12 credit hours at NC State and has earned a cumulative GPA of less than 1.0. Academic Suspension Status is assigned at the end of any spring semester or summer session to any student who has received final grades for at least 12 credit hours at NC State and has not met the minimum standards shown in the Continuation Schedule. In addition, academically suspended students are subject to the provisions of the regulation on Readmission of Former and Academically Suspended Undergraduate
Degree Students. International students who are suspended will have their programs terminated in SEVIS and must immediately meet with an Office of International Scholar and Student Services adviser to discuss immigration consequences and limited options for readmission or transfer.

**Academic Probation**

Academically suspended students may appeal to the University Admissions Committee for re-admission on Academic Probation Status in order to enroll in a regular semester (fall or spring). Students will not be considered in good academic standing while on Academic Probation Status. The Timely Advising Requirement applies to students on Academic Probation Status. The University Admissions Committee may prescribe additional requirements as a condition of re-admission. Students who obtain a cumulative GPA above the suspension level, after being placed on probation status, will have the probation status discontinued. Students on Academic Probation who do not obtain a cumulative GPA above the suspension level or a spring semester GPA of at least 2.5 will return to Academic Suspension Status.

**Timely Advising Requirement**

All students on Academic Warning Status or Academic Probation Status are required to meet with their academic advisers during the first four weeks of classes in regular semesters to review their academic situations and to formulate or review and revise as needed their plans of study. Any student in either of these statuses who does not comply with this requirement will not be allowed to register and continue enrollment at the university during subsequent fall and spring semesters unless the cumulative GPA of the student is 2.00 or greater at the end of the semester in which the requirement was not met.

For the most current information regarding these regulations, please visit the following website: www.ncsu.edu/policies/academic_affairs/academic_progress/REG02.05.1.php

**Readmission of Former and Suspended Degree Students**

An undergraduate degree student who fails to enroll or attend at all, during any regular semester, is considered a “former degree student,” and must re-apply for admission to continue. Readmission applications should be submitted as soon as possible but no later than 30 days prior to the date of desired enrollment. Former students returning should be aware that enrollment restrictions may be imposed at any time, which may affect their readmission.

A non-refundable charge must accompany all applications.

**Readmission for Students Eligible to Continue**

Students who were eligible to continue at NC State at the time of leaving and who have a grade point average of at least 2.0 on all courses taken at NC State are eligible to be readmitted to their former program, provided the program has the capacity to accept additional students.

A student who was eligible to continue at the time of leaving who has subsequently completed academic work at another institution and earned less than a C- average on such work must complete a readmission form and write a letter of petition to the Undergraduate Admissions Committee.

A student who was eligible to continue at the time of leaving and whose grade point average is less than 2.0 on all courses taken at NC State will be:

- Considered for readmission on Academic Warning status if the student’s GPA is not lower than the level required to be eligible to continue under the current regulation; or
- Considered for readmission on Academic Probation Status for one semester if the student’s GPA is below the level required to be eligible to continue under the current policy.
- Former students returning who desire a change of curriculum must be accepted into the desired major based upon current matriculation requirements and submit a properly validated Curriculum Change Form to the Department of Registration and Records before readmission can be processed. (See Intra-Campus Transfers)

**Readmission for Suspended Students**

A student whose grade point average on all courses taken at NC State is such that the student has been suspended may seek readmission under the rules in the sections below.

Readmitted academically suspended students will be on Academic Probation Status and will not be considered in good academic standing until such time as they meet the appropriate minimum cumulative GPA requirement based upon the university’s Continuation of Undergraduate Enrollment regulation.

Any academically suspended student needing 14 or fewer credit hours for graduation and having a GP (Grade Point) deficit of 10 or less will be automatically readmitted to the university on Academic Probation Status for one semester without petitioning for readmission.

- Such students will be permitted to register for successive academic semesters provided that, following readmission, each semester GPA is at least 2.500 until such time as the cumulative GPA is 2.000 or greater (at which time the Academic Probation Status will be removed).
- Failure to achieve the required 2.500 semester GPA or the minimum overall GPA required by the Continuation of Undergraduate Enrollment regulation will result in an additional notice of academic suspension from the university at the end of either the fall or spring semester.
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- So long as the student is on Probation Status, s/he will be limited to a maximum of 14 hours registration each semester (any exception must be approved by the adviser and Academic Dean of the college in which the student is enrolled).

**Automatic Readmission Based on Academic Performance**
A student who is academically suspended may enroll in NC State University Summer Session courses and NC State University Independent Studies courses in order to attempt to improve their overall academic performance.

With consent of the academic department in which the student was formally enrolled, a suspended student may enroll in NC State University Distance Education courses.

- Courses taken through this avenue must be consistent with the student’s program of study.
- To facilitate taking distance education courses, a student must contact his/her academic adviser or the coordinator of advising in the student’s major department to request departmental consent.

Enrollment in NC State University Summer Session, Independent Study, and/or Distance Education courses will be limited to a total of two courses (plus applicable labs) at any given time. An additional one credit hour Physical Education course can be added for students attending on campus summer sessions.

If grades earned through NC State Summer Session courses, Independent Study courses, or NC State Distance Education courses are sufficient to remove the suspension, the student may be automatically readmitted in the subsequent semester without admission committee review.

**Readmission Based on Appeals to the University Admissions Committee**
If the student chooses not to pursue any of the above course options or fails to earn grades sufficient to meet the minimum cumulative GPA requirement (based on the university’s Continuation of Undergraduate Enrollment regulation), the following rules for appeals to the Undergraduate Admissions Committee will apply:

**First Notice of Academic Suspension.** Upon receiving the first notice of academic suspension from the university, a mandatory one regular semester break in enrollment will be imposed for the semester following receipt of the notice (i.e., the fall or spring semester).

During the one-semester break in enrollment, a suspended student may take advantage of an alternative readmission program. This requires a Psychoeducational Assessment offered by the University Counseling Center. The goal of this assessment is to help suspended students identify any underlying educational, behavioral, psychological, or medically related cause(s) of the previously poor educational performance and to make recommendations for adjustments. Students are strongly encouraged to participate in this intervention program.

- Upon verification by the Counseling Center of completion of the Psychoeducational Assessment the student will be eligible for readmission at the beginning of the next semester without admission committee review.
- For readmission in the spring semester, evaluations done at the NC State Counseling Center must be scheduled prior to August 15 and be completed by October 20. Note: Students would not be enrolled during the fall semester.
- For readmission in the fall semester, evaluations done at the NC State Counseling Center must be scheduled prior to May 1 and be completed by July 15. Note: Students would not be enrolled during the spring semester.
- Off-campus, licensed mental health service providers under the guidelines provided by the NC State Counseling Center may also conduct evaluations. Acceptable reports, however, must be filed and discussed by the student with a counselor at the Counseling Center by the October 20 and July 15 dates.

After an absence of at least one regular semester following the first notice of academic suspension, students choosing not to take advantage of the alternative readmission process may petition for readmission through the Admission Committee. The petition should provide evidence of motivation and/or achievement based on any academic work or systematic review of previous performance completed during the suspension period.

Upon readmission the student must meet with their academic adviser to update their plan of study and review their strategies for academic success. Failure to meet with the adviser and to update their plan of study may result in the cancellation of the student’s enrollment.

**Second Notice of Academic Suspension.** Upon receiving the second notice of学术 suspension from the university, a mandatory two regular semester break in enrollment will be imposed. At the end of the mandatory period, the student may petition the Undergraduate Admissions Committee for readmission.

Petitions for readmission must be accompanied by:

- transcript of any courses (including grades) taken during the suspension, and
- a detailed plan of study, developed with the assistance and approval of the adviser, or department designee, outlining courses to be taken in each subsequent semester and the level of performance (GPA and number of hours each semester) necessary to complete the degree requirements, and
- a written evaluation by the adviser candidly discussing the probability the student will be able to meet the performance expectations, and
- evidence that the student participated in the specified intervention program following the automatic reinstatement after the first academic suspension.

If the Admissions Committee decides to readmit the student:
Degree candidates and Unclassified students initiate the official withdrawal process with the Counseling Center, Student Health advising. The withdrawal process is as follows.

- Recommended, but not required, that students considering withdrawal consult their faculty adviser or department coordinator of procedure is not initiated in the academic department or college. Second, a Schedule Revision Form is not used. Third, it is highly recommended, but not required, that students considering withdrawal consult their faculty adviser or department coordinator of advising. The withdrawal process is as follows.

- Failure to follow the plan of study will result in the cancellation of the student’s enrollment and a third notice of suspension from the university.

If the student performs at a level to earn a cumulative GPA that exceeds 2.000, strict adherence to the plan of study may no longer be required. However, a student whose performance drops in subsequent semesters, will then be subject, to a third suspension for poor academic performance.

**Third Notice of Academic Suspension.** Upon the third notice of academic suspension, the student will be permanently suspended from the university, except as provided for under the Contractual Readmission Policy.

**Contractual Readmission.** (An appeal to Undergraduate Admissions Committee by students who have not been enrolled at NC State for three or more years) After not being enrolled at NC State (excluding Summer Sessions, Independent Studies, and NC State Distance Education courses) for a continuous three-year period or longer, a student whose former academic record at NC State was such that the student was suspended or would have been suspended under current policies, may petition the Undergraduate Admissions Committee for contractual readmission.

The Committee will decide each case on its individual merits with special regard to the student’s written appeal, the productive use of the three or more intervening years, evidence of motivation and achievement based on any academic work done during those three or more years, and a supporting letter from the department offering the curriculum into which the student requests admission. This letter must contain a proposed plan of study agreed to and signed by the student, the department head, and the dean. If the curriculum into which the student requests admission is different from that in which the student was last enrolled, the petition to the Admissions Committee must also be accompanied by a Curriculum Change Form approved by the accepting dean.

If a contractual readmission is approved, the following conditions will apply:

- The student’s entire academic record at NC State will be recorded on any subsequent transcript, including a grade point average on all work attempted at NC State.
- For courses attempted prior to readmission, only work of C- or better will count toward fulfilling graduation requirements, providing that such courses meet current curriculum requirements.
- For purposes of suspension and eligibility for graduation, a second grade point average will be calculated based only on courses that are attempted after readmission. Total hours for graduation and suspension will be based on all work at NC State after readmission plus former work of C- or better that is acceptable to the department plus hours transferred from other institutions.
- The student must maintain an overall grade point average of 2.0 or better on all courses attempted after readmission.
- Students who fail to achieve an overall grade point average of 2.0 will lose their contractual readmission status. Their status for subsequent work as a degree student at NC State shall be determined on the basis of total hours attempted at NC State plus transferred hours and their grade point average calculated using all courses attempted at NC State.
- A student may be readmitted under this option only once.

**Notice of Readmission**

Once a student has received notice of readmission, the student should pay the semester’s tuition at the University Cashier’s Office (200 Harris Hall) and register for the schedule of courses agreed upon in consultation with her/his adviser. The student's ID number will be included in the notice of readmission.

**Withdrawal from the University**

Students who wish to drop all the courses for which they are registered must withdraw from the university for the remainder of the semester or summer session in which they are enrolled. Students who have registered and prepaid are considered to be registered and must be officially withdrawn, unless they have notified the university prior to the beginning of the first day of classes that they wish to have their registration cancelled.

The procedure for withdrawing is different in several ways from the procedure for dropping one or some but not all courses. First, the procedure is not initiated in the academic department or college. Second, a Schedule Revision Form is not used. Third, it is highly recommended, but not required, that students considering withdrawal consult their faculty adviser or department coordinator of advising. The withdrawal process is as follows.

Degree candidates and Unclassified students initiate the official withdrawal process with the Counseling Center, Student Health Center, (919) 515-2423. Parental approval to withdraw may be required for single students who are under eighteen.

Non-Degree Studies students withdraw through Student Self Service in MyPack Portal. NDS students may contact Registration and Records at (919) 515-2572 if they have any questions about this process.
International students who wish to withdraw from the university must meet with an Office of International Scholar and Student Services adviser to effect a withdrawal in SEVIS before withdrawing from the university in order to protect their immigration status. International students who are contemplating a withdrawal must call OIS, (919) 515-2961 for an appointment.

NC State students carrying course work at another campus under the interinstitutional arrangement must contact the Department of Registration and Records, 1000 Harris Hall, (919) 515-1496, to initiate the paperwork necessary for removal from the class roll at the other institution.

Students visiting from other institutions who are registered for NC State course work under the Interinstitutional arrangement must initiate withdrawal on their home campus.

Financial Aid recipients who withdraw during the semester or summer sessions may be required to repay all or a portion of the aid received, depending on the date upon which the withdrawal is effective. All students are required to get clearance through the Office of Scholarships and Financial Aid during the withdrawal process to determine their individual repayment obligations.

Withdrawal After the Last Day of the Official Course Drop Period
It is considered that after the last day of the official drop period a student has become a partner in an implied contract with the university to continue until the end of the semester. Therefore, withdrawals without academic penalty are granted by the university only when exception circumstances exist.

Undergraduate and graduate degree students may receive late withdrawals through the Counseling Center under three conditions:

1. Certification by an appropriate medical professional of serious disruption in academic functioning for medical reasons. Such medical petitions are subject to review by a university physician and by the Counseling Center.
2. Certification by the Counseling Center of serious disruption in academic functioning because of an emotional problem or crisis. It is important to verify that (a) there has been a significant decrease in the student’s usual level of psychological functioning and (b) that regaining that previous level of functioning will involve a process of sufficient academic disruption to make continuing as a student unreasonable. In this case a “hold” may often be placed on the student’s readmission pending certification by the Counseling Center and/or independent psychologist/psychiatrist that the student has regained and can be expected to maintain that usual level of psychological competence.
3. Verification by the office of the student’s college dean that a decision has been reached in accordance with that college’s policies and procedures that a documented hardship of any kind which, responsibly handled, resulted in it being unreasonable to insist that the student continue. The hardship should normally have been reasonably unforeseeable.

Courses for which students are officially enrolled are recorded on the transcript without grades or grade points but with a notation of “W” to indicated approval to withdraw after the withdrawal deadline.

Repeating Courses
Course Repeat Policy
Students who repeat a course, regardless of the grade previously made, will have both grades counted in their cumulative grade point average. An exception is the First Year Course Repeat Policy as described in the section following this one.

• Undergraduate students may be allowed as many semester hours as are appropriate in the departmental curriculum for courses that are titled seminar, special topics, independent study or research (usually numbered 490-499 or 590-599) and cover topics different from those studied when the courses were taken previously. Unless a course satisfies one or the other of the above conditions, the semester hours will be counted only once toward the number of hours required for graduation even though students repeat and pass the course both times.
• With the exception of seminar, special topics, independent research courses as described in the above bullet, the adviser’s approval is required for students to repeat any course previously passed with a C- or better; no approval can be given for a grade of A or B. Nor will it be given when: students wish to repeat a lower division course that they have passed with a grade of C- or better after having successfully completed; students wish to take an introductory course after they have successfully completed an advanced course dealing with similar material.
• Students must not register again for any courses in which they have IN grades; such registration does not remove IN grades; and the completion of the course on the second occasion will automatically result in an F for the uncompleted course.

For the most current information regarding this regulation, please visit the following website:
www.ncsu.edu/policies/academic_affairs/pols_regs/REG205.00.23.php

First Year Course Repeat Policy
For courses first attempted in 1995 Fall Semester and afterwards.

The first year course repeat policy is one of forgiveness that helps new NC State undergraduate students maintain good academic standing. The policy is necessary because new students lack familiarity with the university, and as a result, are more likely to make errors in their choice of courses and total course load.

Effects
• The eligible student who repeats a course while electing that the first year course repeat policy apply, will have the grade points and the credit hours attempted and earned on the first completion of the course removed from the calculation of the student’s
cumulative grade point average. The student’s overall GPA will be recalculated based on the credit hours and grade points earned from the second completion of the course even if the grade for the course repeat is less than the grade for the initial course attempt. The credit hours and grade earned from the first completion of the course will not be in the GPA calculation.

- The course title and grade for the first completion will be shown on the official record with a code (R) to indicate that it was repeated and that the first grade was removed from the computation of the cumulative grade point average.
- The recorded grade point average of the student for the semester in which the course was originally taken will not be changed.
- Repeating a course and exercising the first year course repeat policy does not retroactively change the status of the student as to semester academic hours, academic warning, probation, or suspension in prior semesters.
- Many graduate and professional schools recompute grade point averages in the process of considering an application for admission to such programs. This recomputation of grade point averages may include restoring the cumulative grade point average effects of initial attempts at courses repeated under this policy.

Eligibility

1. the initial attempt and the repeat under this policy must be an NC State course;
2. the course being repeated was completed for the first time after the 1995 Second Summer Session;
3. the course being repeated must be at the 100- or 200- level;
4. the student received a grade below C- in the course that is to be repeated;
5. both attempts of the course were for letter grades; no unsuccessful audits or credit-only attempts may be repeated nor may repeats under the policy be made for audit or credit-only;
6. the student has not received credit for an advanced course dealing with the same subject matter as the course being repeated;
7. the first attempt of the course must have occurred within 12 months of the student’s initial enrollment in any classification at NC State; this period is not lengthened by voluntary or involuntary failure to enroll in subsequent semesters or summer session, nor by enrolling at less than a minimum full-time load following the initial date of enrollment;
8. the second attempt is for the same course or for an approved substitute course;
9. the second attempt occurs in a regular semester or summer session which ends within 12 months of the completion of the first attempt of the course; if the course is not available during that period or if the student is not enrolled when it is available, then the second attempt must occur in the next regular semester during which the student is enrolled at NC State and the course is available;
10. the notice of Exercise of First Year Course Repeat Policy is filed by the student with the Department of Registration and Records on or before the “last day to drop a course without a grade for courses at the 400 level and below” of the semester or summer session in which the course is repeated.

Procedures

1. students are advised to consult with their advisers in making the decision to elect a course repeat under this policy.
2. the student must submit a Notice of Exercise of First Year Course Repeat to the Department Registration and Records on or before the last day to drop a course without a grade at the 400 level or below of the semester or summer session in which the course is repeated. Forms may be obtained from advisers, departmental coordinators of advising, associate deans for academic programs, or the Department of Registration and Records.

Code of Student Conduct

All students who enroll at NC State are required to adhere to the Code of Student Conduct. This code “sets out the kind of behavior that disrupts and inhibits the normal functioning of the University, and what action it will take to protect the community from such disruption.” Academic and Non-Academic Misconduct, both on and off campus are addressed in the Code. Students will receive sanctions that may range from a warning to expulsion from the university. For more information contact the Office of Student Conduct at (919) 515-2963 or access the code through the following website: www.ncsu.edu/student_conduct.
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GENERAL EDUCATION PROGRAM (GEP)

General Education at NC State provides the opportunity for a broad and informed understanding of the world, offering our students the foundation for rich and productive lives. General Education is valuable for students because logical and creative thinking are fundamental to improving the human condition; because a respect for the value of diversity and an understanding of human history and cultures are essential to true citizenship; because the development of global knowledge has become increasingly important in response to international interdependence; because knowledge of science and the ability to apply scientific reasoning provide the basis for an appreciation of the workings of the universe and the richness, variety, and ecological interconnectedness of the world around us; because well-considered moral, philosophical, aesthetic, and intellectual convictions are necessary for contributing to human thought and achievement; because effective communication is central to productive engagement in academic, professional, and civic communities; because an ability to understand and evaluate the interaction among science, technology, and society is important in a world that is changing through technological innovation and scientific discovery; and because the development of attitudes and skills for a healthy life is essential to social, mental, and physical well-being. For the most current information available, please see the following website: http://www.ncsu.edu/uap/academic-standards/gep/index.html.

General Education Program Requirements

Mathematical Sciences

**Rationale:** A logical approach to problem solving is important for successful functioning in society. It is also important that students be able to formulate models, be critical consumers of quantitative information, communicate mathematically and solve problems.

**Objectives for courses in the category of Mathematical Sciences:** Each course in the Mathematical Sciences category of the General Education Program will provide instruction and guidance that help students to:

1. improve and refine mathematical problem-solving abilities; and
2. develop logical reasoning skills.

**Mathematical Sciences Requirement:** (6 credit hours)

- A total of six credit hours from the university approved GEP Mathematical Sciences course list.
- At least one course must have an MA or ST prefix.

Natural Sciences

**Rationale:** The natural sciences pursue basic questions about the workings of the universe, and the richness, variety and interconnectedness of the world around us. Students today are exposed to an increasing volume of information, from a large variety of sources, in diverse and changing formats. Training in the natural sciences is essential to help students develop skills to distinguish between testable and un-testable ideas, recognize scientifically valid tests of theories, and understand how information relates to those tests. By studying the natural sciences, students learn to reason both inductively and deductively, develop and test scientific hypotheses, and understand the value and limitations of scientific studies. The development and application of new technologies require scientifically literate citizens who can understand technological issues and evaluate the role of science in society's debate of those issues.

**Objectives for courses in the category of Natural Sciences:** Each course in the Natural Sciences category of the General Education Program will provide instruction and guidance that help the student to:

1. use the methods and processes of science in testing hypotheses, solving problems and making decisions; and
2. make inferences from and articulate scientific concepts, principles, laws, and theories, and apply this knowledge to problem solving.

**Natural Sciences Requirement:** (7 credit hours)

- A total of seven credit hours from the university approved GEP Natural Sciences course list including at least one laboratory course or course with a laboratory.

Humanities

**Rationale:** The humanities comprise the subjects and disciplines that use various models of rational inquiry to understand human human nature and experience, organization and change in human societies, the nature of the world, and rational inquiry itself. An education in the humanities and social sciences requires reading significant works, gaining an exposure to a variety of methodologies, and learning to apply these in written exposition. An education in the basic humanistic disciplines is necessary to become a citizen with a broad knowledge of human cultures and with well-considered moral, philosophical, aesthetic, and intellectual convictions.
Objectives for courses in the category of Humanities and Social Sciences:

Each course in the general humanities category of the General Education Program will provide instruction and guidance that help students to:

1. Engage in the human experience through the interpretation of human culture and
2. Become aware of the act of interpretation itself as a critical form of knowing in the humanities; and
3. Make academic arguments about the human experience using reasons and evidence for supporting those reasons that are appropriate to the humanities.

**Humanities Requirement:** (6 credit hours)

- A total of six credit hours from the university approved GEP Humanities course list.
- The selected courses must be from two different disciplines.

**Social Sciences**

**Rationale:** The study of social sciences enables students to understand individual and collective human behavior by:

1. Exploring meaning with a variety of social, cultural, political, and economic contexts;
2. Analyzing the structures within which human goals are established and human choices are made; and
3. Applying theoretical and empirical models to specific cases.

Objectives for courses in the category of Social Sciences:

Each course in Social Sciences category of the General Education Program will provide instruction and guidance that help students to:

1. Examine at least one of the following: human behavior, culture, mental processes, organizational processes, or institutional processes; and
2. Demonstrate how social scientific methods may be applied to the study of human behavior, culture, mental processes, organizational processes, or institutional processes; and
3. Use theories or concepts of the social sciences to analyze and explain theoretical and/or real-world problems, including the underlying origins of such problems.

**Social Sciences Requirement:** (6 credit hours)

- A total of six credit hours from the university approved GEP Social Sciences course list.
- The selected courses must be from two different disciplines.

**Introduction to Writing**

**Rationale:** Writing is a powerful way of understanding ourselves and the world in which we live. It is through writing that the various disciplines and professions define the knowledge and methodologies that characterize them. Mastery of writing and information skills is central to engaging in the productive life of academic and professional communities.

Objectives for courses in the category of Introduction to Writing:

Each course in this category will provide instruction and guidance that help students to:

1. Write effectively in specific situations, which may include various academic, professional, or civic situations; and
2. Understand and respond appropriately to the critical elements that shape written communication situations, such as audience, purpose, and genre; and
3. Demonstrate critical and evaluative thinking skills in locating, analyzing, synthesizing, and using information in written communication.

**Introduction to Writing Requirements:** (ENG 101 - 4 credit hours)

- A total of four credit hours of English (ENG) 101 are required to fulfill this category.
- Successful completion of ENG 101 requires a grade of C- or better.

**Physical Education/Healthy Living**

**Rationale:** The development of attitudes and skills for a healthy life is essential to a university student’s education. In addition to developing and gaining an appreciation of health-related fitness and wellness concepts and fundamental motor skills, student participation in physical activities and sport significantly decreases major health risks, reduces stress from the pressures of academic life, and improves general social and mental well-being.
North Carolina State University

Objectives for courses in the category of Physical Education/Healthy Living: Each course in the Physical Education/Healthy Living category of the General Education Program will provide instruction and guidance that help students to:

1. Acquire the fundamentals of health-related fitness, encompassing cardio-respiratory and cardiovascular endurance, muscular strength and endurance, muscular flexibility and body composition; and
2. Apply knowledge of the fundamentals of health-related fitness toward developing, maintaining, and sustaining an active and healthy lifestyle; and
3. Acquire or enhance the basic motor skills and skill-related competencies, concepts, and strategies used in physical activities and sport; and
4. Gain a thorough working knowledge, appreciation, and understanding of the spirit and rules, history, safety, and etiquette of physical activities and sport.

Physical Education/Healthy Living Requirement: (2 credit hours)

- A total of two credit hours/two courses including one Fitness and Wellness course from the university approved GEP Physical Education/Healthy Living course list. (Fitness and Wellness courses are those found in the PE 100-level series).
- Students have the option of taking PE courses on an S/U basis and still have the courses satisfy the GEP requirements.

Interdisciplinary Perspectives

Rationale: Interdisciplinary study provides students with the opportunity to synthesize knowledge and skills, to make connections between fields of study, to consider more than one disciplinary approach or methodology, and to bring to bear the insights from two or more disciplines in examining and/or responding to complex problems.

Objectives for courses in the category of Interdisciplinary Perspectives: Each course in Interdisciplinary Perspectives will provide instruction and guidance that help students to:

1. Distinguish between the distinct approaches of two or more disciplines; and
2. Identify and apply authentic connections between two or more disciplines; and
3. Explore and synthesize the approaches or views of the two or more disciplines.

Interdisciplinary Perspectives Requirement: (5 credit hours)

- A total of five credit hours from the university approved GEP Interdisciplinary Perspectives course list.

Additional Breadth

Rationale: One purpose of the General Education Program is to introduce students to a variety of disciplines. To this end, students are required to successfully complete a course from a general education category list that represents an approach to scholarship that is clearly distinct from the primary approach of their major.

Additional Breadth Requirement: (3 credit hours)

- A total of three credit hours in the Additional Breadth category must be selected from the university approved GEP course lists that represent an approach to scholarship that is clearly distinct from the primary approach of the Major. These two approaches are distinguished for GEP purposes as “Humanities/Social Sciences/Visual and Performing Arts” or the “Mathematics/Natural Sciences/Engineering.” Note: At this time, there is no Engineering course list.

U.S. Diversity co-requisite

Rationale: The study of diversity in the United States provides students the opportunity to consider questions of difference and culture, identity and community, privilege and oppression, and power and responsibility in our nation, and to gain an understanding of how these issues affect both individuals and communities.

Objectives for courses in the category of U.S. Diversity: Each course in U.S. Diversity will provide instruction and guidance that help students to achieve at least 2 of the following:

1. Analyze how religious, gender, ethnic, racial, class, sexual orientation, disability, and/or age identities are shaped by cultural and societal influences;
2. Categorize and compare historical, social, political, and/or economic processes producing diversity, equality, and structured inequalities in the U.S.;
3. Interpret and evaluate social actions by religious, gender, ethnic, racial, class, sexual orientation, disability, and/or age groups affecting equality and social justice in the U.S.;
4. Examine interactions between people from different religious, gender, ethnic, racial, class, sexual orientation, disability, and/or age groups in the U.S.
U.S. Diversity Requirement: (1 course, 0 additional credit hours)

- Choose one course from the university approved GEP U.S. Diversity course list.
- Courses on additional GEP course lists that satisfy the U.S. Diversity co-requisite will have a “USD” co-requisite indicator next to the course.

Global Knowledge co-requisite

Rationale: Global knowledge is necessary for students to understand the world and their place in it. The global knowledge requirement provides students the opportunity to explore the complex interrelationships among nations, to gain a deeper appreciation of other cultures and peoples, and to evaluate the impact of U.S. culture and policy on the rest of the world.

Objectives for courses in the category of Global Knowledge: Each course in Global Knowledge will provide instruction and guidance that help students to achieve at least 2 of the following:

1. Compare systematically the ideas, values, images, cultural artifacts, economic structures, technological developments, or attitudes of people from different societies;
2. Identify the historical context of ideas and cultural practices and their dynamic relations to other historical contexts;
3. Explain how a culture changes in response to internal and external pressures.

Global Knowledge Requirement: (1 course, 0 additional credit hours)

- Choose one course from the university approved GEP Global Knowledge course list.
- Courses on additional GEP course lists that satisfy the Global Knowledge co-requisite will have a “GK” co-requisite indicator next to the course.

Foreign Language Proficiency

Rationale: In a sense, languages are keys to the world. The continuous expansion of international relations makes the knowledge of foreign languages increasingly significant. In learning a foreign language and studying its literature and cultures, students acquire a body of knowledge about how humans think, view the world, express themselves, and communicate with one another. Language learning also expands one’s ability to create and discover new meaning in one’s own language and culture. Knowledge of the linguistic structures of a second language helps students to understand their own language better. Likewise, an awareness of contrasting cultural concepts sensitizes students to the differences between their own culture and others. Such awareness has become increasingly important as the communities of the world have become more interconnected and interdependent. The needs of our global society require that more citizens have access to other languages and cultures in order to cooperate in the process of improving the quality of human life.

Foreign Language Proficiency Requirement: To fulfill the GEP Foreign language requirement, the student must have proficiency at the FL* 102 level. This can be demonstrated by completing two years of high school study of the same language with a grade better than a C- in each of the two years, or a passing grade at the FL* 102 level, or by placement into the FL* 201 by examination. Additional requirements have been established by some Colleges and programs.

Technology Fluency

Rationale: Today’s graduate must achieve technology fluency appropriate to the needs of his/her discipline, including technologies for problem solving, empirical inquiry and research. Students will demonstrate critical thinking skills, analytical skills, proficiency and ethical use of the technology within the discipline, which includes responding to and readily adapting to change in those technologies.

Technology Fluency Requirement: Instruction in technologies appropriate to the discipline will be included and assessed within each curriculum.

Communication In The Major (Advanced Communication)

Rational and Requirement: Writing and speaking are fundamental to all disciplinary and scholarly work, also serving as powerful ways of learning and evaluating learning in the disciplines. Each undergraduate curriculum must be designed and taught so that the Major enhances students’ learning through writing and speaking activities and helps students to communicate competently for academic and professional contexts. Because effective communication in these contexts often demands proficiency in the use of information technologies and resources, students must gain a basic understanding of how information is identified, organized, and accessed, in both the print and digital environments.
North Carolina State University

Objectives: Each undergraduate curriculum must be designed to provide instruction and ample opportunities for guided practice that enable students to:

1. Learn more deeply and effectively through the use of writing and speaking activities, and
2. Master the kinds of writing and speaking that are appropriate to their academic or professional majors, and
3. Use information technologies and search strategies appropriate to their academic or professional majors to identify and access information and then to evaluate, synthesize, and incorporate that information effectively in their writing and speaking.

GEP Thematic Track Option

Rationale: The purpose of thematic tracks is to encourage students to connect knowledge from different disciplinary areas while focusing on a unifying theme or topic. It is well suited to students who have an interest in a particular topic and who would benefit by exploring that topic from multiple disciplinary perspectives. Students will be credited with no more than one thematic track.

All students have three options for thematic tracks within the General Education Program (GEP). A student may:

- Choose a thematic track that has been approved by the Council on Undergraduate Education (CUE). Completion of one approved thematic track will be noted in the student’s official transcript upon graduation provided that the student selects the thematic track prior to completion of degree requirements.
- Create a thematic track of their own choice. In this case, the thematic track will not be noted in the student’s transcript.
- Choose to complete the GEP without a thematic track.

Objective for thematic track: Thematic tracks will provide educational experiences that help students to use critical thinking skills to connect multiple disciplinary perspectives around a common topic or theme.

Requirement for completion of a Thematic Track: (12 credit hours)

- Choose a total of twelve credit hours in the thematic track category as a combination of four courses (12 credit hours) - which are linked by a common theme or topic.
- At least one course must come from the university approved GEP Mathematical Sciences/Natural Sciences/Engineering lists; at least one course must come from the GEP Humanities/Social Sciences/Visual and Performing Arts lists.
- The remaining courses are also to be chosen from the approved GEP lists.
College of Agriculture and Life Sciences

Academic programs in the college represent a unique blending of the agriculture and life sciences. Agriculture is a very diverse industry that touches everyone’s life in some way or another. The life sciences provide foundations for studying medical and health-related disciplines as well as environmental experiences and molecular biology.

The goals of the instructional program in the College of Agriculture and Life Sciences include proving relevant, scientific, and practical knowledge of the food, agricultural, and life sciences to its students. These programs emanate from a highly qualified and accomplished faculty committed to academic excellence and the development of the individuals to their personal and professional potential. Central to the college’s goals is the cultivation of interdisciplinary problem-solving skills that will serve its graduates well as they pursue a lifetime of learning and adaptation to change.

The overall objectives of the academic program include:

- To provide an opportunity for a broad university education
- To provide a variety of learning experiences
- To offer a choice of specialization in agriculture and life sciences
- To provide background for graduate or professional programs

Degrees

- The Bachelor of Science degree is conferred upon the completion of one of the curricula in this college.
- The degrees of Master of Science, or Master of (non-thesis) degrees are offered in the various departments in the college.
- The Doctor of Philosophy degree is offered in the following subject areas: animal science and poultry science, biochemistry, bio-informatics, biological and agricultural engineering, crop science, economics, entomology, financial mathematics, food science, functional genomics, genetics, horticultural science, immunology, microbiology, nutrition, physiology, plant biology, plant pathology, sociology, soil science, toxicology, and zoology.

*Further information on graduate offerings may be found in the Graduate Catalog.

Curriculum Offerings and Requirements

A freshman enrolling in Agriculture and Life Sciences has common core courses. The first year-courses are appropriate in all curricula. This approach allows the student time to explore various programs before selecting a curriculum. The student selects a major in a department or interdisciplinary program. All departments offer science curricula (intended primarily for students who anticipate attending graduate or professional school), several technology curricula, and the Agricultural Business Management curriculum is offered in the Department of Agriculture and Resource Economics.

Departmental Majors

Business major: agricultural business management is offered through the Department of Agricultural and Resource Economics. A concentration in biological sciences and the opportunity for double majoring in business and other programs are available.

Science majors: agricultural education, agricultural science, animal science, applied sociology, biochemistry, biological engineering (joint program with the College of Engineering), biological sciences, bioprocessing science, criminology, environmental sciences (joint program with the Colleges of Natural Resources and Physical and Mathematical Sciences), extension education, food science, horticultural science, microbiology, nutrition science, plant biology, plant and soil science, poultry science, turfgrass science, and zoology. Preprofessional courses are offered in the science curriculum track.

Technology/Industry majors: agricultural and environmental technology, animal science, food science, horticultural science, plant and soil science, poultry science, and turfgrass science.

Freshman Year

The curricula in the College of Agriculture and Life Sciences have a common freshman year with the exception of the accredited engineering program offered through the Department of Biological and Agricultural Engineering. For the freshman year of that curriculum, see the College of Engineering.
Academic Minors

Several departments in the College of Agriculture and Life Sciences offer a minor in their discipline. Students interested in additional information regarding a minor should contact the appropriate departmental office. At present, the following minors are available:

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<tr>
<th>Minor</th>
<th>Department</th>
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<tr>
<td>Agricultural Business Management*</td>
<td>Agricultural and Resource Economics</td>
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<tr>
<td>Agricultural and Environmental Technology</td>
<td>Biological and Agricultural Engineering</td>
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<td>Agroecology</td>
<td>Crop Science</td>
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<td>Animal Science</td>
<td>Animal Science</td>
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<td>Applied Sociology</td>
<td>Sociology and Anthropology</td>
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<td>Biological Sciences</td>
<td>Biological Sciences</td>
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<td>Biototechnology</td>
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<td>Crop Science</td>
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<td>Entomology</td>
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<td>Environmental Toxicology</td>
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<td>Extension Education</td>
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<td>Feed Milling</td>
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<td>Food Science</td>
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<td>Horticultural Science</td>
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<td>Leadership in Agriculture and Life Sciences</td>
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<td>Microbiology</td>
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<td>Plant Biosecurity &amp; Regulatory Science</td>
<td>Plant Pathology</td>
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<td>Plant Biology</td>
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<td>Poultry Science</td>
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<td>Soil Science</td>
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<td>Turfgrass Science</td>
<td>Soil Science</td>
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<td>Wetland Assessmen</td>
<td>Fisheries and Wildlife Sciences</td>
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<td>Zoology</td>
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Undergraduate Certificate Programs

- Agricultural Business Management Certif. Prog.*
  (Post Baccalaureate & Undergraduate level programs available)
- Agricultural Leadership**
- Agronomic Crop Production Certif. Prog.*
  *Available via Distance Education
  ** Available via Distance Education and On Campus

Student Activities

Students in the College of Agriculture and Life Sciences have numerous opportunities to take part in broadening extracurricular activities. Most departments have student organizations that provide the professional as well as social experience. Representatives of these clubs form the Agri-Life Council. This council is the student organization representing the college. Student tours provide an opportunity to see firsthand the application of classroom principles. In addition, students representing agrimarketing, agronomy, animal science, horticultural science, food science, poultry science and soil science compete regionally and nationally in a number of activities, providing student members a chance to learn by travel as well as by participation.

Honors Program

The College of Agriculture and Life Sciences has a comprehensive honors program for qualified students throughout their academic careers. Both seminar discussion programs covering broad topics and an independent research program are included. Faculty provide direction on an individual basis to each student with the students selecting their projects. Participation in the CALS Honors Program is limited to CALS students with a GPA of 3.35 or above. The following ALS courses, 398H, 498H, 499H, are required. In addition, a student must take at least 6 hours of 300 level or above honors course work (at least 3 credit hours from CALS) or advanced courses such as 500-level courses in related fields or complete the University Scholars Program or University Honors program. Honors course work must be completed with a “C” or better.

Joint College Honors Program

The Department of Molecular and Structural Biochemistry’s Honors Program, which is administered through the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences, is designed to encourage excellent undergraduate biochemistry majors to develop their academic potential through a selection of courses and research that will challenge their abilities and better prepare them for postgraduate careers.

To be admitted to this program, a student must have at least a 3.5 overall GPA, including grades B or better in calculus (MA 141, 241, 242), general chemistry (CH 101, 201, 202), organic chemistry (CH 221, 223), and calculus based physics (PY 205, 208). To
complete the program, the student must take two semesters of physical chemistry (CH 431, 433) and a minimum of 9 credit hours must be drawn from at least two of the following three categories with at least three credit hours in biochemical-related research. A written scientific report based on the student’s research is required.

- Designated Honors courses, such as BCH 451H, GN 411H, or MB 351H
- Advanced courses, such as 500-level courses in related fields
- Research, such as BCH 492, BCH 493, or ALS 498H and 499H (minimum of 3 hours)

Honor Societies

Students in all majors with strong academic records are recognized by national organizations that have local chapters, Gamma Sigma Delta, Alpha Zeta, Alpha Epsilon Delta, and Phi Kappa Phi.

Scholarship Program

The College of Agriculture and Life Sciences awards approximately 625 scholarships each year on a combination of selection factors including merit, financial need, and leadership.

Jefferson Scholars in Agriculture and Life Sciences and the Humanities

The Thomas Jefferson Scholars Program in Agriculture and Life Sciences and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a program that leads participants to two degrees: one concentrating in an area of agriculture or life science and one in an area of humanities or social science. All majors in each college are available to meet each student’s particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making. The program includes special classes for Jefferson Scholars and a variety of social and service activities. Each spring a number of entering freshmen are chosen to participate in the Jefferson Program. Successful participants receive scholarship support after the sophomore year.

Rising freshmen interested in applying to the Jefferson Scholars program should contact either of the following people before January 15. An online application is available. Visit the Jefferson Scholars website for details at www.cals.ncsu.edu/student_orgs/jeffer.

Dr. Kenneth L. Esbenshade, Associate Dean
College of Agriculture and Life Sciences
NCSU Box 7642, Raleigh, NC 27695
phone: (919) 515-2614

Dr. Mary Wyer, Assistant Dean
College of Humanities and Social Sciences
NCSU Box 8115, Raleigh, NC 27695
phone: (919) 515-1834

INTERDISCIPLINARY PROGRAMS

Curricula in Plant and Soil Sciences

Williams Hall, Room 2321
phone: (919) 515-2643
website: www.soil.ncsu.edu

W.D.Smith, Head of the Department of Crop Science
J. F. Spears, Undergraduate Coordinator, Crop Science
R. Wells, Director of Graduate Programs, Crop Science
M. G. Wagger, Head of the Depart. of Soil Science
H. J. Kleiss, Undergraduate Coordinator, Soil Science
T. J. Smyth, Director of Graduate Programs, Soil Science

Plant and Soil Sciences is a diverse program with concentrations in crop biotechnology, crop production, agronomic sciences, agronomic business, and soil sciences. The Agronomic Science and Crop Biotechnology concentrations are degree programs designed for students who wish to establish professional careers in areas such as applied plant science and crop production research, crop biotechnology, plant breeding, genetics, or physiology. This program will be especially beneficial for students who wish to pursue advanced degrees in areas of applied plant sciences. Students preparing for plant biotechnology, breeding, or genetics careers must have a broad and thorough knowledge of the life and plant sciences, as well as hands on experience in the most recent scientific techniques. At the same time, scientists engaged in plant genetic manipulation at all levels should clearly understand the potential impact engineered plants may have in field production environments. The objectives of these two programs are to merge the scientific/technical expertise in the life sciences with knowledge of plant growth and plant development to prepare students for careers in today’s rapidly changing agricultural industries.

The Agronomic Business concentration is a degree program intended to prepare students for careers in marketing, management, sales, or other economic segments of agri-industry. This concentration is a science based curriculum with built-in flexibility that allows students to choose from a wide range of ARE or BUS electives, plant science courses, and career path electives.

The Crop Production concentration prepares students for career in the crop management, production, or technology. Today’s job market demands that or graduates be well versed in the life sciences and the technical aspects plant agricultural production. This concentration is a science based curriculum with built-in flexibility that allows students to choose from a wide range of crop science courses and career path electives. The flexibility will enable our graduates to have successful careers in plant agriculture-related
positions such as international agricultural development, plant protection, plant inspection, biosecurity, precision agricultural technologies, specialty crop production, and farm management.

**Soil Science**

The concentration provides a focus on the soil resource component of crop and soil management. This concentration provides greater breadth and depth to the role of the physical, chemical and biological properties of the soil. A strong science background allows students to select from a variety of professional career opportunities. In addition to the role of soil in crop production, the soil science concentration prepares students for careers in waste management, watershed/water quality protection, erosion and sediment control, landing planning and soil survey. Opportunities exist in the public sector as well as the private with the potential to become licensed as a professional soil scientist.

The Departments of Crop Science and Soil Science administer the plant and soil science curriculum jointly. Crop Science relates primarily to the biotechnology, genetics, breeding, physiology and management of field crops. Soil Science is oriented toward soil physics, chemistry, origin, microbiology, fertility and management. For further information and employment opportunities, see the departmental headings for Crop Science and Soil Science.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

**Curricula in Environmental Sciences**

Jordan Hall Room 223

For further information, please contact Dr. Bill Winner: wewinner@ncsu.edu

website: www.ncsu.edu/esnr/

Environmental sciences, in the broadest sense, are concerned with the development of basic knowledge about the world's environments and the use of this knowledge to create new and more efficient ways to maintain or enhance the environment for society's benefit. Given the complexity of environmental processes and the many ways in which humans interact with natural environments, a multidisciplinary systems approach is essential for understanding changes in natural environments. Society's future prospects maintaining and improving our environment depends on advances in economics, other social science and humanities and the use of these advances to develop and maintain effective economic, political, and social structures.

Public concern about environmental issues and the resource costs for protecting our environment is increasing. Protecting and improving our environment involves knowledge and systematic problem-solving skills, which will be essential for environmental scientists. Ecologists and other environmental scientists must be conversant with economics, other social sciences, and humanities, while environmental economists and political scientists must be competent in the use of mathematical models and statistics. North Carolina State University's environmental science degree program provides sound training in each of these areas. Successful completion of this diverse and challenging program requires a sound academic background and hard work.

**Curricula in Natural Resources**

A. W. Oltmans, Undergraduate Coordinator Agricultural and Resource Economics; Nelson Hall Room 3304A
H. J. Kleiss, Undergraduate Coordinator Soil Science; Williams Hall, Room 2321

website: www.ncsu.edu/esnr/

Wise use of all our natural resources (soil, water, air, minerals, flora, fauna, and people) for the benefit of current and future members of society is the goal of natural resource management. This important challenge recognizes the interdependence of people with their environment and requires an integrated, multi-disciplinary approach to solving society’s resource problems. Population growth, rising incomes, life style changes and urbanization lead to more intensive use of all natural resources. These trends present challenges to resource managers who must be trained in the basic principles of several disciplines in order to develop and apply sound management strategies to our resource problems. Natural resource professionals must understand resources and the social systems governing their use. They must be able to work in teams to analyze potential effects of resource use and to design ways to make efficient use of natural and environmental resources for current and future generations.

To accommodate the breadth and complexity of natural resource management, the Bachelor of Science degree in Natural Resources is a campus-wide program involving three colleges and four departments that administer seven concentrations. A common core of 84 credit hours of course work provides a balanced foundation in communication, humanities, social sciences, mathematics and the natural sciences. The core course requirements include a freshman orientation course and a senior level applications course that natural resource majors in all concentrations must complete. Within the College of Agriculture and Life Sciences, three concentrations are available: Economics and Management, Soil Resources, and Soil and Water Systems. For information on other concentrations see the Department of Forestry in the College of Natural Resources and the Department of Marine, Earth and Atmospheric Sciences in the College of Physical and Mathematical Sciences.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Agricultural and Extension Education is a broad field of study and practice representing the blending of agricultural and behavioral sciences into educational programs for youth and adults. Agriculture impacts everyone’s life in terms of food, water, air, clothing, homes and the quality of life. Central to the department’s goals is the formal and non-formal teaching of problem-solving and learning skills for a lifetime of growing, evolving, and changing. The Agricultural Science degree provides graduates with both agricultural skills and leadership skills that are essential to leadership positions in the agricultural industry.

There are many professional opportunities that are available to people participating in departmental programs. Graduates have the choice to plan for teaching, administrative leadership and public relations positions in secondary schools, community colleges, Cooperative Extension, and universities and in agribusinesses. Graduates are highly qualified to enter agricultural careers and in agricultural and extension education. Career placement assistance is provided to all graduates.

Curricula

The Agricultural Education curriculum encompasses areas of study that will enable students to participate effectively in planning, promoting, and initiating educational programs in agriculture. The program leads to a Bachelor of Science degree and is designed to prepare teachers of agriculture for secondary schools and community and technical colleges. The demand for agricultural education teachers exceeds present supply in the Carolinas, Virginia, and throughout the nation.

The Extension Education/Extension Concentration curriculum is designed to prepare individuals for careers in the extension service. The program leads to a Bachelor of Science degree in Extension Education. Students are required to complete both classroom and laboratory studies on the NC State campus and a closely supervised practicum in the field. A full semester internship in an Extension office during the senior year is required. Extension Concentrations are available in Agriculture and Natural Resources and in Youth Leadership Development.

The Agricultural Science curriculum is designed to prepare graduates for careers in a wide variety of agricultural industry positions. The program leads to a Bachelor of Science degree in Agricultural Science. Students complete a minimum of two agricultural specialty areas, increasing their options for careers in agriculture upon graduation. In addition to preparation in the agricultural industry, students also complete a series of leadership courses to prepare them for leadership positions within the agricultural industries. Internships are not required in this curriculum, but are strongly encouraged.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Extension Education

The minor in Extension Education is open to all interested baccalaureate students. The minor is especially appropriate for students enrolled in agricultural majors and interested in careers in Cooperative Extension. Students completing a minor in Extension Education will become familiar with the organization, structure, and mission of Cooperative Extension, the planning and delivery of nonformal educational programs, communication media and technology used in extension programs, and accountability systems used in extension. The minor requires a minimum of 16 credit hours with 10 credit hours from a required core and 6 credit hours from a list of advised electives. The minimum grade required for all courses counting toward the minor is “C-.” Additional information related to the minor can be found at: www.ncsu.edu/advising_central/minors_desc/extension edu.htm.

Minor in Leadership in Agriculture and Life Sciences

The Leadership in Agriculture and Life Sciences minor is open to all interested baccalaureate students in the College of Agriculture and Life Sciences. The minor is especially appropriate for students enrolled in agricultural and life science majors seeking a competitive edge when applying for supervisory or management positions in careers related to the agriculture and life sciences industries. Students completing this minor will be able to apply the theory, principles and skills required by leaders in their discipline. The minor requires a minimum of 15 credit hours, with 3 credit hours required and the remaining 12 credit hours from a list of
leadership courses. The minimum grade required for courses counting toward the minor is a “C-.” Additional information related to the minor can be found at www.cals.ncsu.edu/agexed/ugrad/leadership_minor.html.

Certificate in Agricultural Leadership
The department offers a certificate program in Agricultural Leadership that is available to degree and non-degree students. Students in the certificate program complete a total of 12 credit hours in agricultural leadership courses. Those who complete the leadership certificate program will be better equipped to serve in leadership positions within agricultural industry. In addition to an introductory leadership course, students can choose from personal leadership, team leadership, organizational leadership, technical writing, or presentation skills. The minimum grade required for courses counting toward the certificate is a “C-.”

DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS
Nelson Hall, Room 3350
phone: (919) 515-3107
website: www.ag-econ.ncsu.edu

J. A. Brandt, Head
E. A. Estes, Associate Head and Extension Leader
A. W. Oltmans, Undergraduate Coordinator
T.C. Morant, Graduate Coordinator


The Department of Agricultural and Resource Economics serves agricultural, resource and related industries through its extension, research and teaching programs. Applying principles of economics, business, and related disciplines, these programs develop an understanding of contemporary economic and business problems and equip students with knowledge of business organization fundamentals and decision-making skills useful in the operation and management of business firms.

The department offers undergraduate programs leading to a Bachelor of Science degree in Agricultural Business Management (ABM). A concentration in biological sciences and business management (BBM) is offered within the agricultural business management program.

The Agricultural Business Management Program prepares graduates for management, marketing, sales, finance and related careers. The program has sufficient flexibility to provide more extensive course work in basic and applied science and math for those students desiring to prepare for advanced graduate study as well. The concentration in biological sciences/business management prepares graduates for management, marketing, and sales careers in fields such as biotechnology, pharmaceuticals, health care, environmental protection, food processing and finance dealing with biological issues. This concentration is designed to be an attractive option for students with a strong background and interest in science who seek alternatives to technical science careers.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Opportunities
The growing number of specialized business firms producing and marketing services and products in agriculture, resource and life science-related industries has created an increasing demand for graduates trained in agriculture and biological sciences/business management, resource economics and management and environmental policy.

Employment opportunities include careers with companies in purchasing, processing, and marketing food, fiber and related products; firms producing and marketing production inputs (feed, equipment, chemicals, drugs, etc.) and services; banks; other financial and credit agencies; cooperatives; natural resources management units and consulting firms; and natural resources and environmental educational or regulatory agencies.

Many graduates pursue careers in research and education with various state and federal government agencies. These agencies include the Cooperative Extension Service, the Agricultural Research Service, the State Department of Agriculture and Consumer Services, Environmental and Natural Resources, the United States Department of Agriculture, and the Environmental Protection Agency.
Minor in Agricultural Business Management

The Department of Agricultural and Resource Economics offers a minor in Agricultural Business Management. This minor provides students an opportunity to learn basic concepts useful in many careers in agricultural business. A total of 15 hours of course work is required, including ARE (EC) 201, and four additional courses chosen from a list of selected courses in agricultural and resource economics and related business fields. In addition to completing the minor through on-campus courses, students may also obtain a Minor in Agricultural Business Management via Distance Education courses. Consult the Department of Agricultural and Resource Economics for specific information on the requirements of the minor.

DEPARTMENT OF ANIMAL SCIENCE

Opportunities

Opportunities for animal scientists are boundless and the areas of emphasis are diverse. Animal science graduates are qualified for positions in a wide variety of areas such as: research and development at pharmaceutical and biotechnology companies; livestock, horse, or companion animal management; animal breeding and production; feed and animal healthcare product sales and service; livestock marketing; consulting; state and federal departments of agriculture; breed associations; educational and financial institutions; livestock, horse, and companion animal publications and other media; animal technical services; extension services; and public relations. Animal scientists can be found across the nation and around the world in all phases of production, research, sales, service, business, health, and education. Many students in pre-veterinary medicine obtain degrees in animal science, as do other preprofessional students including pre-medical and pre-dental. Students may elect graduate study, after which they will find opportunities in teaching, research, and extension.

Curricula

The degree of Bachelor of Science in Animal Science may be obtained with either the science or industry/business concentration offered by the Animal Science Department in the College of Agriculture and Life Sciences. The science concentration (SAS) is designed for students with interest in advanced study in disciplines such as physiology, nutrition, and genetics. Many students in pre-veterinary medicine are enrolled in this concentration pursuing a Bachelor of Science Degree in Animal Science. The industry/business (IAS) concentration is for students interested in entry into the animal industry or allied businesses. It offers flexibility in complementing animal science with business, economics, and applied science course work.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Minor in Animal Science

A minor in Animal Science is open to all interested baccalaureate students who are not majoring in Animal Science. This minor is appropriate for (but not limited to) students majoring in Agricultural Business Management, Agricultural Economics, Agricultural Education, Agricultural Science, Agronomy, Biological Science, Food Science, Nutritional Science, Poultry Science and Zoology. Students completing a minor in Animal Science will become familiar with animal production and with its related industries. The minor requires a minimum of 15 credit hours with a grade of “C-” or better, including Introduction to Animal Science, Animal Nutrition, and the student’s choice of Animal Science elective courses. The program is flexible in order that students may emphasize the discipline or species of their interest.

See: www.ncsu.edu/advising_central/minors_desc/animal_sci.html.

DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

David S. Weaver Laboratories, Room 102
phone: (919) 515-2694
website: www.bae.ncsu.edu

R.O. Evans, Jr., Head
S.A. Hale, Associate Head Undergraduate Coordinator
T.M. Losordo, Department Extension Leader
D. H. Willits, Director of Graduate Programs


The Department of Biological and Agricultural Engineering applies engineering principles to biologically-based systems, primarily in agricultural and environmental. The BAE department provides excellent educational opportunities at the undergraduate level with programs that are well recognized as among the finest in the United States. Two undergraduate curricula are offered: (1) Biological Engineering (BE) and (2) Agricultural and Environmental Technology (AET).

The BE curriculum includes concentrations in agricultural engineering, bioprocess engineering, and environmental engineering. All concentrations within the BE curriculum emphasize core courses in biology, mathematics, physics, chemistry, environmental, mechanics, materials, and thermodynamics, which collectively provide solid training in basic science and engineering. The curriculum is designed to prepare each graduate to master fundamentals of engineering and biology, develop the ability to solve engineering problems, improve self-confidence, and apply the creative process of engineering design. The educational experience is capped off with a two semester senior level course that immerses each graduate in the team approach to developing engineering solutions to complex problems. By the time of graduation, approximately 80% of BE graduates will have passed the Fundamentals in Engineering exam and thus be well on their way toward licensure as a Professional Engineer.

The AET combines an understanding of agricultural, biological, and physical sciences with technology and economics so that the focus is on applying engineering principles to agricultural and environmental systems. Graduates are prepared to apply and manage the use of technical tools in production agricultural and environmental issues, or in other industries interfacing with natural resources or agriculture. The AET graduates provide a critical link in the agricultural and environmental spectrum by interacting directly with the production personnel as well as designers, implementers and managers of technological systems.

Opportunities

BE students learn to solve a wide variety of engineering problems and will have opportunities for specialization though selection of a specific concentration. Scientific and engineering principles are applied: to conserve and manage air, energy, soil and water resources; to manage, protect and restore natural ecosystems; to understand and utilize biological, chemical and physical processes for the production and conversion of biomass to bioenergy; to analyze, understand and utilize mechanical properties of biological materials; to design and develop machinery systems for all phases of agricultural and food production; to design and evaluate structures and environmental control systems for housing animals, plant growth, and biological product storage; to develop improved systems for processing and marketing food and agricultural products; and to design sensor-based instrumentation and control systems for biological and agricultural applications.

Graduates of the BE curriculum receive a “B.S. in Biological Engineering,” qualifying them for positions in design, development, and research in industry, government and public institutions. The curriculum also prepares students for post-graduate work leading to advanced degrees. Typical positions filled by recent BE graduates include: stream and wetlands restoration project manager; product design; development and testing engineer; plant engineering and management; engineering analysis and inspection for federal and
College of Agriculture and Life Sciences

state agencies; engineering consultant and research engineer. Entry-level salary ranges for BE graduates are similar to those of Civil, Industrial, and Mechanical Engineering graduates.

The AET curriculum provides graduates opportunities in technical analysis, application and evaluation of agricultural production systems and environmental systems. The curriculum's flexibility enables students to specialize technologically in agriculture, the environment, or business management. Careers include technical jobs in production agriculture, environmental systems, agribusiness sales and service, and agricultural extension.

Curricula

The BE curriculum is jointly administered by the College of Agriculture and Life Sciences and the College of Engineering and combines the fields of engineering, biology and agriculture. The BE curriculum is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. BE graduates are qualified to become registered professional engineers by passing the appropriate examinations and upon completing the engineering experience requirements. Specific curriculum requirements are available online.

The program educational objectives of the Biological Engineering (BE) Bachelor of Science (B.S.) degree are to:

- Educate students for successful careers in engineering by mastering the fundamentals of engineering and biology.
- Instill in the students time management skills and a sense of confidence in their ability to grasp and apply engineering principles to solve complex, real-world problems.
- Impart a sense of professional responsibility and work ethic.
- Establish an educational environment in which students participate in interdisciplinary activities.
- Offer a curriculum that provides students an opportunity to become broadly educated engineers and life-long learners.
- Expose students to advances in engineering practice and research.
- Recruit students with high potential who will contribute to the future economic and social well-being of North Carolina.

The AET curriculum is administered by the College of Agriculture and Life Sciences and is intended to uniquely prepare students for hands-on application of technology to efficiently manage agricultural and environmental systems. Flexibility within the program allows students to attain depth in science, business, or environmental areas. Graduates provide a critical link in the agricultural and environmental spectrum by interacting directly with both production personnel as well as the designers and implementers of technological systems.

The program objectives of the Agricultural and Environmental Technology (AET) Bachelor of Science (B.S.) degree are to:

- Develop in students a contextual knowledge of physical and biological systems supporting agriculture and the environment.
- Develop a contextual knowledge of physical and biological systems supporting agriculture and the environment.
- Develop depth and/or breadth by choosing appropriate agricultural, environmental or business electives.
- Utilize hands-on approaches in the formulation of solutions to practical problems.
- Apply critical thinking and existing technology to identify, evaluate, and solve problems with agricultural and environmental systems.
- Communicate effectively between engineers, technicians, businesses, and consumers to gain information needed to solve problems and present solutions.
- Motivate students to engage in life-long learning.
- Work effectively in teams.

Minor in Agricultural and Environmental Technology

A minor is offered to students interested in the application of engineering technology analysis in agricultural and environmental systems that utilize machinery, agricultural structures, food and feed processing, soil, water and waste management, electrical power and controls, and agricultural safety and health technology. This minor is not open to AET majors and allows majors in other programs to understand engineering technology for equipment, materials, resources, processes, and facilities utilized in their major area of study, and be knowledgeable in the application of technology for managing environmental issues, impacts, and monitoring.

DEPARTMENT OF BIOLOGY

David Clark Labs, Room 127
phone: (919) 515-2741
website: www.cals.ncsu.edu/biology

D. Shea, Head
J.L. Lubischer, Director of Undergraduate Programs
W.C. Grant, Undergraduate Coordinator, B.S. in Biological Sciences
J. F. Gilliam, Undergraduate Coordinator, B.S. in Zoology
H.V. Daniels, Director of Graduate Programs
H. V. Daniels, Department Extension Leader

The Department of Biology provides educational opportunities to undergraduate and graduate students and conducts world class research in a variety of areas in modern biology. Undergraduates begin with comprehensive studies of the structure, function, behavior, and evolution of cells, organisms, populations, and ecosystems and then have the opportunity to select upper division courses that reflect their intellectual interests and career goals. Undergraduates who earn a Bachelor of Science degree in Biological Sciences or in Zoology gain a strong background in biology and in related fields. The specific curricula requirements for our undergraduate programs can be compared at http://harvest.cals.ncsu.edu/biology/index.cfm?pageID=1619 (See the Graduate Catalog for a listing of graduate degrees.) Specific curricula requirements are available online: www.ncsu.edu/registrar/curricula

Opportunities

Bachelor of Science graduates in Biological Sciences or Zoology have many career options. Graduates are well prepared for employment in various government agencies and private industries. Graduates may continue their education with studies leading to advanced degrees in many areas of biology, including cell biology, ecology, wildlife and fisheries science, conservation biology, marine science, zoology, neurobiology, and biomedical disciplines. Many choose to seek degrees in medicine, dentistry, optometry, veterinary medicine and other health-related fields. Students who plan to seek certification for pre-college teaching may select a second major in the Department of Mathematics, Science, and Technology Education.

Bachelor of Science in Biological Sciences

There are five different avenues to earning a B.S. in Biological Sciences, each with its own degree code. Students studying for a degree in Biological Sciences can opt for a general curriculum (BLS) or can choose to focus in a particular area by selecting one of four areas of concentration: Molecular, Cellular, and Developmental Biology (MCD), Integrative Physiology and Neurobiology (IPN), Human Biology (HB), or Ecology, Evolution, and Conservation Biology (EEC). The MCD curriculum offers students in-depth studies of the molecular and cellular basis of life and the development of multicellular organisms. The IPN curriculum provides a comprehensive grounding in basic principles of physiology and neuroscience, as well as in-depth exposure to the application of these principles in understanding whole-organism function and the ways in which animals cope with challenges presented by their environments. The HB curriculum provides training in those areas of science most important to health-related professions as well as relevant aspects of the humanities and social sciences. It is designed to provide students with a solid education in the scientific and humanistic concepts that underlie modern health sciences and related areas of scientific research. The EEC curriculum offers students in-depth studies in areas of biology at the level of the organism, populations, and ecosystems. It is designed for students who have an interest in whole organisms and their biodiversity — what maintains it, what environmental changes affect it, and how to protect it in the face of various challenges.

Bachelor of Science in Zoology

The Bachelor of Science in Zoology (SZO) curriculum concentrates on the animal side of biology. Required courses are designed to develop breadth and depth in core areas, providing a strong base for all Zoology majors. Students acquire a knowledge of zoology from the organizational level of molecules and cells to the organizational level of ecosystems, with flexibility in the selection of upper level courses to then specialize or remain generalized, according to individual interests and career goals.

Bachelor of Science in Fisheries and Wildlife Sciences

Faculty in the Department of Biology are also involved in the Fisheries and Wildlife Sciences curriculum, which provides specialization in ecological principles needed to conserve and manage fisheries and wildlife resources. The Bachelor of Science in Fisheries and Wildlife Sciences is administered by the Department of Forestry and Environmental Resources.

Minor in Biological Sciences

The undergraduate minor in Biological Sciences serves to enhance the programs of students whose major fields are outside the biological sciences and who are interested in obtaining either a broad-based perspective in biology or a more focused exposure to a particular field within biology. It is available to all baccalaureate students except those majoring in Animal Science (SAS), Biochemistry (BCH), Biological Sciences (BLS, MCD, IPN, HB, or EEC), Microbiology (SMB), Nutrition (NTS), Plant Biology (PB), Plant and Soil Sciences (PAA, PAB, PAC, PAE, PCB, SST), Turfgrass Science (TFG), or Zoology (SZO). Required courses (8 hours) provide an overview of the field of biology, then students select additional courses (at least 7 hours) from approved lists within biological sciences that best match their interests. Students also can complete this minor through Distance Education course offerings. Courses will count toward the minor only if they are completed with a C- or better.

Minor in Zoology

The objective of the undergraduate minor in Zoology is to provide students with a solid foundation in zoological concepts, including diversity of the animal kingdom, morphology, physiology, evolution, behavior, and ecology. It is available to all baccalaureate
College of Agriculture and Life Sciences

students except those majoring in Biological Sciences (BLS, MCD, IPN, HB, EEC) or Zoology (SZO). Laboratory experiences are an integral part of the minor. Courses will count toward the minor only if they are completed with a grade of C- or better.

DEPARTMENT OF CROP SCIENCE

Williams Hall, Room 2205
phone: (919) 515-2647
website: www.cropsci.ncsu.edu

W.D. Smith, Head
J. F. Spears, Undergraduate Coordinator
R. Wells, Director of Graduate Programs


Crop Science is the discipline of producing abundant, safe and sustainable food, feed, fiber, and fuel crops and enhancing the quality of recreational and ornamental turfgrasses. The Department of Crop Science offers two areas of study: Plant and Soil Sciences (formerly Agronomy) and Turfgrass Science. The Plant and Soil Sciences major offers flexible curricula in several areas of study including concentrations in Agroecology, Agronomic Science, Agronomic Business, Crop Biotechnology, Crop Production and Soil Science (administered by the Department of Soil Science). Undergraduate students in both majors study adaptation, production practices, sustainability, genetics, pest management, soil management and soil fertility associated with producing various commodities. These curricula options allow students with diverse backgrounds and career goals to select courses that meet their individual interests and needs.

Opportunities

There are numerous career opportunities for Plant and Soil Sciences and Turfgrass Science graduates. For example, Agroecology is multi-disciplinary concentration that will prepare students for a diversity of employment opportunities including, government agricultural research, agriculture extension and education, non-governmental organizations, conversation and wildlife management and international agricultural research & development. Many of our Crop Biotechnology and Agronomic Science graduates enroll in graduate programs here at NCSU or at major universities throughout the country. Others find employment as research specialists with companies engaged in biotechnology, plant improvement, genetic enhancement of plant traits, and agri-chemical development. Crop Production and Agronomic Business graduates often secure jobs as consultants, extension agents, farm managers, seed production specialists, agribusness agronomists and managers, soil survey specialists, soil conservationists, technical sales representatives, and waste management specialists. Graduates from our Turfgrass Science program find employment as golf course superintendents, athletic field managers, home and recreational lawn professionals, and turfgrass sod producers.

Curricula

Students may earn a Bachelor of Science degree in Turfgrass Science (TFG) or a Bachelor of Science degree in Plant and Soil Sciences with concentrations in Agroecology (PAE), Agronomic Business (PAA), Agronomic Business (PAB), Crop Biotechnology (PCB), Crop Production (PAC) or Soil Science (SST). The Plant and Soil Sciences curriculum is administered jointly by the Departments of Crop Science and Soil Science.

Minor in Crop Science

The Crop Science Minor is open to any degree seeking undergraduate student (except Plant and Soil Sciences majors) interested in gaining knowledge of the development, productivity and sustainability of crop management systems, genetic improvement and pest management strategies, and the interaction of crops with their physical and biotic environment. It is intended to complement other curricula that are related to crop-environment and agro-ecological studies. An appreciation of agronomic approaches, which lead to a more efficient use of crop production inputs and to a less invasive impact on the environment, is emphasized. It is not intended to prepare students for a professional career in Crop Science. Additional courses are recommended for students who plan graduate work in this discipline.
Minor in Agroecology

The Agroecology minor is open to all baccalaureate students (except Plant and Soil Sciences - Agroecology majors). It is designed for students majoring in the biological sciences, agronomy, horticulture and animal sciences, but will be of interest to a wide array of students as agriculture has broad implications in the life sciences, economics, and sociology. Agroecology instruction provides students a fundamental understanding of agriculture and its interaction with natural and social systems. Students selecting the Agroecology minor will gain an understanding of modern production agriculture from an ecological and sociological perspective, obtain new skills in analyzing agricultural systems, and acquire the knowledge to design a plan for change. This knowledge will improve a student’s ability to work with agricultural professionals to implement a system that meets ecological and social needs while remaining profitable for farmers.

Minor in Turfgrass Science

The Turfgrass Science minor is open to all undergraduate students except those with a major in Turfgrass Science. It is designed for students majoring in Plant and Soil Sciences, Biological Sciences, Horticultural Science, Parks & Recreation and related disciplines but will be of interest to a wide variety of students desiring expertise in establishing and maintaining turfgrass commonly grown throughout the United States. This knowledge will improve the student’s ability to provide high quality turfgrass cover for a variety of situation including home lawns, commercial grounds, parks and other areas.

DEPARTMENT OF ENTOMOLOGY

Gardner Hall, Room 2301
phone: (919) 515-2746
website: www.cals.ncsu.edu/entomology

G.G. Kennedy, Head
J. R. Meyer, Undergraduate Coordinator
D.W. Watson, Director of Graduate Programs
J. S. Bacheler, Department Extension Leader


Undergraduate instruction in entomology provides introductory and advanced courses in the basic science of entomology and the management of beneficial and pest insects. Courses at the 200- and 400-level fulfill General Education Requirements in Natural Sciences or Science and Technology and serve students majoring in biological sciences, agronomy, horticultural science, agricultural education, crop science, forestry and plant biology. They also provide fundamental training for graduate study in entomology (see the Graduate Catalog).

Opportunities

For graduates with advanced degrees in entomology, opportunities include research, teaching, and extension positions in colleges and universities; research, development, production, control, and sales positions in private industries; consultative positions in pest management; research and regulatory positions with state and federal agencies; and curatorial positions in museums.

Curricula

There is no undergraduate major in entomology. Those students with a primary interest in entomology are advised to choose a general biological science curriculum and minor in entomology.

Minor in Entomology

The Department of Entomology offers an undergraduate minor available to all baccalaureate degree students at North Carolina State University. The minor is especially appropriate for (but not limited to) students interested in biological or agricultural sciences, veterinary medicine, or other health sciences. A basic knowledge of insect biology may also be useful to students seeking careers in government, industry, or education. The minor consists of a minimum of 15 credit hours, including one core course (ENT 402 or ENT 425). The remaining hours can be selected from a group of restricted electives.
DEPARTMENT OF ENVIRONMENTAL AND MOLECULAR TOXICOLOGY

Toxicology Building, Centennial Campus
phone: (919) 515-2274
website: www.tox.ncsu.edu

G. A. LeBlanc, Department Head
C. S. Hofelt, Undergraduate Coordinator
R. C. Smart, Director of Graduate Programs
W. G. Cope, Department Extension Leader


Toxicology is the science dealing with how chemicals and physical agents cause adverse effects on living organisms and environmental systems. This includes understanding where chemicals come from, what happens to them in the environment, how people and ecosystems are exposed to chemicals, and the cascade of events that take place following chemical exposure to cause adverse effects. Toxicology is an interdisciplinary field of study that integrates many physical, chemical, and biological principles that help us better protect human and ecological health.

Opportunities

Students who participate in our undergraduate program will gain the scientific background and skills required for employment in environmental and biomedical careers with university, industrial, state, and federal research laboratories and regulatory agencies. The curriculum is especially suited to students preparing for graduate study in environmental sciences, biochemistry, molecular biology, biotechnology, and genetics and for the health fields of medicine, veterinary science, pharmacology and related fields.

Curricula

The Department of Environmental and Molecular Toxicology offers an undergraduate minor in Environmental Toxicology that is available to all baccalaureate degree students at North Carolina State University. The minor is intended to provide undergraduate students with an understanding of how chemicals and physical agents can adversely affect biological systems and the environment, including the mechanisms of chemically induced toxicity, the fate and effects of chemicals in the environment, and the evaluation of chemical hazards and risks. The minor is especially appropriate for (but not limited to) students majoring in the biological or agricultural sciences, physical sciences or science education. For additional information on course, curriculum, and research opportunities please visit our website at www.tox.ncsu.edu or contact Undergraduate Coordinator Dr. Chris Hofelt at c_hofelt@ncsu.edu.

DEPARTMENT OF FOOD, BIOPROCESSING AND NUTRITION SCIENCE

Schaub Hall
phone: (919) 515-2951
website: www.ncsu.edu/foodscience

D. R. Ward, Department Head
B.E. Farkas, Associate Department Head
D.P. Green, Department Extension Leader
B.E. Farkas, Food Science Undergraduate Teaching Coordinator
C.R. Daubert, Bioprocessing Science, Undergraduate Teaching Coordinator
S. L. Ash, Nutrition Undergraduate Teaching Coordinator
J. C. Allen, Director of Graduate Programs


The Department of Food, Bioprocessing and Nutrition Sciences offers three undergraduate degree programs; Food Science, Bioprocessing Science and Nutrition Science. These programs focus on the application and integration of chemistry, biology,
biochemistry, biotechnology, and engineering disciplines on the development, production, and delivery of safe and nutritious foods and other products from bioprocessing operations, in addition to the role of diet more generally in human health. In support of each program, the department maintains modern and fully-equipped laboratories for teaching and research. All three undergraduate programs are compatible with pre-professional school curricula, such as pre-med or pre-vet, and many students elect to minor or double major in Biochemistry, Biological and Agricultural Engineering, Chemical and Biomolecular Engineering, Poultry Science, Animal Science, or other curricula.

Opportunities
Consumer demand for safe, high quality, nutritious foods and biopharmaceutical products creates a variety of career opportunities in the food, pharmaceutical and the allied health industries. Industrial opportunities include management, research and development, process supervision, quality control and assurance, procurement, distribution, and sales. In addition, graduates hold positions with government agencies and many with advanced degrees have teaching and/or research positions in colleges and universities.

Many career opportunities exist in the food and beverage industry, the world’s largest manufacturing sector, for graduates with a Food Science degree. Food science professionals are involved in the discovery of new food sources, new methods of food preservation, or product development. Positions are found worldwide, providing technical support to the food and beverage industry and government agencies. Food scientists work to ensure the safety and quality of foods through the application of basic scientific principles. The demand for food scientists continues to increase as the food industry expands.

The Bioprocessing Science degree is a unique program designed to provide graduates with a special skill set specific in bioprocessing and biomanufacturing. Graduates from this degree program will have exciting opportunities to biomannufacture medicines, vaccines, enzymes and other products that improve the quality of life.

Jobs for those with training in Nutrition Science are increasing due to the growing and aging population, public interest, especially related to obesity and chronic disease risk, and a desire to develop nutritious products for a health conscious consumer. Nutrition scientists may be employed in a variety of settings including clinical or private practice, health management organizations, wellness centers, health-related government agencies or non-profit organizations, and the food industry. Because of the key role that diet plays in the prevention, development, and treatment of many major diseases, health professionals benefit from an understanding of nutrition. Therefore, a degree in Nutrition Science is also highly relevant for those desiring a career in an allied health field.

The department provides both merit and financial need scholarships to encourage and assist students preparing for careers in Food, Bioprocessing, or Nutrition Science.

Curricula
The Food Science Bachelor of Science degree is offered through two curricula emphasizing science or technology. The science curriculum is designed for students desiring a more analytically intense program leading to technical careers in the food industry or graduate school. Students with an interest in business opportunities will find the technology program permits greater flexibility to pursue coursework in business, agricultural economics, or related fields.

The Bioprocessing Science Bachelor of Science degree prepares students for technical careers in biomanufacturing through formal training in fundamental sciences, as well as preparing students for careers in industries whose products are based on biological systems, including biopharmaceutical and biotechnology companies.

The Nutrition Science Bachelor of Science degree is designed for those students with an interest in graduate school or for those going on to post-graduate training in an allied human health profession.

Minor in Food Science
The Food Science Minor is designed to provide students with important food science principles and concepts, giving a competitive edge to individuals seeking employment in the food, pharmaceutical and related industries. A minor provides technical information to improve the student’s knowledge and understanding of food and its manufacture. While a comprehensive coverage of Food Science cannot be accomplished in 15 credit hours, flexibility in developing the minor permits tailoring each program to complement a student’s major. An introductory course (FS 201) is required, but other courses are selected to build on the student's major.

Minor in Nutrition
A Nutrition Science minor is designed to provide knowledge of the principles of nutrition needed to formulate balanced diets and to apply an understanding of nutrient structure, function, and sources to the evaluation of information and policies concerning foods and dietary and/or feeding practices. Introductory Biochemistry and a sophomore seminar are required courses; students then select an additional 11 credit hours from a list of 200-500 level classes, including on- and off-campus independent study or research experiences.

Specific curriculum requirements for all programs are available online: www.ncsu.edu/registrar/curricula
DEPARTMENT OF GENETICS

Thomas Hall, Room 3510
phone: (919) 515-2292
website: www.genetics.ncsu.edu

D.W. Threadgill, Head
S. E. Curtis, Director of Academic Programs


The Department of Genetics offers courses at the advanced undergraduate and graduate levels. Undergraduate students interested in genetics are encouraged to pursue a genetics minor (see below) in conjunction with a major in one of the basic biological or agricultural sciences. An undergraduate major in genetics is not available. The graduate program is designed to train scientists for research and teaching careers in genetics and molecular biology. Please refer to the Graduate Catalog for further information concerning the M.S. and Ph.D. degrees in genetics and the Master of Genetics degree.

Minor in Genetics

The Department of Genetics offers an undergraduate minor in genetics to provide students with strong preparation in the principles of genetics as well as preparation in ancillary fields such as statistics, biochemistry and microbiology. This minor is appropriate for (but not limited to) students with majors in animal science, biochemistry, biological sciences, crop science, environmental sciences, fisheries and wildlife sciences, food science, forestry, horticultural science, microbiology, plant biology, plant and soil sciences, poultry science, and zoology. The genetics minor requires 18 hours—15 specified and 3 elective. A grade of “C” or better is required for all courses to fulfill the genetics minor requirements.

DEPARTMENT OF HORTICULTURAL SCIENCE

Kilgore Hall, Room 120
phone: (919) 515-3131
website: www.cals.ncsu.edu/hort_sci

J. L. Kornegay, Department Head
J. M. Dole, Director of Graduate Programs
J. R. Schultheis, Department Extension Leader
T.G. Bildeback, Interim Director, JC Raulston Arboretum


Horticulture is a dynamic segment of agriculture. The development, growth, distribution, and utilization of fruits, vegetables, flowers, and ornamental plants, plus the art of landscape designing enrich our lives with nutritious foods and more attractive surroundings. North Carolina's varied climatic conditions favor the production of a wide variety of horticultural crops on a commercial scale, as well as numerous beautiful parks, gardens, arboreta. The growing interest in local foods and home gardening has created a demand for more information about fruits and vegetable production and new crop varieties adapted to North Carolina's environments. Urban population growth fuels a need for ornamental plants and a thriving nursery industry. Designers skilled in residential and commercial
landscaping, interior plantscaping, and plant maintenance are in high demand. The growth in demand for horticultural information by the consumer, schools, and state and county government continues to increase.

Undergraduate programs in horticultural science offer a broad based education in physical and biological sciences and a sound cultural background. Students can concentrate in areas of fruit and vegetable science, floriculture, woody ornamental plant science, landscape design, or pursue a general approach encompassing all the specialties. They are prepared for graduate study or for diverse professional service.

Opportunities

Horticulture graduates fill positions in production, processing, sales, service, and outreach. Among these are county extension agents; vocational agriculture teachers; landscape designers and landscape contractors; farm operators; orchard, nursery, greenhouse, and garden center managers; research, production and promotional specialists with commercial seed, fertilizer, chemical and food companies; urban horticulture specialists and garden writers; inspectors and quality control technologists; USDA specialists; county and state government planners; and leaders in other phases of agricultural and industrial developments. Students also prepare for careers in research, teaching or extension in horticulture.

Curricula

The degree of Bachelor of Science with a major in horticultural science can be earned in either science or technology. Under the science curriculum, specialized education is offered in fruit and vegetable crops, floriculture, and ornamental horticulture. Under the technology curriculum, education is offered in landscape design or in a general approach, which allows for specialization in fruit and vegetable science, floriculture, and woody ornamental plant science.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Horticultural Science

The academic minor in Horticultural Science is offered to students who desire a strong foundation in the principles of horticultural science. Students may choose to enhance their own major by selecting courses in a specialized area of horticulture such as fruits and vegetables, ornamentals, floriculture, or landscape horticulture, or they may pursue a more general approach to the entire field of study. Sixteen or seventeen credit hours are required for the minor, depending on courses selected.

DEPARTMENT OF MICROBIOLOGY

Thomas Hall, Room 4510
phone: (919) 515-2391
website: www.microbiology.ncsu.edu

Eric S. Miller, Interim Head
Jim Brown, Director of Undergraduate Programs
M. R. Hyman, Director of Graduate Programs


The microbiology program provides basic preparation in microbiology, virology, and immunology for professional microbiologists and students in other sciences and an awareness of the microbial world as it relates to our daily lives for non-science majors.

Microbiology is concerned with the growth and development, physiology, classification, ecology, genetics, and other aspects of the life process of an array of microscopic, generally single-celled, organisms and viruses. These organisms frequently serve as model systems for elucidation of fundamental processes that are common to all living cells. Most of the major discoveries that have produced the spectacular advances in biology and genomic science during the past decade have resulted from studies of microbial systems. Future developments in biotechnology, production of food and fuel, and human and animal health will rely heavily on understanding microbial processes.

Opportunities

Microbiologists are employed in university, governmental and industrial research laboratories, diagnostic, environmental and quality control laboratories, teaching, and technical sales and service positions.
Curricula

The microbiology curriculum leads to a Bachelor of Science degree and is designed to provide the student with a strong foundation in mathematics, chemistry, and physics, and skills in oral and written communication. The student will also gain broad general knowledge of molecular and cellular biology as well as a foundation in the basic areas of microbiology, virology, and immunology. Advising tracks in pre-professional health sciences, microbial biotechnology, and research microbiology are available. Graduates of this curriculum will be prepared for work in research laboratories and production facilities or for further study in graduate and professional schools such as Medical and Dental schools.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Microbiology

The Department of Microbiology offers an undergraduate minor available to all baccalaureate degree students at North Carolina State University who are not majoring in microbiology. The minor is especially appropriate for (but not limited to) students majoring in the biological or agricultural sciences, bioprocessing, physical sciences, or science education. The minor requires 15 semester hours including 8 hours of required courses and 7 hours from a group of restricted electives. Any prerequisite courses are in addition to these courses. A grade of C or better is required for all courses taken to fulfill the minor requirements.

DEPARTMENT OF MOLECULAR AND STRUCTURAL BIOCHEMISTRY

Polk Hall, Room 128
phone: (919) 515-2581
website: biochem.ncsu.edu

D. T. Brown, Head
E. S. Maxwell, Assistant Department Head and Director of Graduate Programs
J. A. Knopp, Undergraduate Coordinator


Biochemistry is the science which is concerned with the discovery and understanding of the chemical principles of life. It is a wide-ranging field from the composition, biosynthesis, structure and function of biomolecules to the control and regulation of biochemical processes within organelles, cells, organs and organisms. Biochemical principles form the basis of most laboratory procedures within the life cycle.

Opportunities

The Biochemistry program provides B.S. graduates with the scientific background and skills required for employment in biochemistry, molecular biology, biotechnology, and genetics and for the health fields of medicine, veterinary science pharmacology, and related fields.

Awards

The H. Robert Horton Award is given to the outstanding student in Biochemistry based on scholarly and research achievements as selected by the Biochemistry graduate students. The Samuel Tove Award is given to a graduate student who has demonstrated excellent performance as a teaching assistant.

Honors

The honors program in Biochemistry is jointly administered within the College of Agriculture and Life Sciences and the College of Physical and Mathematical Sciences. It is designed for students who wish to explore advanced courses and be rewarded for outstanding academic achievement.

To be admitted to the honors program, a student must complete the three-semester sequence of Calculus (MA 141, 241, 242) and the calculus based Physics sequence (PY 205 and 208). Exceptions can be made for transfer students. Students with a GPA of at least 3.5 are invited into the program in their junior year. To complete the program, a student must take two semesters of Physical Chemistry sequence (CH 431 and 433), at least three hours of research and six hours of advanced or honors courses at the 300- or 400-level. Interested students should contact the Undergraduate Coordinator of Biochemistry for more detailed information.
Curricula

The curriculum emphasizes the fundamentals of biological and physical sciences, offering students both breadth of knowledge and depth of understanding. It is designed to provide students with broad experience in biological and chemical sciences and to encourage the development of experimental skills. One important aspect is the requirement of at least one semester experience in a Biochemistry laboratory. Because of the breadth of the course requirements, many students can easily add a second major in Biological Sciences, Chemistry, or other science as well as add a minor in Genetics.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

DEPARTMENT OF PLANT BIOLOGY

Gardner Hall, Room 2115  
Phone: (919) 515-2727  
website: www.cals.ncsu.edu/plantbiology

M. E. Daub, Head  
C. V. Jordan, Undergraduate Coordinator  
R. S. Boston, Director of Graduate Programs


The instructional program in Plant Biology provides classroom, laboratory, and field experience in the major areas of plant science. Undergraduates majoring in plant biology select major courses that are tailored to their interests within the discipline and are required to have a supervised research or teaching experience that allows them to work closely with departmental faculty. Majors, as pre-professionals in the plant sciences, are prepared for advanced study in plant biology and other biological fields, as well as in the applied plant sciences, such as horticulture, crop science, plant pathology, natural resource management and conservation.

Opportunities

The undergraduate degree is an excellent preprofessional degree in the plant sciences. Graduates are employed as researchers in academic, government, or industrial labs, as field botanists and conservationists in state and natural parks, and as employees of environmental education, or public service organizations. Many majors continue with graduate studies in a plant science discipline, after which they are qualified for teaching positions in community and junior colleges, prominent colleges and universities, for research positions in major federal and state government laboratories, and in private industry. Research technician positions in many life science areas in governmental and industrial laboratories are also career possibilities. The field of plant biotechnology provides additional opportunities with several graduates seeking employment in the biotechnology industry including companies in nearby Research Triangle Park. Graduates are also well qualified for professional training in the health professions.

Curricula

The Bachelor of Science degree with a major in Plant Biology is offered under the science curriculum of the College of Agriculture and Life Sciences. Students can choose to pursue a general major with courses in different areas of Plant Biology, or can specialize their study in one of the following areas: Ethnobotany; Plant Biotechnology and Cell and Molecular Biology; and the Plant Ecology, Biodiversity, and Conservation. The Bachelor of Science in Plant Biology with a with double-major in another life science or applied plant sciences, such as horticulture, crop science, plant pathology, natural resource management and conservation.

Minor in Plant Biology

The minor in Plant Biology is available to all degree-seeking students at NC State University who are not enrolled in the plant biology major. The minor requires 15 hours comprised of a 4 credit hour introductory course (PB 200 or PB 250) and 11 hours of plant biology elective coursework. Up to 4 credit hours of special topics or special problems courses can be used to meet the elective hour requirements.

Minor in Biotechnology

The Minor in Biotechnology provides first-hand laboratory experience with a variety of technologies that use gene manipulation, recombinant organisms, or cell culture. The laboratory courses typically are started in the junior year, following completion of BIO 183 and Organic Chemistry (CH 223) with a grade of C- or better. BIT 410, “Manipulation of Recombinant DNA” is required for all students but BCH 454 can be substituted. Other requirements for the minor include a 3 credit research internship, 4 credits of
advanced biotechnology laboratory courses (BIT 460-495), and a biotechnology ethics course. Interested students should visit the website www.ncsu.edu/biotechnology, or contact Dr. Sue Carson at sue_carson@ncsu.edu for more information.

DEPARTMENT OF PLANT PATHOLOGY

Thomas Hall, Room 2510
phone: (919) 515-2730
website: www.cals.ncsu.edu/plantpath

J. W. Moyer, Department Head
T. B. Sutton, Departmental Extension Leader
E.L. Davis, Director of Graduate Programs
L. F. Grand, Undergraduate Coordinator


Undergraduate instruction in plant pathology is designed to provide introductory and advanced courses on the biology of plant pathogens and the nature and control of plant diseases to students majoring in crop science, horticultural science, the life sciences, and forestry. It also provides fundamental training necessary for graduate study in plant pathology and related fields. Thanks to the generosity of Dr. Arthur and Mrs. Helen Kelman, family and friends, the department offers the S.E. Kelman Memorial Scholarship to one or more outstanding undergraduates enrolled either in the College of Agriculture and Life Sciences, or the College of Natural Resources. Selected applicants will gain research experience as interns working under the supervision of a faculty member in the Department of Plant Pathology. For details of this scholarship program, consult www.cals.ncsu.edu/plantpath/activities/awards/kelman.

Opportunities

Employment in research, extension and teaching is available to graduates with advanced degrees in plant pathology. Research openings are typically with the U.S. Department of Agriculture, universities state experiment stations, industry and private consulting. The rapid development of biotechnology, and the regulatory sciences, agricultural chemicals, other methods for disease control offer numerous opportunities for fulfilling careers in this field of study.

DEPARTMENT OF POULTRY SCIENCE

Scott Hall, Room 203
phone: (919) 515-2626
website: www.cals.ncsu.edu/poultry

S. L. Pardue, Head
M.J. Wineland, Department Extension Leader
C. M. Williams, Undergraduate Coordinator
J.T. Brake, Director of Graduate Programs


The Department of Poultry Science provides instruction in the principles of vertically integrated poultry production and in such related disciplines as nutrition, physiology, genetics, immunology, toxicology, biotechnology, and general poultry management. Through teaching, research, and extension, the department serves students, poultry producers, and allied industries. Poultry production has increased rapidly during the last two decades and ranks first in North Carolina as a source of agricultural income.
North Carolina currently ranks third nationally in the production of poultry products. Growing demand for poultry products, our climate and economic conditions in the state provide a sound base for continued expansion.

**Opportunities**

The transition from small farm operations to large commercial poultry enterprises has created more specialized positions than there are available poultry graduates. Production-oriented positions and off-the-farm operations in areas such as processing and distribution offer new job opportunities. The allied industries—feed, equipment, financing, pharmaceutical and other supplies—need additional employees trained in Poultry Science. Graduates hold positions as managers and field representatives for business identified with or serving the poultry industry. Graduates are also employed in the communication and public relations sectors, as teachers, and extension and research specialists. Some graduates develop their own poultry businesses.

**Curricula**

Students desiring a Bachelor of Science degree with a major in Poultry Science may choose either the science or technology curriculum offered by the Department of Poultry Science. One may obtain a double major in other curricula through careful use of electives and/or summer school attendance. These students should consult the undergraduate advisers in the department(s) concerned. Currently, the pre-veterinary science student may obtain all requirements toward a Bachelor of Science degree in the science option. The science curriculum reflects a student’s interest in the basic biological and physical sciences. These students are better prepared for advanced study in various disciplines such as genetics, nutrition, physiology, and pathology. Several pre-veterinary students are currently enrolled in this curriculum and are seeking a Bachelor of Science degree in Poultry Science. (See the Pre-professional Program in Veterinary Medicine).

The technology curriculum in Poultry Science is designed to prepare students for direct entry into the poultry industry upon graduation. It allows a greater selection of courses in business and economics; and offers a student both basic and applied knowledge in poultry production which can be utilized in a poultry operation upon graduation.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

**Minor in Poultry Science**

A minor in Poultry Science is open to all interested baccalaureate students who are not majoring in Poultry Science. This minor is appropriate for (but not limited to) students majoring in Agricultural Business Management, Agricultural Economics, Agricultural Education, Agricultural Science, Agronomy, Animal Science, Biological Science, Food Science, Nutritional Science and Zoology. Students completing a minor in Poultry Science will become familiar with poultry production and with its related industries. The minor requires a minimum of 15 credit hours with a grade of “C-” or better. The program is flexible so that students may emphasize the discipline or species of their interest.


**Minor in Feed Milling**

This minor is appropriate for (but not limited to) students majoring in Agricultural Business Management, Agricultural Economics, Agricultural Education, Agricultural Science, Agronomy, Animal Science, Biological Science, Food Science, Nutritional Science, Poultry Science and Zoology. Students completing a minor in Feed Mill Science will become familiar with the feed milling process and with its related industries. The minor requires a minimum of 15 credit hours with a grade of “C-” or better. The program is flexible in order so that students may emphasize the discipline or species of their interest.

**DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY**

1911 Building, Room 334
phone: (919) 515-3180

M.P. Atkinson, Head
S. C. Lilley, Associate Head
D. A. Curran, Undergraduate Administrator
T.N. Greenstein, Director of Graduate Programs, Sociology
A.L. Schiller, Director of Graduate Programs, Anthropology

**Sociology Teaching, Research and Extension Faculty:** Goodnight/Glaxo Wellcome Distinguished Chair of Social Science: C.R. Tittle; William Neal Reynolds Professor: R.C. Wimberley; Alumni Distinguished Graduate Professor: M.D. Schuman; Distinguished Professor: V.M. Aldige; Alumni Distinguished Undergraduate Professor: L.R. Della Fave; Professors: M.P. Atkinson, T.N. Greenstein, J. Hoban, E.L. Kick, J.C. Leiter, P.L. McCall, T.L. Parcel, M.L. Schwalbe, E.M. Woodrum, M.A. Zahn; Associate Professors: F. Chen, S.M. Decoster, R.L. Engen, S.C. Lilley, W.R. Smith, M.E. Thomas, M.S. Thompson, R.J. Thomson; Assistant Professors: S.K. Bowen, B.L. Clark, M. Crowley, S.G. Elliot, A.K. Jorgenson, S. McDonald; Professors Emeriti: E.M. Crawford, T.N. Hobgood, Jr., R.L. Moxley, R.D. Mustian, L.B. Otto, M.M. Sawhney, M.E. Voland; Associate Professors Emeriti: R.C. Brisson, R.F. Czaja, A.C. Davis, S.K. Garber, Associate Member of the Faculty: J.R. Thigpen (Sea Grant); Adjunct Professor: B.A. Risman (University of Illinois-Chicago), A. Thompson (North Carolina A&T State University); Adjunct Associate Professor: C.R. Zimmer (University of North Carolina at Chapel Hill) Anthropology Teaching and Research Faculty: Alumni Distinguished Undergraduate Professor: A.L. Schiller; Associate Professor: N. Haenn, A.H. Ross, J.M. Wallace; Assistant Professors: D.T. Case,
College of Agriculture and Life Sciences

R.S. Ellovich, S.M. Fitzpatrick, J.K. Jacka; Associate Professors Emeriti: G.S. Nickerson, I. Rovner, M.L. Walek; Associate Teaching Professor: W.E. Wormsley.

The Department of Sociology and Anthropology offers introductory and advanced courses in sociology and anthropology covering the major subfields of the two disciplines. It also offers supervised fieldwork and practical experiences required for certain curricula in the department.

Aims of the departmental offerings are to provide majors with academic background and experience useful for many careers in government and industry or for pursuing advanced academic work (for a description of the graduate degrees offered by the department, see the Graduate Catalog) and to provide service courses to other students.

This department, jointly administered by the Colleges of Humanities and Social Sciences and Agriculture and Life Sciences, offers seven undergraduate curricula. The five curricula administered by the College of Humanities and Social Sciences are Bachelor of Arts in Sociology, Bachelor of Arts in Criminology, Bachelor of Arts in General Anthropology, Bachelor of Arts in Applied Anthropology, and Bachelor of Arts in Bioarchaeology.

Honors Program

In this program, outstanding majors pursue an individual program of study involving close working relations with departmental faculty. Twelve credit hours of honors courses will allow students to enhance their expertise in sociology and anthropology. Honors courses combine nine hours of credit in regular and independent study classes with a three-credit honors thesis done in consultation with a faculty honors adviser.

To be admitted, students must have earned 12 hours in their major and have a 3.25 overall GPA and a 3.25 in the major. To graduate with Sociology/Anthropology Honors, the student must have a 3.25 GPA overall and in the major. Successful completion of the program is noted on the student’s transcript, diploma and at commencement.

Bachelor of Arts in Sociology

Sociology studies the behavior and interaction of people as they operate in society. The groups that people form such as families, peers, ethnic groups, and social classes are investigated. The following departmental requirements must be met by all students majoring in sociology: A minimum of 31 hours in the major field including SOC 202, SOC 300; theory, SOC 400 or 401; no more than three additional credit hours of 200-level sociology courses; and, at least 12 credit hours of 400-level or above sociology courses. Additional electives in sociology may be at the 300-level or above. ST 311 is also required.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Bachelor of Arts in Anthropology

The major introduces students to anthropology with basic and advanced offerings in the subdisciplines of the field. The comparative nature of anthropology is reflected by courses based in a variety of geographical areas. Theory and methods courses are required. An internship is required for the applied concentration.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Bachelor of Arts in Criminology

The Criminology degree seeks to develop a professional orientation that will be relevant both to occupational goals and participation as a citizen in community affairs. Courses provide a general background in the causes of crime and the agencies of criminal justice. More specific areas covered deal with deviance, juvenile delinquency, the court system, correctional facilities, and the like, including field placement in an agency of the criminal justice system.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Minor in Anthropology

A minor in Anthropology focuses on the comparative study of human beings, with emphasis on biology and behavior. A flexible selection of courses (15 credit hours) includes offerings from anthropological subdisciplines such as cultural anthropology, physical anthropology, archaeology, and linguistics.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Minor in Criminology

The criminology minor emphasizes criminological theory and research with substantive applications. The minor is grounded in sociological theory and methods and allows students flexibility in the choice of specialized criminological study such as juvenile delinquency, sociology of law, formal institutions of social control, community and crime, and data analysis in criminology, ideology and social justice.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.
Minor in Sociology

The minor emphasizes sociological theory and research with substantive applications. The minor builds on theory and methodology and allows students flexibility in the choice of sub-specialties such as stratification, race and ethnic relations, agriculture, development, work and organization, or the family.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

DEPARTMENT OF SOIL SCIENCE

Williams Hall, Room 2234  
phone: (919) 515-2655  
website: www.soil.ncsu.edu

M. G. Wagger, Department Head  
D. L. Osmond, Department Extension Leader  
H. J. Kleiss, Undergraduate Coordinator  
T. J. Smyth, Director of Graduate Programs


The Department of Soil Science trains students in fundamentals of soils, develops an understanding and appreciation of soils as a resource, and presents principles of soil management and utilization for both farm and non-agricultural purposes. Soils constitute one of the largest capital investments in farming, and proper soil management is essential for efficient production. Future world food needs will require people conversant in soil resources and use of fertilizers. Soil properties are important considerations in urban-suburban planning and development. Also, knowledge of soil and its interaction with potential pollutants is essential in maintaining environmental quality. Therefore, the demand for people trained in soils by private consultants, agribusiness, research, service planning-development, education and conservation-related agencies should continue to be great.

Opportunity

Soil science graduates fill positions of leadership and service in land resource planning, environmental science, conservation, natural resource management and agriculture. Among these are opportunities as: farm operators and managers; county agricultural extension agents; employees of other public advisory agencies; and Natural Resources Conservation Service and other conservation-related agencies concerned with soil resources. Graduates also serve as technical representatives and salesmen in fertilizer companies and in other agribusiness activities. Many opportunities exist for privately consulting soil scientists who serve a variety of clientele needs. Environmental concerns usually require soil science expertise, especially in land-based waste management. Provisions are made for students wishing for more thorough training in biological sciences, chemistry, mathematics and physics leading to graduate study. (See the Graduate Catalog for a listing of graduate degrees). Students with an advanced degree have greater opportunities in teaching, research, service and extension with state, federal and private educational or research institutions and agencies.

Curricula

The Bachelor of Science degree may be obtained with a major in plant and soil science, natural resources or environmental sciences. The Plant and Soil Science Program is administered jointly with the Department of Crop Science. A soil science concentration is available in the Plant and Soil Science curriculum. Two soils concentrations are available in the Natural Resources curriculum, Soil Resources and Soil and Water Resource Systems. An Environmental Soil Science concentration is available in the Environmental Sciences curriculum. (The Plant and Soil Science, Natural Resources, and Environmental Sciences curricula are shown previously within the College of Agriculture and Life Sciences).

Minor in Soil Science

The minor in Soil Science is offered to students desiring a strong knowledge of the principles of Soil Science to complement their major. The program is intended to strengthen the understanding of basic physical and chemical soil properties that would be relevant to students interested in land management. These interests may include (but are not limited to) Forestry, Geology, Natural Resources, Environmental Sciences, Plant and Soil Science, Turfgrass Management, Plant Biology, Landscape Architecture, Horticulture, Biological and Agricultural Engineering, Agricultural Business Management, or Agricultural Education. Fourteen hours of required courses and three hours of electives are necessary to complete the minor.
The North Carolina Agricultural Research Service (NCARS) is the agricultural, life sciences, and home economics research agency of the State of North Carolina. Forestry research is a jointly conducted program between NCARS and the College of Natural Resources. NCARS is funded principally by appropriations from the North Carolina General Assembly, federal formula funds, grants and contracts.

The mission of NCARS is to develop the knowledge and technology needed to:

- Improve productivity, profitability and sustainability of industries in agriculture and the life sciences;
- Conserve and improve the state’s natural resources and environment;
- Improve the health, well being and quality of life of North Carolina’s citizens;
- Provide the science base for research and extension programs.

Many research faculty in NCARS have joint appointments in teaching or extension. In classroom and informal teaching functions, our research scientists develop and teach quality science-based curricula in the fields of agriculture, biology, social sciences and the environment. Our faculty also contribute to the graduate training of students destined to become leaders, teachers, and scientists who will help sustain viable agriculture and life science industries.

Publications
NCARS publishes bulletins and scientific papers on research solutions to problems and opportunities that will benefit citizens, businesses and communities. Copies of technical bulletins may be obtained from the Department of Communication Services Customer Service at (919) 513-3045 and scientific papers from authors.

Services
The faculty of NCARS conducts research, which has a direct impact on the agriculture and life science industries in North Carolina. This research includes field and laboratory experimentation in the agricultural, biological, physical, social, and environmental sciences. Primary emphases are devoted to two areas: 1) the production, processing, distribution, and consumption of the many agricultural and forestry commodities and products produced throughout the State and 2) developing and marketing life-science based processes and technologies. Together, these two research areas help improve the quality of life of both rural and urban citizens.

The North Carolina Cooperative Extension Service of North Carolina State University works in collaboration with the United States Department of Agriculture, the State of North Carolina, the 100 counties in the state and the Cherokee Reservation. Its work is supported by federal funds made available under the Smith-Lever Act of 1914, as amended by state and county appropriations, by grants and contracts, and by foundations.

The federal and state appropriations are used to maintain an administrative and specialist staff and to pay a portion of the salary and the travel expenses of the county extension agents. Under this cooperative arrangement, the Cooperative Extension Service serves as the “educational arm” of the United States Department of Agriculture and as the “field faculty” of North Carolina State University in the areas of agriculture and natural resources, family and consumer sciences, 4-H youth development, and community and rural development.
The primary purpose of the North Carolina Cooperative Extension Service is to provide the people of the state with research-based information emanating from NC State University and the Land Grant System, which is, related to:

- Strengthening the economy through profitable, sustainable and safe food, forest and green industry systems
- Protecting the environment and natural resources
- Empowering youth and families to lead healthier lives and become community leaders

North Carolina Cooperative Extension partners with communities to deliver education and technology that enrich the lives, land and economy of North Carolina. The programs of this organization have sufficient flexibility to address the needs and interests of the people in each county. County Advisory Councils are utilized to determine and prioritize the county educational program content. Assistance is given to individuals, families, communities, agricultural and seafood processing and marketing firms, other businesses and certain organizations. This includes work with adults and youth in both city and rural areas.

In carrying out this educational program, a variety of methods and techniques are employed: method and result demonstrations; meetings; visits to farms, homes and businesses; organized groups of men, women and youth; web-based information; tours; leaflets, pamphlets and other printed materials and mass media. The basic sources of information to be taught through this educational program are the findings and recommendations resulting from research conducted by the Agricultural Research Service in this and other states and by the United States Department of Agriculture.

**AGRICULTURAL INSTITUTE**

Patterson Hall, Room 111  
phone: (919) 515-3248  
e-mail: Ag_Institute@ncsu.edu  
website: www.cals.ncsu.edu/agi

J. C. Wynne, Dean, College of Agriculture and Life Sciences  
K. L. Esbenshade, Associate Dean, College of Agriculture and Life Sciences and Director, Academic Programs  
B.M. Kirby, Associate Director of Academic Programs and Director, Agricultural Institute

The Agricultural Institute is a two-year academic program that awards the Associate of Applied Science Degree upon successful completion of at least one of nine curricula. The Agricultural Institute provides education and training in pest management, livestock & poultry management, agriculture, horticulture, turfgrass management and agribusiness. It is part of the academic programs in the College of Agriculture and Life Sciences at North Carolina State University. Provision for the Agricultural Institute was made by the 1959 North Carolina General Assembly and instruction began in the fall, 1960. The objective of the Agricultural Institute is to provide technical training for those desiring a comprehensive education in the agricultural sciences, agribusiness and related areas. The instructional programs of the Agricultural Institute are organized and conducted as part of the overall academic program in the College of Agriculture and Life Sciences. The Agricultural Institute is an addition to, and not a substitute for, the college’s regular degree-granting program. The Agricultural Institute uses the same facilities (classrooms, laboratories, farms) as the four-year program. The facilities are used extensively for both teaching and observing the application of technology in agriculture and other closely related areas.

The faculty of the four-year program are responsible for organizing and teaching courses offered by the Agricultural Institute. Emphasis is placed on practical knowledge and training, with many courses requiring laboratories using hands-on experience. The Agricultural Institute offers majors in nine areas: Agribusiness Management; Agribusiness Management - Horticulture concentration; Field Crops Technology; General Agriculture; Livestock and Poultry Management; Ornamentals and Landscape Technology; Pest Management (Agricultural and Urban concentrations); and Turfgrass Management.

**Opportunities**

Rapid technical advancement has been important in changing agriculture from a small production industry to the nation’s largest industry. Closely associated with production agriculture are those areas related to recreation and beautification such as turfgrass management, landscaping and ornamental plants.

Today’s complex agriculture requires a large work force. This work force must have some technical training and be able to deal with a vast array of problems and opportunities. Graduates of the Agricultural Institute have the education and training that is in demand by the agricultural industries and that permits them to assume responsible positions in agriculture and allied fields. Some career examples include farm and herd managers, golf course superintendents, nursery managers, pest control specialists, sales and service of agricultural equipment and products, lawn care specialists and others. More job opportunities than graduates make salaries attractive and competitive. The College of Agriculture and Life Sciences maintains a Career Services Office to assist graduates in addressing resume construction, interviewing strategies, successful job search techniques, location of summer internships, and job market trends.

**Entrance Requirements**

Applicants must have graduated from an accredited high school with at least a 2.0 GPA (on a 4.0 system), or have successfully passed the General Education Development (GED) test before being admitted to the Agricultural Institute at NC State. An admission application, one letter of recommendation from someone other than a family member, a high school transcript and supporting documents must be submitted directly to the Admissions Office at NC State University. The regular college entrance exam (Scholastic Aptitude Test- SAT) is not required. The 2.00 minimum high school GPA is waived for transfer students and for
College of Agriculture and Life Sciences

applicants 21 years or older at the time of enrollment in the Agricultural Institute. For additional information, write: Director, Agricultural Institute, Box 7642, 111 Patterson Hall, North Carolina State University, Raleigh, NC 27695-7642, phone: (919) 515-3428, website: www.cals.ncsu.edu/agi.

Programs of Study

Graduates of the Agricultural Institute are awarded the Associate of Applied Science degree. The nine programs of study are Agribusiness Management; Agribusiness Management - Horticulture Concentration; Pest Management and Technology (Agricultural and Urban concentrations); Field Crops Technology; Ornamentals and Landscape Technology; General Agriculture; Livestock and Poultry Management; and Turfgrass Management.
College of Design

Now in its sixth decade, the College of Design at North Carolina State University has from the beginning prepared designers who, in the broadest sense, shape the world. Design education is more than an attempt to teach a set of technical skills. The environment— including the spaces in which people live and work, the products they consume, and the messages they receive— have a powerful impact on how humans function as a society. Good design, therefore, requires attention and sensitivity to social, economic, political, cultural, and behavioral issues. The aim of the curricula in the College of Design is to develop the designer’s perception, knowledge, skills, and problem-solving abilities.

The College of Design admits students through a selective process that ensures a highly motivated and heterogeneous design community. The entering student body consistently ranks at the top of academic achievement in the university and the college graduation rates are the highest in the institution. While providing undergraduate and graduate study in multiple disciplines and encouraging individual plans of study, the college functions as a unified, interactive education center, dedicated to preparing designers capable of shaping the environment to various scales in response to society’s needs.

The First Year Experience

Students enter the College of Design into one of five departments. The first year experience centers on courses that are populated with a mix of students from the five disciplines. They include introductions to the design process, a design vocabulary, and fundamental principles of designing. Project activities include hands-on work, discussions, demonstrations, critiques, and occasional field trips. Emphasis is on interaction, independence, self-discipline and self-motivation.

In both semesters, the first year experience emphasizes learning how to use the design process, establishing disciplined work habits, communicating about design, using studio design vocabulary, and working in collaboration with others, thus forming the foundation for all subsequent design activity in the college and later in the professions.

Curricula and Degrees

The College of Design offers undergraduate instruction leading to the four-year Bachelor of Environmental Design in Architecture, Bachelor of Art and Design, Bachelor of Graphic Design, and Bachelor of Industrial Design, Bachelor of Design Studies, as well as a five-year degree program leading to the Bachelor of Landscape Architecture and a one-year postgraduate program leading to the Bachelor of Architecture. The General Education component of each curriculum consists of courses in mathematical and natural sciences, physical education, science/technology/society, and communication and information technology. In addition to 6-credit design studios where students apply their expanding knowledge and skills to theoretical and practical design problems, majors in the College of Design take support courses dealing with design knowledge and skills, such as communication and presentation, human behavior, environment, history, philosophy, physical elements and systems, methods and management. The curriculum path has some flexibility, affording students the opportunity to concentrate in one area, while making contact with the other design disciplines. In addition to their faculty mentors, students are exposed to a broad range of design professionals through guest lecturers, juries, projects, and workshops.

Graduate studies are designed for students who want to build on undergraduate education and professional experience, as well as for those who come from non-design backgrounds and want to pursue advanced design degrees. The college offers graduate study leading to the Master of Architecture, Master of Art and Design, Master of Graphic Design, Master of Industrial Design, Master of Landscape Architecture, and Ph.D. in Design. Please refer to the NC State University Graduate Catalog for specific curriculum information on master’s and doctoral programs in the College of Design.

DaVinci Scholars Program

This joint program between the College of Design and the College of Humanities and Social Sciences allows students to earn two undergraduate degrees within five or six years - a bachelor’s degree in one of the six undergraduate disciplines in the College of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences.

The primary purpose of the double degree is to provide students with a strong liberal education as a complement to their professional interests in design. For example, students majoring in Graphic Design, with a second degree that focuses on writing, may improve their opportunities for employment in communications. A student in Architecture with a second degree in history may improve opportunities for focused graduate study in architectural history, preservation, or urban planning. Study of a foreign language may improve students’ opportunities for international design practice.

DaVinci Scholars earn their first degree in design with no adjustment in their design requirements. They elect a second major from any of those available in the College of Humanities and Social Sciences. Most students complete their second degree within one additional year of study or two summer sessions plus one additional semester. Students will be designated as DaVinci Scholars only during their first year of enrollment in the College of Design.
To qualify for the DaVinci Scholars Program students must:

- present a minimum GPA of 3.00 at the end of their first semester of study in the College of Design
- declare interest in the DaVinci Scholars Program in writing to the Associate Dean for Undergraduate Studies and Academic Support of the College of Design within their first year of study in the College of Design
- be selected by a review panel composed of faculty in the College of Design and faculty in the College of Humanities and Social Sciences and chaired by the Associate Dean for Undergraduate Studies and Academic Support of the College of Design.

For more information, please contact office of the Associate Dean for Undergraduate Studies and Academic Support, College of Design, 200 Brooks Hall, Box 7701, NCSU, Raleigh, NC 27695-7701; (919) 515-8302.

Minor in Design Studies (Non-Design Majors)

This minor’s objectives are to provide a general orientation to the practice and theory of design for students whose primary study and employment will be in the other disciplines, to clarify the role design plays in society, and to create informed consumers who are able to make intelligent decisions about communication, products, and environments in work and in their personal lives. Any undergraduate student in the university who is not majoring in a design discipline would benefit from this program. Any student seeking this minor should contact the Associate Dean for Undergraduate Studies and Academic Support in the College of Design for an application and assignment of a minor adviser.

Anni Albers Scholars Program

The Anni Albers Scholars Program, a collaboration between the NC State University College of Design and the College of Textiles, provides students simultaneously with exemplary preparation in art and design and in textile technology. This rigorous program will greatly improve graduates’ creative flexibility and employment opportunities by combining professional skills in design with high quality technological knowledge, making them innovative leaders in the field of textiles.

Students completing the Anni Albers Program will earn two undergraduate degrees; a Bachelor of Art and Design in the College of Design, and a Bachelor of Science in Textile Technology in the College of Textiles.

The program is named for a person who exemplifies the ideals and goals to which the program aspires; textile designer and artist Anni Albers. Anni Albers was educated in the Weaving Workshop at the Bauhaus and immigrated to the United States from World War II Germany. Albers, a noted textile designer, artist, and writer, brought her influential beliefs in the importance of textiles to Black Mountain College in North Carolina, and eventually to Yale University. Her work and writings have provided generations of American textile designers and fiber artists a philosophical framework and standard of excellence against which to measure progress and achievement in the medium.

Resources

The College of Design offers the Anni Alber Scholars a complete studio-based art and design education, beginning with a firm foundation in one of the country’s best design fundamentals programs, followed by intensive upper level studios emphasizing design process and creative problem-solving. Studio-based instruction in textiles is rooted in learning by making with the hands, thus all students make textiles on hand looms, and add color and pattern with hand-screen printing and dyeing techniques. A basic knowledge of textile history underlies the entire curriculum. The Anni Albers Scholars take advantage of the Department of Art and Design’s broad offerings in drawing, painting, sculpture, printmaking, color and light, illustration, animation and digital imaging. The college provides a hand weaving lab; a printing/dyeing lab; the Harrye B. Lyons Design Library; college and departmental computer labs; and materials labs (shop).

The College of Textiles will provide the Albers Scholars with instruction in textile technology, operations management, textile chemistry, and computer technology in textiles. The curriculum provides a fundamental understanding of textile technology in direct digital printing on fabric, computer-aided design software for both knitted and woven fabrics and textile product development. CAD/CAM facilities and studio spaces are also available. The Model Manufacturing Facility in the college is 100,000 square feet of lab space with industrial scale textile equipment that provides complete manufacturing capability from bale-to-sale. The Burlington Textiles Library is also housed in the college.

Anni Albers Dual Degree Requirements

Applicants to the program must have completed successful admission to both the College of Design (including portfolio review) and the College of Textiles through the usual processes and meeting college deadlines. At the same time as applying to the colleges, or after arrival at NC State, students may apply to the Anni Albers Program. All applications are reviewed by faculty committees in each college. Students admitted to the program must maintain a minimum 2.8 GPA to remain in the program. The degree is 164 credit hours combining the essence of Art and Design and Textile Technology. General Education Requirements are arranged to meet the specified choices in both curricula. The degree requires five (5) school years. On-campus and off-campus transfer students must have a 3.0 University GPA to qualify for the program.
Albers Scholars will have academic advisers in both colleges. Individual interests, directions, needs and transfer credits may change the length of time required for completion of the program.

Advisers:

Associate Professor Vita Plume  
College of Design, Box 7701  
NC State University Raleigh, NC 27695-7701  
phone: (919) 513-4466  
fax: (919) 515-7330  
e-mail: vita_plume@ncsu.edu

Professor Traci Lamar  
College of Textiles, Box 8301  
NC State University Raleigh, NC 27695-8301  
phone: (919) 513-4196  
fax: (919) 515-3733  
e-mail: traci_lamar@ncsu.edu

SCHOOL OF ARCHITECTURE

214 Brooks Hall  
phone: (919) 515-8306

Robin Abrams, Head  
David Hill, Director of Graduate Programs


In a world of changing conditions- social, cultural, economic and technological- the central task of the architect remains to give meaningful form to the physical environment. These rapid changes, however, force today’s architects to not only concern themselves with traditional design issues like shelter, appropriateness, comfort, and beauty, but also to address emerging concerns like sustainability, environmental conservation, rapidly expanding cities, adaptive uses and preservation of older buildings, providing built environments in a global market, and new means of producing architecture. The aesthetic revolution of the past few decades has also freed architects from the rigidity of earlier theory allowing for greater diversity and expressiveness in architectural design.

The School of Architecture has addressed the diversity of roles and responsibilities through its faculty and its curricula. Its distinguished faculty embrace a broad definition of the practice of architecture and is, therefore, free of a singular, dogmatic, or stylistic bias. This diversity is evident in the experience, area of interest, national origins, and educational backgrounds of the faculty. The architecture curriculum balances mathematics, English, natural sciences and humanities and integrates with architectural design studios and a rich selection of design support courses. The design studio- a working laboratory in which the student learns how to design buildings under the guidance of a professor- is central to the curriculum.

The undergraduate Bachelor of Environmental Design in Architecture is a pre-professional degree that stresses the education of the individual and serves as the foundation for advanced, professional study in the discipline. The first semester is spent on design fundamentals in a studio common to all students in the College of Design. Following this introductory experience students receive a broad introduction to architectural design, theory, history, technology, and design processes, while exploring educational opportunities within the university.

Following the pre-professional program students may continue their studies in either of two professional programs: the one-year, post-graduate Bachelor of Architecture or two-year Master of Architecture program (see the Graduate Catalog for information on the latter program). Entry into both of these programs is competitive. To be accepted students must demonstrate potential for professional accomplishment, capability in design, and satisfy a specific set of professionally-oriented undergraduate requirements. Many students spend one or more years gaining professional experience in architecture firms or related fields before pursuing the advanced degrees. Educational enrichment is an important characteristic of the architectural program. The College of Design regularly presents public lectures by leading professionals and exhibitions of design and artwork. Electives are available in related disciplines- painting, sculpture, photography, landscape architecture, industrial design, and graphic design. Also available are field trips to buildings in urban centers of architectural interest, urban design studios conducted at the College of Design’s Downtown Design Studio, and a variety of foreign study programs including the College of Design’s Prague Institute.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Accreditation

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards. Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree. The NAAB Conditions for Accreditation, including the required Student performance Criteria, can be viewed on the NAAB website at www.naab.org.

The North Carolina State University School of Architecture offers the following NAAB accredited degree programs:

- B. Arch. (pre-professional degree + 30 in professional program)
- M. Arch. (pre-professional degree + 48 graduate hours)
- M. Arch (non pre-professional degree + 96 hours)

Next accreditation visit for all programs: 2012

DEPARTMENT OF ART AND DESIGN

212 Brooks Hall
phone: (919) 515-8308

Chandra Cox, Head

Professors: S. Brandeis, C. Joyner; Professors Emeriti: W. Taylor, S. Toplikar; Associate Professors: C. Cox, P. Fitzgerald, V. Plume, D. Raymond; Visiting Associate Professor: K. Rieder; Assistant Professors: M. Freeman, J.R. Wan; Adjunct Assistant Professor: M. Bissinger, A. Robertson, T. Temple

The Department of Art and Design awards the Bachelor of Art and Design degree and the Bachelor of Arts Degree in Design Studies. The pedagogical core of the program aims to reinforce foundation principles of design theory as applied to two-and three-dimensional design. Our curriculum addresses broad cultural, ecological, and societal considerations and promotes in our graduates the ability to meet the challenges of collaborative design. We emphasis the application of creative thinking and problem solving to design projects ranging from single to mass-produced artifacts. The areas of application span the range from formal design, fibers and surface design to emerging areas in media arts. Examples of current areas of study are hybrid applications of traditional and digital media that encompass imaging, animation, fiber and surface design, photography, printmaking, illustration, form generation and installations.

The Department of Art and Design believes there is an essential need for students in a technically-based research university to engage in course work that fosters creative thinking and problem solving. To meet this need, the department offers courses to all students in the university a minor in Art and Design. Minors are guided through a selection of courses with the consultation from a design adviser.

Opportunities

Career opportunities for graduates of the Department of Art and Design range from independent artist-designers to corporate level art-design directors. Graduates of this department are currently working in fields such as software design, multimedia, illustration, textile design, fashion and apparel design, art and design education, photography, filmmaking, special effects-digital, set design, exhibition design, museum education, public art and entrepreneurs.

Curricula and Degrees

Bachelor of Art and Design

The Department of Art and Design awards the Bachelor of Art and Design degree. The Bachelor of Art and Design degree is a broadly based, multidisciplinary undergraduate experience that fully utilizes a diverse faculty and bridges art and design with new technology. Students work closely with faculty in a well-planned sequence of progressively complex and in-depth studios. Students are advised through learning paths designed to produce optimal outcomes. This degree program provides a sound, well-rounded visual design education with a focus on providing students skills that allow them to perform and succeed in a wide variety of art and design professions after graduation.

While the degree is not profession-specific, students selecting the Bachelor of Art and Design degree may wish to use it as a foundation for graduate study in a specific art or design discipline. The goal of the curriculum is to provide structure for the creation of a new model of art and design professional. These individual artistic and practical talents are developed as different expressions of one potentiality.
College of Design

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Design Studies
The Bachelor of Arts Degree in Design Studies is a non-studio based program that provides an interdisciplinary orientation to the history and theory of the design disciplines, material culture and design thinking. Design Studies focuses on the social, historical, technological and physical contexts in which design is produced. It presents the formative role of design in shaping human values and experiences.

Undergraduate students will be introduced to the breadth of the design disciplines expanding their awareness of design and the design process. Students can explore the range of career options in the fields of design through Design Studies concentrations in Non-Profits Studies, Business Administration or Museum Studies. Individuals preparing for a graduate education in design theory and criticism, museum practice, business management, entrepreneurship or marketing in design may choose from courses suited to their unique objectives. Students who want more general education will develop an understanding of design and its intrinsic relationship to the broader culture.

Design Studies is:
• Open to students whose interests and talents in design are more general and/or cross-disciplinary than those in the specific student-based programs
• Broadly engaged in issues of material culture
• Preparatory for later advanced study in the design professions
• A blend of aesthetic, cultural, historical, social, physical, technological, business and entrepreneurial knowledge
• Collaborative in providing the learning and background necessary for further study in archival and cultural preservation, museum practice, conversation, collections administration, costume and theatre design, criticism, research, and arts and nonprofits management

DESIGN STUDIES IS NOT A TRANSITIONAL PROGRAM from which to transfer into one of the studio-based degree programs in the College of Design. Design Studies students who wish to change majors will need to apply for competing seats in the freshmen class of a studio-based program and are subject to the select admissions process that requires a portfolio review.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Art and Design
The Minor in Art and Design’s objectives are to discover basic principles through hands-on activities, to apply design process and theory to solve problems creatively and efficiently, to increase awareness of one’s self and environment, and to foster an appreciation and understanding of the disciplines of Art and Design. Any curious undergraduate student with an overall grade point average of 2.75 in the university who seeks alternative methods of experiencing the environment in which we live will benefit from this minor.

The minor in Art and Design consists of 15 total credits hours of study, of which six (6) hours must be satisfied at the basic course level. The remaining nine (9) hours of courses may be selected from the course list in the information provided by the Art and Design adviser. A grade of “B” or better will be required for credit in all courses in the minor in Art and Design program. The course selection will be determined with guidance from the student’s minor adviser and tailored to the needs, interests, and goals of the student. Interested students seeking this minor should contact Professor Charles Joyner.

Although, all efforts are made to accommodate minors, it is important for potential students to know and understand that access to Art and Design courses are based on a hierarchy where priority access goes to Design majors.

DEPARTMENT OF GRAPHIC DESIGN
215 Brooks Hall
phone: (919) 515-8306
Santiago Piedrafita, Head
M. Davis, Director of Graduate Programs

Professors: M. Davis, D. Gonzales-Crisp, M. Scotford; Professor Emeritus: A. Lowery; Associate Professors: K. Bailey, D. Gonzales Crisp, S. Townsend; Assistant Professors: W. Temple; Adjunct Assistant Professors: K. Meaney

Graphic design is the process of bringing meaningful visual form to communication. Graphic designers translate communication goals through printed, environmental, and electronic presentations of information. Graphic designers use words and images to express messages that inform, persuade, and incite people to action. Graphic designers are active in all aspects of communication design. For example, they design books, magazines and newspapers for the publishing industry. They also create printed materials such as logotypes, symbols, annual reports, newsletters, business forms, and other related literature for corporations, institutions, businesses, and governmental agencies. Graphic designers create multimedia presentations, websites, computer interfaces, and motion graphics such as film titles and typographic treatments for video, as well as on-air graphics for television. Graphic designers
are employed in a variety of settings, including graphic design offices, advertising agencies, communication businesses, as well as corporations, institutions, or governmental agencies as part of internal communications departments.

The Bachelor of Graphic Design is a professional degree recognized by the American Institute of Graphic Arts (AIGA) and is accredited by the National Association of Schools of Art and Design (NASAD). The program includes the study of visual, theoretical, historical, and technical aspects of the discipline. The curriculum provides comprehensive experiences in the analysis of communication problems, the development of creative solutions to those problems, and the implementation and evaluation of those solutions. Required courses in typography explore the role of words and language in graphic communication, while courses in imaging provide students with experiences in a range of photographic, videographic, and computer media. Instruction in computer software programs is fully integrated in design courses, and is not taught as a separate activity. In their studio coursework, graphic design majors prepare for careers in the field through the execution of demonstration projects of varying complexity and scale.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

DEPARTMENT OF INDUSTRIAL DESIGN

215 Brooks Hall
phone: (919) 515-8306

Santiago Piedrafta, Head
H. Khachatoorian, Director of Graduate Programs

Professors: H. Khachatoorian; Professor Emeritus: V.M. Foote; Associate Professors: P. Hooper, B. Jin, B. Laffitte; Assistant Professors: T. Buie, S. Joines; Adjunct Assistant Professor: C. Jordan, S. Barnes, M. Bissinger, S. Hilliard, G. Morris

The Department of Industrial Design awards a bachelor degree in Industrial Design. The pedagogical core of the department aims to reinforce the foundation principles of design theory as applied to traditional and advanced technologies, i.e. new media, materials, and production techniques. Our curriculum addresses broad cultural, technological, and societal considerations and promotes in our graduates the ability to meet the challenges of technological complexity through collaborative design. We emphasize the application of creative thinking and problem solving to design projects ranging from single to mass-produced artifacts. The areas of application span the range from industrial design to interactive multimedia. The program is recognized by the Industrial Designers Society of America (IDSA) and accredited by the National Association of Schools of Art and Design (NASAD).

Opportunities

Career opportunities for graduates of the Department of Industrial Design span the range from industrial design to virtual design. Graduates of this department are currently working in fields such as product development, furniture design, recreational product design, toy design, exhibition design, textile design, fashion design, photography, film making, special effects, set design, ergonomics and human factors.

Curricula and Degrees

The Department of Industrial Design awards four-year bachelor and two-year or more master’s degrees. Industrial Design is concerned with all human aspects of machine-made products and their relationship to people. The industrial designer is responsible for product safety, aesthetics, maintenance, and cost. Industrial designers deal with consumer and industrial products. In order to achieve these ends, designers must be involved in four major design and research areas: human behavior, human-machine relationships, the environment, and the product itself. In addition, the designer’s responsibility extends into sustainability, product liability and cross-cultural issues.

Areas of study in the Bachelor of Industrial Design include furniture, textiles, house wares, appliances, transportation, tools, farm equipment, medical instruments, electronics, human-computer interfaces, and recreational support equipment. The goal of the Industrial Design curriculum is to teach the design and development of products or product systems and their relationship to human beings and the environment.

Graduates of the Bachelor of Industrial Design program have career opportunities in three general types of practice: corporate design offices in manufacturing companies, independent consulting offices, and governmental agencies.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Landscape architecture is a multi-faceted profession dedicated to the welfare of the physical environment and the living communities of the earth. It is a diverse and growing design profession that combines art, science, engineering, and technology. Landscape Architecture at the College of Design is especially concerned with the stewardship, restoration, and regeneration of the natural and cultural environments in urban, rural, and wilderness settings.

The Bachelor of Landscape Architecture program delivers and integrates the processes of design thinking with the core themes and subjects of Landscape Architecture to enable its graduates to understand, make, and steward landscapes of consequence and value for society and the planet.

The program prepares students for applications in the practice and discipline of Landscape Architecture as it presently exists and equips them with the knowledge base and tools for engaging situations as they may change and evolve in the future. It provides a program of study that prepares students to enter current practice, and provides opportunities to pursue inquiry in areas reflective of their own interests, while exposing them to increased depth in various subjects reflective of the interests of faculty in the Department, College of Design and beyond.

The program’s “laboratories” are the urban, suburban, and rural landscapes of the Mountain, Piedmont, and Coastal Plain of North Carolina. These landscapes present diverse cultural and environmental situations and opportunities in which to shape regionally responsive landscape design and planning. Imperatives within the public and private realms of these landscapes fuel the academic and research agenda. While representing an accessible spectrum of good and bad examples and situations to study, the knowledge and experiences derived apply to multiple scales and cultures.

It is with this context that the NCSU Department of Landscape Architecture links theory with practice, history with change, technology with invention, and designers with their constituents.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

The Department of Landscape Architecture currently enjoys full accreditation from the Landscape Architecture Accreditation Board (LAAB).
College of Education

Mission: The College of Education is a voice of innovation for learning across the life span. We prepare professionals who educate and lead. Our inquiry and practice reflect integrity, a commitment to social justice, and the value of diversity in a global community.

Vision: To be a nationally ranked, research-intensive, professional College of Education with distinction for working, teaching and learning in technology enhanced environments.

Undergraduate degree programs are offered in business and marketing education, elementary education, mathematics education, middle grades education (language arts, social studies, math, science), science education, and technology education. In addition to being admitted to a curriculum, all teacher education candidates must meet program and unit requirements for admission to candidacy in teacher education (including a minimum 2.50 overall grade point average after completing 60 semester hours) and for admission to student teaching (including a minimum 2.50 GPA overall, in one’s teaching field, and in professional studies.)

Degree programs lead to a license to teach technology education or business and marketing education (grades 9-12); and mathematics education and science education (grades 7-12). The college offers undergraduate degree programs in elementary education (K-6) and middle grades teaching with dual concentrations either in language arts/social studies or mathematics/science (grades 7-9); students may pursue a single concentration in middle grades mathematics or science.

A program of professional preparation is provided for those students enrolled in the College of Humanities and Social Sciences who wish to become teachers of secondary English or social studies (grades 9-12) and teachers of French and Spanish (grades K-12). The College of Agriculture and Life Sciences and the College of Education jointly provide a program to prepare students to become agriculture teachers (grades 9-12).

Students enrolled in a natural sciences or a mathematical sciences curriculum may double major in the Department of Mathematics, Science, and Technology Education and earn a license to teach (6-9 or 9-12).

Most of the education programs listed in the following pages also offer graduate-level degree programs. In addition, the College of Education has graduate programs in:

- Adult and Higher Education
- Counselor Education
- Curriculum and Instruction
- Educational Administration
- Educational Leadership and Policy Studies
- Elementary Education
- English Education
- Instructional Technology
- Higher Education
- Middle Grades Education
- Reading Education
- Social Studies
- Special Education
- Training and Development

The College also offers a Master of Arts in Teaching for prospective students who have degrees in other fields but wish to pursue a program leading simultaneously to a masters degree and an initial teaching license. The M.A.T. degree program includes elementary education, English education, math education, middle grades education, science education, social studies education, special education (general curriculum), and technology education.

See the Graduate Catalog or contact faculty members for information on graduate programs. Public schools post-master’s licensure programs are available in some curricular areas.

All of the bachelor’s level and graduate level licensure programs are approved by the North Carolina State Board of Education. The college is accredited by the Council for the Accreditation of Counseling and Related Programs (CACREP) and the National Council for the Accreditation of Teacher Education (NCATE).

The College of Education is located in Poe Hall. It includes a Learning Resources Library and Instructional Computing Labs. The building houses laboratories for technology education, reading, science, counseling and testing activities.

Scholarships and Awards

The College of Education has a scholarship program distinct from the campus Merits and Awards Program. Over 29 scholarships are awarded to undergraduates each year. Several scholarships are available to encourage students from under-represented populations to enroll in the college.

North Carolina State University is one of 18 institutions participating in the N.C. Teaching Fellows Program and has over 160 Teaching Fellows enrolled. Each Fellow receives $6,500 per year for four years in exchange for a commitment to teach for four years in-state.

Many students receive awards through the North Carolina State Board of Education’s Scholarship Loan Fund for Prospective Teachers and through other sources. High school counselors receive information about, and applications for, all of these scholarships and awards.

The Ruth L. and Herbert E. Speece Scholarship is awarded to as many as three outstanding juniors or seniors either in mathematics education or science education. The department sponsors two undergraduate organizations: the Mathematics and Science Education Club and the Technology Education Collegiate Association. Annual awards are given to the outstanding seniors in Mathematics Education (9-12), Science Education (9-12), Technology Education (7-12), and Middle Grades Education (6-9) in mathematics and in science. Technology education students are eligible for the Epsilon Pi Tau Leadership Award.
The College is very proud to announce the Burroughs Wellcome Fund Scholars and the Noyce Mathematics Education Teacher Scholars, both targeted toward increasing the number of highly qualified students in STEM areas.

For more information on Scholarships and Awards visit http://ced.ncsu.edu/student_services/scholarship_info.php

Honors Society
The College of Education maintains the Omicron Rho chapter of Kappa Delta Pi (www.kdp.org), an international honor society in education. It elects those to membership who exemplify high academic achievement and exhibit the ideals of scholarship, high personal standards, and promise in teaching and allied professions. The contact person is Dr. Drinda Benge (drinda_benge@ncsu.edu).

SAY Village
The college and University Housing have partnered to provide a living and learning residential experience for first year students called Students Advocating for Youth (SAY Village). Housed in Syme Hall, this experience targets students interested in working with elementary-aged youth. No matter what the major or aspirations for the future, advocating for youth spans many fields of study. For more information, visit http://www.ncsu.edu/housing/villages/say/index.php. Additionally, sophomore students who return to SAY Village and live in Syme Hall comprise what is known as the “DAY” portion of the program - “Determined Area Youth.” The DAY component enables those students returning to SAY to teach self-advocacy skills to area middle school youth.

International Activities
Faculty members have been involved in overseas projects in China, Ghana, Japan, New Zealand, Peru, Puerto Rico, Russia, and South Africa. Some of the foreign language teacher education students spend a year in France or Spain in an exchange program. International students in several of the education programs and elsewhere at NC State participate in on-campus, multi-cultural opportunities.

Accreditation
Teacher Education programs at NC State University are accredited by the North Carolina State Board of Education and the National Council for Accreditation of Teacher Education. For information regarding Title II Survey Data, please visit: ced.ncsu.edu/teachered/title2.html.

DEPARTMENT OF ADULT AND HIGHER EDUCATION
(See Graduate Catalog)

DEPARTMENT OF EDUCATIONAL RESEARCH LEADERSHIP AND POLICY STUDIES
(See Graduate Catalog)

DEPARTMENT OF CURRICULUM AND INSTRUCTION
Poe Hall, Room 602
phone: (919) 515-3221
ced.ncsu.edu/ci

E. S. Vasu, Department Head
E.R. Gerler, Director of Graduate Programs in Counselor Education
R. J. Pritchard, Director of Graduate Programs in Curriculum and Instruction


The Department of Curriculum and Instruction prepares undergraduate students to become teachers of language arts and social studies in middle grades (6-9), or teachers of business or marketing courses in middle and secondary schools. The Department currently includes a diversity of highly qualified students. All programs emphasize scholarship and individually designed study, and include cross-disciplinary work, field-based experiences and allow for semester abroad options.
The Business and Marketing Education curriculum is specifically designed to prepare professional teachers to teach business or marketing courses in the middle and secondary schools. All graduates are qualified to be licensed by the State of North Carolina as either business or marketing education teachers (grades 6-12). In addition, it provides the necessary pedagogical and technical preparation needed by business and marketing instructors in community and technical colleges, as well as preparing students for selected training and development roles in business and industry. The combination of a broad general and professional education, business and marketing courses, and supervised work experience in marketing occupations provides a unique preparation for educators in a rapidly expanding professional field.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

CURRICULUM IN MIDDLE GRADES EDUCATION

Middle Grades Education, Language Arts and Social Studies Concentration
Poe Hall, Room 402 John Kelly Lee, Coordinator
phone: (919) 513-0126

The Middle Grades Language Arts and Social Studies (MSL) undergraduate program in the Department of Curriculum and Instruction seeks to prepare teachers who can effectively educate young adolescents, while being responsive to their unique needs, interests, and abilities. Graduates earn licensure for teaching in grades 6-9 in two subject disciplines: language arts and social studies. Even though the Undergraduate Catalog states, “All undergraduate students will be required to have at least a 2.0 GPA in order to graduate,” the Department of Curriculum and Instruction requires its students to maintain a 2.5 GPA throughout the program. A 2.5 GPA is a statewide requirement to student teach. Therefore, it is likely that all MSL majors will graduate with a higher GPA than required by the university. Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

For Middle Grades Education, Mathematics/Science Concentration, see the Department of Mathematics, Science, and Technology Education.

ENGLISH TEACHER EDUCATION
Tompkins Hall, Room 268 Jason Miller, Teacher Education Coordinator and Advisor
jason_miller@ncsu.edu

Students desiring to become secondary English teachers in grades 9-12 will be enrolled in the College of Humanities and Social Sciences. In that college’s section of this catalog, curriculum requirements for the teacher education option can be found under the Department of English. Students desiring to become language arts teachers in grades 6-9 will be enrolled in the College of Education.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

FRENCH TEACHER EDUCATION
Withers Hall, Room 413 Karen Tharrington, Program Coordinator
kltharr@ncsu.edu

Students desiring to become teachers of French will be enrolled in the College of Humanities and Social Sciences. In that college’s section of this catalog, curriculum requirements for the teacher education option in French can be found under Foreign Languages and Literatures. See the following website for more information: sasw.chass.ncsu.edu/fl.

SPANISH TEACHER EDUCATION
Withers Hall, Room 413 Karen L. Tharrington, Coordinator
kltharr@ncsu.edu

Students who wish to become licensed to teach Spanish K-12 by the State of North Carolina will be enrolled in the College of Humanities and Social Sciences. The curriculum requirements for the teacher education option in Spanish (LTA curricula) can be found under information for the Department of Foreign Languages and Literatures in the College of Humanities and Social Sciences.

DEPARTMENT OF ELEMENTARY EDUCATION AND TEACHING
317 Poe Hall Ellen McIntyre, Department Head
phone: (919) 513-4631

The Department of Elementary Education and Teaching offers a four-year Bachelor of Science degree to a cohort of students in Elementary Education and Teaching consisting of three components: 1) general studies required by the university, 2) interdisciplinary subject-matter emphases that build on disciplines of the general studies component (mathematics, statistics, and
logic; science, and 3) professional studies that include pedagogical courses and field experiences. Integral to the professional studies component are themes of diversity and technology. Satisfactory completion of the 123-124 credit-hour degree would result in the awarding of the Bachelor of Science degree in Elementary Education and Teaching and a recommendation for the North Carolina “A” level K-6 teacher’s license.

The elementary education curriculum will provide NC State University future teachers with more study in the disciplines of mathematics and the sciences than is customary in elementary teacher preparation programs. As a means of directly addressing the competencies required by The NC Department of Public Instruction and to be at the leading edge of the professional field, the NC State program will include more specialized methods courses as well as supervised field experiences in mathematics, science, and technology than typical elementary education teacher preparation programs.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

DEPARTMENT OF MATHEMATICS, SCIENCE AND TECHNOLOGY EDUCATION

Poe Hall, Room 326
phone: (919) 515-2238

P. Simmons, Head
A. Y. Scales, Assistant Head
A. Clark, Director of Graduate Programs for MSTE
H.S. Lee, Program Coordinator, Graduate Programs for Mathematics Education
V. W. Deluca, Graduate Programs for Technology Education
L. Annetta, Program Coordinator, Graduate Programs for Science Education


The Department of Mathematics, Science and Technology Education prepares undergraduate students to become teachers of mathematics, science and technology. The department traditionally prepares competent professionals who have strong subject matter backgrounds and pedagogical skills. Departmental majors may seek licensure for teaching high school grades 9-12 or middle grades 6-9. Students in the high school curriculum in mathematics or science education take approximately 45 percent of their program in science and mathematics and may complete a double major, receiving a second degree in mathematics or one of the sciences. Students in Technology, Engineering and Design Education may be licensed as teachers of technology programs in middle grades and high schools, 7-12. All pre-service teaching programs provide a broad background: an in-depth study in mathematics, technology or an area of science; and the development of professional competencies. In addition, the technology education curriculum provides a non-teaching and graphic communications option with a general background for a variety of employment opportunities in business and industry. A minor in Technology, Engineering and Design Education is available.

The department also offers a minor in Graphic Communications in which the student develops proficiency in applying graphic techniques in both career and leisure activities.

CURRICULA IN EDUCATION, GENERAL STUDIES

Poe Hall, Room 204
phone: (919) 515-5906

The General Studies Education program serves those students previously enrolled in teacher education programs at North Carolina State University, but whose career goals have changed.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

CURRICULA IN MIDDLE GRADES EDUCATION (GRADES 6-9 LICENSURE)

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Middle Grades Education, Mathematics Concentration

Poe Hall, Room 502K
phone: (919) 515-1062
College of Education

Middle Grades Education, Mathematics/Science Concentration
Poe Hall, Room 326N  J. Park, Coordinator of Advising
phone: (919) 515-6920

CURRICULA IN MATHEMATICS EDUCATION, SECONDARY
Poe Hall, Room 502K  E. Williams, K. Hollebrands, Coordinators of Advising
phone: (919) 515-1061

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

CURRICULA IN SCIENCE EDUCATION, SECONDARY
Poe Hall, Room 326N  J. Park, Coordinator of Advising
phone: (919) 515-6920

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

CURRICULA IN TECHNOLOGY EDUCATION
Poe Hall, Room 510D  W. J. Haynie III, Coordinator of Advising TED and TEN Programs
phone: (919) 515-1748
Poe Hall, Room 510N  A.Y. Scales, Coordinator of Advising TGC Program
phone: (919) 515-1754

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Graphic Communications
Poe Hall, Room 510  T. J. Branoff, Coordinator of Advising
phone: (919) 515-1754

This is a 15 hour minor develops competencies in selecting and applying graphic techniques in both career and leisure activities, provides in-depth manual and computer skills, and enriches visual perception and critical thought in graphic areas. Minor programs are individually designed to meet the needs of the student and to fit with the student’s major, such as engineering or technology education.

AGRICULTURAL TEACHER EDUCATION
213 Ricks Hall, Box 7607  E.B. Wilson, Undergraduate Coordinator
phone: (919) 515-9441

Students desiring to become teachers of agriculture will be enrolled in the College of Agriculture and Life Sciences. The curriculum requirements for the teacher education program can be found under the Department of Agricultural and Extension Education. For more information, please see the following website: www.cals.ncsu.edu/agexed.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Men and women who seek a challenging technical career in research and development, design, construction, production, maintenance, technical sales, management, teaching, or other careers requiring a methodical, creative solution of problems, should consider an engineering or computer science education. At NC State, the College of Engineering has a distinguished and internationally recognized faculty, and the College of Engineering offers an opportunity for ambitious men and women to become the leaders and prime movers of our increasingly technological world. Because of the great influence of science and technology on our everyday lives, today’s engineers and computer scientists must be acutely aware of, and responsible for, the effects their creations may have on society. In addition to safety, aesthetics, economics, and energy, today’s technologists must consider environmental, sociological, and other “human concern” costs.

The college’s graduates work in diverse careers around the world. Most are practicing engineers, but because their education has equipped them well to address problems in a wide variety of fields, many College of Engineering graduates have become corporate presidents, lawyers, medical doctors, and leaders in government. The College of Engineering is organized into twelve departments: Biological and Agricultural Engineering; Biomedical Engineering; Chemical and Biomolecular Engineering; Civil, Construction, and Environmental Engineering; Computer Science; Electrical and Computer Engineering; Industrial and Systems Engineering; Materials Science and Engineering; Mechanical and Aerospace Engineering; Nuclear Engineering; Paper Science and Engineering; and Textile Engineering. Eighteen undergraduate degree programs are offered in these twelve departments. In addition, a degree program in Engineering is offered by special arrangement to the very few students who can clearly demonstrate the need for an individualized program of study. All departments also offer advanced studies leading to master’s degrees and the Doctor of Philosophy degree. Consult the Graduate Catalog for graduate degrees.

The College of Engineering requests and receives accreditation from the Engineering Accreditation Commission of ABET, Inc. for sixteen of its undergraduate degree programs. These are aerospace engineering, biological engineering, biomedical engineering, chemical engineering, civil engineering, computer engineering, construction engineering and management, electrical engineering, engineering-mechatronics, environmental engineering, industrial engineering, materials science and engineering, mechanical engineering, nuclear engineering, paper science and engineering, and textile engineering. The Bachelor of Science in Computer Science program is accredited by the Computing Accreditation Commission of ABET, Inc. Accreditation ensures that these programs satisfy requirements for acceptance by these nationally recognized agencies. All curricula and programs are designed to maintain the college’s national and international reputation while meeting the needs of the people and industries of the state and region through effective instruction, competent research, and the development of new and meaningful contributions to scientific knowledge.

The University Career Center is maintained by the university to assist continuing students and graduating students in achieving their career goals.

Degrees
Entering students receive assistance in planning an appropriate program of study and have available continued guidance from academic advisers throughout their academic careers. Beginning freshmen enroll in the First Year Engineering Program for one to two years. After successfully completing matriculation requirements, students may be admitted to a departmental degree program. In order to be eligible to apply for admission into a degree program, unmatriculated students must successfully complete the following courses: MA 141 and MA 241; PY 205; ENG 101; CH 101, 102(lab); E 101 and a satisfactory grade in E 115. In addition, students must have achieved a total GPA of 2.9 within the first 60 hours of enrollment at NC State.

Bachelor of Science: The baccalaureate program provides preparation for entry into industry, government, business or private practice as well as graduate school. Graduates with a B.S. degree in engineering or computer science may be engaged in design development, production, construction, sales, maintenance, or the planning, operation or management of industrial units.

The undergraduate curricula offer programs of study leading to bachelor’s degrees in aerospace engineering, biological engineering, biomedical engineering, chemical and biomolecular engineering, civil engineering, construction engineering and management, computer engineering, computer science, electrical engineering, engineering-mechatronics, environmental engineering, industrial engineering, industrial engineering-furniture manufacturing option, materials science and engineering, mechanical engineering, nuclear engineering, paper science and engineering, and textile engineering. Graduation requirements include completion of one of the curricula with an overall grade point average of 2.0 and a grade point average of 2.0 in the major courses. The total number of required credits ranges from 120 to 128 semester hours.

Double Degree Programs
NC State students may wish to earn Bachelor of Science degrees in two fields from the College of Engineering. When the two courses of study are planned early and carefully, a number of courses can simultaneously satisfy requirements in both degrees. Humanities, social science, physics, mathematics, chemistry, English, and physical education sequences are common to most curricula. Students interested in such a program should consult the Office of Academic Affairs (118 Page Hall).

Other students may wish to combine a Bachelor of Science from the College of Engineering with a Bachelor of Science or Bachelor of Arts degree in another college at NC State University. A number of courses required for one degree may also satisfy requirements for a second degree. When the two courses of study are planned early and carefully, a double-degree program can be completed in as few as five years. Students interested in such a program should contact the Office of Academic Affairs (118 Page Hall).
Student Activities
Each department in the College of Engineering has technical societies open to every student enrolled in the respective degree(s). In most cases, these are student chapters of national professional organizations. Each curriculum also has one or more honor societies to give recognition to students who have earned superior academic records. In addition, there are college-wide honor, professional, and service societies that offer personally and educationally rewarding opportunities for students. Such societies include, for example the Engineers’ Council, Society of Women Engineers (SWE), and National Society of Black Engineers (NSBE). For more information about student organizations, visit www.engr.ncsu.edu.

International Opportunities
The college is actively working to provide its students with opportunities for overseas study experience. In addition to the Study Abroad Program, which is available to all students at NC State, College of Engineering students can participate in an exchange program with: Segovia, Spain; Prague; Czech Republic; Zhejiang, China; Rio de Janeiro, Brazil; and others. Students that choose to study abroad may earn an International Certificate from the College of Engineering. Students interested in these opportunities should contact the Office of Academic Affairs (118 Page Hall).

Cooperative Education Program
This optional program is structured so that the student will alternate semesters of study with semesters of practical work as sophomores and juniors. The freshman and senior years are spent on campus, while sophomore and junior academic work is spread over a three-year period to permit alternating academic semesters with work-experience semesters. Students earn a salary while they are in industry. This income can prove useful in offsetting college expenses. The Co-op plan can be completed in five years, during which time the student receives 12 to 18 months of industrial experience.

Students in all curricula in the College of Engineering may apply for the Co-op program if they have a grade point average of 2.5 or better. Application for admission into the Co-op program should be made early in the spring semester of the freshman year. However, later applications resulting in fewer work semesters prior to graduation will be considered during the sophomore year or the first semester of the junior year. Students must be admitted into an engineering degree program prior to beginning the first Co-op assignment. Further information may be obtained from the Office of Cooperative Education, 300 Clark Hall or online at www.ncsu.edu/co-op_ed.

Benjamin Franklin Scholars Program
A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars Program. Students completing the program receive a Bachelor of Science in an engineering discipline or in computer science and a bachelor’s degree in humanities or social sciences.

This double-degree program, a joint undertaking of the College of Engineering and the College of Humanities and Social Sciences, provides a unique opportunity to integrate a solid base of knowledge in technology or science with a broad humanistic and social perspective. The curriculum for the double-degree program has four main components: (1) a strong general education, (2) specially designed interdisciplinary courses, (3) all technical course requirements associated with the engineering or computer science degree, and (4) a second major in the humanities and social sciences chosen from among the traditional majors or an interdisciplinary major. Students who have matriculated in the College of Engineering and declared a major in the College of Humanities and Social Sciences and have at least a 3.0 GPA are generally eligible for scholarships from the program. With careful planning, the program can be completed in five years. For more information, contact the Program Director, Dr. Ross Bassett, ross_bassett@ncsu.edu, or the Office of Academic Affairs (118 Page Hall).

Computers
The College of Engineering provides its students with a large number of workstation labs for the purpose of running high-end engineering applications. In addition, incoming freshmen are expected to own a laptop computer to use in classroom, lab, and mobile settings. The first-year lab course, E115, Introduction to Computing Environments, instructs students in the use of their own computers to interface effectively with the vast resources of the college computing environment, named “Eos.” The course emphasizes the student’s responsibility for his or her own computer, including security and hands-on maintenance. Computers, both lab-based and student-owned, are central to engineering education in the college.

Transfer Program
Students with non-engineering degrees or one or more years of academic work completed at other institutions may apply for transfer admission to the College of Engineering through the Office of Undergraduate Admissions. Students are admitted from four-year institutions as well as from junior and community colleges. Students currently attending or anticipating attendance at other institutions are advised to contact the Office of Academic Affairs for information on transfer course credit and admission to NC State.

Golden LEAF Biomanufacturing Training and Education Center
Biomanufacturing is the production of useful products such as penicillin through the use of biological molecules and living organisms. The Golden LEAF Biomanufacturing Training and Education Center (BTEC) simulates a biomanufacturing pilot plant capable of producing biopharmaceutical products and packaging them in a sterile, current Good Manufacturing Practices (cGMP)-like environment, and is the only facility of its kind in the nation and one of only a few in the world.
College of Engineering

The BTEC hands-on, laboratory-intensive academic program is provided using large-scale equipment, including bioreactors, downstream separation and purification processes, bioreactor control systems, and aseptic processing operations. In addition to undergraduate and graduate courses, the BTEC educational program includes an undergraduate Minor in Biomanufacturing, and a University Certificate in Biomanufacturing. A Post-baccalaureate Certificate in Biomanufacturing is available for students who have earned a bachelor’s level degree. Undergraduate students majoring in chemical engineering may elect to complete a concentration in biomanufacturing sciences. The BTEC graduate program will include a Minor in Biomanufacturing, a Master of Science degree, and a Professional Science Masters in Biomanufacturing.

For additional information, please see: http://www.btec.ncsu.edu/

DEPARTMENT OF BIOLOGICAL AND AGRICULTURAL ENGINEERING

David S. Weaver Laboratories, Room 102
phone: (919) 515-2694
website: www.bae.ncsu.edu

R.O. Evans, Head
S. A. Hale, Associate Head and Undergraduate Coordinator
T.M. Losordo, Department Extension Leader
D.H. Willits, Director of Graduate Programs


The Department of Biological and Agricultural Engineering applies engineering principles to biologically-based systems, primarily in agriculture and environment. The BAE department provides excellent educational opportunities at the undergraduate level with programs that are well recognized to be among the finest in the United States. Two undergraduate curricula are offered: (1) Biological Engineering (BE) and (2) Agricultural and Environmental Technology (AET).

The BE curriculum includes concentrations in agricultural engineering, bioprocess engineering, and environmental engineering. All concentrations within the BE curriculum emphasize core courses in biology, mathematics, physics, chemistry, hydraulics, mechanics, materials, and thermodynamics which collectively provide solid training in basic science and engineering. The curriculum is designed to prepare each graduate to master fundamentals of engineering and biology, develop the ability to solve engineering design. The educational experience is capped off with a two semester senior level course that immerses each graduate in the team approach to developing engineering solutions to complex problems. By the time of graduation, approximately 80% of BE graduates will have passed the Fundamentals in Engineering exam and thus be well on their way toward licensure as a Professional Engineer.

Opportunities

BE students learn to solve a wide variety of engineering problems and have opportunities for specialization though selection of a specific concentration. Scientific and engineering principles are applied: to conserve and manage air, energy, soil, and water resources; to manage, protect and restore natural ecosystems; to understand and utilize biological, chemical and physical processes for the production and conversion of biomass to bioenergy; to analyze, understand and utilize mechanical properties of biological materials; to design and develop machinery systems for all phases of agricultural and food production; to design and evaluate structures and environmental control systems for housing animals, plant growth, and biological product storage; to develop improved systems for processing and marketing food and agricultural products; and to design sensor-based instrumentation and control systems for biological and agricultural applications.

Graduates of the BE curriculum receive a B.S. in Biological Engineering, qualifying them for positions in design, development and research in both industry, government, and public institutions. The curriculum also prepares students for post-graduate work leading to advanced degrees. Typical positions filled by recent BE graduates include: stream and wetlands restoration project manager; product design; development and testing engineer; plant management engineer; design, construction or inspection engineer for federal or state agencies; engineering consultant; and research engineer. Entry-level salary ranges for BE graduates are similar to those of Civil, Industrial, and Mechanical Engineering graduates.

Curricula

The BE curriculum is jointly administered by the College of Agriculture and Life Sciences and the College of Engineering and combines the fields of engineering, biology and agriculture. The BE curriculum is accredited by the Engineering Accreditation
Commission of the ABET, Inc. BE Graduates are qualified to become registered professional engineers by passing the appropriate examinations and upon completing the engineering experience requirements. Specific curriculum requirements are available online:

**Program Educational Objectives**

Graduates of NC State’s BE program, within the first few years following graduation, will be:

1. Able to grasp and apply engineering principles, procedures, and time management skills needed to solve real-world problems.
2. Professionally responsible in performing engineering tasks at an appropriate level of expertise and willing to accept the ethical responsibility for the social and environmental impacts of engineering practices.
3. Able to communicate effectively with diverse and global audiences and able to work effectively in today’s integrated team environments.
4. Life-long learners, with a solid background in the biological sciences, engineering sciences and mathematics; an understanding and appreciation for the arts, humanities, and social sciences; and an appreciation of the need for further professional educational opportunities.
5. Knowledgeable of current advances in engineering practice and research, prepared for opportunities in graduate engineering education, and making progress toward registration as a professional engineer.

**Minor in Agricultural and Environmental Technology**

A minor is offered to students interested in the application of engineering technology analysis in agricultural and environmental systems that utilize machinery, agricultural structures, food and feed processing, soil, water and waste management, electrical power and controls, and agricultural safety and health technology. This minor is not open to AET majors and allows majors in other programs to understand engineering technology for equipment, materials, resources, processes, and facilities utilized in their major area of study, and be knowledgeable in the application of technology for managing environmental issues, impacts, and monitoring.

**JOINT DEPARTMENT OF BIOMEDICAL ENGINEERING**

2147 Burlington Laboratories  
phone: (919) 515-5252 
website: www.bme.ncsu.edu

Nancy L. Allbritton, Head  
David S. Lalush, Associate Head/Chair  
L. A. Cartee, Director of Undergraduate Studies


Biomedical engineering is a profession that develops and applies engineering knowledge and experience to solve problems in biology and medicine and to enhance health care. Biomedical engineers are professionally trained to combine the rigors of medical and biological studies with the power of engineering analysis and design. People become biomedical engineers to be of service to others, to enjoy the excitement of understanding living systems, and to use state-of-the-art science and technology to solve the complex problems of medical care. The emphasis in biomedical engineering is on finding solutions by researching, testing, and applying medical, biological, chemical, electrical, and materials information. Biomedical engineers are unique individuals who make contributions to health care that are both satisfying to themselves and beneficial to others.

**Opportunities**

Biomedical engineers are employed by hospitals, pharmaceutical companies, medical device and testing companies, government agencies, universities, and medical schools. With so many areas of specialization within the field, graduates are encouraged to further their education by attending graduate or professional school after graduation from NC State. Graduates from this program have attended graduate programs in biomedical engineering, physical therapy, mechanical engineering, industrial engineering, microbiology, virology, public health, and sports physiology, among others, at many different institutions. Graduates who have taken additional courses to satisfy entrance requirements have also been accepted by medical, dental and pharmacy schools.

**Program Educational Objectives**

The Biomedical Engineering Program is preparing its graduates to:

1. Define and solve problems in basic medical sciences and human health by integrating engineering and biology using engineering analysis, experimentation, mathematical, and scientific principles.
2. Design biomedical systems, components, and processes by applying the scholarly and practical skills of engineering and life sciences using methods of modern engineering design and manufacturing, teamwork, and communication skills.
3. Use technical and hands-on knowledge in engineering practice, research, and management while exercising ethical and professional responsibility in the public, private, and academic sectors.
4. Become leaders and mentors that consistently enhance their information literacy by participating in activities that introduce them to advances in biomedical engineering practice and research.

Curriculum
The department offers the Bachelor of Science in Biomedical Engineering.

Novel aspects of the undergraduate program include capstone engineering design projects that use a design control process based on the FDA's Quality System Regulations, opportunities to apply for industrial internships after completing junior-level engineering courses, continuous and caring faculty advising, student involvement in program evaluation and improvements, and engineering specialization in one of three areas: Biomechanics, Biomaterials or Bioinstrumentation. Computers are used throughout the program. Graduates will be prepared for professional employment in research, design, engineering and the life sciences. First year students interested in this curriculum should enroll in the College of Engineering undesignated program and indicate BME as their curriculum choice. The biomedical engineering program is accredited by the Engineering Accreditation Commission of ABET, Inc. It is the only accredited BME program in a North Carolina public university.

The current specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Scholarships
Students in this degree program are eligible for scholarships from the College of Engineering.

Facilities
Teaching facilities are located in the David S. Weaver Laboratories on the central campus. These facilities include state-of-the-art classroom and laboratory facilities, study space, and convenient access to computing resources. Faculty offices are located in Burlington Laboratories, Weaver Laboratories, the College of Textiles, and various other academic areas on campus. Contact offices for advising are maintained in Burlington Laboratories and in Weaver Laboratories. Extensive Internet and video-conferencing capabilities are deployed to facilitate convenient faculty-student contact.

Research facilities are located in Weaver Laboratories, Burlington Laboratories, and the College of Textiles as well as in the laboratories of many other faculty throughout the university who do research in biomedical engineering areas. Facilities include access to advanced materials testing instrumentation, imaging resources, rapid prototyping facilities, biomedical instrumentation, and clinical resources.

Minor in Tissue Engineering
The Minor in Tissue Engineering is intended to provide graduates with the knowledge base and practical skills that will prepare them to quickly contribute to research and manufacturing of devices designed for repair and replacement of tissues and organs. Interested students should contact the BME Student Services Coordinator for information and application materials.
and economic sciences. Chemical engineering organizes these diverse skills into a coherent discipline uniquely suited to the needs of the chemical, biochemical, environmental, petroleum, plastics, textile, and pulp and paper industries among others.

**Facilities**

Departmental teaching and research activities are based on the first two floors comprising the east wing of Engineering Building I. Equipment for studying the principles of fluid flow, heat transfer, distillation, absorption, and drying is maintained in several laboratories. Chemical reaction kinetics, including heterogeneous catalysis and polymerization, are studied on specially designed equipment. Extensive apparatus is available for characterizing the relationships between molecular structure and bulk properties of polymers. A 20,000 square foot biotechnology laboratory has been equipped to include a pilot plant for synthesizing genetically engineered proteins in cell culture bioreactors. Specialized digital computational equipment complements campus-wide university computer resources. The department makes constant use of the College of Engineering Eos computer system that is accessible for use 24 hours a day by students and faculty.

**Opportunities**

Graduates find employment at attractive salaries in diverse subdisciplines including research and development, production, management and administration; process control, technical service, and sales; estimation and specification writing; consulting and teaching. Students desiring careers in teaching, research, or consulting are advised to consider graduate training (consult the Graduate Catalog). Chemical and biomolecular engineering graduates often pursue careers in law or the medical sciences since the broadly structured undergraduate curriculum provides strong preparation for graduate study in a wide range of professional specialties.

**Minor in Chemical and Biomolecular Engineering**

In addition to B.S. graduates of the chemical and biomolecular engineering program at NC State, there is a pool of students in other disciplines whose professional work assignments may require a knowledge of chemical engineering nomenclatures, technologies, and methods. The minor in chemical engineering is intended to allow such students to develop an understanding of the fundamental concepts and practice of chemical engineering. This minor should be most attractive to undergraduate students in environmental engineering, pulp and paper technology, and chemistry, and it will allow non-chemical engineering majors to prepare themselves for graduate study in chemical engineering with a minimum amount of prerequisite work following their acceptance into the graduate program.

Students enrolled in the minor in chemical engineering must complete CHE 205, CHE 225, CHE 311, CHE 315, CHE 316, and CHE 446. All the courses must be completed with a grade of “C-” or higher. An application for the minor must be submitted to the Director of Undergraduate Studies in the Department of Chemical and Biomolecular Engineering. Admission to the minor will require a minimum 2.5 over-all grade point average at NC State and a grade of “B-” or higher on the first enrollment in CHE 205.

**Curricula**

The successful practice of chemical engineering requires a broad, diversified preparation. The spirit of research and experimental inquiry is vital; students, therefore, require sound scientific backgrounds essential to original and disciplined thought, enthusiastic inquiry and, ultimately, original and constructive accomplishment. The undergraduate curriculum emphasizes the scientific, engineering, and economic principles involved in the design and operation of chemical processes.

Design methodologies are practiced in all core chemical and biomolecular engineering courses. This integrated design experience culminates with the senior design sequence, CHE 450 and CHE 451. The background in organic, physical, and inorganic chemistry is comparable to the training offered to chemistry majors. Mathematics, physical sciences, and distributed humanities courses are also required. The chemical engineering program is accredited by the Engineering Accreditation Commission of ABET, Inc. The curriculum requirements are available online: www.ncsu.edu/registrar/curricula

**Program Educational Objectives**

Given the foundation of knowledge, skills, experiences, and the discipline of hard work and critical thinking provided by the curriculum, our students are expected to achieve one or more of the following within five years of graduation:

1. Excel in engineering practice and/or entrepreneurship in various industries, including petrochemical, biochemical, pharmaceutical, fine chemical, environmental, semi-conductor, pulp and paper, advanced materials, and health care.
2. Advance in positions of increasing leadership responsibilities in their chosen career fields.
3. Earn an advanced degree or certification leading to a career in academia, law, medicine, or research and development.
4. Exhibit professionalism, ethical responsibility, a habit of life-long learning, an interest in contemporary issues of importance to society, and an appreciation of the impact of engineering development in a societal context.
Biomanufacturing Sciences Concentration in Chemical Engineering

In conjunction with the Biomanufacturing Training and Education Center (BTEC), this concentration provides students with the knowledge base and hands-on skills to prepare them to quickly contribute to a cGMP biomanufacturing operation. Students completing this concentration also receive a Minor in Biomanufacturing.

Biomolecular Concentration in Chemical Engineering

The biomolecular concentration integrates a unique set of core and advanced course offerings that are highly relevant to pharmaceutical, medical, and agricultural fields. Students completing this concentration also receive a Minor in Biotechnology.

Nanoscience Concentration in Chemical Engineering

The nanoscience concentration allows the student to develop an understanding of the scientific and technological principles associated with the design and manufacture of patterns and devices with features and advanced functionality on the nanometer scale.

Green Chemistry & Engineering Concentration in Chemical Engineering

The green chemistry and engineering concentration introduces students to the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances.

Honors Program in Chemical Engineering

The honors program allows talented students to gain a deeper understanding of chemical engineering principles than would be acquired by completing the standard CHE curriculum. Admission to the program requires students to have earned a minimum overall GPA of 3.5 and a minimum GPA of 3.5 in CHE 205 and CHE 225. An honors thesis is required for completion of the honors program.

DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING

The Department of Civil, Construction, and Environmental Engineering offers several degree programs concerned with the improvement and care of both public and private infrastructure and natural environments. The degree programs address the planning, design, construction, operation, and maintenance of buildings, dams, bridges, harbors, power facilities, pollution control facilities, and water supply and transportation systems. The curricula provide academic preparation for students considering careers in civil, construction, or environmental engineering.

The department offers undergraduate degree programs leading to the Bachelor of Science in Civil Engineering, the Bachelor of Science in Construction Engineering and Management, and the Bachelor of Science in Environmental Engineering. All three programs are accredited by the Engineering Accreditation Commission of ABET, Inc. Graduation from an ABET accredited engineering degree is the first step toward licensure as a Professional Engineer. All three programs also prepare students for graduate education.

Opportunities

People will always need constructed facilities to live, work, and sustain their lives and environment, and civil, construction, and environmental engineers will always be needed to plan, design, and construct these facilities. Civil, construction, and environmental engineering comprises such a diversified field that graduates have a wide choice in locations and type of employment. Jobs range from federal, state, or municipal agencies to a variety of manufacturing and processing industries, consulting firms or construction companies.
companies. The work may be performed partially or wholly in an office or in the field and may be located in a small community, a big city, an industrial center, or even in a foreign country. Careers in either professional practice or teaching and research are common for many graduates who complete advanced degrees.

Facilities
The Department of Civil, Construction, and Environmental Engineering has well-equipped laboratories, including several computer laboratories with a collection of both individual workstations and collaborative learning spaces. The College of Engineering at NC State maintains a state-of-the-art computing environment known as Project Eos, a large-scale distributed system that consists of hundreds of workstations across the college on both main and Centennial Campus. Eos is a distributed client-server network running a location-independent file system that delivers a comprehensive suite of engineering applications to three platforms—Microsoft Windows, Red Hat Linux, and Sun Solaris—and to student-owned computers through remote access and the Virtual Computing Lab. Project Eos is operated by a professional support group that provides consultation and basic system and software services.

The department’s other laboratories contain a variety of special equipment for instruction and research in structures, mechanics, soils, construction materials, construction engineering, hydraulics and environmental engineering. Environmental engineering research facilities include over 5000 sq. ft. of new laboratory space devoted to environmental chemistry, microbiology, process engineering, and hydraulics. Students have the opportunity to conduct research on water and wastewater treatment, ground water contaminant transport and site remediation, refuse decomposition, anaerobic microbiology, analytical chemistry, and applied molecular microbial ecology.

The Constructed Facilities Laboratory (CFL) on Centennial Campus features unique facilities devoted to all aspects of constructed infrastructure research and assessment. Facilities include: specially designed reaction floors and walls for testing large-scale structural systems to failure, such as full scale bridge girders up to 100 feet long and beam-column systems subject to earthquake loading; and large pits up to 20 feet deep for testing granular and compacted soils for foundation strength. State-of-the-art facilities like these heighten students’ learning experiences by exposing them to the forefront of technological advances.

Curricula
The Department of Civil, Construction, and Environmental Engineering at NC State is home to the educational programs in Civil Engineering, Construction Engineering and Management, and Environmental Engineering. A single department head and management structure direct the educational missions of these three related fields. Each curriculum is designed to prepare the graduate for a career in the respective field and for lifelong learning through graduate education, continuing education and/or self-study.

Civil Engineering Degree
The Civil Engineering curriculum provides academic discipline in mathematics, the physical sciences, the humanities and social sciences, and the technical aspects of civil engineering. After introductory exposure to several of the professional areas such as environmental and water resources, geotechnical, structures, and transportation engineering, the student builds additional depth in one of these specialties.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Educational Objectives in Civil Engineering
The educational objectives of the civil engineering program at North Carolina State University are to prepare its graduates to:

1. function successfully in a professional environment by utilizing and enhancing their problem-solving and communication skills;
2. continue learning through graduate or other professional education and obtaining licensure where appropriate;
3. provide professional leadership within their companies, engineering societies and civic organizations, and provide mentoring to those under their supervision and influence; and,
4. promote organizational success with consideration of cost and time management while practicing and promoting ethical behavior and stewardship of a sustainable environment.

Construction Engineering and Management Degree
The Construction Engineering and Management curriculum is designed for the student interested in the planning, design, direction, and management of construction projects. It includes the core course requirements in mathematics, the physical sciences, and the humanities and social sciences. After exposure to engineering fundamentals and engineering design of facilities, the curriculum provides a series of specialty courses in construction engineering related to the analysis, design, and management of the construction process. The General Construction Concentration is designed for students pursuing careers in the building, residential, highway, and heavy construction industry. The Mechanical Construction Concentration is designed for students pursuing a career emphasizing construction of mechanical systems for buildings, residences, and industrial facilities.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
College of Engineering

Educational Objectives in Construction Engineering and Management
The educational objectives of the construction engineering and management program at North Carolina State University are to prepare its graduates to:

1. function successfully in careers emphasizing application of construction engineering and management principles with the ability to solve a broad set of engineering problems in construction.
2. practice construction engineering including the design and management of construction process to achieve needed safety, quality, durability, sustainability, and economic objectives.
3. function in team-oriented, multi-disciplinary, open-ended engineering activities considering the societal and economic impacts of construction engineer.
4. engage in life-long learning through graduate study, self study, or continuing education; pursue licensure; provide mentoring to those under their supervision and influence; and provide leadership in their employment organizations, industry associations, and professional societies.

Environmental Engineering Degree
The Environmental Engineering curriculum is designed for students interested in environmental protection. The curriculum provides students with basic knowledge of the chemical, biological and physical processes that govern the transport and fate of pollutants in the environment as well as the design of engineered treatment systems. Upon graduation, students are prepared to work in the areas of water and wastewater treatment, air pollution control, solid waste management, and hydrology and water resources. The curriculum emphasizes the interdisciplinary nature of environmental engineering with courses in both engineering and life sciences, including specialized courses on pollution control and waste management.
Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Educational Objectives in Environmental Engineering
The educational objectives of the environmental engineering program at North Carolina State University are to prepare its graduates to:

1. function successfully in a professional environment by utilizing and enhancing their problem-solving and communication skills while practicing and promoting ethical behavior.
2. continue learning through graduate or other professional education and obtaining licensure where appropriate.

Post-Baccalaureate Study
If a student is interested in more intense specialization in one particular area, advanced level training is available leading to the Master of Civil Engineering, the Master of Science or the Doctor of Philosophy. Specialization areas include coastal engineering, computer-aided engineering, construction engineering and management, construction materials, environmental and water resources engineering, geotechnical engineering, mechanics and structural engineering and transportation engineering. With judicious choices of electives during the B.S. program, a student may also prepare for additional studies in law, business administration, business management and city and regional planning.

Student Activities and Scholarships
Student chapters of the American Society of Civil Engineers, American Concrete Institute, Associated General Contractors, National Association of Home Builders, Institute of Transportation Engineers, and Air and Waste Management Association undertake projects to further student exposure to the profession. Guest speakers representing various aspects of engineering practice speak at weekly lunch meetings. Students who accumulate outstanding academic records may be considered for membership in the Chi Epsilon Honorary Society. Through the generosity of industry and program alumni, many scholarships are available on a competitive basis to students in addition to university, college, and need-based financial aid.

DEPARTMENT OF COMPUTER SCIENCE
EBII, Rooms 3320 (Department Office) & 1204 (Undergraduate Advising Office)
phone: (919) 515-2858
website: www.csc.ncsu.edu

M. A. Vouk, Head and Associate Vice-Provost for Information Technology
D. J. Thuente, Director of Graduate Programs
D. R. Bahler, Director of Undergraduate Programs
B. J. Adams, Director of Advising

Computers

Computers are ubiquitous in modern life. In addition to high-tech machines like aircraft and medical imaging systems, everyday devices as diverse as automobiles, vending machines, refrigerators, and videogame consoles now contain some type of computer. Computers help design our highways, bridges, pharmaceuticals, electronic circuits, and buildings; handle banking, stock trading, and other financial transactions; assist in management decisions; control communications, utilities, and manufacturing processes; and analyze farm production. Computers watch over our health, security, and safety. Computers serve as vital research tools for scientists, from those exploring the farthest reaches of the cosmos to those searching for subtle patterns in the human genome. Explosive growth in computer gaming, digital entertainment, and multimedia-based education has spawned entirely new industries in recent years. Computers are linked together in worldwide networks that provide information and computing power to nearly anyone who wants it, anywhere in the world.

Opportunities

Designing computer systems, and the software that runs on them, is the job of computer scientists. Computer scientists can find demand for their innovation, design, analysis, and engineering skills in the full gamut of professions. As a direct consequence of the increasingly critical role of computers in society, the discipline of computer science has enjoyed rapid growth for many years. And the trend looks likely to continue: the most credible employment projections indicate a serious and worsening nationwide shortfall in the supply of people skilled in information technology, and a resulting steady rise in demand and salaries, for decades to come. Computer Science graduates from NC State are in high demand, including by employers that are extremely selective in their national recruiting. Anchoring one corner of the world-famous Research Triangle Park, and located in a modern state-of-the-art teaching and research facility on NC State’s Centennial Campus, our students and faculty benefit from strong and active industry partnerships. NC State Computer Science is one of the top suppliers in the nation of new grad hires to a number of high-tech companies, including several Fortune 500 companies, some with a substantial presence in the Research Triangle. Starting salaries for our undergraduates have averaged well over $55,000 for many years and show a steady increase. Opportunities are also plentiful for graduate study for those who wish to pursue the field in more depth.

Curriculum

Like all freshmen in the College of Engineering, Computer Science Freshmen take a core of courses in the humanities, chemistry, mathematics, physics, and computing. After successfully completing the freshman year, students can matriculate into the Computer Science curriculum if they have a specified college GPA.

The Computer Science curriculum teaches students the skills necessary to understand, design, implement, test, and deploy computer systems and software of all kinds, in addition to exposing students to the application of computers to problem solving in diverse fields, and the mathematical methods needed to analyze and compare both computation problems themselves and alternative approaches to solving them.

Core courses provide a foundation for all students in programming languages, data structures, software engineering, computer architectures, numerical analysis, theory of computation, and the social and ethical dimensions of the practice of computer science.

Computer science electives are chosen in consultation with advisers, usually starting during the junior year. These electives allow exploration of more advanced areas, among them artificial intelligence, database management systems, computer graphics, human-computer interface design, multimedia technology, web technologies, networks, privacy and security, remote sensing, computer architecture, distributed computing, and operating systems. Electives can be chosen to provide coherent concentration in areas such as computer and network security, software engineering, and computer game design. A special focus is on skills that help our students be competitive in the global economy. This includes technical communication skills, understanding of business principles in organizations that use information technology, innovation, an understanding of intellectual property issues, and an understanding of latest technologies, such as web-services, security and sensors, as well as both closed and open source solutions and engineering issues.

All Computer Science majors must complete a team project, most often in an area such as networking, computer graphics, computer gaming, database technology, or web services. Projects under the auspices of the department’s Senior Design Center have industrial sponsors; so student teams gain experience working jointly with industry representatives to achieve project goals. The department’s location near the Research Triangle Park also means many opportunities for Co-ops and internships, part-time employment, and forging the industry contacts often vital in a successful job search.
College of Engineering

The undergraduate curriculum leads to a Bachelor of Science in Computer Science. This program is nationally accredited by the Computing Accreditation Commission of ABET, Inc.

Game Development Concentration. It is now possible to pursue a B.S. in Computer Science with a Concentration in Game Development. Over the last 10 years there have been significant advances in computer game development technologies. In addition to the more familiar entertainment sector, these advances also have applications to such areas as training, education, visualization, and social interaction forums — so-called “serious games.” North Carolina is now among the top tier of states for the game development industry. Opportunities for new graduates with strong background in computer science with a focus on game development will therefore expand.

Many aspects of computer game development are unique to the games industry; the game development concentration provides specialized coursework in these areas. The concentration focuses on game development technologies while preserving the breadth and depth of the general computer science BS degree. The concentration requires that students take both the initial course on computer graphics (CS 461) and the initial course on game development (CSC 481). They must then choose as a concentration project either the graphics or game development advanced elective (CSC 462 or CSC 482, respectively). Two additional restricted electives with content highly relevant to game development are chosen from a list of CSC courses. Among the credit hours required for other electives, students in the concentration must select three courses from a list that spans writing, film, and music. These courses provide grounding in the creation of the conventional media and provide the background in these disciplines needed to participate in the multidisciplinary aspects of the design of games.

Program Educational Objectives
The CSC undergraduate program at NCSU prepares its B.S. graduates to achieve the following career and professional goals:

1. To apply their knowledge of computer science problems encountered in their professional careers or in pursuit of advanced degrees.
2. To use evolving technologies, analytical thinking, and design to address contemporary issues.
3. To communicate well orally and in writing, interact professionally, and work effectively on multidisciplinary teams to achieve project objectives.
4. To uphold high ethical standards, including concern for the impact of computing on individuals, organizations, and society.
5. To engage in lifelong learning to enhance their professional capabilities.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Computer Programming
The Department of Computer Science offers a Minor in Computer Programming to undergraduate majors in any field except Computer Science and Computer Engineering. The objectives of this minor are to: 1) encourage students to combine computing with their own disciplines, 2) promote quality in programming techniques, and 3) give graduating seniors with a minor in computer programming an added advantage in the job market. The minor requires completion of 21 credit hours from the Computer Science core.

Scholarships and Financial Aid
The College of Engineering and the Department of Computer Science have a number of endowed and other scholarships available to students. There is also opportunity for financial aid sponsored by industry and for Co-op and internship positions. Interested students are invited to apply through the College of Engineering. In addition, the department organizes job-fairs and maintains a job matching service for our industrial partners (ePartners) and others who wish to hire our students for the summer or part-time during the academic year.

Facilities
North Carolina State University boasts one of the most extensive and sophisticated advanced high-performance communications infrastructures available for student use today. It ranges from 10 Gbps research network, to wireless computing, to sensor networks. NC State University High-Performance Computing operations provide NC State students and faculty with entry and medium level high-performance research and education computing facilities and consulting support. Another service, called Virtual Computing Laboratory (VCL), provides on-demand and reservation-based utility computing services from NC State’s extensive library of Engineering, Design, and Scientific software applications, as well as support for research projects. It is intended to address the increasing needs of local and distance students, faculty and researchers for virtualized resources by providing 24x7 access to advanced computing laboratory facilities through a variety of computer systems they own.

In addition to that, the Department of Computer Science has over 30 general purpose and specialized teaching and research laboratories, centers and other facilities that support its educational and research mission. These facilities are located in three buildings: Daniels Hall, Engineering Building II, and Montieth Research. Facilities range from introductory programming laboratories, to networking laboratories, to a games center, to an advanced visualization center, to a senior design center. At different stages of their education undergraduates will have the opportunity to use many of these facilities.
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Box 7911, Engineering Building II, NC State University, Raleigh, NC 27606
phone: (919) 515-2336

D.D. Stancil, Head and Alcoa Professor of Electrical and Computer Engineering
I. Viniotis, Associate Head
H. J. Trussell, Director of Graduate Programs
C. W. Townsend, Coordinator of Advising


The professions of electrical engineering and computer engineering are concerned with the analysis, design, construction and testing of systems based on electrical phenomena. In contemporary society, electrical methods are used to communicate and store information, control equipment and systems, perform mathematical operations, and convert energy from one form to another. Frequently, two or more of these functions are important in the design of systems such as television, radio, telecommunications, computer, robots and intelligent machines, telemetry systems, solid-state electronics, vehicle safety systems, biomedical devices, environmental controls, electric machinery, and electric power generation and transmission facilities.

Computer engineering is a field in which digital techniques are used in system design. Low-cost solid-state microprocessors and memories permit computers to be widely incorporated in many different types of devices from toys to traffic control systems. To work effectively in this rapidly growing field, the computer engineer must understand both hardware and software techniques and must effectively use both in order to design, build and test complex digital systems. Both the electrical engineering and the computer engineering programs, which lead respectively to the degrees, Bachelor of Science in Electrical Engineering and Bachelor of Science in Computer Engineering, are accredited by the Engineering Accreditation Commission of ABET, Inc.

Program Educational Objectives

The Electrical/Computer Engineering Program graduates will be competent in the following areas:

1. Engineering problem definition and solution using engineering analysis, experimentation, and creativity based on sound mathematical and scientific principles.
2. Electrical/computer systems, components, processes, design requiring knowledge of the discipline, teamwork, communication, skills and an ability to work with a diverse set of constraints.
3. Productive engineering practice, research or management using technical, hands-on and professional knowledge, skills and initiatives required for success in the public, private or academic sectors.
4. Continuing education and learning on the job, experiential learning, leading and mentoring others and the ability to apply lessons learned to new situations.

Scholarships and Awards

Superior academic performance is recognized within this department in three ways: election of students to membership in the electrical engineering honor society, Eta Kappa Nu; awarding merit scholarships; and presentation of awards to outstanding seniors. The department has one endowed merit scholarship for rising sophomores, the Eugene C. and Winifred Sakshaug Scholarship, and twenty-one endowed scholarships which are usually awarded to juniors and seniors: William E. Clark, Elizabeth P. Cockrell, Eugene C. Denton, Virginia Stewart Easter Memorial, William and Tipton Gray, John and Ann Hauser, Llewellyn Hewett, William and Carol Highfill, L. A. Mahler, Amelia N. Mitta, Dewey Carr Ogburn Memorial Scholarship, Frank T. Pankotay, Ronald G. Pendred, Pratt Family, William DeRosset Scott III, E. Chester Seewald, Fredrick J. Tischer, Herbert B. Walker, Simon B. Woolard, North Carolina Electric Membership Corporation, and William D. Stevenson, Jr., the latter two of which are for students studying electric...
College of Engineering

power systems. The department also from time to time has scholarships provided by industrial organizations such as Square D, Duke Power, Progress Energy, Northrup Grumman, Cisco and Boeing. Academic merit is generally the primary requirement for these awards, but other characteristics, such as demonstrated leadership, may also be specified. In addition, the endowed William M. Cates Scholarship Program provides multiple scholarships for students having documented financial need and high academic performance. These are awarded each fall to juniors, with provision for continuation in the senior year.

Facilities

Many courses are accompanied by coordinated laboratory work and projects. These assignments typically focus on real-world systems and problems and involve computer simulation and analysis, design, development and testing of hardware and software associated with electrical, electronic, and electromechanical systems, circuits, and devices. Extensive facilities are provided for experimental study of analog and digital circuits, microprocessors, computers, VLSI devices, robots and intelligent machines and telecommunications. The William F. Troxler Design Center, 2,700 square feet senior design laboratory, provides resources for many required industry-sponsored, semester-long design projects. In all, the Department of Electrical and Computer Engineering maintains 14 teaching labs, all located in the newly constructed Engineering Building II on Centennial Campus. These labs provide students with state-of-the-art equipment designed to teach the students many practical, industry sought skills. Approximately 160 computers and a variety of other equipment—oscilloscopes, multimeters, power supplies, and function generators—are in use by the students on a daily basis. In addition, Engineering Building II houses a public lab of over 80 computers running a variety of operating systems and industry standard software. This lab is available to all engineering students and is staffed by trained student operators. A student-owned laptop platform has been developed in the College of Engineering. Combined with a comprehensive wireless network and many remote computer services this program allows education to expand outside of traditional classroom and laboratory facilities.

Core Courses

The electrical and computer engineering curricula share core courses comprising a substantial portion of the first three years of study. Many of the core courses are offered three times a year in fall, spring, and summer. A strong emphasis is placed on fundamental concepts in core courses so that graduates are prepared for rapid technological changes common in the electrical and computer engineering professions. A comprehensive foundation in mathematics and the physical sciences in the freshman year is followed in subsequent years by additional core courses in mathematics, physics, electric circuit theory, digital logic, computer systems, electronics, electromagnetics, and linear systems. Laboratory work is designed to demonstrate fundamental principles and to provide experience in designing and testing electronic hardware and computer software. Both curricula have required senior design project courses which give students comprehensive experience in designing, building, and testing physical systems.

Curricula

In addition to the core courses described above, students in the electrical engineering curriculum take seven specialization electives in areas of their choice within the discipline and two technical electives, which are selected engineering courses offered by other departments. Beyond the core, students in the computer engineering curriculum take courses in discrete mathematics, data structures, embedded systems, and complex digital systems, in addition to four specialization electives in areas of their choice and one technical elective. For both curricula, a variety of elective courses are offered in communications, computational intelligence, controls, digital signal processing, digital systems, mechatronics, microelectronics, networking robotics, and VLSI design. There are typically a dozen or more of these courses offered each fall and spring semester and two or three available each summer.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

INDIVIDUALIZED DEGREE PROGRAM IN ENGINEERING

Page Hall, Room 118
phone: (919) 515-3263

The B.S. in Engineering degree offers an individualized academic program for those exceptional students who have academic and career goals that cannot be accommodated by the other engineering degree programs. Before being admitted into the program, students must complete the freshman year, and have at least a 2.5 grade point average, have completed the requirements for admission into an engineering degree program and have a plan of study approved. For more information, contact the Assistant Dean for Academic Affairs at (919) 515-3263.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

BACHELOR OF SCIENCE IN ENGINEERING - MECHATRONICS CONCENTRATION

Joint Degree with University of North Carolina at Asheville
phone: (828) 251-6640, website: www.unca.edu/ncsu_engr/

Y. Fahmy, Program Director
C. Alderman, Associate Director
R. Bruce, Associate Director

The Joint Mechatronics Engineering curriculum (JEM) combines the best that two nationally recognized universities have to offer. From NC State University comes the engineering component comprising course work from the Departments of Mechanical and Aerospace Engineering (MAE), Electrical and Computer Engineering (ECE), and mechatronics courses taught by NC State
University faculty on the campus of the University of North Carolina at Asheville. Hands-on laboratories are integral to the engineering course work. From the University of North Carolina at Asheville comes an engineering-themed Humanities and Social Science component with a rich liberal arts foundation.

Mechatronics engineering focuses on the precision control of mechanical and machine systems. In today’s modern engineering systems, control is achieved electronically through sensors, actuators and microprocessors. The marriage of modern control systems with mechanical devices is key to the design and development of high-performance engineering systems. Just a few examples of computer-controlled mechanical systems are robots, engine-fuel systems, hybrid automobiles, autonomous aerospace vehicles, stair-climbing wheelchairs, garage door openers and alternative power generation systems. Through modern mechatronics engineering, new avenues of thinking and design can greatly enhance the utility, performance, and efficiency of modern machinery.

**Program Educational Objectives**

Two-to-three years after graduation, Mechatronics graduates will be able to:

1. Apply mechanical engineering and electrical engineering knowledge and skills to problems and challenges in the areas of mechatronic engineering.
2. Be skilled in integrating and applying systems or devices incorporating modern microelectronics, information technologies and modern engineering tools for product design, development and manufacturing.
3. Demonstrate professional interaction, communicate effectively with team members and demonstrate the ability to work effectively on multi-disciplinary teams to achieve design and project objectives.

The Engineering - Mechatronics program is accredited by the Engineering Accreditation Commission of ABET, Inc.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

EDWARD P. FITTS DEPARTMENT OF INDUSTRIAL AND SYSTEMS ENGINEERING

Daniels Hall, Room 400
phone: (919) 515-2362
website: www.ise.ncsu.edu

P.H. Cohen, Edgar S. Woolard Professor and Head
R.E. King, Professor and Director of Graduate Programs

Henry A. Fosse Professor: C.T. Culbreth; University Professor: S.E. Elmaghraby; Walter Clark Professor: S.C. Fang; James T. Ryan Professor: T.J. Hodgson; A. Doug Allison Professor: S.D. Roberts; C.A. Anderson Professor: R. Uzsoy; Dopaco Professor: R.A. Wysk; Professors: M.A. Ayoub, R.H. Bernard, Y. Fathi, D.B. Kaber, Y.S. Lee, J.R. Wilson, R.E. Young; Professors Emeriti: J.R. Canada, H.L. Nuttle, R.G. Pearson, A.L. Prak, W.A. Smith, Jr.; Associate Professors: S.M. Hsiang, M.G. Kay; Associate Professor and Fitts Faculty Fellow: O. Harrysson; Research Associate Professor: J. Taheri; Assistant Professor and Fitts Faculty Fellows: B.T. Denton, J.S. Ivy; Assistant Professor: J. Dong; Lecturers: J.C. Low

The Edward P. Fitts Department of Industrial and Systems Engineering offers an undergraduate B.S. program in Industrial Engineering. Four areas of educational focus are provided under this program: operations research, production systems, ergonomics and manufacturing. Additionally, a BSIE Furniture Manufacturing degree track is offered as an accredited specialization within the standard BSIE. In a cooperative effort of faculty representing all focus areas, the following undergraduate educational objectives were developed.

The Edward P. Fitts Department of Industrial and Systems Engineering is preparing its graduates for:

1. Engineering problem definition and solution using engineering analysis, experimentation, client/customer needs, and creativity based on sound mathematical and scientific principles.
2. Systems analysis and design requiring knowledge of the discipline, multidisciplinary teamwork, communication skills and an ability to work with a diverse set of constraints.
3. Productive engineering practice, research, leadership or management using the technical, professional, ethical and societal knowledge, skills and initiatives required for success in the public, private or academic sectors.
4. Formal as well as informal continuing education, leading and mentoring others and the ability to apply lessons learned as needed.

The Bachelor of Science in Industrial Engineering, Furniture Manufacturing prepares graduates for both engineering and managerial positions in the furniture industry. The curriculum offers industrial engineering students a concentrated study of the materials, products, and processes of the furniture industry.

The Bachelor of Science in Industrial Engineering (as well as the optional Bachelor of Science in Industrial Engineering, Furniture Manufacturing) is accredited by the Engineering Accreditation Commission of ABET, Inc.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
College of Engineering

Minor in Industrial Engineering
The minor in Industrial Engineering is designed to provide undergraduate engineering students and other science majors in curricula other than Industrial Engineering with the fundamentals of industrial engineering necessary for advanced study in the discipline and/or employment in industrial engineering to acquire some level of expertise in areas common to all industrial engineers as well as a deeper knowledge in at least one specific area of interest.

Admissions and Certification of Minor
The minor must be completed no later than the semester in which the student expects to graduate from his or her degree program. Paperwork for certification can be found in 432 Daniels Hall and should be completed no later than during the registration period for the student’s final semester at NC State.

Minor in Furniture Manufacturing
The minor in Furniture Manufacturing is open to all undergraduate degree students at NC State who are interested in gaining specialized knowledge of furniture product engineering and related manufacturing processes and design. A set of four cohesive courses provides for a concentrated study of this manufacturing industry as well as the application of industrial engineering fundamentals.

Admissions and Certification of Minor
The minor must be completed no later than the semester in which the student expects to graduate from his or her degree program. Paperwork for certification can be found in 432 Daniels Hall and should be completed no later than during the registration period for the student’s final semester at NC State.

Accelerated Baccalaureate/Masters (ABM) Program
This program will allow exceptional undergraduate students to complete both undergraduate and graduate degrees at an accelerated pace. The student is allowed up to 12 credit hours to be counted towards both the undergraduate and graduate degrees.

Requirements:
- Have completed a minimum of 75 credit hours and up to a maximum of 96 credit hours by the end of the current semester (includes transfer credits).
- Earned a GPA of at least 3.5 for all courses and 3.5 for all Industrial Engineering courses.
- Satisfied all prerequisite requirements for 400 level courses.
- A letter of recommendation from the undergraduate teaching adviser identifying the applicant as a participant in the ABM program should accompany the application as well as the course numbers and titles of the 12 credit hours to be used for both the bachelor’s and master’s degree programs.

Whether in the traditional B.S. or combined B.S.-MIE/MSIE, ABET and university requirements will be satisfied based upon the four (4) year curriculum.

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING
Engineering Building I, Room 3002
phone: (919) 515-2377
website: www.mse.ncsu.edu

J. Schwartz, Head
D.W. Brenner, Associate Head
R.O. Scattergood, Director of Graduate Programs
C.M. Balik, Director of Undergraduate Programs


The Department of Materials Science and Engineering offers programs to qualify graduates for positions in industry, R & D laboratories, educational institutions and governmental agencies. This basic education involves design, development selection and processing of engineered materials. Industries served by graduates in materials science and engineering are aerospace, automotive, chemical and chemical processing, communications, electronics, energy production, manufacturing, nuclear and transportation. This program has been accredited by the Engineering Accreditation Commission of ABET, Inc.
Program Educational Objectives

The MSE program at NCSU prepares their B.S. graduates to achieve the following career and professional goals:

1. Apply their basic MSE knowledge and skills to problems and challenges encountered in their professional careers.
2. Use modern analytical equipment and methods as needed for materials testing, design, processing, development and research.
3. Communicate well, orally and in writing, interact professionally and work effectively on multidisciplinary teams to achieve design and project objectives.
4. Engage in lifelong learning in their profession and practice professional and ethical responsibility.

Opportunities

The continuing industrial and technological growth of the United States, the southeast region, and the state of North Carolina has been marked by a particularly strong and increasing demand for materials engineers and scientists. Modern technological advances require new materials and novel processing and/or fabrication methods. At the national level, materials research is prominently mentioned in most lists of critical or enabling technologies. As our understanding of materials science advances, common features and elements tend to unite many different industries. As an example, consider that our current knowledge of silicon is necessary in the electronics, photovoltaics, optical fiber technologies, lasers, pollution control, and biomedical industries. Advanced understanding of polymers also crosses and unites several different industries such as plastics, textiles, electronics, biomaterials and recycling.

Education in materials science and engineering provides career opportunities in a wide range of industries from those that produce and/or use metals, glass, polymers, or ceramics, to those which use such materials in an integrated fashion such as the microelectronics industry. These opportunities include careers in research and development of new materials, new processes for producing them, failure analysis, product design and reliability, and technical management at all levels of business. The importance and growth potential of the materials science and engineering discipline is reflected by a recent U.S. Department of Labor study which predicts that over the next decade the demand for materials engineers and scientists will exceed that of any other engineering discipline.

Curricula

The materials scientist and engineer must understand the wide range of phenomena that occur in all classes of materials: metals, polymers, composites, and electronic materials. The MSE undergraduate curriculum achieves this by integrating concepts common to all classes of materials into each course as much as possible. This approach differs from traditional MSE curricula in which separate courses are devoted to metals, ceramics, polymers and electronic materials. The integrated approach provides students with a better understanding of the differences between the various classes of materials by comparing them in each course. Students are then better prepared to design and select the right material for various applications.

The MSE curriculum includes fundamental courses in thermodynamics, kinetics and structure, followed by more applied courses that cover mechanical, thermal, electrical, magnetic and optical properties of materials. Two intensive laboratory courses introduce students to analytical methods used to characterize the structure of materials at all length scales and to measure properties of all classes of materials. Cutting-edge technologies in materials science and engineering such as nanotechnology, biomaterials, computer modeling and forensics (materials degradation and failure analysis) are covered. Five technical electives are included which allow students to select from a broad range of courses in materials processing, engineering, chemistry, physics, mathematics and other disciplines. The flexibility afforded by these technical electives allows students to customize their education to prepare them for careers in industry or for graduate school.

The required two-semester capstone senior design sequence provides a bridge between concepts learned in the classroom and practical application of these concepts in an industrial setting. The fall semester course involves open-ended classroom exercises, design methodologies, critical thinking skills, group dynamics, team formation and preparation of team project proposals. In the spring semester course, teams of students work on real-world material problems submitted by the industrial sponsors. The remaining required courses in the MSE curriculum are distributed among mathematics, physical sciences, and the humanities and social sciences.

The materials science and engineering program, which is accredited by the Engineering Accreditation Commission of ABET, Inc., leads to the degree Bachelor of Science in Materials Science and Engineering. An accelerated 5-year BS/MS program is available for advanced study and further specialization. Graduate degrees are also offered (consult the Graduate Catalog): www.ncsu.edu/grad/catalog

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Materials Science and Engineering

The Materials Science and Engineering minor is designed to provide undergraduate engineering and science majors in curricula other than MSE with the fundamentals of modern materials science and engineering. Students may select between two tracks in the MSE minor. One track focuses on inorganic materials and requires 17 hours of MSE courses. A cumulative GPA of 2.0 or higher is required in the minor courses. Further information regarding a Minor in Materials Science and Engineering is available from the MSE Director of Undergraduate Programs.
Aerospace engineering applies science and engineering principles to design, development, manufacture, and operation of aerospace systems and vehicles. The aerospace vehicles include aircraft such as low-speed propellor-powered aircraft, remotely piloted vehicles, micro air vehicles, hovercraft, and helicopters, and they include spacecraft such as rockets, space stations, and planetary rovers. Aerospace engineering not only involves design, development, manufacture, and operation but also considers environmental, economical, ethical, and social issues.

The undergraduate curriculum provides the student with knowledge of aerodynamics, aerospace materials, structures, propulsion, flight mechanics, and vehicle stability and control plus knowledge of selected topics in orbital mechanics, space environment, attitude determination and control, telecommunications, space structures, and rocket propulsion. The program educates students to define, formulate, and solve aerospace engineering problems, to function in multi-disciplinary teams, and to communicate effectively.

In addition to taking strong foundational courses, aerospace engineering students gain experience with low-speed and high-speed wind tunnels and structural and material facilities for testing prototype models. A prominent feature of the program is the year-long senior design experience in which students choose from three possibilities: (1) design, construct, and flight-test a fly-by-wire aircraft; a unique 25-year tradition of the aerospace engineering program (2) design a prototype spacecraft, like a satellite or a planetary rover, or (3) design a prototype research fly-by-wire aircraft whose design is inspired by features of flight found in nature (like birds and flying insects).

Aerospace engineering undergraduates are employed by the aerospace industries and other industries with similar technical problems. Many of our students enter graduate school after which they are employed by these same industries and by government laboratories such as NASA, NAVAIR, and the Air Force.

Mechanical engineering applies mechanical, thermal, and fluid principles to research, design, development, testing, manufacture, and operation of products and systems. Mechanical engineering is the broadest of the engineering programs, providing a technological foundation that serves societal needs in energy, health, safety, and all walks of life. Mechanical engineers solve problems dealing with energy and environmental systems (alternative fuels, renewable technologies), advanced materials and manufacturing (precision metrology, smart materials, and auto-adaptive materials), robotics and sensor technologies (opto-mechanical systems, MEMS, power supply harvesting, human centric and bio-inspired intelligent systems), manipulation, dynamics of nano-mechanical systems, micro-particle transport), and transportation (automotive, high speed rail).

In addition to taking strong foundational courses, mechanical engineering students gain experience in experimental laboratories for measurement and data analysis, performance evaluation of thermal systems, and testing and analysis of mechanical components. The
senior design experience is a distinctive joint departmental-industry effort in which students solve industrial problems by designing, building, and testing prototype machines with the support of facilities for machining and electronics. Many of the students are involved in the department’s student clubs, such as its Mini-Baja Formula and SAE car clubs that compete nationally and regularly place in the top 10.

Because of discipline’s wide breadth, mechanical engineering students have a wide variety of employment opportunities. Undergraduate students enter engineering fields that deal with, to varying levels, design, development, manufacturing, plant operation, testing and experimentation, consulting, sales and service. The employers come from industry, government and service organizations. Many of the undergraduate students go on to graduate school to pursue advanced degrees in engineering, science or business, as well as professional degree programs such as medicine, accounting and law.

Program Educational Objectives

The Aerospace Engineering program is preparing its graduates for:

1. **Engineering problem solving** using engineering analysis, experimentation, client/customer needs, and creativity based on sound mathematical and scientific principles.
2. **Aircraft and space systems design, analysis & manufacturing** requiring knowledge of the discipline, multidisciplinary teamwork, good communication skills and an understanding of the importance of cost and time management.
3. **Productive engineering practice, entrepreneurial behavior, research and leadership or management** within the public, private or academic sectors by using the technical, professional, ethical and societal knowledge, skills and attitudes required for success in the complex modern world.
4. **Continuing to learn formally and informally**, applying lessons learned to new situations and teaching & mentoring of others in the workplace.

The Mechanical Engineering program is preparing its graduates for:

1. **Engineering problem solving** using engineering analysis, experimentation, client/customer needs, and creativity based on sound mathematical and scientific principles.
2. **Mechanical and thermal systems design, analysis & manufacturing** requiring knowledge of the discipline, multidisciplinary teamwork, good communication skills and an understanding of the importance of cost and time management.
3. **Productive engineering practice, entrepreneurial behavior, research and leadership or management** within the public, private or academic sectors by using the technical, professional, ethical and societal knowledge, skills and attitudes required for success in the complex modern world.
4. **Continuing to learn formally and informally**, applying lessons learned to new situations and teaching & mentoring of others in the workplace.

Honors Program in Mechanical and Aerospace Engineering

Students enter the mechanical and aerospace honors program by invitation. Students in these programs participate in special educational experiences involving deeper investigations into subjects and research projects.

DEPARTMENT OF NUCLEAR ENGINEERING

Burlington Engineering Laboratories, Room 1110
phone: (919) 515-2301
website: www.nc.unc.edu

Y.Y. Azmy, Head
J.M. Doster, Undergraduate Administrator
K.L. Murty, Director of Graduate Programs

Alumni Distinguished Undergraduate Professor: Associate Professor J.M. Doster; Alumni Distinguished Graduate Professors: Professors M.A. Bourham and R.P. Gardner; Professors: D.G. Cacuci, J.G. Gilligan, K.L. Murty and P.J. Turinsky; Research Professor: B.W. Wehring; Professors Emeriti: D.J. Dudziak, T.S. Elleman, R.L. Murray, K. Verghese; Adjunct Professors: R.M. Lindstrom, D. McNelis, A. Sood, B. Wieland, M.S. Wechsler; Associate Professor and Director of Nuclear Reactor Programs: A.I. Hawari; Associate Professor: D. Anistratov, S.C. Shannon, and M.S. Yim; Assistant Professors: H.S. Abdel-Khalik and J. Eapen; Health Physicist: G.D. Wicks; Nuclear Services Manager: S. Lassell; Manager of Reactor and Engineering Operations: A. Cook; Director of Outreach Programs: L.M. Marshall

Nuclear engineering is concerned with the engineering aspects of the control, release, and utilization of nuclear energy from both fission and fusion nuclear reactors. Nuclear reactors serve many functions: they serve as heat sources for electric power plants and are used in the production of radioactive isotopes for a variety of peaceful applications. Nuclear methods are applied in medical diagnosis and treatment, scientific research, and the search for new resources. The nuclear engineering program educates individuals in scientific and engineering principles essential for effective and productive contributions in industrial, university and government service. The Department of Nuclear Engineering maintains its national undergraduate and graduate rankings in the top 10 among all nuclear engineering programs.
Opportunities

Nuclear power reactor operation continues with over one hundred reactors operating in the nation, increasing our reliance upon nuclear energy as a substitute for energy from fossil fuels. Development of advanced fission and fusion reactors offers the potential of vast new energy sources. Industrial and medical applications of radiation continue to increase in diverse industries. Demand for nuclear engineers is on the rise within the electric power industry and national laboratories, naval reactors, and other industries. According to the National Society of Professional Engineers, nuclear engineers are among the top four best compensated of the engineering disciplines.

Scholarships and Awards

Several special scholarships exist for NC State nuclear engineering students, including the Progress Energy, Duke Energy, Eastern Carolinas ANS, Institute for Nuclear Power Operations, and American Nuclear Society scholarships. A special department fund supports scholarships for incoming freshmen and exceptional upperclassmen. NC State nuclear engineering students have received special recognition awards at the Undergraduate Research Symposium and have gained national recognition by several times receiving the Student Design Award of the American Nuclear Society. NC State nuclear engineering students are also frequent recipients of nationally awarded fellowships.

Facilities

Facilities for nuclear education include a nuclear research reactor (PULSTAR), which can be operated at a steady state power of 1 MW; radiation detectors and multi-channel analyzers; nuclear materials laboratory; thermal hydraulic laboratory; prompt gamma facility; neutron activation analysis laboratory; radio-chemistry laboratories; neutron radiography unit; positron facility; ultra cold neutron source; neutron diffractometer; numerous computer facilities including graphic terminals, departmental computer workstations, College of Engineering Eos engineering workstations, microcomputers; and reactor simulation laboratory, plasma generation and diagnostics laboratory, atmospheric plasma science laboratory, and plasma launchers laboratory.

Mission

The Department of Nuclear Engineering has four primary missions:

1. Provide a quality education at both the undergraduate and graduate levels to students who desire to pursue careers in nuclear science and engineering;
2. Develop research programs in areas of emphasis related to applications of nuclear science and engineering;
3. Assist industries and government in North Carolina, nationally and internationally in their efforts to apply these nuclear technologies to the betterment of the economy and the environment - in a safe, effective, and innovative manner; and
4. Enhance, promote, and utilize the PULSTAR research reactor and associated facilities in an exemplary manner, leading to national recognition as a premier 1 MW Nuclear Reactor Program dedicated to research, teaching, and extension.

Program Educational Objectives

Consistent with the Department of Nuclear Engineering’s mission, the department has developed the following objectives for undergraduate education.

The Nuclear Engineering program is preparing its graduates for:

1. solving nuclear engineering problems, and applying the creative process of nuclear engineering design,
2. performing nuclear engineering tasks with understanding of the professional and ethical responsibility and accountability for the social and environmental impact of nuclear engineering practices,
3. participating in cross disciplinary projects.
4. applying written and oral communication skills necessary to communicate effectively with a variety of audiences,
5. applying advances in nuclear engineering practice and research
6. continuing to learn and being successful in pursuing graduate and professional education opportunities that are available.

Curriculum

Nuclear engineers work in nuclear systems research, design, development, testing, operation, environmental protection, and marketing. The Bachelor of Science program prepares graduates for positions in industry, national laboratories, or for graduate study (consult the Graduate Catalog). The curriculum incorporates basic sciences and engineering, with emphasis on mathematics and physics, followed by course work in nuclear science and technology. Design concepts are introduced in numerous nuclear engineering courses throughout the curriculum to provide an integrated educational experience, capstoned by senior nuclear projects involving reactors and radiation systems. Attention is also given to the efficient utilization of energy resources and to the environmental aspects of nuclear energy. Computers are widely used throughout the curriculum.

The nuclear engineering program, which is accredited by the Engineering Accreditation Commission of ABET, Inc. leads to the degree of Bachelor of Science in Nuclear Engineering. Advanced undergraduates who desire to attend graduate school at NC State and specialize in the areas of Fission, Fusion/Plasma, or Radiological Engineering may enter a combined 5-year B.S./MNE professional program or B.S./M.S. bachelor/master degree program during their senior year which will culminate at the end of their
fifth year with both the Bachelor of Science in Nuclear Engineering and the Master of Nuclear Engineering or the Master of Science degrees, respectively.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

PAPER SCIENCE AND ENGINEERING PROGRAM
Biltmore Hall, Room 2105
phone: (919) 515-2888

S. S. Kelley, Head
R. A. Venditti, Director of Graduate Programs
M. V. Byrd, Director of Undergraduate Programs


The wood-based industry of North Carolina, as well as throughout the South, is a vital part of the nation’s economy. In terms of the dollar value of shipments of wood and paper products, the South leads all regions of the country. North Carolina manufactures more wood household furniture than any other state, ranks third in shipment value for all wood and paper products, and is second in the number of employees and wages paid. Thus, many opportunities exist in North Carolina and other southern states for careers in the wood-based industry.

The Department of Wood and Paper Science offers two curricula leading to Bachelor of Science degrees: Paper Science and Engineering, and Wood Products. Both curricula prepare men and women for careers in the wood, paper, and allied industries or in government agencies connected with wood resources.

Curricula in Paper Science and Engineering

M. V. Byrd, Director of Undergraduate Programs

The Paper Science and Engineering curriculum prepares students for careers in the paper industry, which ranks as the fifth-largest manufacturing industry in the United States. Science, engineering, and mathematics form the basis for a multidisciplinary approach to understanding the fundamental manufacturing principles involved. Students study the technology and engineering of wood pulping processes, chemical and by-product recovery systems, and pulp bleaching. In addition, various paper making operations, such as refining, sizing, coating, and drying are studied. These topics along with the chemistry of wood, pulping, and paper making, and the physics of paper as it relates to product characteristics and design form a fundamental core of courses that all students in the curriculum take.

Two concentrations are available emphasizing the different engineering aspects of pulping and paper making. The Paper Science and Engineering concentration provides an extensive background in the pulp and paper manufacturing processes and elective credit hours for studies in chemistry, marketing, economics, management or other areas of interest to the student. Greater depth in general chemical engineering principles can be obtained from the Chemical Engineering Concentration. Students who have completed the Chemical Engineering Concentration in Paper Science and Engineering can, in cooperation with the College of Engineering and with an additional semester of study, earn a Bachelor of Science in Chemical Engineering as a second degree.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Program Educational Objectives

The Paper Science and Engineering Program at NC State prepares its B.S. graduates for the following professional and career objectives:

1. They are effective engineers and leaders in the paper, chemical process and related industries, applying fundamental principles of science, mathematics, engineering, and economics to solve problems.
2. They communicate well in oral and written form, and they work well with other people in team situations.
3. They make decisions and develop solutions with consideration of the possible effects on others, on the environment, and on the world; they subscribe to established standards for safety and ethical behavior.
4. They are lifelong learners, seeking educational and developmental opportunities for their professional lives.
Opportunities

Graduates of this curriculum find opportunities for challenging careers as process engineers, product development engineers, process control engineers, chemists, technical service engineers, quality control supervisors, and production supervisors. Design and construction engineering companies employ graduates as project engineers, and pulp and paper machinery companies use their education and skills for technical service and sales positions. Opportunities for managerial and executive positions are available to graduates as they gain experience.

The broad and intensive nature of this curriculum makes graduates attractive not only to the pulp and paper industry, but also to a variety of other major chemical process industries. This appeal is especially true for the dual degree in Paper Science & Engineering and Chemical Engineering.

Summer Internship

All Paper Science and Engineering majors are required to work one summer in a pulp or paper manufacturing facility. One hour of academic credit is granted after completion of 12 weeks of this work and presentation of an engineering report of professional quality. In addition, students are urged to work in manufacturing facilities the other two summers, as the work provides valuable practical experience. Departmental advisers assist students in locating summer jobs, which are found throughout the US and abroad.

Many Paper Science & Engineering students work at least one co-op rotation, in which they leave school for one semester and work in the industry. The resulting experience adds significantly to a student’s desirability upon graduation.

Accredited Program

The Paper Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, Inc.

Regional Program

The Paper Science and Engineering curriculum is a regional program approved by the Southern Regional Education Board as the undergraduate program to serve the Southeast in this field.

Scholarships

Approximately 125 undergraduate academic scholarships are granted annually to new and continuing students by more than 50 companies comprising the Pulp and Paper Foundation.

Minor in Paper Science and Engineering

The Paper Science and Engineering Minor is available to all undergraduate students enrolled in the university as degree candidates except Paper Science and Engineering Majors. The minor requires 15 credit hours. Six hours of required courses provide a comprehensive overview of pulping and paper making science and technology, including pulping, bleaching, chemical recovery, recycled fibers, paper making, coating, printing, converting, and paper properties. Nine elective hours may be chosen from areas including wood chemistry, wet end chemistry, unit operations, process design and analysis, project management, paper physics, process control, or to gain more in depth exposure to the basic pulping, bleaching, and paper making process.

The Paper Science and Engineering Minor, with its focus on paper making science and technology, is intended to be especially valuable to students majoring in programs leading to careers in corporate or government positions which would interface with the paper and related industries. Students interested in business, scientific or engineering specialties, which may interface with, or are employed by these industries will find the minor especially useful.

Admissions and Certification of Minor

All undergraduate students enrolled in the university as a degree candidate, other than PSE majors, are eligible for admission to the PSE minor program. The PSE Minor Adviser will serve as adviser and certify completion of the minor. Paperwork for certification must be submitted to the minor adviser no later than the registration period for the student’s final semester at NC State. The minor must be completed no later than the semester in which the student expects to graduate form his or her degree program. Contact Person: Dr. Med Byrd, Minor Adviser, 2205 Biltmore Hall, (919) 515-5790.
TEXTILE ENGINEERING PROGRAM

Textile Building/Centennial Campus, Room 3250

J. P. Rust, Head, Department of Textile Engineering, Chemistry and Science
J. A. Joines, Associate Head, Director of Undergraduate Programs
P. J. Hauser, Associate Head, Director of Graduate Programs


The Textile Engineering (TE) Program at North Carolina State University is administered jointly by the College of Textiles and the College of Engineering and is an interdisciplinary curriculum drawing on diverse science and engineering principles. Textile engineering students develop a unique background, through undergraduate research, summer intern experiences, and design projects ranging from artificial blood vessel development to the design of novel high-tech sporting equipment. Textile engineers also design computer information systems that can integrate a worldwide distribution program eliminating a company’s reliance on regional stockpiles or streamline an industrial process using Six Sigma quality saving a company millions of dollars. The program offers small class sizes with personal attention from faculty. With the focus on interdisciplinary research, the opportunities for textile engineers have never been brighter.

Opportunities

Textile engineers, teaming with chemists, physicists, materials scientists, and other engineers are designing new polymers, fibers, and textile structures to revolutionize the future of materials. Whether it be for personal protective garments such as bullet proof vests and Gore-tex® or materials used in the next generation space shuttle and the stealth bomber, textile engineers are developing products that are stronger, lighter, and more durable than current materials. Textile engineers are employed in a wide variety of industries that include aerospace, automotive, chemical, composites, management consulting, fiber processing, medical devices, manufacturing and retail, and textile processing.

The TE Program provides a fundamental engineering degree with a working knowledge of the very large textile industry as well as its allied industries. We have our own career planning and placement center to assist students in identifying and selecting internships and permanent careers. Historically, TE graduates have had nearly 100% placement into graduate school or full time employment with starting salaries among the highest at N.C. State University. Compared to the rest of North Carolina State University, the College of Textiles has the highest percentage of students participating in scholarship programs. Indeed, over 50% of all Textile Engineering students receive scholarship support! Owing to the size of the program, many of our undergraduate students participate in research with our world renowned faculty further providing financial assistance as well as professional growth. Almost all of our textile engineering students participate in summer internships. Many of our graduates select jobs that are located in the Southeast, but others who desire to work in other regions of the country have opportunities to do so. Our graduates work in the biomedical industries on the east and west coasts and in Chicago, the automotive industry in Michigan, the aerospace industry in Texas, as well as large apparel and retail companies in Ohio and North Carolina.

Curriculum

The TE program has three concentrations allowing a customized curriculum that fits your specific educational goals. All three programs are accredited by the Engineering Accreditation Commission of ABET, Inc. The concentrations emphasize Information Systems Design, Chemical Processing and Product Engineering. Minors in associated engineering fields (e.g., Computer Science, Industrial Engineering, and Materials Science) as well as foreign language minors are strongly encouraged as part of the academic plan. For exceptional students, dual degree programs with Chemical and Biomolecular Engineering, Biomedical Engineering, and Materials Science and Engineering provide a bachelor degree in two engineering majors with one additional semester of course work.
Educational Objectives

The Textile Engineering Program of the Department of Textile Engineering, Chemistry and Science is committed to instill a strong academic program whereby graduates, within the first few years after graduation are prepared for the following accomplishments:

1. They will be able to define, analyze, and solve complex, real-world problems by utilizing the principles of mathematics and basic sciences integrated with statistical experimentation and engineering analysis.
2. They will possess an appreciation for commitment to being life-long learners by seeking educational and developmental opportunities in their personal and professional lives such as pursuing advanced degrees and professional licenses.
3. They will excel in careers in diverse fields in the public and private sectors, and across various industries within or outside the textile complex, including textiles and its ancillary industries.
4. They will demonstrate productive engineering practice, entrepreneurial behavior, research and leadership, or management within the public, private or academic sectors by using the technical professional, ethical and societal knowledge, skills and attitudes required for success in the complex modern world.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
COLLEGE OF
HUMANITIES AND
SOCIAL SCIENCES

106 Caldwell Hall
NCSU Box 8101
Raleigh, NC 27695-8101
phone: (919) 515-2468
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e-mail: questions@chass.ncsu.edu
website: www.chass.ncsu.edu

Jeffery Braden, Dean
Edward T. Funkhouser, Associate Dean for Academic Affairs
Vicki Gallagher, Associate Dean for Graduate Programs
Mary Wyer, Interim Associate Dean for Research
Karen Young, Interim Assistant Dean for Academic Affairs and Undergraduate Programs
Mary Wyer, Assistant Dean for Interdisciplinary Studies
Vacant, Assistant Dean, Finance and Administration
Traceiel Reid, Director of Diversity
Heidi Hobbs, Director, International Programs
Dara Leeder, Director, Student Recruitment and Retention
The College of Humanities and Social Sciences offers programs of study that lead to baccalaureate and advanced degrees in the disciplines of the humanities and social sciences. The college also offers courses in these disciplines that are required in all undergraduate programs. In this way the university provides its students the opportunity to prepare for a full life in the professions and occupations that require intellectual flexibility, broad knowledge, and a basic comprehension of human beings and their problems.

CHASS is comprised of nine departments or schools: Communication, English, Foreign Languages and Literatures, History, Philosophy and Religion, School of Public and International Affairs, Psychology, Social Work, and Sociology and Anthropology (also a department in the College of Agriculture and Life Sciences). Interdisciplinary programs are administered through Academic Affairs in the CHASS Dean’s Office.

The college offers undergraduate majors in: Africana studies; Anthropology; Arts Applications; Communication; Criminology; English; French; German Studies; History; Interdisciplinary Studies; International Studies; Philosophy; Political Science; Psychology; Religious Studies; Science, Technology and Society; Social Work; Sociology; Spanish; and Women’s and Gender Studies. In addition, special options or concentrations are available within some of the major programs:

### Anthropology
- Applied Anthropology
- Bioarchaeology

### Communication
- Communication Media
- Public & Interpersonal Communication
- Public Relations

### English
- Creative Writing
- Film
- Language & Literature
- Language, Writing and Rhetoric
- Teacher Education
- World Literature

### Philosophy
- Logic, Representation & Reasoning
- Philosophy of Ethics
- Philosophy of Law

A Teacher Education Option is available in English, French, Spanish, and social studies (history and political science). Degrees granted include the Bachelor of Arts, Bachelor of Science, Bachelor of Social Work, Master of Arts, Master of Fine Arts, Master of Science, and Doctor of Philosophy, as well as professional degrees in political science and sociology.

### Academic Minors
The College of Humanities and Social Sciences offers 40 minors:

- Africana Studies
- American Literature
- Anthropology
- Arts Studies
- Chinese Studies
- Classical Greek
- Classical Studies
- Cognitive Science
- Creative Writing
- Criminology
- English
- Film Studies
- French
- German
- Health, Medicine & Human Values
- Hindi-Urdu
- History
- International Studies
- Italian Studies
- Japan Studies
- Japanese
- Journalism
- Law and Justice
- Linguistics
- Music
- Nonprofit Studies
- Philosophy
- Political Science
- Psychology
- Religious Studies
- Russian Studies
- Social Work
- Sociology
- Spanish
- Technical and Scientific Communication
- Theatre
- Women’s and Gender Studies
- World Literature
Dual Degree Programs

DaVinci Scholars Program
The DaVinci Scholars Program is a joint program between the College of Humanities and Social Sciences and the College of Design. Students completing the DaVinci Scholars program will earn two degrees within five or six years: a bachelor’s degree in one of the five undergraduate disciplines in the College of Design and a B.A. or B.S. degree in the College of Humanities and Social Sciences. DaVinci Scholars will earn their first degree in design with no adjustment in their design requirements. They will elect a second major from any of those available in the College of Humanities and Social Sciences, including interdisciplinary studies. They must meet all requirements for both degrees.

The primary purpose of the dual degree program is to provide students with a strong liberal education as a complement to their professional degree study. In some cases, however, students will also improve their employment opportunities by selecting study that directly supports their profession in design. For example, students majoring in graphic design who take a second degree that focuses on writing improve their opportunities for employment in communications. A student in architecture with a second degree in history may improve opportunities for graduate study in architectural history, preservation, or urban planning. Study of foreign language may improve opportunities for international design practice.

Students who wish to participate in the DaVinci Scholars should apply to the Associate Dean of the College of Design at the beginning of their second semester of study in the College of Design. DaVinci Scholars will participate in special programs and meet as a group for regular discussions and advising. Interdisciplinary seminars led by College of Design and College of Humanities and Social Sciences faculty will focus on issues relevant to the nature of the disciplines. Other programs may include lectures and field trips. Scholarship funding is available for art-related summer study abroad. Depending on the availability of funds, scholars, may receive scholarships toward participation in the program.

Benjamin Franklin Scholars Program
A limited number of freshmen in the College of Engineering are selected to participate in the Benjamin Franklin Scholars program. Students completing the program receive a Bachelor of Science degree in an engineering discipline or computer science and a bachelor’s degree in humanities or social sciences.

This dual degree program, a joint undertaking of the College of Engineering and the College of Humanities and Social Sciences, provides a unique opportunity to integrate a solid base of knowledge in technology or science with a broad humanistic and social perspective. The curriculum for the dual degree program has four main components: a strong general education, specially designed interdisciplinary courses, all technical course requirements associated with the engineering or computer science degree, and a second major in the humanities and social sciences chosen from among the traditional majors or an interdisciplinary major. Students who have matriculated in the College of Engineering and declared a major in the College of Humanities and Social Sciences and have at least a 3.0 GPA are generally eligible for scholarships from the program. With careful planning, this program can be completed in five years.

For more information, contact the Assistant Dean for Academic Affairs, College of Engineering, 118 Page Hall, or the Interdisciplinary Studies office of the College of Humanities and Social Sciences, 106C 1911 Bldg., or visit Franklin Scholars Program homepage at http://ids.chass.ncsu.edu/bfs.

Alexander Hamilton Scholars Program
The Alexander Hamilton Scholars Program permits students to earn a B.A. in International Studies and a B.S. in Business Management, or a B.A. in Economics.

Key elements of the Alexander Hamilton Program include at least three semesters of foreign language study beyond the level required for admission to the university, a management capstone course (business policy and strategy or economics seminar) with a strong global orientation, and several additional courses on topics such as international relations, global affairs, and intercultural communication. Each Hamilton scholar is required to complete at least one international field experience.

Hamilton scholars will participate in special programs throughout their enrollment that are designed to increase their exposure to leading-edge management practices, international business, and foreign cultures. These programs will include activities such as special lectures and seminars, corporate tours and field trips, and scholar’s banquets. For additional information about the Alexander Hamilton Scholars Program, contact the Associate Dean for Academic Affairs, College of Management, 112 Nelson Hall, or Dr. Helga Braunbeck, International Studies, College of Humanities and Social Sciences, 301 Withers Hall. Visit the Hamilton Scholars Homepage at www.mgt.ncsu.edu/undergraduate/current/Hamilton_Scholars.

Jefferson Scholars in Agriculture and the Humanities
The Thomas Jefferson Scholars Program in Agriculture and the Humanities is a joint program of the College of Agriculture and Life Sciences and the College of Humanities and Social Sciences. It is a program that leads participants to two degrees: one concentrating in an area of agriculture or life science and one in an area of humanities or social science. All majors in each college are available, to meet each student’s particular interests and career goals. The purpose of the program is to produce potential leaders in agriculture and the life sciences who have not only technical expertise but also an appreciation for the social, political, and cultural issues that affect decision-making. The program includes special classes for Jefferson Scholars and a variety of social and service activities. Each spring a number of entering freshmen are chosen to participate in the Jefferson Program. Successful participants receive scholarship support after the sophomore year.
College of Humanities and Social Sciences

Rising freshmen interested in applying to the Jefferson Scholars Program should contact either of the following people before January 15. An online application is available. Visit the Jefferson Scholars website for details at www.cals.ncsu.edu/student_orgs/jeffer.

Dr. Kenneth L. Esbenshade, Associate Dean, College of Agriculture and Life Sciences, NCSU Box 7642, Raleigh, NC 27695, phone: (919) 515-6964

Dr. William Kimler, History, College of Humanities and Social Sciences, NCSU Box 8108, Raleigh, NC 27695, phone: (919) 513-2238

Gifford Pinchot Scholars Program
The Gifford Pinchot Scholars Program, a joint program with the College of Natural Resources, follows the mode established by other dual degree programs. Academically talented students are invited to pursue simultaneously a B.S. degree in Forest Management through the College of Natural Resources and a B.A. degree in a major in Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number (10 or fewer per year) of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program.

Pinchot Scholars follow the requirements for the B.S. in Forest Management (with one exception: the physics sequence PY 211-212 is not required.) For the B.A. degree, they follow a 30-hour major concentration in interdisciplinary studies. Included in this major are two core requirements: IDS 498 Senior Thesis (3 credits) and an additional interdisciplinary studies seminar (1 credit). In addition, Pinchot Scholars complete all the general education requirements for a B.A. degree in the College of Humanities and Social Sciences. A total of 155 credit hours are required for the double degree, which students can complete in four and a half years.

The theme of the interdisciplinary studies major will involve placing forest management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by students in consultation with their advisory group, subject to the approval of the Interdisciplinary Studies Committee. Each student is assigned an advisory group consisting of an academic adviser from each college, plus a mentor from the forest industry. Pinchot Scholars also participate in existing cooperative activities with other dual degree program scholars. For more information, contact the Associate Dean for Academic Affairs, College of Natural Resources, 1022-N Biltmore, Box 8001, or the Assistant Dean for Undergraduate Academic Affairs, College of Humanities and Social Sciences, 106 Caldwell, Box 8101.

Cooperative Education
Cooperative Education in humanities and social sciences seeks to broaden the student’s intellectual horizons and at the same time to provide an introduction to the world of business, industry, government, or finance in preparation for a career after graduation. In this program, the freshman and senior years are usually spent on campus while the sophomore and junior years are devoted either to alternate periods of on-campus study and full-time work experience or part-time work and study on a continuous basis. The student is paid for work experiences by the employer. Ordinarily the program takes five years to complete, but those who are willing to attend summer school or take on a summer co-op assignment can finish in four years. Transfer students are eligible, and all interested students are urged to apply early in the academic year. The program is also open to graduate students although less time is required on work assignments.

Further information may be obtained from Cooperative Education, 300 Clark Hall, or at (919) 515-2300.

Honors Program
Each department in the college offers an honors program designed to encourage outstanding students to develop their intellectual potential to the fullest extent possible through individualized study, special seminars, and close association with faculty members in their major field.

Scholarships
In addition to the university-wide awards available, the College of Humanities and Social Sciences offers a number of merit and need-based scholarships. For further information contact Dara Leeder, Director of Student Recruitment and Retention, College of Humanities and Social Sciences, (919) 515-3638.

Folger Institute
North Carolina State University is a member of the Folger Institute of Renaissance and Eighteenth-Century Studies, a unique collaborative enterprise sponsored by the Folger Shakespeare Library in Washington, D.C., and 20 universities in the Middle Atlantic region. Each year the institute offers an interdisciplinary program in the humanities—seminars, workshops, symposia, colloquia, and lectures. Admission is open to faculty and students of North Carolina State University, and a limited number of fellowships are available through the campus Folger Institute Committee.

Evening Undergraduate Degree Programs
The College of Humanities and Social Sciences offers courses toward undergraduate degree programs during the evening hours for adult part-time students. Sufficient courses are generally offered in the evening hours to complete majors in English, history, political science, and sociology.
Africana Studies Program

Core Faculty:
Dr. Craig C. Brookins, Associate Professor, Director
Dr. Deidre H. Crumbley, Associate Professor
Dr. Fred Hord, Professor (Director, African American Cultural Center)
Dr. John C. Charles, Assistant Professor, English
Dr. Lamont Welch, English

Bachelor of Arts in Africana Studies

The Africana Studies curriculum is designed to give students an integrated and critical understanding of the experiences, contributions, and achievements of peoples of African descent throughout the world. The core courses emphasize conceptual and methodological issues within Africana Studies. Students are taught academic skills and encouraged to conduct critical research and analyses designed to understand the relationships between and solutions to the political, social, cultural, and economic developments in Africa and the African Diaspora. The overall goal of the Africana Studies program is to provide students with competencies to succeed as citizens, workers, and leaders of the global community.

For more information, see the program website at www.chass.ncsu.edu/ids/afs/index.html.

Minor in Africana Studies

The minor in Africana Studies provides a comparative and interdisciplinary study of the Black experience in Africa and the Americas. Three required courses include African Civilizations (AFS 240), an Introduction to African-American Studies (AFS 241), and Introduction to the African Diaspora (AFS 342). Two elective courses may be selected from a list of designated courses in such disciplines as anthropology, English, history, music, political science, psychology, sociology, and social work. Study Abroad (e.g., Africa, Caribbean) and service learning opportunities are also available.

Arts Studies Program

Core faculty:
Dr. Stephanie Spencer, Associate Professor, Director
Dr. Rodney A. Waschka, Professor

Bachelor of Arts in Arts Applications

The Arts Applications major offers four areas of specialization within a curriculum that focuses on the history, interpretation, and production of the visual and performing arts in aesthetic and cultural context. Students pursue the academic study of film, music, theater, or visual art. Within each specialization, they have opportunities to focus on the specific subject area and to develop connections between and among diverse art forms and practices, historical periods, and cultures.

Students take 21 hours in foundation courses (15 hours in history and analysis and 6 hours in production or studio courses), 6 hours in linking courses (courses that examine the relationship between art and other areas of inquiry in the humanities, social sciences, and sciences), a 3 hour capstone course, and an advised elective designed support their particular interests and career objectives. To enroll, students apply at the CHASS Dean’s Office, 106 Caldwell Hall.

Minor in Arts Studies

The Minor in Arts Studies is open to all undergraduate majors in the university. This interdisciplinary minor is designed to enrich the student’s university experience, to serve as a foundation for learning and understanding the arts beyond the university years, and to stimulate intellectual development in ways that may reinforce or complement the objectives of the student’s major. This minor provides the student with a fundamental understanding of the historical, theoretical, and practical disciplines of the arts.

A total of eighteen credit hours must be taken to complete this minor. Students interested in the minor should refer to the Arts Studies courses listed under “Arts Studies” in the course description section of this catalog. These courses are described in detail under their departmental prefixes.
College of Humanities and Social Sciences

Minor in Film Studies
Dr. Marsha Orgeron, Assistant Professor, Director

The Departments of English, Communication, and Foreign Languages and Literatures offer a Minor in Film Studies. The minor provides an introduction to the nature of the film experience, some background in the history of the medium, and the opportunity for in-depth study of selected topics. Fifteen hours of course work are required to complete the minor: ENG 282 and either COM 364 or COM 374, plus nine credit hours selected from the following: ENG 382, ENG 492, COM 244, COM 364 or 374 (whichever course was not taken to fulfill the requirement above), IDS 496, HI 336, and DN 316 (prerequisite waived, consent of instructor). Any students taking this minor cannot count courses from the minor toward their majors.

International Studies Program
Dr. Norma Haenn, Associate Professor

Bachelor of Arts in International Studies
The Bachelor of Arts in International Studies is designed to educate students within a global context. The program of study requires students to integrate theoretical knowledge about broad global processes and methods used to study them with in-depth examination of a particular world region or major theme in international studies. The curriculum is designed to expose students to a variety of disciplinary approaches. It prepares students to pursue advanced studies in diverse academic fields, and for careers in global corporations, international organizations, and in the government or non-profit sectors. For more information, see the International Studies Program website at www.chass.ncsu.edu/is/.

Minor in International Studies
The International Studies Minor is offered to all students in the university who want to add a significant international dimension to their departmental majors. This minor program enables students to explore international topics, issues and research from cross-cultural, transnational perspectives. The program will provide some tools that students can use to understand better the global context of the modern world and to learn the international dimensions of their chosen fields of study.

Nonprofit Studies Program

Minor in Nonprofit Studies
The interdisciplinary minor in Nonprofit Studies is designed to prepare undergraduate students for careers in the nonprofit sector, in both paid and volunteer positions. The program provides students with an understanding of the role of the nonprofit sector in society and builds students’ knowledge, skills and abilities in effective nonprofit leadership. Through multiple service-learning experiences and a nonprofit internship requirement, students are offered a variety of hands-on experiences designed to facilitate an understanding of the issues and challenges faced by nonprofit organizations and prepare students for nonprofit leadership positions in the 21st century. The minor in Nonprofit Studies is a strong complementary course of study for students with majors offered across the NC State campus including Communication, English, History, Political Science, Psychology, Social Work, Parks, Recreation and Tourism, Forestry, Business Management, Art and Design, Education, and more. The minor in Nonprofit Studies enables students to explore the interconnections between their chosen field and the nonprofit sector.

Science, Technology, and Society Program
Dr. Patrick W. Hamlett, Associate Professor

Science, Technology, and Society (STS) is an interdisciplinary field of study that seeks to explore and understand how science and technology shape culture, values, and institutions, and how such factors shape science and technology. Science and technology are closely linked to economics and commerce, politics and international relations, energy and the environment, health and medicine, and other crucial areas. Further, the STS program studies basic questions of equity, justice, and sustainability. With these connections in mind, STS examines how science and technology emerge, how they engage with society, how they change through social processes, and how society changes under their influence. For more information visit the STS Program website at http://ids.chass.ncsu.edu/sts.

Bachelor of Arts and Bachelor of Science in Science, Technology, and Society
The B.A. and B.S. majors in STS, include 30 credit hours of course work in the major: STS 214 - Introduction to STS; STS 403 - Seminar in STS; a four-course breadth requirement consisting of courses chosen from: I-History, II-Philosophy of Science and Ethics, III-Assessment and Policy, and IV-Other STS Courses; and a four-course STS Specialty that addresses a coherent theme related to science, technology, and society. For more information, visit the STS Program website at www.chass.ncsu.edu/ids/sts.

Minor in Science, Technology, and Society
The Minor in Science, Technology, and Society is a fifteen-hour, interdisciplinary minor providing students an opportunity to appreciate and understand better the roles that science and technology play in the larger sociocultural context. A goal of the minor is to help students develop the ability to order and integrate the diverse aspects of their educations. Two essential components of this ability are sensitivity to the moral dimensions of scientific and technological inquiry as affecting how people may live or want to live
and an appreciation of the practical implications of scientific and technical theory. In addition, the Minor in Science, Technology, and Society enables students to increase the breadth of their interests in science and technology.

**Honors in Science, Technology, and Society**

The Honors Program in STS offers an enriching and challenging educational experience to qualified majors. Admission to the program requires at least a 3.25 overall GPA and 3.25 major GPA, including STS 214 - Introduction to STS and at least 6 other hours of course work in the major requirements. Honors students must complete the Honors Option in STS 403 - Seminar in STS with a course grade of B+ or better; three hours of course work in the major requirements taken from among graduate courses and independent study courses; and three additional hours of course work in the major requirements taken from among honors courses, honors option courses, graduate courses, and independent study courses. Graduation requires a 3.25 GPA overall and a 3.40 GPA in the major. Successful completion of the program is noted on the student’s transcript and in the commencement and honors convocation programs.

**Bachelor of Arts and Bachelor of Science in the Interdisciplinary Self-Design Major**

The Interdisciplinary Studies Self-Design major allows students to design their own academic majors. Instead of following the requirements for a major in one of the traditional disciplines, the candidate for the Bachelor of Arts or Bachelor of Science degree has the responsibility of organizing a concentration or field of specialization from two or more disciplines.

The freshman and sophomore basic requirements for the self-design major are the same as for the other Bachelor of Arts and Bachelor of Science programs in humanities and social sciences. In satisfying basic requirements in language, humanities, social science, mathematics, and natural science, students should, whenever possible, choose courses that are most appropriate as background for the courses in their major concentrations.

To become candidates for a self-design major in interdisciplinary studies, students must first get application forms and information from the CHASS website and then prepare a tentative proposal, which includes a list of courses totaling 30 credit hours for the B.A. and 27 credit hours for the B.S. and an essay of 500 words explaining the reasons for making this set of courses the field of specialization. Full application guidelines are on the website. The student’s proposal is reviewed by a faculty adviser or the director and submitted to the Self-Design Committee for consideration. After a thorough examination to determine whether the set of courses proposed as an interdisciplinary major is academically sound and coherent, the committee will approve the proposal or suggest specific improvements. To apply, contact Dr. Robert C. Kochersberger, Associate Professor, Director, 107 Tompkins Hall (919) 515-4159.

**Honors Program**

The Honors Program in Interdisciplinary Studies provides able students the opportunity to integrate the various strands of their concentrations in a capstone project. The program also provides a context in which students can sharpen their thinking on the unique challenges and opportunities of interdisciplinary work.

To be admitted into the IDS Honors Program, students must have earned nine credit hours in an IDS major, have an overall GPA of 3.25 and a major GPA of 3.25. To graduate with Honors in IDS, students must have a GPA of 3.25, and must have completed the IDS capstone course, “Independent Studies for IDS Students” with a grade of B+ or better, and have earned six additional credit hours in courses that are both Honors courses and also part of their IDS majors.

**Women’s and Gender Studies Program**

Core Faculty:
Dr. Christine Pierce, Director
Dr. Karey Harwood, Assistant Professor
Dr. Mary Wyer, Associate Professor

**Bachelor of Arts in Women’s and Gender Studies**

The Women’s and Gender Studies major provides students with a broad perspective on women’s and gender issues from a wide variety of disciplines, leads students to critically examine and reinterpret existing data and common assumptions about gender and gender identity, familiarizes students with the often unacknowledged contributions made by women in various fields of endeavor, and encourages the translation of research into committed and responsible social involvement and leadership. For more information about the Women’s and Gender Studies Program, please visit www.ncsu.edu/chass/wgs.
College of Humanities and Social Sciences

Minor in Women’s and Gender Studies
The Women’s and Gender Studies Minor offers all students in the university the possibility of rigorous interdisciplinary study of women’s and gender issues. Course offerings across the campus give students the opportunity to understand the complex relationships between gender, class, ethnic, and race structures; to understand feminist theory and methodological perspectives and their substantial contributions to social and public policy analysis; to develop the ability to reach out to community and non-profit organizations concerned with social equality; and to develop international understandings and perspectives.

DEPARTMENT OF COMMUNICATION
Winston Hall, Room 201
phone: (919) 515-9736

K. Zagacki, Head
J. Jameson, Associate Head, Director of Undergraduate Program
M. Johnson, Director of Graduate Program
S. Stallings, Assistant Head for Advising


The Bachelor of Arts in Communication program provides opportunities for study and training in human communication for professionals entering business, industry, non-profit organizations, or government service. Today, many organizations are seeking graduates with demonstrated competencies in human communication to fill positions that require constant and skillful contact with a wide variety of internal and external publics. Depending on their area of specialization, graduates may find employment opportunities as communication consultants, media specialists, trainers, public relations or corporate communication specialists or therapists. Many graduates choose to enter graduate or law school.

Programs of Study
The Communication major calls for the successful completion of at least 36 semester credit hours of Communication (COM) courses. All majors must take COM 230, COM 240, and COM 250 one-at-a-time, in sequence, and earn a “C-” or better in each course. In addition, all majors must take COM 110 and/or COM 112 (depending upon their concentration). Students select one of the three departmental concentrations in which they take the remaining credit hours in the major. The concentrations are:

Communication Media
This concentration focuses on the construction, distribution, use, and effects of visual images, sounds, and words conveyed through a wide range of communication media, including print, television, the Internet, and emerging technologies. Students create and produce media content, and also conduct empirical and critical analyses of issues related to media economics, history and development, social and global impact, and public policy.

Public and Interpersonal Communication
This concentration investigates analytical, theoretical, and skills approaches to the study of human communication processes and problems, including interpersonal relationships, group processes, conflict management, public and political discourse, argumentation, persuasion, and ethics.

Public Relations and Organizational Communication
This concentration focuses on the communication theories, methods, principles, and ethical practices used by organizations to establish and maintain mutually beneficial relationships with an organization’s internal and external publics (such as employees, stockholders, and customers). Students are instructed in strategic planning and communication techniques used in a variety of organizations, including corporate, government, and non-profit entities.

Honors Program
Completion of the program will be noted on the student’s transcript and diploma, and in the Commencement and Honors Convocation programs. For more information, contact the Communication Honors Program Director, Dr. Dan DeJoy, dejoy@social.chass.ncsu.edu.

Curriculum Notes
• Students must enroll in COM 230 during their first semester as a Communication major.
• Admission to the Department of Communication is based upon academic record. Courses in progress at the time of the application deadline will not be considered. Two opportunities for admission exist: Automatic Admission and Admission by Application.
• **Automatic Admission:** Students will automatically be accepted into the Department of Communication if they have completed at least 12 hours at NC State with a GPA of 3.0 or better. Students who have met these criteria may enter the Department at any time in the year and should proceed to CHASS Dean’s Office in Caldwell 106

• **Admission by Application:** Students not meeting the conditions for Automatic Admission may apply for entrance if they have completed 12 hours and have GPAs between 2.5 and 3.0 and have completed FL 201 with a “B-” or better and one of the following with a “B-” or better; ST 311, LOG 201, PHI 221, PHI 250.

Application deadlines are February 15, June 15, and September 15.

Students who have met these criteria should proceed to the CHASS Dean’s Office in Caldwell 106. Applications will be reviewed after each deadline; students will be notified of their admission status within one month of the deadline. **Please understand that admission is competitive and meeting these requirements does not guarantee admission.**

No final grades below “C-” are permitted for courses used to satisfy Departmental graduation requirements. No grades in COM courses below “C-” may be used to satisfy any University graduation requirements.

**Minor in Theatre**

The Department of Communication offers an academic minor in Theatre to all NC State undergraduate degree-seeking students except those majoring in Communication. The minor includes a combination of courses from traditional theatre and the communication theory curricula.

**Internships**

The department operates an Internship Program that offers qualified seniors the opportunity to gain work experience in the communication field. The Internship is required of all students in the Public Relations & Organizational Communications Concentration, but students from the other Communication concentrations are also encouraged to participate in this program.

**Graduate Programs**

The Department of Communication offers a Masters Degree in Communication. In conjunction with the Department of English, the Department of Communication also offers an interdisciplinary Ph.D. program in Communication, Rhetoric, and Digital Media. For more information, please visit the Graduate School website at www.ncsu.edu/grad.

**DEPARTMENT OF ENGLISH**

Tompkins Hall, Rooms 221, 246
phone: (919) 515-3866

A.H. Harrison, Head
S.M. Setzer, Associate Head, Coordinator of Advising
B.M. Blackley, Assistant Head for Scheduling
C.A. Prioli, Director of Graduate Programs
S.Miller-Cochran, Director of First-Year Writing Program


The Department of English offers basic and advanced courses in writing, language, and literature. The freshmen course required of all undergraduate students develops skill in expository writing and in analytical reading. Advanced courses in writing available to all students cover a variety of areas, including journalism, technical and business writing, and creative writing. These courses give students opportunities to pursue special personal and career interests, as do courses in literature, linguistics, film, and folklore.

The department offers a Bachelor of Arts major in English with six options: creative writing; film; language and literature; language, writing, and rhetoric; world literature; and teacher education. It also offers a Bachelor of Science major. Internships available to qualified students provide practical experience as well as an understanding of how academic studies are relevant to the workplace.
College of Humanities and Social Sciences

On the graduate level, the Department of English offers three graduate degrees: a Master of Arts in English, a Master of Science in Technical Communication, and a Master of Fine Arts in Creative Writing. In conjunction with the Department of Communication, the Department of English also offers an interdisciplinary Ph.D. program in Communication, Rhetoric, and Digital Media. For more information, please visit the Graduate School website at www.ncsu.edu/grad. A five-course certificate program in Professional Writing, available to students not seeking a degree at NC State, offers preparation in practical writing and editing, including both journalism and technical writing.

Opportunities

A degree in English provides both liberal education and practical knowledge about the role of writing and language in the everyday world. It leads to careers in such fields as teaching, journalism, advertising, public relations, personnel management, technical writing, business writing, and creative writing. It sharpens the analytical and interpretive skills needed for professional and managerial careers, and it serves as an excellent preparation for students planning to study law or medicine and for those intending to do graduate work in literature and rhetoric.

English Honors Program

The Honors Program in English provides courses that enrich the intellectual life of the English major. The Honors student contributes to and learns from seminar settings, takes up the obligation of independent study, produces documents representing sustained and logically articulated research practices, and earns recognition for excellent work beyond ordinary requirements.

For admission, students must have a minimum GPA of 3.25 and must have completed at least three English courses above the freshman level with a minimum GPA of 3.25. Successful completion of the Honors Program requires completion of 9 hours of honors courses with grades of A or B, a GPA of at least 3.25 in NC State English courses, and a minimum overall GPA of 3.25.

Bachelor of Arts in English

Major in English, Creative Writing Concentration

The student must schedule 36 hours beyond freshman composition. Within these hours, students must take eighteen hours of literature (including the CHASS six hours), six hours of linguistics, rhetoric or writing practice, and 12 hours of creative writing electives.

Major in English, Film Concentration

The concentration in film trains students in the history, analysis, and interpretation of film. Students schedule 36 hours in literature and film beyond freshman composition. Within these hours, students take fifteen hours of literature, six hours of linguistics, rhetoric, or writing practice, and fifteen hours of film studies. Through coursework in film studies, students acquire skills in interpretation, analysis, and criticism, situate films within historical periods, consider the relation of film to literary texts, and study important film genres, directors, and national traditions. They may also become involved in the creative work of screenwriting.

Major in English, Language and Literature Concentration

This curriculum provides a strong general education with an emphasis on the study of the English language and of British and American literature. It leads to a broad range of careers in education, business, government, law, etc. The major includes 36 hours of English courses beyond freshman composition, nine courses that satisfy categorical requirements and three elective English courses.

Major in English, Language, Writing, and Rhetoric Concentration

This curriculum provides a strong general education, a basic exposure to literature, and an emphasis on the study of written English in its theoretical, cultural, and practical applications. It can lead to a broad range of professions, with a special focus on careers that involve creating, designing and producing documents: the news media, business and technical communication, the writing and publishing professions. Students may also focus their studies upon rhetoric, composition, and linguistics and prepare for graduate study in these areas or for law school, teaching, and other professions. Students must schedule 36 hours of English courses beyond freshman composition, including 6 hours of CHASS literature electives, 15 hours from the English core, and 15 hours from a focused distribution of courses specially designed for LWR majors.

Major in English, Teacher Education Concentration

English majors may enroll in the Teacher Education Concentration offered by the College of Humanities and Social Sciences in cooperation with the College of Education. Students who complete this program are eligible to apply for certification to teach English in secondary schools in North Carolina. The requirements of this program include 25 semester hours in professional courses and 36 semester hours in English beyond freshman composition (total 125 credit hours required for graduation). Admission to the program requires the joint permission of the English department and the College of Education. Formal applications are required for Admission to Teacher Education Candidacy and Admission to the Professional Semester.

Major in English, World Literature Concentration

The Lawrence Rudner Concentration in World Literature provides a strong general education in the humanities while enabling students to study literature in a global context by mixing courses in English and American literature with courses in foreign-language literatures. It prepares for a broad range of post-graduate options, including graduate and professional school, and a wide variety of careers in business, education, government, and law. It is especially appropriate for students intending to pursue careers in international relations. Students must schedule 36 hours beyond freshman composition. The 36 hours include two courses in rhetoric, linguistics and writing practice; nine courses that meet categorical requirements in historical periods, cultural regions, and literary modes; and one elective course in literature. At least 18 of these hours must consist of ENG or ENG/FL courses; at least 12 of them must consist of FL or ENG/FL courses.
Bachelor of Science in English

The Bachelor of Science in English provides students with a broad but structured foundation in both the sciences and in language and literature. It requires 30 hours of English requirements, plus a 15-hour science/technology option.

Minor in American Literature

The Department of English offers a minor in American Literature to NC State students, except for LAN and LIT English majors. The minor consists of any five courses in American literature, three of which must be at the 300 level or above, and one of which must be at the 400 level or above. Students may transfer in no more than six hours toward the minor. This minor will focus on the English language literature of the United States and of the British colonies out of which the United States emerged.

Minor in Creative Writing

A minor in Creative Writing is available from the Department of English for NC State students, except LCW English majors.

Minor in English

The Department of English offers a minor in English to majors in any field except English. The minor program will allow students to pursue general interests in writing, literature, and language.

Minor in Film Studies

The Departments of English, Communication, and Foreign Languages and Literatures offer a minor in Film Studies open to students across the university. The minor provides a comprehensive introduction to the art and industry of the cinema through courses in film analysis, history, theory, criticism, screen writing, and production.

Minor in Journalism

The Department of English and the Department of Communication offer a minor in Journalism to NC State students, except LWR English majors. The minor will provide course work in writing and editing news and features for print and non-media as well as an introduction to the profession of journalism.

Minor in Linguistics

The Department of English and the Department of Foreign Languages and Literatures offer a minor in Linguistics to NC State students, except LWR English majors. The minor is designed to investigate the structure and function of language as a cognitive and behavioral science. Five courses in designated areas of linguistics are required in the minor. Among students likely to be attracted to this minor are those who expect to pursue graduate study in linguistics, those interested in foreign languages or English as a second language, and those interested in communication sciences.

Minor in Technical and Scientific Communication

A minor in Technical and Scientific Communication is available from the Department of English for NC State students, except LWR majors, who are interested in supplementing their studies in technical, scientific, or other academic fields with strong writing and communication skills. Students minoring in Technical and Scientific Communication will be introduced to numerous genres including internal and external documents such as proposals, reports, science writing, users guides, reference manuals, and online documentation. Critical perspectives towards the role of communication in the creation of scientific and technical knowledge will be examined. The minor may lead to career opportunities in technical and scientific writing and communication.

Minor in World Literature

In keeping with the university’s mission to provide an international curriculum, the World Literature minor offers NC State students, except for LAN and LIT English majors, an opportunity to broaden their perspectives on foreign cultures through the study of literature outside the Anglo-American tradition. Students will also develop critical, analytical, and linguistic skills essential in today’s job market. The minor offers choices from a range of courses in literature, in translation or in the original language, from Europe, Asia, Africa, and Latin America.

DEPARTMENT OF FOREIGN LANGUAGES AND LITERATURES

310 Withers Hall
phone: (919) 515-2475

R. V. Gross, Head
D. M. Marchi, Associate Head
S.G. Navey-Davis, Director of Undergraduate Advising
A.C. Wright, Scheduling Officer
Opportunities

The expansion of international relations makes the knowledge of foreign languages a critical need for today's professional. The student of foreign languages is not limited to teaching, translating or interpreting. There are careers in politics, diplomacy, commerce, business, agriculture, science, and research in which a thorough knowledge of foreign languages and cultures is crucial for success. The demand for multilingual personnel extends to all fields of human enterprise and will continue to grow in the coming years.

Bachelor of Arts in French, German or Spanish

All the general requirements for Bachelor of Arts degree must be met. Degree designations are B.A. in French Language and Literatures, B.A. in Spanish Language and Literature, B.A. in German Studies, B.A. in French Language and Literature with Teacher Education option, and B.A. in Spanish Language and Literature with Teacher Education Option.

Outstanding students may become members of the Alpha Lambda chapter of Phi Sigma Iota, National Foreign Languages Honor Society or of the Sigma Delta Pi, National Hispanic Honor Society. A department honors program in French and Spanish is also available to eligible students.

Major in French or Spanish with Teacher Education Option

In collaboration with the College of Education and the Department of Curriculum and Instruction, the Department of Foreign Languages and Literatures offers a program leading to a French or Spanish teaching license in North Carolina, grades K-12.

Programs Abroad

Summer study programs are offered in Austria, Egypt, France, India, Italy, Mexico, Spain, and Peru.

Minors in Foreign Language, Literatures, and Cultures

Minor programs in the Department of Foreign Languages and Literatures include courses in language, literature, and civilization. The minor program requires 15 hours of study in Chinese Studies, Classical Greek, Classical Studies, French, German, Hindi-Urdu, Italian, Japanese, Russian, or Spanish.

Undergraduate students majoring in any area of study at NC State are eligible to minor in a foreign language. Students may not, however, major and minor in the same language.

ESL at NC State

The English as a Second Language program serves the academic and professional language needs of international university students. Courses are designed to help both undergraduate and graduate students perfect their language skills. The English Placement Test may be required for new students. Check with the ESL section for details. An ESL licensure program is also available.

DEPARTMENT OF HISTORY

Withers Hall, Room 350
phone: (919) 515-2483
website: http://history.chass.ncsu.edu/

J. Ocko, Head
D. A. Zonderman, Associate Head
J. E. Crisp, Assistant Head, Scheduling Officer
K. P. Vickery, Director of Undergraduate Advising
S.T. Parker, Director of the Honors Program
K.P. Luria, Director of Graduate Programs
C.T. Friend, Director of the Public History Program


The Department of History offers three undergraduate majors, a minor, an M.A. in History, and an M.A. in Public History (see Graduate Catalog for M.A. degrees). The departmental honors program provides a guided experience in independent research and
awards departmental honors in history upon graduation. Outstanding history students are eligible for membership in Phi Alpha Theta, the professional honors society for historians.

The Department of History at NC State brings alive the treasure of human experience and cultures, from the ancient near East to the post-Cold War world, from Shang China to Mandela’s Africa, from the Roman senate to the U.S. Senate. We are particularly strong in the history of race relations, law and society, the history of science and technology, and world history, and we have a strong record of publications, grant and fellowship awards, and public outreach.

History teaches that understanding a situation requires identifying with people who lived in other times and places. History is a discipline whose very method seeks and applies fair and appropriate norms to understand and judge human behavior. Students will learn to exercise independent judgment as well as to tolerate differences.

History melds personal experience with human experience and the wisdom of earlier ages. Through dialogue with the past, history deepens and enriches our appreciation of the present. History graduates will be better informed and more sophisticated about the world and their place in it than more specialist majors. Precisely because a history education provides general skills of information gathering, analysis, and communication, it is translatable into a variety of careers and professions in an information age economy. Our students can be expected to have the intellectual, social, and cultural flexibility needed to cope with a rapidly changing work world.

Students may also pursue particular concentrations such as our clusters on such topics as the history of science and technology, and the history of law and society.

Opportunities

There are many reasons to major in History. History teaches us how to put forward the best argument based on the known facts. That is one reason it provides such an excellent preparation for the study of law. About 1/5 of our graduates go on to pursue teaching careers. In addition, training in gathering all the relevant facts and developing the most persuasive explanation has application in business, government, journalism, and many other professions.

Honors Program

The departmental honors program allows selected students to pursue intensive individually directed work in history. Students are invited to enter the honors program (usually in the junior year). Students must take 9 hours of individual, directed study (HI 498, 495, 496) leading toward the writing of an Honors Thesis. Students must participate for three semesters in a non credit honors reading seminar.

Majors in History

Bachelor of Arts in History (LAH)

Requires 30 hours of history course work (in addition to the 6 hours required of all College of Humanities & Social Sciences majors), including the HI 300 and HI 491 seminars. At least 24 of the 30 hours must be at the 400 level, and 9 of the 24 must come from three groups: pre-modern and non-western history (3); European history (3); and American history (3). This degree allows 33 hours of free electives for a total of 122 hours. History courses are scheduled in order to make possible the completion of the B.A. degree by evening attendance.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Bachelor of Arts, Teaching Option in History & Social Studies (LTH)

Students who complete this program are eligible for certification to teach social studies and history in secondary schools in North Carolina and most other states. Students are required to take professional courses in education and psychology and additional social science courses.

The degree requires 30 hours of history course work, including the HI 300 and HI 491 seminars, plus 12 additional hours of social science course work from a prescribed list and 25 hours of professional courses in education and psychology. The degree is completed with 120 hours and includes no free electives. Contact Professor Ken Vickery, Blair Kelty or Gerald Surh.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Bachelor of Science in History (LSH)

The importance of science and technology in our society makes a background in science and technology valuable even for humanities majors. The B.S. degree offers a way for students to get both the analytical and writing skills that come from a history major and the technical proficiency that comes with coursework in science and engineering. This combination is very helpful in a wide variety of careers, including law, business, and public policy. This degree is particularly well suited for students transferring into history from a science or engineering major.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
College of Humanities and Social Sciences

It requires 27 hours of history course work, including the 6 hours required of all College of Humanities & Social Science majors, the HI 491 seminar, and at least 4 other courses at the 400 level. HI 300 is highly recommended. This degree allows students to integrate a broad base in science and math, specialized study in a single area of science and technology, and a history education. This program includes 18 hours of free electives for a total of 122 hours. Contact Professor Ross Bassett.

Minor in History
The minor requires 18 hours of history: two 200-level history courses, one in recent American or European history and one in ancient, medieval or renaissance history or in Asian, African, or Latin American history; and four courses at the 300 or 400 level (at least two of which must be at the 400 level).

DEPARTMENT OF PHILOSOPHY AND RELIGIOUS STUDIES
Withers Hall, Room 340
phone: (919) 515-3214
website: www.ncsu.edu/ncsu/chass/philo

M. J. Pendlebury, Head
J. C. Bivins, Associate Head
C.M. Driscoll, Director of Advising
J.C. Bivins, Senior Religious Studies Adviser
D. D. Auerbach, Senior Philosophy Adviser


Philosophy and Religious Studies confront the most important questions with the most rigorous standards, relying on over two millennia of accumulated wisdom from the best minds. They provide excellent training for any line of work where there’s value in the ability to think straight and express oneself clearly—virtually every line of work. Law school, medical school and other professional school admission boards know this. A double major in this department and another (e.g., political science for law, biochemistry for medicine) can make an applicant very attractive to a professional school. Majors receive excellent training for graduate school in Philosophy or Religious Studies, as is shown by the department’s record in placing graduates in top graduate programs in each field.

Opportunities
For students interested in postgraduate study, information compiled by post-college professional schools reveals that undergraduate majors in philosophy and religion who apply to graduate schools of management have in the past scored extremely well in combined total scores on the Graduate Management Admission Test, with exceptional scores on verbal fields.

Those undergraduate philosophy majors who apply to law schools have been shown to be more likely to be admitted than virtually any other field represented. Students intending to study philosophy and religion in graduate programs have consistently scored much higher than other students on the verbal section of the Graduate Record Examination. Because of this capability of scoring so well on the various postgraduate tests, many businesses and industries welcome philosophy and religion majors into their training programs.

Philosophy Honors Program
The honors program in Philosophy offers an enriching and challenging educational experience to qualified majors. Admission to the program requires completion of nine credits in the major, a 3.66 GPA in the major, and a 3.25 GPA overall. To graduate with Honors in Philosophy, a student must (i) complete PHI 300 and 301 and at least one other course in history of philosophy (PHI 302, 303, 310, 376, or 401), (ii) complete LOG 335, (iii) write and honors thesis (PHI 498 for three credits to be evaluated by the instructor and one other member for the faculty in Philosophy, and (iv) complete at least one three-credit 400-level course in Philosophy (in addition to the PHI 498 honors thesis) or a concentration in Philosophy. Graduation requires a 3.66 GPA in the major and 3.25 GPA overall. Successful completion of the program is noted on the student’s transcript and in the commencement and honors convocation programs.

Religious Studies Honor Program
The honors program in Religious Studies guides outstanding majors in independent, critical inquiry of the academic study of religion. Admission to the program requires junior standing, completion of nine hours in the major, and a 3.25 GPA overall and in the major. Honors students must complete at least nine credit hours of honors option course work in Religious Studies (including at least one 400 level course) and write an honors paper as part of an independent study course (REL 498) which is evaluated by an honors committee.
Graduation requires a 3.25 GPA overall and in the major. Successful completion of the program is noted on the student’s transcript and in the commencement and honors convocation programs.

**Bachelor of Arts in Religious Studies**

The major in Religious Studies consists of thirty (30) credit hours. The courses must include: REL 200 (3 credit hours); 3 credit hours in Non-Western Religious Traditions (REL 230, 331, 332, 333, 334, 340, 407, 408); 3 credit hours in Western Religious Traditions (REL 311, 312, 314, 317, 320, 323, 350 402, 412, 413, 423); 3 credit hours in Textual Methods (REL 311, 312, 314, 412, 413, 484, 491); 3 credit hours in Historical Methods (REL 230, 317, 320, 331, 332, 333, 334, 340, 350, 402, 407, 408); 3 credit hours in Critical/Theoretical Methods (REL 309, 323, 327, 383, 423, 471, 472, 483, 489); 9 credit hours of advanced Religious Studies classes (REL 4***); 3 credit hours of Religious Studies electives (REL ***).

**Bachelor of Arts in Philosophy**

Candidates for the Bachelor of Arts in Philosophy must complete 27 hours in philosophy, in addition to the three hours in philosophy required for all CHASS students. Included are two courses in the development of Western philosophic thought (two of: PHI 300, 301, or 302); a course in logic (one of LOG 201 or 335); one course in value theory (one of: PHI 221, 309, 313, 375, 376, 415, 420, 422); one course in contemporary philosophy (one of: PHI 330, 331, 332, 333, or 440); one-credit writing courses in each of three core areas of philosophy (all of: PHI 494, 495, and 496); and four additional LOG or PHI courses.

**Major in Philosophy with a Concentration in Ethics**

The concentration requires 27 hours in philosophy, in addition to the three hours in philosophy required of all CHASS students. Included are two courses in the development of Western philosophic thought (two of: PHI 300, 301, or 302); a course in logic (one of: LOG 201 or 335); two core courses in ethics (either PHI 375 or 376, plus PHI 475); two additional courses in ethics (two of PHI 309, 313, 325, 375 (if not taken as a core course), 376 (if not taken as a core course), 415, 420, or 422); one course in contemporary philosophy (one of: PHI 330, 331, 332, 333, or 440); one-credit writing courses in each of three core areas of philosophy (all of: PHI 494, 495, 496); and one additional LOG or PHI course.

**Major in Philosophy with a Concentration in Philosophy of Law**

The concentration requires 27 hours, in addition to the three hours of philosophy required of all CHASS students. Included are one course in value theory (one of: PHI 221, PHI 375, or PHI 420); two advised electives, three core courses (all of: PHI 309, 312, and 313), one course in development of Western philosophic thought (one of: PHI 300, 301, or 302), a course in logic or practical reasoning (one of LOG 201, 335, or PHI 250), one course in contemporary philosophy (one of: PHI 330, 331, 332, 333, or 440), and one credit writing courses in each of three central areas of philosophy (all of: PHI 494, 495, 496).

**Bachelor of Science in Philosophy**

**Major in Philosophy with a Concentration in Logic, Representation and Reasoning**

The concentration requires 30 hours in addition to the three hours of philosophy required of all CHASS students. Included are two courses in the development of Western philosophic thought (PHI 301 plus either PHI 300 or 302); one course in value theory (one of: PHI 375 or 376); three courses in logic, language, and cognitive science (three of: LOG 335, 435, PHI 331, PHI/PSY 425); one course in the philosophy of science (one of: PHI 440 or 445); two additional courses in logic and cognitive philosophy (two of: LOG 201, 335, 435, PHI 330, 331, 332, 333, PHI/PSY 425, PHI 440, or 445); and one credit writing courses in each of three core areas of philosophy (PHI 496 and 497, plus either PHI 494 or 495).

**Minor in Philosophy**

Students who take a Minor in Philosophy are required to complete with a grade of C or better 15 hours of courses in selected fields in philosophy, including a course in the history of philosophy (3 credit hours), a course in normative (ethics and ethics-related) philosophy (3 credit hours), a course other than one in normative philosophy, but not including logic or the history of philosophy (3 credit hours).

**Minor in Religious Studies**

Students who take a minor program in Religious Studies are required to complete with a grade of C or better 15 hours of courses in selected fields of Religious Studies. In order to ensure a wide study of the field, students are required to select at least one course in each of the following categories: Historical Methods, Textual Methods, and Critical/Theoretical Methods. As part of these requirements, it is expected that at least one of the above classes focus on Western religious traditions and at least one non-Western religious traditions. Electives may be filled from any of these courses or from other Religious Studies course offerings (but REL 101 and REL 10 may not be counted toward the minor).

**Minor in Cognitive Science**

Students who take a Minor in Cognitive Science must complete 15 credit hours with a grade of C or better distributed as follows: Two of the three advanced core courses (two of: PHI/PSY 425, PSY 420, CSC 411), three additional complementary courses chosen from the following list for a total of 15 credits: CSC 312, CSC 333, CSC 411, ENG 210, ENG 324, ENG 524, ENG 525, ENG 527, LOG 335, PHI 331, PHI 332, PHI 425/PSY 425, PSY 340, PSY 400, PSY 420, PSY 430. Courses from at least three of the four primary disciplines of cognitive science must be represented in the minor. For purposes of the minor, the primary disciplines are philosophy (including logic), psychology, computer science, and linguistics.
Minor in Philosophy
Students who take a Minor in Philosophy are required to complete with a grade of C or better 15 hours of courses in selected fields in philosophy, including a course in the history of philosophy (3 credit hours), a course in normative (ethics and ethics-related) philosophy (3 credit hours), a course other than one in normative philosophy, but not including logic or the history of philosophy (3 credit hours).

Minor in Religious Studies
Students who take a Minor in Religious Studies are required to complete with a grade of C or better fifteen hours of courses in selected fields of religious studies. In order to ensure a wide study of the field, students are required to select at least one course in Western religious traditions and at least one course in non-Western religious traditions. REL 101 and REL 102 may not be counted in the minor.

Minor in Cognitive Science
Students who take a Minor in Cognitive Science must complete 15 hours with a grade of C or better distributed as follows: Two of the three advanced core courses (two of: PHI/PSY 425, PSY 420, CSC 411), three additional complementary courses chosen from the following list for a total of 15 credits: CSC 312, CSC 333, CSC 411, ENG 210, ENG 324, ENG 524, ENG 525, ENG 527, LOG 335, LOG 435, PHI 331, PHI 332, PHI/PSY 425, PSY 340, PSY 400, PSY 430, or ZO 488. Courses from at least three of the give participating disciplines are philosophy (including logic), psychology, computer science, neurobiology, and linguistics.

Minor in Ethics
Students who take a Minor in Ethics are required to complete with a grade of C or better 15 hours of courses, including the core courses in ethics (PHI 375 or 376, plus PHI 475), two additional courses in ethics (two of: PHI 309, 33, (STS) 325, 375, 376, 415, 420, 422, or REL 473), and one course from a list of relevant courses in other disciplines, including Anthropology, English, Genetics, History, Microbiology, Political Science, Sociology, and Science, Technology & Society.

Minor in Health, Medicine, and Human Values
The Minor in Health, Medicine, and Human Values are required to complete with a grade of C- or better, with an overall GPA of 2.0, 15 hours of courses, including core course (PHI/STS 325) and twelve hours from the following list of courses, with at least two courses from each group: Group One, Humanities and Social Sciences Perspective on Health and Medicine (EC 437, GRK 333, HI 322 or 481, PHI 221 or 375 or 376 or 415, REL 473, SOC 381 or 465); Group Two, Science Perspective on Health and Medicine (GN 301 or 311 or 414, MB 200 or 411, NTR/ANS/FS 301 or NTR 419 or NTR/FS 400, PEH 284 or 285 or 286, PSY 430, ZO 488.

Minor in Japan Studies
Students who take a Minor in Japan Studies are required to complete with a grade of C or better 18 hours of courses distributed as follows: Tested language competence through FLJ 202, with at least six hours of Japanese language instruction at NC State at or above the FLJ 201 level, and four of the following cognate courses: EC 470; ENG/FL 394; HI 263; HI 264; HI 472; PS 342; REL 334. With the minor adviser’s approval, additional Japan-related classes may be used to fulfill the cognate course requirement.

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS
Caldwell Hall, Room 211
phone: (919) 515-2481
website: spia.chass.ncsu.edu

R. C. Kearney, Director
A. J. Taylor, Chair of Political Science
J. Coggburn, Chair of Public Administration
H. Hobbs, Director, Master of International Studies
S. Carey, Director of Advising


The Department of Political Science, part of the new School for Public and International Affairs, offers basic and advanced courses in all major fields of the discipline: American government and politics (local, state, and national), public law and criminal justice, public administration, comparative politics, international relations and global issues, political theory, and methodology of political science. The department affords opportunities for the study of government and administration to students in other curricula and schools.

Graduate courses in public administration and international studies are available to advanced undergraduates. See the listing of graduate degree programs and consult the Graduate Catalog.
The department provides academic credit for internships with political parties and campaigns, lobbyists, non-profits, and all levels of government, including the North Carolina General Assembly Legislative Internship Program. Majors in political science with distinguished academic achievements are annually invited to join the Zeta Epsilon Chapter of Pi Sigma Alpha, the national political science honor society.

Opportunities
A degree in political science is excellent preparation for a number of careers and graduate opportunities. Political science majors study critical issues surrounding such things as international security, public policy, and government practices. They develop real-world skills such as solving problems logically and systematically, working with others in vertically and horizontally organized arrangements, expressing a position and defending it with corroborating evidence, and writing clear and correct prose. They also develop citizenship and leadership competencies that include the personal obligation to participate in public life. Consequently, political science majors are well-positioned for careers in teaching, the legal profession, criminal justice agencies, state and local government, urban planning, the federal bureaucracy, journalism or in any of the organizations that seek to monitor political processes or to influence the content of public policy. Private firms also seek managers and public affairs specialists who have a knowledge of the functioning of the political system and of politics in general.

For more information, see the department’s website ps.chass.ncsu.edu.

Honors Program
The honors program includes nine credit hours of specialized coursework designed to challenge academically talented majors and allow them to realize their greatest potential as political science students. Required for admission to the program: 3.25 GPA both overall and in the major, completion of 9 hours of PS coursework, and completion of PS 371. Majors admitted to the program complete a substantial research project in consultation with a faculty honors adviser (6 credit hours). Also required: either one 500 level PS course or an honors option 400 level political science course (3 credit hours). Successful completion of the program is noted on the student’s transcript, and at commencement.

Curricula

Bachelor of Arts in Political Science
Major requirements are: 19 hours of core courses that cover major political science sub fields (i.e., American government, international relations, theory, public law and policy, and research methods) as well as courses that develop computer competencies and an orientation to the discipline; 15 hours of political science electives, 12 of which must be taken at the 300 level or above, and one of which must be a 400 level senior seminar, which includes a substantial research requirement. Grades of C- or better are required for courses applied towards the major. At graduation, a minimum GPA of 2.0 is required for all political science courses taken. For a semester-by-semester guide to the course requirements for the Bachelor of Arts curriculum, including all of the concentrations described below, see the departmental website at ps.chass.edu/curricula.html.

Students who wish to focus their studies in a specific sub field may elect one of the following concentrations under the Bachelor of Arts program:

American Politics
This concentration develops skills that benefit students interested in graduate and professional school, administrative careers, and business careers that involve government relations and policy. Major requirements are: 21 hours of core courses; 9 hours of courses specifically related to the study of political processes, institutions, political culture, and political events within the American system.

International Politics
This concentration develops skills that benefit students interested in graduate or professional school, careers in government service, international organizations, issue advocacy, and businesses with international interests. Major requirements are: 15 hours of core courses; 12 hours of concentration electives in regional and world politics; 3 hours of concentration electives in any political science sub field.

Law and Justice
This concentration develops skills that benefit students interested in graduate or professional school (particularly law school), law enforcement, judicial administration, and careers with agencies involved in the administration of justice. Major requirements are: 18 hours of core courses; 12 hours of emphasis electives in either the justice system or law and theory.

Public Policy
This concentration prepares students for careers with public institutions where they will work with the processes, formulation, implementation, and evaluation of public policy at international, national, state, and local levels. Major requirements are: 15 hours of core courses; 15 hours of concentration electives.

Bachelor of Science in Political Science
Major requirements are 27 hours of political science coursework. At least 6 hours must be taken from each of the following groups: Group A-American politics/or public policy and administration; Group B- international affairs/comparative politics; and Group C-political theory/scientific methods. At least 18 hours of coursework must be at the 300 level or higher. At least 6 hours of coursework
must be at the 400 or 500 level, including one course that is designated as a senior seminar. Grades of C- or better for courses applied towards the major with a minimum GPA of 2.0 for all political science requirements for the Bachelor of Science curriculum, see the departmental website at www2.chass.ncsu.edu/pspa.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Political Science

Minor requirements are 15 hours of political science coursework with grades of C- or better in each course and a cumulative GPA of 2.0 for all political science courses. A minimum of 12 hours must be taken at the 300 level or above, including one 400 level senior seminar. Coursework must cover at least two of the following three groups: Group A - American politics/or public policy and administration; Group B - international affairs/comparative politics; and Group C - political theory/scientific methods.

Minor in Law and Justice

Minor requirements are 15 hours of political science coursework with grades of C- or better in each course and a cumulative GPA of 2.0 for all political science courses. These 15 hours must include: PS 205 (Law and Justice); 12 hours of elective courses, at least one of which must be a 400 level seminar or a 500 level graduate course in political science. This minor program is designed for students who have a special interest in the areas of public law, criminal justice and political theory.

DEPARTMENT OF PSYCHOLOGY

Poe Hall, Room 640
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website: www.ncsu.edu/psychology

D. Gillan, Head
D. H. Mershon, Associate Head
S. A. Lane, Assistant Head, Undergraduate Coordinator
K. Young, Coordinator of Advising


Psychology is one of the basic majors in liberal arts and sciences. Psychologists use the methodology of science to study human behavior and experience. A bachelor’s degree in psychology forms an excellent foundation for careers in psychology, as well as business and government. It will also enhance, life skills such as parenting and human social interaction. Students can also use this degree as an entry into further education leading to an advanced degree in applied or experimental psychology, or to such fields as law, medicine, business or social work. There are two programs for undergraduate majors in psychology: The General Option (PSY) and Applied Psychology. Separate descriptions of these programs are included in the next section.

Curriculum in Psychology - General Option

The General Option is oriented toward the student who wants a broad understanding of the types of problems with which psychology is concerned and the ways in which psychologists approach and attempt to solve these problems. Curriculum requirements in the General Option are sufficiently flexible for students to concentrate, if they wish, in another area of study as well as psychology, and thereby prepare themselves for a variety of careers or professional programs. By wise choice of elective courses, a student can prepare for medical, legal, business, or education graduate training, while at the same time acquire a basic background in the social sciences.

Curriculum in Psychology - Applied Psychology

The Applied Psychology Option is designed to provide a groundwork of skills and experience for students who wish to enter human service careers with a B.A. degree, as well as for students who wish to pursue a graduate degree in psychology. With appropriate curriculum modifications, the program can also provide a sound background for students who wish to develop a career in management, personnel, social work, counseling, guidance, education, and other areas. Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

The Applied Psychology Option focuses on enabling students to gain direct experience in the areas in which they would like to work. Applied Psychology students devote a semester to learning principles and skills related to working with human problems, and subsequently each Applied Psychology student spends a semester working part-time or full-time in a job related to his/her own area of interest. The Applied Psychology Option accepts a maximum of 20 students each year. Interested students already in the general option can apply for admissions to Applied Psychology during the fall semester of their sophomore or junior year. Further
information about the Applied Psychology option is available through the Department of Psychology office or by contacting Dr. Pamela Martin.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

**Honors Programs**

Honors tracks reside within the General Option and the Applied Psychology Option. The goals of the programs are to provide a curriculum that will expose the most talented majors to a more rigorous set of courses both within and outside of psychology than is required of standard undergraduate tracks and to provide them some pre-graduate school experiences. In addition, the program provides Honors students a close working relationship with individual faculty in research and data collection. By these means, Honors students develop transcript records attractive to graduate schools and are formally recognized for their superior achievement. To be eligible for admission, students must be nominated by a faculty member in whose laboratory the student has worked. Student should feel free to approach faculty members with whom they work to obtain a nomination.

**Psychology Club**

All undergraduate majors are members of the Psychology Club, which provides a number of enrichment activities. There is also an active chapter of Psi Chi, the national psychology honor society, which provides enrichment to the program.

**Minor in Psychology**

The Department of Psychology offers a minor in psychology to majors in any field except psychology. To complete the minor, eighteen hours of courses are required, six of these hours in the basic science of psychology, and nine in the applied aspects of psychology. PSY 200 is a required prerequisite and the student must have passed this course with a grade of B- or better. To be eligible for the psychology minor, students must have passed BIO 105/106 with a grade of “C” (not C-) or better. The student must also have an overall GPA of 3.0.

**Minor in Cognitive Science**

The Departments of Psychology and Philosophy and Religion offer an interdisciplinary minor in cognitive science. The minor provides a general introduction to contemporary interdisciplinary research within the framework of the “computer model” mind, and offers the student the opportunity for in-depth study of selected topics of such as the nature of human information processing, and the acquisition and use of machine intelligence.

To complete the minor, 15 hours are required, distributed as follows: PSY 420 (Cognitive Processes); PSY 340 (Ergonomics) or PSY 744 (Human Information Processing); PHI 331 (Philosophy of Language); PHI 332 (Philosophy of Psychology); PHI/PSY 425/525 (Introduction to Cognitive Science).

**DEPARTMENT OF SOCIAL WORK**

Room 205, 1911 Building  
phone: (919) 515-2492

T. Hancock, Head and Graduate Program Director  
L. Williams, Associate Head and Undergraduate Program Director  
K. Osborne, BSW Field Director  
J. Hall, MSW Field Director  
S. Mallard Barnes, BSW Advising Coordinator

Professor: T. Hancock, J. Pennell; Associate Professors: N. Ames, J. Taliaferro; Clinical Associate Professor: L. Williams; Assistant Professors: W. Casstevens, M. Leach, J. Wells; Clinical Assistant Professors: J. Hall, K. Osborne; Teaching Assistant Professor: Karen Watkins, BSW Advising Coordinator: S. Mallard Barnes; Child Welfare Education Collaborative Coordinator: K. Graves.

The Department of Social Work offers the Bachelor of Social Work (BSW) degree, which is accredited by the Council on Social Work Education. Students complete a curriculum based on the liberal arts that incorporates a professional foundation, including social work practice, human behavior and diversity, community social services, social policy, and research methods. Optional courses offer opportunities to study in depth various social work practice areas such as child welfare, aging, health care, addictions recovery, African American families, school social work and a study abroad program in Guatemala. Students complete three pre-professional placements and a 480-hour field placement in a social service setting. A minor in Social Work is available; an MSW (Master of Social Work) degree is available.

The mission of the Department of Social Work is to prepare students for entry-level generalist professional practice with diverse populations in urban and rural areas of North Carolina. The program uses a framework that advances cultural respect, human rights, and social and economic justice and contributes to the empowerment of individuals, families, groups, and communities that experience oppression and discrimination. The program also prepares students for advanced graduate-level academic work. The curriculum is a liberal arts base that includes English, literature, history, natural science, math and statistics, foreign language, philosophy, social sciences, physical education, diversity, global perspectives, interdisciplinary perspectives, and free electives. Forty-three hours of core social work courses and 3 hours of social work electives complete the 121 hour graduation requirement. Enrollment in practice and field classes is limited to social work majors, and no credit towards the social work degree is given for student life experiences.
Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Opportunities

Social work is an exciting, challenging, and dynamic profession. No matter what the political climate or the changing nature of personal or social need, social workers will be in demand. The BSW Program provides students with the knowledgeable, values, and skills to respond competently to 1) the aspirations and service needs of diverse client populations and 2) the contexts that shape the needs of clients and service delivery systems throughout the state. Social workers are employed in a variety of settings which include health care, mental health, services to the aging, child welfare, public welfare, addictions recovery, public schools, developmental disabilities, and many other public and private settings. In each of these areas there is recognition for professional preparation, and the BSW graduate will be prepared to embark upon a career in his or her chosen field. All states, including North Carolina, have licensing or certification procedures for social work practice. Graduation from the Department of Social Work makes the student eligible for such licensing or certification.

Minor in Social Work

The minor is designed to familiarize students with the social service system, major social welfare programs, and elements of the profession of social work. The student takes four required courses and selects one additional course from elective offerings, which represent the contribution of professional social work in a number of settings.

Student Organizations

Baccalaureate Student Social Work Association (BSSWA) is open to all majors and gives students the chance to interact with other Social Work majors and practitioners in the community to share concerns and ideas and to undertake fund-raising and service projects for the community. It is an organization run by students and aims to help students enhance professional development and promote human dignity.

Phi Alpha Honor Society is national honor society for social work students. A BSW student is eligible for membership after achieving national and local chapter requirements which include having sophomore status, achieving a 3.0 overall grade point average and a 3.25 grade point average in required social work courses, matriculating into the professional degree program, and completing 9 hours of social work courses.

Matriculation into the Professional Degree Program

The social work faculty is committed to helping all entering students evaluate career goals and objectives to ensure that the students meet minimum academic standards; have goals and objectives compatible with the major; and know specifically what the profession of social work is in terms of its philosophy, value base, and fields of practice. The matriculation procedure is intended to strengthen the student’s certainty regarding career choice and to enhance the student’s focus and sense of purpose in curriculum planning. Specific components of the matriculation procedure include: (1) applicant must be a current social work major; (2) completion with a grade of B- or better in two of the following courses: SW 201, 290, 307, 310, and/or 312; (3) completion of the application to matriculate; and (4) completion of a personal interview with the Department Student Review Committee if requested. The Department of Social Work Student Handbook spells out further details of this procedure, as well as other elements of the department.

Child Welfare Education Collaborative

The NC Child Welfare Education Collaborative strengthens public child welfare services in the state by increasing the number and diversity of well trained and highly committed BSWs and MSWs working in local Departments of Social Services. Any BSW student interested in a course of study leading to employment and leadership in public child welfare is eligible to apply for the program. Candidates for $4000/semester service awards must have matriculated into the professional degree program and agree to work in child welfare in a county Department of Social Services for up to 1 1/2 years following graduation. Further information about the Collaborative Program is available online.

DEPARTMENT OF SOCIOLOGY AND ANTHROPOLOGY

1911 Building, Room 334
phone: (919) 515-3180

M.P. Atkinson, Head
S. C. Lilley, Associate Head and Department Extension Leader
D. A. Curran, Undergraduate Administrator
T.N. Greenstein, Director of Graduate Programs, Sociology
A.L. Schiller, Director of Graduate Programs, Anthropology
S.C. Lilley, Department Extension Leader

Sociology Teaching, Research and Extension Faculty: Goodnight-Glaxo Wellcome Distinguished Chair of Social Science: C.R. Tittle; William Neal Reynolds Professor: R.C. Wimberley; Alumni Distinguished Graduate Professor: M.D. Schulman; Distinguished Professor: V.M. Aldige; Alumni Distinguished Undergraduate Professor: L.R. Della Fave; Professors: M.P. Atkinson, T.N. Greenstein, T.J. Hoban, E. L. Kick, J.C. Leiter, P.L. McCall, T.L. Parcel, M.L. Schwalbe, M.A. Zahn; Associate Professors: F. Chen, S.M. DeCoster, R.L. Engen, S.C. Lilley, W.R. Smith, M.E. Thomas, M.S. Thompson, R.J. Thomson; Assistant Professors:
College of Humanities and Social Sciences

S.K. Bowen, B.L. Clark, M. Crowley, S.G. Elliot, A.K. Jorgenson, S. McDonald; Professors Emeriti: W.B. Clifford, E.M. Crawford, T.N. Hobgood Jr., R.L. Moxley, R.D. Mustian, L.B. Otto, M.M. Sawhney, M.E. Voland; Associate Professors Emeriti: R.C. Brisson, R.F. Czaja, A.C. Davis, S.K. Garber; Associate Member of the Faculty: J.R. Thigpen (Sea Grant); Adjunct Professor: B.A. Risman (University of Illinois-Chicago), A. Thompson (North Carolina A&T State University); Adjunct Associate Professor: C.R. Zimmer (UNC-Chapel Hill).

Anthropology Teaching and Research Faculty: Alumni Distinguished Undergraduate Professor: A.L. Schiller; Associate Professors: N. Haenn, A.H. Ross, J.M. Wallace; Assistant Professors: D.T. Case, R.S. Ellovich, S.M. Fitzpatrick, J.K. Jacka; Associate Professors Emeriti: G.S. Nickerson, I. Rovner, M.L. Walek; Associate Teaching Professor: W.E. Wormsley

The Department of Sociology and Anthropology offers introductory and advanced courses in sociology and anthropology covering the major subfields of the two disciplines. It also offers supervised fieldwork and practical experiences required for certain curricula in the department.

Aims of the departmental offerings are to provide majors with academic background and experience useful for many careers in government and industry or for pursuing advanced academic work (for a description of the graduate degrees offered by the department, see the Graduate Catalog) and to provide service courses to other students.

The department, jointly administered by the Colleges of Humanities and Social Sciences and Agriculture and Life Sciences, offers seven undergraduate curricula. The five curricula administered by the College of Humanities and Social Sciences are Bachelor of Arts in Sociology, Bachelor of Arts in Criminology, Bachelor of Arts in General Anthropology, Bachelor of Arts in Applied Anthropology, and Bachelor of Arts in Bioarchaeology.

Honors Program

In this program, outstanding majors pursue an individual program of study involving close working relations with departmental faculty. Twelve credit hours of honors courses will allow students to enhance their expertise in sociology and anthropology. Honors courses combine nine hours of credit in regular and independent study classes with a three-credit honors thesis done in consultation with a faculty honors adviser.

To be admitted, students must have earned 12 hours in their major and have a 3.25 overall GPA and a 3.25 in the major. To graduate with Sociology/Anthropology Honors, the student must have a 3.25 GPA overall and in the major. Successful completion of the program is noted on the student’s transcript diploma and at commencement.

Bachelor of Arts in Sociology

Sociology studies the behavior and interaction of people as they operate in society. The groups that people form such as families, peers, ethnic groups, and social classes are investigated. The following departmental requirements must be met by all students majoring in sociology: A minimum of 31 hours in the major field including SOC 202, SOC 300; theory, SOC 400 or 401; no more than three additional credit hours of 200-level sociology courses; and, at least 12 credit hours of 400 level or above sociology courses. Additional electives in sociology may be at the 300 level or above. ST 311 is also required.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Bachelor of Arts in Anthropology

The major introduces students to anthropology with basic and advanced offerings in the subdisciplines of the field. The comparative nature of anthropology is reflected by courses based in a variety of geographical areas. Theory and methods courses are required. An internship is required for the applied concentration. Specific curriculum requirements are available online: www.ncsu.edu/curricula.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Bachelor of Arts in Criminology

The Criminology degree seeks to develop a professional orientation that will be relevant both to occupational goals and participation as a citizen in community affairs. Courses provide a general background in the causes of crime and the agencies of criminal justice. More specific areas covered deal with deviance, juvenile delinquency, the court system, correctional facilities, and the like, including field placement in an agency of the criminal justice system.

Specific curriculum requirements are available online: www.ncsu.edu/curriculum

Minor in Anthropology

A minor in Anthropology focuses on the comparative study of human beings, with emphasis on biology and behavior. A flexible selection of courses (15 credit hours) includes offerings from anthropological subdisciplines such as cultural anthropology, physical anthropology, archaeology, and linguistics.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curriculum.
Minor in Criminology
The criminology minor emphasizes criminological theory and research. The minor is grounded in sociological theory and methods and allows students flexibility in the choice of specialized criminological study such as juvenile delinquency, sociology of law, formal institutions of social control, community and crime, and data analysis in criminology, ideology and social justice.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Minor in Sociology
This minor emphasizes sociological theory and research with substantive applications. The minor builds on theory and methodology and allows students flexibility in the choice of sub-specialties such as stratification, race and ethnic relations, agriculture, development, work and organization, or the family.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.
Advances in science and medicine, technology and engineering are continually changing how we live, learn, work, and play. The College of Management’s curriculum provides students the knowledge and skills needed to launch careers in our dynamic global business community. Graduates will be prepared to seek positions with large corporations, small firms and startups, nonprofit organizations, government agencies, or to start their own businesses. Others choose to pursue advanced studies in law, professional accounting, economics and business administration.

The college’s academic programs provide a wide range of options that enable students to build on their personal interests and strengths, and to explore new directions. Students may study accounting, information technology, financial management, supply chain management, marketing, economic analysis, human resource management, or entrepreneurship. Communication skills and computer literacy are integrated in the curriculum, along with project-based, hands-on learning that provides valuable real-world experience.

Students also acquire a strong liberal arts background through general studies and electives that they choose from the many options available through NC State’s historically strong academic programs in science, technology, engineering, humanities and social science. Dual degree and interdisciplinary programs are also available, and students are encouraged to participate in study abroad, internships, and co-op programs.

NC State University is accredited by AACSB International--the Association to Advance Collegiate Schools of Business. Accreditation brings the College of Management into the select ranks of the best business and management schools in the world.

A large number of the college’s faculty are members of NC State’s Academy of Outstanding Teachers, and many others have been honored for their teaching, research and service. Research groups and teaching initiatives provide opportunities for focused study and applied learning in entrepreneurship, innovation management, supply chain management, and other areas. The faculty is organized into four departments: Accounting; Business Management; Economics; and Management, Innovation, and Entrepreneurship.

Degree Programs

The college offers four undergraduate degree programs: B.S. in Accounting, B.S. in Business Administration, and a B.A. and B.S. in Economics. Accounting and Business Administration are professional degree programs.

New freshmen will enter the college as undeclared majors. In their third semester, students will choose which degree program they want to pursue. Transfer students matriculate directly into their chosen degree program.

The Accounting program provides a broad business education and a specialization in accounting issues and skills. Students develop interpersonal, teamwork and problem-solving skills, and learn how to apply technology in the accounting field. The curriculum includes financial and managerial accounting, taxation, business law and ethics, auditing and accounting information systems. Four concentrations are offered: financial analysis, information systems, managerial accounting, and internal auditing.

Outstanding students completing the Bachelor of Science in Accounting program may choose to apply directly to the Master of Accounting (MAC) program, earning the graduate degree with just one additional year of coursework. Successful completion of the graduate program qualifies students to sit for the Certified Public Accounting (CPA) exam.

The Business Administration curriculum focuses on integrating the core business functions and offers six concentrations. All students take foundation courses in finance, marketing, strategy, business law, supply chain/operations management, human resources and information systems and select a concentration in one of the following areas: entrepreneurship, finance, human resource management, information systems/information technology, marketing, and operations/supply chain management. The curriculum emphasizes computer skills and the application of information technology, teamwork, problem-solving and ethical and critical thinking for decision making.

The Economics program provides a broad education in the liberal arts with a specialization in economic theory and application. Students can select the Bachelor of Arts in Economics degree, which provides more liberal arts courses, or the Bachelor of Science in Economics, which includes a greater focus on business, mathematics, statistics, and science. The program is flexible, and with careful planning, students can easily pursue an economics degree along with a minor or even a second major in another area.

For those interested in advanced studies, the college also offers graduate degrees: Master of Accounting, Master of Economics, Master of Business Administration, Master of Global Innovation Management and Doctorate in Economics.

Alexander Hamilton Scholars Program

The Alexander Hamilton Scholars Program is a dual-degree program sponsored jointly by the College of Management and the College of Humanities and Social Sciences at NC State. Students earn one degree in either accounting, business administration or economics and a second degree in international studies. This program includes a focus in a foreign language as well as a specialization in a region of the world or a theme in international studies.

Hamilton Scholars participate in special programs designed to increase their exposure to leading-edge management practices, international business, and foreign cultures. These programs include lectures and seminars, and participation in corporate tours and field trips, and scholars’ banquets.
Requirements for this program include advanced study in a foreign language, a management capstone course (a business policy and strategy course or economics seminar) with a strong global orientation, and several additional courses on topics such as international relations, global affairs, and intercultural communication. Each Hamilton Scholar is required to complete at least one international experience lasting a minimum of six weeks.

For more information, contact the Office of Undergraduate Programs in the College of Management, 2150 Nelson Hall.

Academic Minors

Students enrolled in other majors at NC State may choose to minor in accounting, business administration, or economics. See each department section below for details.

Student Organizations

Numerous student organizations provide opportunities for undergraduate students to gain valuable leadership and business experience and to participate in service and professional development activities. Information about College of Management student organizations is available at mgt.ncsu.edu/current/student_organizations.php.

Student Services

The College of Management provides comprehensive academic advising services to undergraduate students. Each student is assigned to a professional advisor who works with the student from freshman to senior year to plan their academic programs. The college also has career development staff dedicated to working with our students seeking internships and career positions upon graduation.

Scholarships

In addition to university-wide awards, the college has several scholarships for College of Management majors, primarily for entering freshmen. The college reviews all freshmen applicants for admission who may be eligible for scholarships. Upperclassmen are encouraged to contact the University Financial Aid office for more information on the availability of scholarships.

Admission to the College of Management

To learn more about admission requirements and how to apply to the College of Management, visit mgt.ncsu.edu/undergraduate/future_students/.

DEPARTMENT OF ACCOUNTING

3102 Nelson Hall
phone: (919) 515-2256

F. A. Buckless, Department Head

The accounting program provides education and training to individuals who will pursue careers as professional accountants in consulting, business, government, and industry. The Department of Accounting offers Bachelor of Science and Master of Accounting degrees. The Bachelor of Science degree requires the student to specialize in one of four concentrations: information systems, financial analysis, managerial accounting or internal auditing. The Master of Accounting (MAC) degree program produces more specialized accounting professionals and responds to the American Institute of Certified Public Accountants mandated 150-hour education requirement for certification.

The curriculum consists of a broad foundation in humanities, social science, science and mathematics; a comprehensive business core; a comprehensive accounting core; and a concentration in a functional accounting area.

Opportunities

The field of accounting deals with identifying, measuring and communicating information to assist individuals and companies in making informed economic decisions. Accounting provides students with excellent career opportunities. Individuals graduating with an accounting degree can expect to be exposed to all aspects of an organization from a broad top-down perspective.

Curriculum and Degree Requirements

All accounting majors are subject to the department’s residency requirement: a minimum of 30 credit hours of course work after being formally admitted to the B.S. degree program in Accounting (or the B.S. in Business Administration). In addition, accounting majors must complete at least 30 hours of major courses and specified accounting courses in residency at NC State.

Minor in Accounting

The Accounting Minor is offered to students interested in gaining a basic knowledge of accounting and to supplement another degree.

For additional information, view the curriculum and courses information on the College of Management’s website at www.mgt.ncsu.edu/undergraduate/current/minors.php.
The Bachelor of Science degree in Business Administration is offered jointly by faculty in the Departments of Business Management and Management, Innovation and Entrepreneurship. This degree program prepares students for careers in consulting, business, government, or nonprofit organizations and for graduate study in business, law, and related fields. The curriculum offers a broad professional education with a specific concentration in a business field: entrepreneurship, finance, human resource management, marketing, management information systems, operations/supply chain management, and entrepreneurship.

The curriculum consists of a broad foundation in humanities, social science, science, and mathematics; a comprehensive business core; and a concentration in a functional business area of specialization.

**Opportunities**

Graduates of this degree program are prepared for a variety of careers in business or industry, including banking and finance, manufacturing, product development, human resources, IT management, business analysis, consulting, and new business development. They have the knowledge and tools to launch new business ideas and succeed in management positions.

**Curriculum and Degree Requirements**

All business administration majors are subject to the department’s residency requirement: a minimum of 30 credit hours of course work after being formally admitted to the B.S. degree program in Business Administration (or the B.S. in Accounting). In addition, business administration majors must complete at least 30 hours of major courses while in residency at NC State.

**Minor in Business Administration**

The Business Administration minor is offered to students interested in gaining a basic knowledge of business practice to supplement another degree. Additionally, students may complete an additional focus in Entrepreneurship within the Business Administration minor. Students majoring in Textile and Apparel Management (TXM) or Agricultural Business Management (ABM) may apply up to six hours of major coursework to the minor. Students must apply for admission to the Business Administration minor program. For information and an application visit: mgt.ncsu.edu/undergraduate/current/minors.php. Enrollment in upper level business courses is restricted to students enrolled in the degree or minor program.

**DEPARTMENT OF ECONOMICS**

The Department of Economics offers both Bachelor of Arts and Bachelor of Science degrees in economics. The Bachelor of Science degree also offers a concentration in Business Economics. An undergraduate program in economics prepares a student for careers in business and government as well as for many graduate and professional degree programs.

Economics students can develop their understanding of economic issues in a variety of areas including financial institutions, international trade and finance, labor and industrial relations, health care economics, environmental and natural resource economics, public finance, and economic history.

An economic degree provides rigorous analytical training with a broad understanding of the workings of the economic system. Its flexibility allows students to tailor their education to specific interests and career goals.

**Opportunities**

An undergraduate degree in economics has long served as the foundation for advanced professional degrees and graduate study in economics as well as jobs in business, law, industry and government.
Curricula and Degree Requirements
The Bachelor of Arts in Economics is a broad and flexible program of study. The major course work for the B.A. in Economics includes courses in economic theory, mathematics and statistics as well as courses in advanced, applied economics. The program provides for substantial flexibility, so students may tailor their studies to their particular interests and long-term goals.

The Bachelor of Science in Economics emphasizes training in analytical methods in economics. It differs from the Bachelor of Arts by placing greater emphasis on courses in mathematics, science, and statistics. The B.S. in Economics also includes a concentration in business economics that combines training in Economics with courses in core business functions.

Honors Program
The Honors Program in Economics is designed for academically talented and motivated students who desire a richer educational experience than offered in regular courses. The primary goal of this program is to help students develop the ability to apply economic analysis to a variety of issues at the individual, household, firm, and government level.

Class size is kept small in honors sections to accommodate discussion and interaction among students and with the instructor. Students graduating with honors in economics are well prepared for graduate or professional school or for entering the private or public sector job market.

Students enrolled in the University Scholars program or who have completed 30 hours at NC State with an overall GPA of 3.25, or better, may enroll in economics honors courses.

To be certified as a graduate of the economics honors program, students must have at least a 3.25 GPA in all economics courses attempted at NC State and an overall GPA of 3.25 or higher. In addition, students must complete specific course requirements.

Questions about the economics honors program should be directed to the Department of Economics.

Minor in Economics
The Minor in Economics is available to undergraduate students majoring in an area other than economics. The Minor in Economics is an excellent complement to many majors within the university, including international studies, political science, statistics, business administration, accounting, and engineering.

For additional information, view the curriculum and courses information on the College of Management’s website at mgt.ncsu.edu/undergraduate/current/minors.php
NC State University  
College of Natural Resources  
Bringing science, technology, policy and people together to work for a healthy and sustainable tomorrow.

VISION  
We desire to improve the sustainability of the world’s natural resources and economic and social condition of its people through education, innovation and the discovery and dissemination of new knowledge.

MISSION  
Our mission is to serve as a leader in our disciplines in North Carolina, the nation and the world. We seek to strengthen natural resource management, enhance environmental quality and conservation values, increase the sustainable yield of forestland good and services, increase the value and competitiveness of the forest products and natural resource-based industries, expand recreation and tourism opportunities, and enhance the health and well being of our citizens through superior professional education, innovative scientific research, and dissemination of credible and timely information.

Values  
We value—
- Academic excellence in all of its forms—the scholarships of discovery, teaching, information transfer and scientific integration.
- Both cutting-edge research in fundamental science and translational research to address practical problems in North Carolina, the nation and the world.
- Diversity of disciplines, people, places and ideas
- Our students, staff and faculty and are committed to nurturing all.

We admire—academic and scientific rigor and dedication

We seek—innovative and creative solutions to today’s problems.

We strive—for collegiality and appreciate friendly service.

We aspire—to leadership in all of our disciplines.

We intend—to make the world a better place for this and future generations.

Degree Programs  
The College of Natural Resources offers programs of study leading to baccalaureate and graduate degrees in the management and use of natural resources, and also offers courses in these areas to students in other colleges. Ten professional curricula are administered in the college through its Departments of Forestry and Environmental Resources; Parks, Recreation and Tourism Management; and Forest Biomaterials. These programs provide a broad education in the biological, physical, and social sciences as well as a sound cultural and professional background. Baccalaureate degrees prepare students for careers in the fields of fisheries and wildlife management; forest management; natural resources assessment and policy; environmental monitoring, testing and remediation; parks, recreation and tourism management; professional golf management; sport management; paper science and engineering; environmental science-watershed hydrology; and wood products.

Graduate degrees offered include Master of Science, Master of Forestry, Master of Natural Resources Administration, Master of Wood and Paper Science, Master of Parks, Recreation and Tourism Management, and the Doctor of Philosophy. Graduate degree programs may be tailored to a variety of specialized and interdisciplinary topics related to the teaching and research activities of the college. In addition, a graduate certificate in Graphical Information Systems is available to NC State students who wish to develop recognized academic credentials in the GIS area. Applicants should consult the Graduate Catalog for additional information about these programs.

Student Activities  
Each department in the college has student curriculum clubs within the degree programs and/or student chapters of the appropriate national professional organizations. All of these organizations provide opportunities for professional development, for interaction with faculty and other students, and for participation in local, regional, and national student and professional activities. Student representatives from each organization and curriculum serve on the College of Natural Resources Council. The Council provides overall coordination for student activities, allocates funds for student activities, and oversees production of the Pinetum, the College of Natural Resources student yearbook.
CNR Ambassadors
The CNR Ambassador Program highlights the “student face” of the college. The group is composed of leaders from each program in the college, following a college-wide nomination and selection process. Their activities include representing the college in many ways, ranging from mentoring freshmen to working with prospective students, through shadowing experiences, phone calls and campus tours. In addition the Ambassadors represent their programs and the college to outside visitors, such as the Board of Trustees, Foundation officers, and others who would like to know about the CNR student experience at NC State.

Facilities and Laboratories
In addition to standard classrooms and teaching laboratories, the College of Natural Resources has a unique complex of indoor and field facilities that are utilized in the academic programs. CNR computer facilities provide access to disciplinary applications such as geographic information systems, remote sensing, and management/planning software as well as to the university computer network. Included are a general computer lab, two classrooms incorporating a flexible landscape, plasma screens and laptop computers providing the breadth of teaching/learning approaches, a high-tech “collaboratory” designed especially for student team project work. Also available are several different analytical and biotechnology facilities, a photo interpretation lab, an extensive herbarium, and a wood sample collection. About 95,000 acres of forestland are available for field instruction and research at Chowan Swamp, Bull Neck Swamp, Goodwin Forest, Hill Forest, Hofmann Forest, Hope Valley Forest, Hosley Forest and Schenck Forest. Slocum Camp, the site of the annual forestry and wildlife camps at Hill Forest, contains classrooms, dining facilities, and student and staff housing. Specialized pilot plant laboratories unique to wood and paper science are contained in the Hodges Wood Products Laboratory and the Reuben B. Robertson Pulp and Paper Laboratory. Equipment in the Hodges Laboratory includes computer controlled woodworking machinery, dry kilns, veneer lathe and numerous other items required to convert wood into products. The Robertson Laboratory is a 50,000 sq. ft. facility, which contains laboratories and modern pulping and paper making equipment dedicated to teaching and research activities. Examples of equipment are secondary fiber recycling equipment, a thermo-mechanical pulping unit, a pilot-scale paper machine, process control equipment, paper testing laboratory, and pulping digesters.

Fields of Instruction and Work Experience
All curricula in the college have strong components of hands-on field and laboratory instruction and experience, and all either require or strongly recommend on-the-job work experience. All students are required to complete the equivalent of one or more of the following summer activities: camp, internship, practicum, and work experience. The Forest Management and Fisheries and Wildlife curricula both have required summer camps. Undergraduates enrolled in Parks, Recreation and Tourism Management complete a 9-week internship immediately following the completion of the junior year. All Paper Science majors complete a 12 week internship in an industrial setting approved by the college. Wood Products students are required to complete a summer internship in the industry. Students in all curricula are encouraged to participate in summer jobs and the cooperative education program to gain work experience.

Outdoor and other practical laboratories are a regular part of some courses. In other courses, field instruction may include longer trips (often on weekends) to privately owned businesses and industries, governmental agencies, state and federal forests, and wildlife refuges.

Honors and Scholars Programs
The College of Natural Resources participates in the University Honors Program, the University Scholars Program, and the Women in Science and Engineering (WISE) Program in which exceptional new students (freshman or transfer) are selected for special courses and activities that provide an expanded educational experience.

The College of Natural Resources also offers a disciplinary honors program, which offers the opportunity for advanced students with outstanding records to enhance the depth of study in their major field. Students with an overall GPA of 3.0 or better and a major GPA of 3.25 or better are invited to participate in the Honor’s Program. Students must have at least 40 hours of credit. Honors students develop more rigorous programs of study, frequently taking advanced courses in mathematics, science, or social science, or graduate courses in the chosen curriculum. With the adviser’s consent honors students may substitute preferred courses for normally required courses in order to develop strength in special interest areas. Honors students are required to undertake a program of independent study, which can involve a research problem or special project during their junior or senior year, and they must participate in the senior honors seminar.

Two honor societies in the College of Natural Resources promote and recognize academic excellence: Xi Sigma Pi (for majors within the Forestry and Wood & Paper Science) and Rho Phi Lambda (for recreation majors). Advanced undergraduate and graduate students with high academic achievement are invited to become members of these societies. High achieving forest management and natural resources students are also eligible for recognition by two agriculture honor societies, Alpha Zeta and Gamma Sigma Delta. All students are also eligible for recognition by the campus-wide honor societies.

Gifford Pinchot Scholars Program
The Gifford Pinchot Scholars Program, a joint program with the College of Humanities and Social Sciences, follows the model established by the Jefferson, Franklin, and Whitney Programs. Academically talented students may pursue simultaneously a B.S. degree in the Department of Forestry and Environmental Resources and a B.A. degree through the College of Humanities and Social Sciences. The Pinchot Scholars Program is limited to a small number of highly qualified and motivated students. Scholarship support is available to some participants in the Pinchot Scholars Program, but the primary degree must be in the Department of Forestry and Environmental Resources to qualify.
This interdisciplinary studies major places resources management in the context of cross-cultural perspectives, global issues, and public policy. The exact set of courses that will constitute the major will be determined by the student in consultation with their advisory group. Each student is assigned an advisory group consisting of an academic adviser from each college, plus a mentor from industry. Pinchot Scholars also participate in existing cooperative activities with other double-degree program scholars. For more information, contact the Director of Undergraduate Programs, Dr. Gary Blank at (919) 515-7566 or gary_blank@ncsu.edu.

**Scholarships**
The College of Natural Resources administers a large program of academic scholarships that is separate from the University Merit Awards Program. About 170 academic scholarships (ranging from $1,000 to $10,000 per year), renewable annually, are awarded to entering freshmen and transfer students. The appropriate departments accept applications, and based on academic excellence and leadership award the scholarships administered through the North Carolina Forestry Foundation and the Pulp and Paper Foundation.

**Computer Competency**
Extensive use of computers and workstations is incorporated throughout all curricula of the College of Natural Resources. Students are expected to use the computer for increasingly complex class assignments and for the preparation of papers and reports. Computing resources are available for student use in the college and elsewhere on campus, but many students find it more convenient to purchase a personal computer. Questions about such purchases should be directed to the Associate Dean for Academic Affairs or the appropriate departmental curriculum coordinator.

**International Activities**
Students in the College of Natural Resources are exposed to the international dimensions of their programs in a variety of ways. Many faculty members regularly travel abroad and a number are active in major projects in foreign countries, including an international cooperative research project concentrating on Central American and Mexico, faculty exchange programs with Sweden and Finland, and several recent agreements for student exchange programs in Asia and South America. With the faculty’s experiences, the international aspects of many topics are covered in core courses, and several elective undergraduate and graduate courses focus specifically on the international dimensions of natural resource management. In addition, many international students enroll in the college with as many as 21 different countries represented in recent years. There are also in-the-major study abroad opportunities, which are led by CNR faculty, and which range from two-week trips to five-week summer sessions. Recent study trips have included China, Australia, Namibia, Ghana, Sweden, and Chile. There is also scholarship support to help students take advantage of international job opportunities.

**DEPARTMENT OF FORESTRY AND ENVIRONMENTAL RESOURCES**
Jordan Hall, Room 3119
phone: (919) 515-2891
B. Goldfarb, Head
G.B. Blank, Director of Undergraduate Programs
S.T. Warren, Director of Graduate Programs

Alumni Distinguished Graduate Professor: F.W. Cubbage: Alumni

The undergraduate program of the Department of Forestry and Environmental Resources prepares students for professional challenges, personal growth, and a lifetime of service as managers of natural resources. Each degree curriculum is designed to produce well-educated graduates who have the basic knowledge, skills, flexibility, and attitude needed for successful professional performance in a wide variety of career opportunities. Graduates will be prepared to face the challenges of competing uses of natural resources and the environment, and the pressures for increasing production of goods and services from natural ecosystems while maintaining their quality for future generations.
The Department of Forestry and Environmental Resources strives to enroll and graduate a high-quality culturally and ethically diverse student body to enhance the diversity and richness of forestry, fisheries and wildlife sciences, environmental technology and natural resources professionals, as well as international study abroad opportunities. Its academic curricula are enriched by out-of-class contacts among students, faculty, and practicing professionals, which promote a sense of professionalism and global awareness. Gaining practical experience is encouraged through participation in summer employment, internships, undergraduate research opportunities, and the cooperative education program.

The department has six Bachelor of Science programs: Forest Management, Natural Resources Ecosystem Assessment, Natural Resources-Policy and Administration, Fisheries and Wildlife Sciences, Environmental Sciences-Watershed Hydrology, and Environmental Technology. The Forest Management curriculum provides the broad-based forestry education needed for direct employment into positions in a wide variety of forestry or forestry-related organizations. The Natural Resources curricula provide more generalized, interdisciplinary programs in natural resources management that focus on the area indicated in the curriculum titles. The Fisheries and Wildlife Sciences curriculum provides specialization in ecological principles needed to conserve and manage fisheries and wildlife resources. The curriculum in Environmental Sciences Watershed Hydrology focuses on the specialized area of hydrologic science and watershed management. The Environmental Technology curriculum provides broad-based and applied skills for the assessment and management of society’s impact on the environment.

Instruction and practice in communications skills (both writing and speaking) are integrated into the required forestry (FOR) courses throughout the Forest Management curriculum and natural resources (NR) courses of the Natural Resources curriculum, and in several of the professional courses of the Environmental Sciences Watershed Hydrology, Environmental Technology, and Fisheries & Wildlife Sciences curricula. The communications-across-the-curriculum program produces graduates who are highly competent and confident in the communication skills needed by successful natural resource managers and environmental sciences professionals.

The use of computers is integrated into all of the curricula in the department. Computer-aided assignments are integrated into many of the advanced courses. The curriculum in Environmental Sciences Watershed Hydrology has a heavy emphasis on computer applications (including programming) throughout the curriculum.

Information on department programs may be obtained by contacting Dr. Gary Blank, Director of Undergraduate Programs, Department of Forestry and Environmental Resources, NCSU, Box 8008, Raleigh, NC 27695-8008, phone (919) 515-7566, e-mail: gary_blank@ncsu.edu.

Scholarships

The Department of Forestry and Environmental Resources annually awards four types of scholarships that are available to freshmen, transfers, and advanced students: Academic, Forestry & Wildlife Summer Camp, Industrial and Work-Study. About 40 Academic Scholarships varying between $4000 and $7000 are awarded annually in May for the following academic year and are renewable provided that superior progress is made toward a degree. Timber sales from the James L. Goodwin and Hofmann forests and nineteen endowments provide these awards.

Nine scholarships support students attending forestry or wildlife summer camps. Each award provides $500-$1000. Six endowments support these awards.

Three Industrial scholarships are available each year. In addition to cash awards of $2000 - $4000, the Industrial Scholarships provide practical work experience with industrial forestry organizations. Industrial Scholarships are supported by grants.

Approximately 18 Work-Study Scholarships are awarded each year, generally to juniors and seniors. Work-Study Scholarships, currently at $4032 each, carry a work requirement, which is usually satisfied by assisting with operational activities on the college forests. This requirement means that recipients must be advanced students with some field skills.

Scholarship applications or questions should be directed to Dr. Richard Braham, Scholarship Coordinator 3003 Biltmore Hall, phone: (919) 515-7568, fax: (919) 515-8149, e-mail: richard_braham@ncsu.edu.

Cooperative Education, Internships, and Summer Work Experience

Practical work experience is an important component of the professional degree programs in the Department of Forestry and Environmental Resources. Experience may be gained through participation in the Cooperative Education Program, summer work, and internships. The department has established professional relationships with employers in forestry, wildlife, fisheries, environmental technology and natural resources and provides placement assistance for the work experience programs. The Fisheries and Wildlife Sciences Program offers summer internships with research faculty and others across the state. The Cooperative Education Program, which requires a minimum 2.25 GPA after at least one year of study (many employers require a higher minimum), involves alternating semesters or summer periods on the job with semesters on campus for classes. A total of 12 months of work experience is required. Students who successfully complete the co-op program are in high demand by employers. Interested students should contact the department placement officer, Dr. Gary Blank, phone: (919) 515-7566, fax: (919) 515-6193, e-mail: gary_blank@ncsu.edu.

Dual Degree Programs

Students enrolled in one of the department’s degree programs who have a strong interest in another degree topic may obtain a second baccalaureate degree in addition to the primary one. Such dual degree programs may be designed to provide a broader base in a related technical field such as wood products or soil science, or to broaden the student’s knowledge and skills in a supporting field.
College of Natural Resources

such as business, economics, sociology, or political science. Majoring in dual degree programs require coordination of the courses required in both curricula and the additional time required to complete them depends on the similarity between the curricula and the use of electives in one to satisfy required courses in the other. One to several extra semesters may be required to complete two degrees but expanded employment opportunities are a definite benefit.

Transfer Students
The Department of Forestry and Environmental Resources accepts NC State students as on-campus transfers, as well as students with good academic records from other accredited colleges and universities. Students at community colleges or other baccalaureate institutions who plan to transfer to one of the department’s degree programs should closely follow the desired curriculum by taking equivalent courses. Only equivalent courses will be credited to the appropriate degree program after enrolling at NC State, and the time required to complete the degree will depend on the courses remaining in the degree track. Students applying for the Forest Management curriculum must have at least 30 credits equivalent to those in the freshman and sophomore years and must transfer in the fall of the sophomore year in order to complete the courses required for summer camp. Formal articulation agreements exist with the four forestry programs at North Carolina community colleges and those students do not need to attend Summer Camp. Questions about transfer procedures, admissions criteria, or courses should be directed to Dr. Gary Blank, Director of Undergraduate Programs, Department of Forestry and Environmental Resources, NCSU Box 8008, Raleigh, NC 27695-8008, phone: (919) 515-7566, e-mail: gary_blank@ncsu.edu.

Curriculum in Forest Management
The curriculum in Forest Management is a professional program accredited by the Society of American Foresters that has long been ranked as one of the best in the country. The Forest Management curriculum satisfies the education requirements to become registered (licensed) forester by the North Carolina State Board of Registration for Foresters. With a rigorous math and science base, the curriculum produces graduates with a broad education in natural sciences, humanities and social sciences, communications skills, technology and the practical knowledge and skills needed for sound management of the multiple resources of natural and managed forest ecosystems. Preparatory courses in the freshman and sophomore years are followed by the nine-week forestry summer camp where the woods knowledge and field skills that are essential for all foresters are acquired. Core courses of the junior and senior years focus on forest ecosystem processes, applied economics, operational practices in the forest stand management, measurement and analysis of forest stand components, policy issues in natural resource management and the management decision-making tools and skills needed to develop and implement forest management plans.

Forestry Summer Camp
An intensive, full-time, nine-week summer camp with training in the Coastal Plain, Piedmont, and Mountain regions of North Carolina is required in the Forest Management curriculum. The camp is based at the college’s Hill Demonstration Forest located in Durham County, NC with trips taken to other regions. Students take summer camp between the sophomore and junior year and earn nine-semester credits in required courses that provide a base of knowledge and skills for the advanced courses in the junior and senior years.

Opportunities
Graduates in Forest Management are in high demand by state and federal land management agencies, forest products companies growing wood as a raw material, investment firms and insurance companies with land ownership portfolios, state forestry and agriculture extension services, the Peace Corps, environmental and wetland consulting firms, wood procurement companies, nursery and landscape management firms, and environmental organizations. After several years of experience, many graduates start their own businesses in forestry and land management consulting. Some graduates continue their education in graduate school to specialize in a wide variety of forestry and related programs.

Minor in Forest Management
The Forest Management minor is open to all undergraduate degree students at NC State, except majors in Forest Management, who are interested in learning the basics of the structure and functioning of forest ecosystems and the policies and practices of forest management. The minor will be useful to students in related career fields who wish to have a better understanding of the scientific and policy issues involved in the sound stewardship of the nation’s forests. The minor will also be useful to students who may be responsible for management of natural resources or interacting with foresters.

The minor in Forest Management requires a minimum of 15 credit hours, in one of the following options: Option A - FOR 172, FOR 212, FOR 252 and 6 hours of electives; or Option B - FOR 172, FOR 212 and attend forestry summer camp. Students who are interested in instruction and field experience in forestry technical skills should choose option B. For additional information, contact Dr. Gary B. Blank, Director of Undergraduate Programs, gary_blank@ncsu.edu or (919) 515-7566.
Minor in Wetland Assessment

The Undergraduate Minor in Wetland Assessment is an interdisciplinary, interdepartmental minor that is designed to provide the requisite knowledge of skills needed for entry-level competence in wetland delineation and assessment. The soils, hydrology, and plant identification courses of the minor build the scientific background and skills needed to understand the structure and functions of wetland ecosystems and to apply assessment protocols. The capstone course, NR 421 Wetland Assessment, Delineation, and Regulation, focuses on further development of knowledge and skills in applying wetlands assessment, delineation, and regulation procedures. The Undergraduate Minor in Wetland Assessment consists of 17 credit hours. PB 405 and FOR (NR) 420 are prerequisites of NR 421, and therefore, must be completed before enrolling in NR 421.

Curricula in Natural Resources

The two natural resources curricula offered by the Department of Forestry and Environmental Resources are part of the campus-wide baccalaureate degree program in Natural Resources. The curricula produce natural resources professionals with a broad interdisciplinary background coupled with a specific focus in natural resources management. The Natural Resources curricula include a series of common courses to highlight the integrated nature of work by interdisciplinary teams.

The curriculum in Natural Resources Ecosystem Assessment produces graduates who have knowledge and skills to inventory and describe ecosystems characteristics and to evaluate the impacts of management decisions. Ecosystem assessment or environmental impact assessment is an important part of development planning that calls for individuals who understand ecosystem structure and processes; who can identify, measure, inventory, and describe ecosystems; and who can apply standard evaluation and classification systems such as wildlife habitat evaluation procedures and the federal wetland delineation criteria. The curriculum entails a strong science base, as well as advanced courses in sampling and measurements, vegetation, soils, hydrology, and wildlife and fisheries are added. The 400-level courses also address techniques and issues of natural resource management.

The curriculum in Natural Resources Policy and Administration produces graduates who have knowledge and skills to manage natural resources programs in a variety of settings and organizations with an emphasis on public agencies. The advanced courses of the curriculum provide background in economics, policy, government, public administration, and natural resources management. An economics track begins with introductory microeconomics and culminates with environmental economics and public finance. Courses in government and public administration provide knowledge of how public institutions work. Courses in forestry, wildlife and fisheries, and outdoor recreation provide techniques of managing natural ecosystems for various uses. A common thread of how public policy on natural resources is influenced and developed runs through many of the courses already noted and culminates in two senior courses that focus on policy. For information on entrance requirements, contact the program coordinator: Dr. George Hess, Department of Forestry and Environmental Resources, NCSU, Box 8002, Raleigh, NC 27695-8002, phone: (919) 515-7437, fax: (919) 515-8149, e-mail: george_hess@ncsu.edu. Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Opportunities

Graduates of the Natural Resources Ecosystem Assessment curriculum work in environmental service firms, public agencies, non-governmental organizations, and industries. The U.S. Environmental Protection Agency, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the N.C. Division of Water Quality, and county and city governments employ graduates to help manage compliance with county, state, and federal environmental regulations, particularly wetlands and protected species. Non-governmental organizations and private engineering and environmental consulting firms employ graduates to prepare environmental impact statements and assessments, delineate wetlands, and conduct searches for threatened or endangered plant and animal species. The broad background in natural resources provided by this curriculum also provides a strong base for students interested in graduate school or environmental law.

The curriculum in Natural Resources Policy and Administration produces managers and administrators for public agencies and private organizations involved with management, administration, policymaking, planning, preservation, or regulation of natural resources. Examples are the USD1 National Park Service, the US Environmental Protection Agency, the US Geological Survey, state and local government agencies, and not-for-profit environmental organizations. Background in government, economics, policy, and natural resource management also provides a strong base for students who wish to pursue a graduate program in natural resources economics and policy or environmental law.

Curriculum in Environmental Sciences/Watershed Hydrology

Hydrology is the science of water that is concerned with the origin, circulation, distribution, and properties of the waters of the earth. Watershed hydrology is the application of that science to the study of the storage, movement, and quality of water in the context of the natural landscape unit, the watershed, and the effects of human’s activities on that water. The curriculum in Environmental Sciences—Watershed Hydrology produces graduates who have the knowledge and skills needed to analyze the hydrologic functioning of watersheds, to plan and implement watershed management practices, and to deal with the ecologic, social, political, and economic aspects of water resources problems. The Environmental Sciences core provides a strong education in the basic physical, biological, and mathematical sciences; the humanities and social sciences; and the structure and functions of natural ecosystems. Advanced courses of the concentration in Watershed Hydrology focus on hydrologic processes in watershed;
Applications of hydrology in environmental management; skills of measurement, analysis, and communication; and computer applications. For information on entrance requirements, contact the program coordinator: Dr. April James, Department of Forestry and Environmental Resources, NCSU, Box 8008, Raleigh, NC 27695-8008, phone: (919) 513-2511, e-mail: april_james@ncsu.edu.

Opportunities
Increasing stresses on water resources resulting from population growth and climate change maintains the demand for hydrologists in a variety of career positions. Hydrologists are needed in research, technical, environmental assessment and management positions in a variety of federal and state agencies and private organizations. The Environmental Sciences, Watershed Hydrology curriculum meets the criteria of the US Office of Personnel Management for the position of Hydrologist. Graduates are qualified to serve as hydrologists in federal agencies such as the US Geological Survey, US Forest Service, US Army Corps of Engineers, and the USDA Soil Conservation Service. State agencies such as the Office of Water Resources and the Division of Environmental Management are also excellent sources of employment. In the private sector, hydrologists are needed by environmental consulting firms, environmental organizations, and companies that own and manage large areas of forested, agricultural, or urbanized land. The rigorous scientific and quantitative background in the field of hydrology in this curriculum also provides excellent preparation for students who wish to pursue a graduate program in water resources.

Minor in Environmental Science
The Environmental Science minor is open to all undergraduate degree students at NC State, except for majors in Environmental Science. The Environmental Science minor provides opportunities for students to acquire a basic understanding of the interrelationships between humans and the environment. It includes natural and social science courses that help to integrate disciplines and provides a base for analyzing environmental problems. Students will build a foundation for studying future environmental issues.

The minor in Environmental Science requires a minimum of 15 credit hours. Students are required to choose one course from each of four groups (Biological Science, Physical Science, Social Science, and Advanced Courses), and at least one additional course from any of the groups. The groups of courses are listed on the Environmental Science Minor web page (www.ncsu.edu/advising_central/minors_desc/env_sci.html). For additional information, contact Dr. William Winner, Department of Forestry and Environmental Resources, NCSU, Box 8008, Raleigh, NC 27695-8008, e-mail: wewinner@ncsu.edu, phone: (919) 515-5780.

Curriculum in Environmental Technology
Environmental Technology offers a comprehensive teaching and research program, preparing students for careers within the arenas of environmental regulation, environmental site assessment, and environmental health and safety. This curriculum prepares graduates to collect data, analyze and interpret those data, and determine appropriate solutions for sound environmental management. The curriculum focuses on the sciences behind the biological and chemical mechanisms of environmental processes. Students learn how to deal with a range of topics from every day environmental management activities to natural and man-made disasters such as chemical spills, fires, hurricanes, oil spills, and more. Many Environmental Technology courses emphasize hands-on training with state-of-the-art monitoring equipment. An internship to obtain actual working-world experience is required. For information on entrance requirements, contact the program coordinator: Terrie Litzenberger, Department of Forestry and Environmental Resources, NCSU, Box 8008, Raleigh, NC 27695-8008, phone: (919) 515-7581, fax: (919) 515-6193, e-mail:terrie_litzenberger@ncsu.edu.

NC State is revising the B.S. degree in Environmental Sciences, and the Environmental Science academic minor. Updates for revisions are available at the ESNR website: www.ncsu.edu/senr/. Please contact Dr. W.E. Winner if you have questions.

Opportunities
Career opportunities include technical positions with: firms that offer environmental services; manufacturing companies that are required to maintain sophisticated environmental monitoring networks; consulting and audit firms that perform independent environmental audits; and state and federal regulatory agencies. A number of graduates have also pursued graduate degrees. Several professional certifications can be achieved through the major. Students may receive Hazardous Waste Operations and Emergency Response training and are eligible to sit for two professional certification exams: the exam for certification as an Associate Environmental Professional, and the exam Certified Hazardous Materials Manager.

Curricula in Fisheries and Wildlife Sciences
The Department of Forestry and Environmental Resources administers the Fisheries and Wildlife Sciences Program, which is shared among the College of Natural Resources, the College of Agriculture and Life Sciences, and the College of Veterinary Medicine. The undergraduate curriculum prepares the student for the Bachelor of Science in Fisheries and Wildlife Sciences degree concentrating in either Fisheries Science or Wildlife Science. The program emphasizes application of ecological principles to management of fisheries and wildlife populations and habitats. The curriculum integrates biological sciences with social sciences, mathematics, physical sciences, and specialty courses in fisheries and wildlife to give students a well rounded undergraduate education and to prepare students for graduate school.

The Fisheries and Wildlife Sciences Program facilitates and provides opportunities for student internships, cooperative education and professional society interactions that are extremely valuable in preparation for future employment. The Student Chapter of the Leopold Wildlife Club, and the North Carolina Chapter of the American Fisheries Society offer students in all levels of study the opportunity to network, to perform community service, and to learn from professionals in their chosen field. For information on
entrance requirements, contact the program coordinator: Dr. Chris Moorman, Coordinator, Fisheries and Wildlife Sciences Program, Department of Forestry and Environmental Resources, NCSU, Box 7646, Raleigh, NC 27695-7646, phone: (919) 515-5578, fax: (919) 515-5110, e-mail: chris_moorman@ncsu.edu.

**Fisheries and Wildlife Summer Program**

Four courses comprise the six-week summer session that is required of all fisheries and wildlife science majors. These courses, offered in part at Hill Forest, a residential camp about one hour from Campus, provide the opportunity for intense study and practical application in fisheries and wildlife sciences. Additionally, one course is offered at Great Smoky Mountains National Park on the border of Tennessee and North Carolina and another course is offered in coastal North Carolina studying marine and estuarine habitats.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

**Minor in Fisheries**

The objective of the fisheries sciences minor is to provide students, who might pursue careers in related areas of natural resources management, with basic ecological and management knowledge about fisheries resources. Additionally, the minor will provide students majoring in unrelated fields an appreciation for the value of fish resources and the need for sound management.

Requirements: 15-16 credits

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<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>FW 221 or BIO/PB 360 or FOR 260</td>
<td>Conservation of Natural Resources; Evolution, Behavior &amp; Ecology; Intro Ecology; Forest Ecology</td>
<td>3 - 4</td>
</tr>
<tr>
<td>BIO 420</td>
<td>Fishery Science</td>
<td>3</td>
</tr>
<tr>
<td>BIO 423</td>
<td>Intro. Fisheries Science Lab</td>
<td>1</td>
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<tr>
<td>BIO 419</td>
<td>Limnology</td>
<td>4</td>
</tr>
<tr>
<td>BIO 441</td>
<td>Biology of Fishes</td>
<td>3</td>
</tr>
<tr>
<td>BIO 442</td>
<td>Biology of Fishes Lab</td>
<td>1</td>
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</table>

**Minor on Wildlife**

The objective of the wildlife sciences minor is to provide students, who might pursue careers in related areas of natural resources management, with basic ecological and management knowledge about wildlife resources. Additionally, the minor will provide students majoring in unrelated fields an appreciation for the value of wildlife resources and the need for sound management.

Requirements: 16-17 credit hours:

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<tr>
<th>Number</th>
<th>Title</th>
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<tbody>
<tr>
<td>FW 221 or BIO/PB 360</td>
<td>Conservation of Natural Resources; Forest Ecology</td>
<td>3 - 4</td>
</tr>
<tr>
<td>FW 353</td>
<td>Wildlife Management</td>
<td>3</td>
</tr>
<tr>
<td>FW 453</td>
<td>Principles of Wildlife Science</td>
<td>4</td>
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Choose 2 courses from the following list:

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<tr>
<td>FW 404</td>
<td>Forest Wildlife Management</td>
<td>3</td>
</tr>
<tr>
<td>FW 411</td>
<td>Human Dimensions of Wildlife</td>
<td>3</td>
</tr>
<tr>
<td>FW 460</td>
<td>International Wildlife Mgmt. &amp; Conservation</td>
<td>3</td>
</tr>
</tbody>
</table>

**Opportunities**

Graduates are prepared for graduate school and entry-level professional positions in state and federal government agencies, non-profit organizations and private industry. Upon graduation, students are qualified to seek certification from The Wildlife Society or the American Fisheries Society.
DEPARTMENT OF PARKS, RECREATION AND TOURISM MANAGEMENT

Biltmore Hall, Room 4008
phone: (919) 515-3276
website: http://cnr.ncsu.edu/prtm/

D.H. Anderson, Head
C. G. Vick, Associate Department Head, Director of Undergraduate Programs
M.F. Floyd, Director of Graduate Programs
R.W. Wade, Director of Professional Golf Management Program


PRTM is committed to educating its students by providing them with the latest knowledge and tools to address society’s most pressing needs. The undergraduate programs focus on ways to promote health and enjoyment in people’s lives as well as contribute to the natural and cultural sustainability of recreation resources in communities by creating and applying information for the lifelong learning of current and future professionals who support the value of recreation, parks, tourism, and sports. PRTM’s unique undergraduate programs combine relevant class time with hands-on field experiences and service learning. The department strives to enroll and graduate a highly motivated and culturally diverse student body.

The department has an established reputation for providing comprehensive, professional education programs in Professional Golf Management, Parks, Recreation and Tourism Management, and Sport Management. Each degree is designed to produce well educated graduates who have the skills, knowledge, and attitude needed to plan activities and manage parks, recreation, tourism and sport areas and facilities in a range of environment for all ages and lifestyles.

Opportunities

As increased discretionary time becomes available for large segments of the American population, opportunities for growth in the leisure service professions have increased dramatically. Tourism and sports are two of the world’s largest industries. A recreation and park professional’s goal is to influence people to use their discretionary time wisely and to improve the quality of their lives. This goal is accomplished by providing recreation programs and facilities for people in a variety of settings.

Career opportunities include employment by park and recreation departments operated by county and municipal governments; state agencies, such as state parks; federal government, with agencies such as the National Park Service, Corps of Engineers, and U.S. Forest Service; resorts and country clubs; and sport agencies.

Other major employers include youth and family service organizations, such as the YMCA, YWCA, Boy’s Clubs, and Boy and Girl Scouts. Industries employ recreation directors to head employee recreation programs. Areas with perhaps the greatest growth potential for employment are tourism agencies and commercial recreation establishments, such as resorts, private clubs, theme parks, and convention and conference centers. Sport management is also a growing profession with career opportunities in sports marketing and sales, game day operations, and community athletics.

Scholarships

The Department of Parks, Recreation, and Tourism Management annually awards scholarships that are available to freshmen and advanced students. Approximately 12 academic scholarships varying between $500 and $3,000 are awarded in May for the following academic year and are renewable provided that superior progress is made toward a degree. Timber sales from the Hofmann forest and eight endowments provide these awards.

Curriculum in Parks, Recreation and Tourism Management

The curriculum in Parks, Recreation and Tourism Management is a professional program accredited by the National Recreation and Park Association. The curriculum produces graduates with a broad education in natural science, humanities and social science, and communication skills and the professional and technical skills to plan recreation programs and manage facilities, manage parks, and operate tourism services and agencies. General education courses include geology, biology, psychology, sociology, English, mathematics, communication, and economics. A specialized course is required in statistics.

The curriculum is designed to prepare men and women for a variety of positions in a dynamic and challenging profession. The focus of the curriculum is on management rather than face-to-face leadership. The curriculum provides 35 hours of professional course work that includes recreation philosophy, recreation facility management techniques, fiscal management, supervision, flexibility and site planning, recreation programming, administration, and evaluation.
In addition to the general education requirements and the core professional requirements, students can attain specialized training through concentration courses. They choose one of the following concentrations: tourism and commercial recreation, park and natural resource management, or program management.

Academic studies on campus are supplemented by practical laboratory experiences in the Raleigh area, out-of-state field trips and service learning opportunities, and a 10-week internship with a park, recreation or tourism agency. Cooperative work-study programs are available. Study abroad opportunities are also encouraged.

Concentrations

**Park and Natural Resource Recreation (18 hours)**
This concentration is well suited for people who enjoy working outdoors, who are interested in environmental protection and conservation, facility planning and development, and for those wanting to make a positive impact on the lives of others and on the natural environment. Concentration courses include ecology, GIS, outdoor recreation management and adventure education. Students are prepared for positions in planning, managing and maintaining parks and other natural resource oriented areas at the federal, state, regional or local levels in settings ranging from primitive to urban.

**Tourism and Commercial Recreation (18 hours)**
This concentration is for students who enjoy working with people; who are interested in business management, marketing, travel, and event planning; and, for students who want to make a positive impact on the leisure experiences of others. Concentration courses include resort management, accounting, marketing, event planning, and business management. The tourism and commercial recreation concentration prepares students for positions in planning, marketing and managing tourism facilities, attractions, and products. The positions could be with private companies, nonprofit groups or public agencies.

**Program Management (18 hours)**
Program Management is designed for students interested in designing and delivering recreation programs or events for diverse audiences in a variety of settings. Students take classes in special event programming adventure programming, marketing, community development and interpretive programs. Possible professional positions include recreation program director, event planner, outdoor adventures instructor, youth director and facility manager. Positions could be with public agencies, nonprofit group or private companies.

Specific curriculum requirements are available online: [www.ncsu.edu/registrar/curricula](http://www.ncsu.edu/registrar/curricula) or [cnr.ncsu.edu/prtm/undergrad/PRTM.html](http://cnr.ncsu.edu/prtm/undergrad/PRTM.html)

Curriculum in Professional Golf Management

NC State University is one of a select few universities across the United States to offer a PGA of America Accredited Bachelor of Science degree in Professional Golf Management. Located in the heart of a great golf state, NC State’s PGM program is uniquely qualified to become one of the best in the nation.

The golf profession today requires expertise in a variety of areas, including turf grass management, retail operations and merchandising, food and beverage management, personnel management, accounting, risk management, marketing, and customer services in addition to teaching golf. A unique interdisciplinary combination of golf management, business, life sciences, turf grass management, food & beverage management, parks, recreation and tourism management courses, with extensive co-op experiences, will help students become leading professionals in the golf industry.

In addition to PGM course requirements, PGM students will complete 16 months of cooperative education at approved golf facilities. PGM students are also required to complete all requirements for levels one, two, and three of the PGA-Professional Golf Management Apprentice Program prior to graduation.

Specific curriculum requirements are available online: [www.ncsu.edu/registrar/curricula](http://www.ncsu.edu/registrar/curricula) or [cnr.ncsu.edu/pgm](http://cnr.ncsu.edu/pgm)

Curriculum in Sport Management

The Sport Management degree provides students with high quality educational experiences to enable their success as managers in sport and sport related industries and organizations. NC State’s Sport Management program will provide students with a multidisciplinary perspective that includes sound management principles combined with a global understanding of sport and the impact of sport in social, economic, political and technological environments. Sport can be viewed as both an industry and an academic discipline. This program will educate students in the theoretical principles of sport management as well as the application of those principles. The interdisciplinary curriculum, including courses in recreation and accounting, will enable students to develop leadership, communication, evaluation and problem-solving skills in a “real world” environment.

The curriculum provides 38 hours of professional course work that includes recreation philosophy, management techniques and skills, sport finance and economics, sport law, programming, administration, and analysis and evaluation. Students can use the 30 hours of free electives in this program to pursue a minor or design a special track that will meet their career goals. Academic studies on campus are supplemented by a 10-week internship with an approved sport agency.
College of Natural Resources

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula or cnr.ncsu.edu/prtm/undergrad/SM.html

Minor in Parks, Recreation and Tourism Management

The academic minor in Parks, Recreation and Tourism Management is offered to students interested in gaining a basic knowledge of the parks, recreation and tourism fields and an understanding of the importance of leisure and recreation in American society. It is not intended to prepare students for a professional career in parks, recreation, sport, and tourism. Six hours of required courses and nine hours of electives are necessary to complete the minor. The program provides a background in recreation and park management which is useful to students who will assume full-time careers associated with recreation and park services and become involved in the park and recreation field as a volunteer, program leader, or policy making board member with such organizations as the Scouts, Y’s, art advisory councils, and conservation organizations.

Admission

Any undergraduate student enrolled in the university as a degree candidate is eligible for admission to the minor program. The undergraduate curriculum coordinator of Parks, Recreation and Tourism Management will advise students regarding their plan of work and process all necessary records.

Requirements for Admissions and Completion

Students should see the minor adviser, Dr. Candace Goode Vick for both admission and certification of the minor. She can be reached at (919) 513-3939, or candace_goode@ncsu.edu. The minor must be completed no later than the semester in which the student expects to graduate from his or her degree program.

Online application for the minor should be completed during the registration period for the student’s final semester at NC State.

Requirements:
• A minimum of 15 hours (5 courses required to complete the minor in Park, Recreation & Tourism Management)
• Student must take PRT 152 and PRT 358
• A grade of “C-” or better is required in all courses to be used toward the minor.

DEPARTMENT OF FOREST BIOMATERIALS

Biltmore Hall, Room 2105
Paper, Science & Engineering Program, phone: (919) 515-2888
Wood Products Program, phone: (919) 515-3181

S. S. Kelley, Head
R. A. Venditti, Director of Graduate Programs
M. V. Byrd, Director of Undergraduate Programs, Paper Science and Engineering
P. N. Peralta, Director of Undergraduate Programs, Wood Products


The wood-based industry of North Carolina, as well as throughout the South, is a vital part of the nation’s economy. In terms of the dollar value of shipments of wood and paper products, the South leads all regions of the country. North Carolina manufactures more wood household furniture than any other state, ranks third in shipment value for all wood and paper products, and is second in the number of employees and wages paid. Thus, many opportunities exist in North Carolina and other southern states for careers in the wood-based industry.

The Department of Forest Biomaterials offers two curricula leading to Bachelor of Science degrees- Paper Science and Engineering, and Wood Products. Both curricula prepare men and women for careers in the wood, paper, and allied industries or in government agencies connected with wood resources.

Curricula in Paper Science and Engineering

M. V. Byrd, Director of Undergraduate Programs

The Paper Science and Engineering curriculum prepares students for careers in the paper industry, which ranks as the fifth-largest manufacturing industry in the United States. Science, engineering, and mathematics form the basis for a multidisciplinary approach to understanding the fundamental manufacturing principles involved. Students study the technology and engineering of wood pulping processes, chemical and by-product recovery systems, and pulp bleaching. In addition, various papermaking operations, such as...
refining, sizing, coating, and drying are studied. These topics along with the chemistry of wood, pulping, and papermaking, and the physics of paper as it relates to product characteristics and design form a fundamental core of courses that all students in the curriculum take.

Two concentrations are available emphasizing the different engineering aspects of pulping and papermaking. The Paper Science and Engineering concentration provides an extensive background in the pulp and paper manufacturing processes and elective credit hours for studies in chemistry, marketing, economics, management or other areas of interest to the student. Greater depth in general chemical engineering principles can be obtained from the Chemical Engineering Concentration. Students who have completed the Chemical Engineering Concentration in Paper Science and Engineering can, in cooperation with the College of Engineering and with an additional semester of study, earn a Bachelor of Science in Chemical Engineering as a second degree.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Program Educational Objectives
The Paper Science and Engineering Program at NC State prepares its B.S. graduates for the following professional and career objectives

1. They are effective engineers and leaders in the paper, chemical process and related industries, applying fundamental principles of science, mathematics, engineering, and economics to solve problems.
2. They communicate well in oral and written form and they work well with other people in team situations
3. They make decisions and develop solutions with concentration of the possible effects on others, on the environment, and on the world; they subscribe to established standards for safety and ethical behavior.
4. They are lifelong learners, seeking educational and developmental opportunities for their professional lives.

Opportunities
Graduates of this curriculum find opportunities for challenging careers as process engineers, product development engineers, process control engineers, chemists, technical service engineers, quality control supervisors, and production supervisors. Design and construction engineering companies employ graduates as project engineers, and pulp and paper machinery companies use their education and skills for technical service and sales positions. Opportunities for managerial and executive positions are available to graduates as they gain experience.

The broad and intensive nature of this curriculum makes graduates attractive not only to the pulp and paper industry, but to a variety of other major chemical process industries. This appeal is especially true for the dual degree in Paper Science and Engineering and Chemical Engineering.

Summer Internships and Co-ops
All Paper Science and Engineering majors are required to work one summer in a pulp or paper manufacturing facility. One hour of academic credit is granted after completion of 12 weeks of this work and presentation of an engineering report of professional quality. In addition, students are urged to work in manufacturing facilities the other two summers, as the work provides valuable practical experience. Departmental advisers assist students in locating summer jobs, which are found throughout the U.S. and abroad.

Many Paper Science and Engineering students work at least one co-op rotation, in which they leave school for one semester and work in the industry. The resulting experience adds significantly to a student’s desirability upon graduation.

Accredited Program
The Paper Science and Engineering program is accredited by Engineering Accreditation Commission of ABET, Inc.

Regional Program
The Paper Science and Engineering curriculum is a regional program approved by the Southern Regional Education Board as the undergraduate program to serve the Southeast in this field.

Scholarships
Approximately 125 undergraduate academic scholarships are granted annually to new and continuing students by more than 50 companies comprising the Pulp and Paper Foundation.

Minor in Paper Science and Engineering
The Paper Science and Engineering Minor is available to all undergraduate students enrolled in the university as degree candidates, except Paper Science and Engineering Majors. The minor requires 15 credit hours. Six hours of required courses provide a comprehensive overview of pulping and papermaking science and technology, including pulping, bleaching, chemical recovery, recycled fibers, papermaking, coating, printing, converting, and paper properties. Nine elective hours may be chosen from areas including wood chemistry, wet end chemistry, unit operations, process design and analysis, project management, paper physics, process control, or to gain more in depth exposure to the basic pulping, bleaching, and paper making process.
The Paper Science and Engineering Minor, with its focus on papermaking science and technology, is intended to be especially valuable to students majoring in programs leading to careers in corporate or government positions which would interface with the paper and related industries. Students interested in business, scientific or engineering specialties, which may interface with, or are employed by these industries, will find the minor especially useful.

**Admissions and Certification of Minor**

All undergraduate students enrolled in the university as a degree candidate, other than PSE majors, are eligible for admission to the PSE minor program. The PSE Minor Adviser will serve as adviser and certify completion of the minor. Paperwork for certification must be submitted to the minor adviser no later than the registration period for the student’s final semester at NC State. The minor must be completed no later than the semester in which the student expects to graduate from his or her degree program. Contact Person: Dr. Med Byrd, Minor Adviser, 2205 Pulp & Paper Labs, (919) 515-5790.

**Curriculum in Wood Products**

P. N. Peralta, Director of Undergraduate Programs

The wood products industry is of major importance to the economy of North Carolina and the Southeast. It ranks third in the state in the value of shipments, behind only textiles and tobacco products, and it is second to textiles in the number of employees. The career opportunities for graduates with a B.S. in Wood Products are excellent. The Wood Products curriculum is a material science curriculum based on the renewable, natural resource, wood. The anatomical, physical, mechanical, and chemical properties of the material are emphasized and the 15 semester hours of technical electives and the 9 hours of free electives in the base curriculum allows the student to select courses to meet individual career goals.

There are two concentrations available in Wood Products—Manufacturing and Business Management. The Manufacturing concentration provides a concentrated exposure to Industrial engineering principles and practices. This concentration is for the Wood Products students who have as career goals either process and product engineering or upper level plant management in a large wood manufacturing company. Students completing the Manufacturing concentration earn a minor in Industrial Engineering. The Business Management concentration provides a concentrated exposure to business management practices, including financial and operations management, accounting practices, and marketing. This concentration is for the Wood Products students who have as career goals owning an enterprise or having responsibility for the business operations aspect of a company and who desire acquiring business management skills to complement the technical background in wood. Students completing the Business Management concentration earn a minor in Business Management.

Specific curriculum requirements are available online: [www.ncsu.edu/registrar/curricula](http://www.ncsu.edu/registrar/curricula)

**Opportunities**

Graduates have a strong foundation in the production and processing of wood products and find numerous opportunities for careers in the wood industry. Entry positions are frequently as quality control technicians in composite plants, process or product engineers in the furniture industry, or in sales with the huge supplier industries, such as finishes, equipment, glues, and hardware. Advancement to positions of increased responsibilities comes quickly to those with dedication and active involvement in career development.

**Scholarships**

There are seven endowed scholarships within the program and seven non-endowed industrial scholarships. These are awarded on merit through a selection process involving faculty and industrial representatives.

**Accreditation**

The Wood Products curriculum is accredited by the Society of Wood Science and Technology.

**Minor in Wood Products**

The Wood Products minor is available to all undergraduate students, except Wood Products majors, enrolled in the university as degree candidates. Due to the various semester credit hours of the elective courses, the semester hours required for this minor may be as low as 17 or as high as 20 credits. Eleven hours of required courses provide a general background in wood anatomy, physical properties, and wood-based composites. Elective courses (minimum two courses required) may be chosen from areas including wood processing, wood mechanics, quality control, and plant infrastructure.

The Wood Products minor, with its focus on wood properties and processing, is designed to be especially valuable to students majoring in programs leading to careers in areas such as structural design, furniture manufacturing, and forestry. Students interested in natural and renewable materials will also find the minor useful.
The College of Physical and Mathematical Sciences offers programs for students whose interests lie in the basic as well as the applied physical science and mathematical areas. These programs of study and research are offered at both the undergraduate and graduate levels and lead to many career opportunities. In addition, the college provides the core physical science and mathematical education support for the entire university. The college consists of five academic departments: Chemistry, Mathematics, Physics, Statistics, and Marine, Earth, and Atmospheric Sciences. It jointly administers academic programs in Biochemistry with the College of Agriculture and Life Sciences. The Center for Research in Scientific Computation, the Institute of Statistics, the State Climate Office, and the Center for Marine Science and Technology are also associated in whole or in part with the college.

Graduates of the college are in demand and valued for their well-developed analytical thinking and problem-solving skills. They are recruited for technical and administrative positions in industry and laboratories, universities and colleges, non-profit research organizations, and government agencies. A large percentage of the graduates undertake advanced study in medical, law, business, or other professional schools as well as further study leading to the Master of Science and Doctor of Philosophy degrees.

The high school student who enjoys computers, mathematics, statistics, chemistry, geology, marine science, meteorology, or physics; who has an interest in natural phenomena and their fundamental descriptions, and who hopes to make a difference in the quality of life should consider the career opportunities opened by degrees in the physical and mathematical sciences.

Degree Programs

The college offers undergraduate programs of study leading to the Bachelor of Science degree with majors in chemistry, geology, mathematics, applied mathematics, meteorology, natural resources, environmental sciences, physics, and statistics and the Bachelor of Arts degree with majors in geology, chemistry, and physics. In some programs, students may choose to highlight their studies with concentrations in compatible disciplines. For example, they may select an earth systems history concentration in geology; an air quality, geology, or statistics concentration in an environmental sciences curriculum; or marine and coastal resources concentration in a natural resources curriculum.

Curricula within the college have similar freshman years enabling a freshman to change from one department to another in the college without loss of time. A time-limited Physical and Mathematical Sciences Undesignated (PMU) “curriculum” is offered to students who want to major in one of these curricula but have not yet made a decision.

Minors are offered in geology, mathematics, meteorology, physics, and statistics.

Pre-Medical Sciences

Medical and dental schools as well as many other health-related professional schools have long regarded degree programs in the core physical and mathematical sciences as excellent preprofessional curricula. Some professional schools prefer the in-depth knowledge gained by this route over those curricula which offer a cursory view of a variety of topics. For further details, contact Dr. Anita Flick, Director of pre-Health Advising.

Dual Degree Programs

Students may wish to earn bachelor’s degrees in two fields within the college. Other students may wish to combine a bachelor’s degree in the college with one in another NC State college. With effective planning a number of courses can satisfy core, general education, or elective requirements simultaneously in both degree programs. For example, many students choose to pursue simultaneous degrees in mathematics and mathematics education or one of the physical sciences and science education.

Student Activities

In addition to university-wide extracurricular activities and honor organizations, the College of Physical and Mathematical Sciences has student chapters of the following professional and honor organizations: Sigma Pi Sigma (Physics Honor Society); Society of Physics Students; Pi Mu Epsilon (National Mathematical Honor Fraternity); Society for Undergraduate Mathematics (A Student Chapter of the Mathematical Association of America); Phi Lambda Upsilon (National Honorary Chemical Society); American Chemical Society; Alpha Chi Sigma, national co-ed professional chemistry fraternity, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers; Mu Sigma Rho (Statistics Honorary Society); Statistics Club; American Meteorological Society; Society of Mining Engineers/Society of Exploration Geophysicists (Geology Club); National Association of Environmental Professionals (Student Chapter); and the nation’s first chapter of the Society of African-American Physical and Mathematical Scientists. In addition, majors in the college are eligible for induction in the national honor societies: Phi Beta Kappa and Phi Kappa Phi.

Honors Program

All departments in PAMS have active honors programs, designed to encourage excellent undergraduates to pursue a program that will challenge their abilities and better prepare them for their post-graduate career, through a combination of independent research and honors course work, often at the graduate level. Students in an honors program are advised by honors advisers who help students customize their education based on their individual interests, talents and skills and who proactively present opportunities for academic study, research and study abroad. For information on a particular departmental program, please visit the departmental websites.
Facilities
Faculty and students within the college have access to an extensive array of computational and network services. Extensive use of computers to fulfill the daily task requirements encompasses word processing, e-mail, information access from the library and Internet, and the use of numerous specialized software tools. The college provides a large number of workstations for use by undergraduate and graduate majors and is a participant in the university’s campus-wide workstation network. Individual departments either utilize these workstations or provide additional platforms for work with discipline specific programs; for example instruction or research in mathematics, statistics, satellite data acquisition and analysis, weather modeling, chemistry, or physics. Additionally, students have access to university facilities for additional workstations, peripherals, and services. There is a fully staffed help desk to assist students with problems that they might encounter.

Cooperative Education, Field Experience, and Undergraduate Research
The college recognizes the value of career-related work experience to students and encourages its majors to avail themselves of such opportunities whenever possible. That experience may be gained through the university’s Cooperative Education Program, department sponsored field experience, academic research, and summer employment. Advisers work with students to develop a plan of study that balances a challenging course load with appropriate extracurricular activities.

Scholarships
College of Physical and Mathematical Sciences majors may be eligible for a variety of freshman and undergraduate college and departmental scholarships in addition to those administered at the university level. The awards are based on a combination of factors, with a strong emphasis on academic excellence. Some scholarships are renewable for up to four years, and some carry opportunities for significant career-related work experience.

Community Outreach
The college of Physical and Mathematical Sciences demonstrates its commitment to community outreach primarily through its Science House. The Science House offers programs for K-12 students and teachers to enhance their understanding of, appreciation for, and involvement in mathematics and physical sciences. The Science House, located on the Centennial Campus, houses classrooms, laboratories and a teaching resource library. Vans from the Science House carry Science on the Road demonstration programs and teaching laboratory equipment to schools across North Carolina.

Tutorial and Audio-Visual Assistance
Most of the departments in college offer students some form of free tutorial assistance, including regularly scheduled review sessions and Supplemental Instruction (SI) for selected sections of chemistry, mathematics, and physics. Several departments provide facilities for students to use supplementary videotaped or computer assisted instructional materials on a voluntary basis.

Graduate Study
The Master of Science and Doctor of Philosophy degrees are available with majors in biomathematics, chemistry, marine, earth, and atmospheric sciences, mathematics, applied mathematics, statistics, and physics. The Master of Biomathematics, Master of Chemistry, and Master of Statistics are also offered. The Departments of Statistics, Mathematics, and Physics offer B.S.-M.S. programs that allow students to enroll in up to twelve credit hours of graduate level course work that may be applied toward the requirements of both the bachelor’s and master’s degrees.

DEPARTMENT OF CHEMISTRY
Dabney Hall, Room 108; Mary Anne Fox Science Teaching Laboratory
phone: (919) 515-2546
www.ncsu.edu/chemistry

Morteza G. Khaledi, Department Chair
Laura Sremaniak, Associate Department Chair and Director of Facilities
Philip A. Brown, Director of Undergraduate Studies
Chris Gorman, Director of Graduate Studies
Honors Program

To be invited to join the Chemistry Honors Program at the end of the sophomore year, a student must have a GPA of 3.25 or higher. Only students in the Chemistry B.S. program will be invited to join.

Chemistry Honors students must maintain a GPA of at least 3.25 to graduate with honors. In addition, the departmental requirements for students in the Honors Program are the completion of 9 extra credit hours of work that is NOT required for their degree(s). Between 3-6 credit hours can come from research conducted in laboratories in the Department of Chemistry. Research in other laboratories of molecular sciences may also be considered. However, in the latter case, prior approval is required. A 3-page report and a letter from the supervisor indicating the nature of the work, time spent in the lab, and performances are required at the end (before finals week) of the semester, in which the research is conducted. It should be noted that simply working in a research lab does not necessarily meet the requirements of the Honors Program. The nature of the work must be meaningful research. The rest of the credit hour requirements can be met with 500 level or higher courses in chemistry, biochemistry, polymer sciences, materials sciences, biotechnological sciences and pharmacological sciences. Courses in other subject areas may be considered. However, prior approval is required. If you are in doubt as to whether a particular course will count toward the Chemistry Honors Program, please contact Professor Reza Ghiladi.

Curricula

The B.A. program offers a flexible course of studies for students who may not plan to become professional chemists but who desire an interdisciplinary program with an emphasis on chemistry. The proper choice of electives will prepare the graduate for any of the following: medical, veterinary or dental school; work in chemical sales and management; teaching in secondary schools; work in environmental science; or graduate school in an allied science. This route is also an excellent premedical or predental program.

The B.S. curriculum, accredited by the American Chemical Society, includes a strong, broad background in mathematics, physics, and the liberal arts. The basic areas of organic, physical, inorganic, and analytical chemistry are stressed. Laboratory and classroom work develop the skills, knowledge, and inquiring spirit necessary for a successful career in chemistry. The advised elective credits allow individual diversity at the junior and senior levels. Many undergraduates participate in current departmental research through part-time employment or research projects. The B.S. curriculum prepares the student to enter the job market directly as a chemist or to enter various graduate schools in chemistry or an allied science.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

DEPARTMENT OF MARINE, EARTH AND ATMOSPHERIC SCIENCES

Jordan Hall, Room 1125
phone: (919) 515-3711
www.meas.ncsu.edu

J. C. Fountain, Head
C. J. Thomas, Director of Undergraduate Programs


The Department of MEAS covers a broad range of disciplines with one overarching goal: a deeper understanding of the Earth’s environment. MEAS takes an interdisciplinary approach to studying our planet’s air, earth and water, combining meteorology, earth science, and oceanography in a single department.

This interdisciplinary viewpoint is particularly important today, in light of accelerating global changes and increasing corporate and public interest in environmental health and wise use of natural resources. Many pressing questions require more than narrow training in a single discipline. MEAS graduates can be equipped for tasks as diverse as improving severe storm forecasting; assessing potential effects of oil exploration; modeling global climate trends or coastal flooding; understanding the transport of tree-killing air pollutants from industrial centers to the North Carolina mountains; developing non-polluting technology for mining; ascertaining
MEAS offers degrees in meteorology, geology, marine sciences, environmental sciences and natural resources. Marine science majors learn how the oceans, solid earth, and atmosphere interact. Marine sciences courses are highly interdisciplinary and are available in chemical oceanography, physical oceanography, biological oceanography, coastal geology, and marine meteorology. Earth science courses encompass the entire earth, from the core, through the crust, to the minerals, sediments, ground water, and land forms of the surface. Tools learned allow students to understand and characterize the physical and historical earth. Course work in all areas of geology equips students to reduce potential disasters from geological hazards and to ameliorate the negative impact of human society on the geological resources of the earth. Selection of a paleontology focus produces graduates knowledgeable about the evolution of the earth’s ecosystems. The meteorology program stresses a quantitative understanding of atmospheric structure and processes. It addresses problems like air pollution, climate changes, and severe weather, such as thunderstorms, tornadoes, winter storms, and hurricanes. Forecasting and climate studies are enhanced by using real-time satellite imagery, radar-data products, and state-of-the-art computer technology. MEAS majors in Environmental Sciences and Natural Resources fill a unique need in today’s society as experts who can interpret their science to public policy shapers and decision makers. The training they receive in economics, political science, and policy issues, and management (for Natural Resources majors) equips MEAS graduates to interact with industry and with regulatory and conservation agencies.

Opportunities

MEAS undergraduate degree programs provide talented students with the foundation of scientific knowledge for careers in government, industry, or academe. Many students pursue graduate degrees.

Marine Sciences graduates can go on to become oceanographers, to manage our coastal resources, model air-sea interaction, and explore global climate change. They may conduct pure and applied research, serving as environmental consultants for industry and governmental agencies, policy and management experts for governmental agencies, and environmental science educators. Graduates with a Natural Resources degree are versed in the fundamental processes and interdisciplinary nature of the coastal zone. As scientists, managers, administrators, and regulators, they make decisions regarding use and conservation of coastal and marine resources.

Geology graduates address society’s needs for dealing effectively with earth processes, such as water supply and water quality (from ecosystem health in rivers and estuaries to residential and industrial supply and disposal), or assessment of stability of land forms. They work for engineering firms and permit-issuing agencies, and they are recruited by industries that rely on geological resources. Paleontologists are familiar with the evolution of ecosystems through time, and provide a perspective on potential long-term reactions of the biosphere to both past and current changes and stresses. Their expertise is used in education, including museums, and in theoretical and practical study of biosphere response. Those with Environmental Science degrees are trained to assess and monitor geological resources like ground water contamination. Marine geologists are experts in the complex issues facing industry, municipalities, and residents in the dynamic and ecologically vulnerable coastal zone.

Meteorology graduates may enjoy careers in areas such as weather forecasting, air quality assessment, development of weather products and services, broadcast communications, and advanced research. Marine meteorologists study ocean-generated weather systems. Their research is yielding practical benefits like refined prediction of storm surge, which has streamlined evacuation efforts during severe storms along the Carolina coast. Environmental Sciences graduates with an air quality emphasis may work for environmental firms, regulatory agencies, and in applied research. Study of air quality and how air pollution is transported and dispersed is a rapidly expanding field in the atmospheric sciences.

MEAS graduates play a key service role for the State of North Carolina, assisting in everything from forecasting severe storms and analyzing the impact of atmospheric pollutants on agriculture and our estuaries, to determining the effects of toxic waste disposal on quality of surface and ground water.

Honors Program

Participants receive enhanced coverage of academic material and are involved in research. Eligibility is based on scholastic achievement. Minimum requirements are a GPA of 3.5 overall and 3.5 in the major, including required mathematics, chemistry, and physics courses taken to date. Students are reviewed for eligibility after the first semester of the sophomore year and again as first semester juniors. Participation is optional. To successfully complete the honors program, a student will acquire a minimum of 9 credit hours of honors work, including 3 to 6 hours of independent study culminating in a written scientific report, and one of the following options: oral presentation in the department, a poster presentation at the Sigma XI Undergraduate Research Symposium, or presentation at a professional meeting. The remaining honors credit is earned in honors’ sections of undergraduate courses, and in advanced (graduate) courses. Students must graduate with a 3.4 grade point average overall.
Undergraduate Research, Cooperative Education, and Internships

Examples of past undergraduate research projects include studies of coral reef fish in the Bahamas to understand age, growth, and life history transitions; assessment of Lake Victoria’s impact on the climate of East Africa; examination of the relationship between atmospheric ozone and meteorological parameters as measured with instrumented balloons; experiments on generation of oxygen from moon rocks to supplement a manned moon station; and reconstruction of events during past volcanic eruptions on Hawaii. Outstanding MEAS students can receive career training with pay through the NC State Cooperative Education program, after completing the first year of undergraduate studies. Co-op and internship students have completed assignments with the National Weather Service, US Geological Survey, US Air Force, US Environmental Protection Agency, NC Museum of Natural Sciences, NC State Climate Office, NC Division of Marine Fisheries, NASA, local environmental consulting firms, and other state and federal agencies. Many students co-op or intern at the internationally renowned Research Triangle Park. After graduation, co-op students often are hired full-time by the same companies or agencies.

Facilities

The home base of MEAS is Jordan Hall, an award-winning structure that accommodates regular and tele-video classrooms, teaching laboratories, computing facilities, and offices of faculty and staff. Jordan Hall has several facilities housing networked computers, some for unstructured student use, and some, like the Weather Analysis and Forecasting Laboratory, for teaching. This laboratory houses 50 workstations providing access to real-time and archived satellite, radar, surface, and upper-air observations plus a wide variety of numerical model fields. From the rooftop Weather Observatory, detailed weather measurements are automatically logged and archived and weather balloons are launched. Other structures include the Research III building on NC State’s Centennial Campus, which houses the State Climate Office, where many students gain skills in instrumentation, data acquisition, data analysis, and interaction with the public. For class work and field research in coastal settings, students may travel to NC State’s Center for Marine Sciences and Technology on the shore of Bogue Sound, in Morehead City.

Students who attend a research-intensive (“Research I”) university benefit from the opportunity to engage in research as undergraduates and to study with professors whose involvement in research keeps their knowledge and enthusiasm fresh. The faculty members in MEAS are internationally acknowledged research scientists, and the department maintains an extensive inventory of both laboratory and field research equipment and facilities. As a member of the Duke/UNC Oceanographic Consortium, MEAS has access to the R/V Cape Hatteras, a 135’ coastal oceanographic research vessel, which serves as a platform for work on the physics, chemistry, geology, biology and meteorology of the sea offshore. Training cruises on the R/V Cape Hatteras occur each year, providing practical experience in oceanography for marine science majors.

Specialized equipment in the department supports teaching and research in: geological materials (electron microprobe, X-ray fluorescence spectrometer, an automated X-ray diffractometer, neutron activation analysis), geophysical measurements (GPS, gravimeter, magnetometer, seismic reflection, high-resolution sub-bottom profiler (Chirp Sonar) and swath bathymetric sonar system), and sedimentology (microcomputer-controlled grain-size analysis). Stable- and radio-isotope laboratories support research in biogeochemical cycling, paleoclimatology and paleontology. Paleontology also employs molecular techniques. Ecological studies are supported by a motion analysis system, a biotelemetry laboratory, and the departmental membership in the Cooperative Institute of Fisheries Oceanography, a joint venture of NOAA’s National Marine Fisheries Service and a number of universities within the state. Advancements in air-sea interactions come through the Satellite Oceanography and Image Analysis Laboratory; the Physical Oceanographic Research Laboratory with its complement of equipment to monitor the ocean’s motion and composition; the Planetary Boundary-Layer Laboratory with its instrumentation for monitoring physical processes at the land-air and sea-air interfaces; and the center for Marine Sciences and Technology at the coast in Morehead City, NC.

Curricula

The department offers several curricula in each of the areas of marine, earth and atmospheric sciences. Each prepares students for employment at graduation or for further professional training. There are three Bachelor of Science (B.S.) curricula in atmospheric sciences: Meteorology, Marine Meteorology, and Environmental Sciences, Air Quality. Most students in meteorology are employed with private companies and public agencies. Air quality graduates are employed by consulting firms, private industry and public agencies. In the marine sciences, students can pursue a B.S. in marine science with one of five concentrations: Biological Oceanography, Chemistry, Geology, Meteorology, and Physics. The B.S. in natural resources, with a concentration in marine and coastal resources, combines marine sciences with economics, politics, policy, and management, to prepare scientists who can interface with policy-makers and regulators. Earth sciences house three curricula: B.A. (Bachelor of Arts) and B.S. in Geology, and B.S. in Environmental Sciences, Geology concentration. The B.A. and B.S. degree programs require similar core courses, but the B.A. contains more social sciences and humanities, and the B.S. more mathematics and other physical sciences. An environmental sciences degree combines core knowledge in the science with economics, politics, and policy. Geologists are employed in both the private and public sector.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Minor in Geology

The Department of Marine, Earth, and Atmospheric Sciences offers a Minor in Geology to majors in any field except geology. This program provides a means of recognition for students in any field who have a curiosity about the materials, structures, and processes of the solid earth. Admission to the program requires a grade of C or better in MEA 101 and MEA 110. Successful completion of the program requires a C- or better in at least 15 hours of geology or geophysical course work which must include MEA 101, MEA 110 and two additional laboratory courses.
Minor in Meteorology

The Department of Marine, Earth, and Atmospheric Sciences offers a Minor in Meteorology to majors in any field except meteorology. Admission to the program requires a grade of C or better in MA 141, 241, and 242, and in PY 205 and 208. Successful completion of the program requires a grade of C- or better in the following courses: MEA 213, 214, 311, 312, 313, 314, and 421. MEA 130 may substitute for MEA 213.

Program Administrator and Contact
Dr. Matthew Parker
Department of Marine, Earth and Atmospheric Sciences
5149 Jordan Hall, Box 8208
Phone: (919) 513-4367

DEPARTMENT OF MATHEMATICS

SAS Hall, Room 2108
Phone: (919) 515-2382
www.math.ncsu.edu

A. G. Helminck, Department Head
H. T. Tran, Associate Head
J. S. Scroggs, Director of Undergraduate Programs
S. L. Campbell, Director of Graduate Programs
E. L. Stitzinger, Administrator of Graduate Programs
J. R. Griggs, Coordinator of Classroom Instruction
H. J. Charlton, Scheduling Officer and Director of Summer School


The department offers Bachelor of Science degrees in Mathematics and in Applied Mathematics. These programs provide a core of basic mathematics courses along with flexible choices of electives, which permit both a well-rounded education and preparation for math-related careers. Students may focus their studies in financial mathematics, mathematical biology, mathematical physics, mathematical statistics, or computational mathematics. Employment objectives can be focused on quantitative careers in business or government, teaching at the secondary level, or graduate study in mathematics and/or related areas.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

Academic Enrichments

Many undergraduates in the Mathematics Department participate in research programs with members of our faculty, presenting their results in both regional and national meetings. Other enrichment activities include programs, such as the NSF sponsored Research Experience for Undergraduates, the Budapest Semester in Mathematics, and the Society for Undergraduate Mathematics, a club for all students interested in mathematics, and is a Student Chapter of the Mathematical Association of America.

Talented students are encouraged to consider a 5-year Accelerated Bachelors/Masters Program (ABM). A key feature of the program is counting up to 12 hours of graduate courses to both the BS and MS degrees. Students can choose between the MS in Mathematics, Applied Mathematics, or Financial Mathematics.

Undergraduate math students have the opportunity to take courses that are part of our Financial Mathematics (FM) Professional Science Masters (PSM), and to focus their studies in the area of Actuarial Science. Faculty affiliated with FM has research interests and teaching specialties related to finance. A career that involves modeling energy futures or pricing mortgage-backed securities requires advanced training, such as the FM PSM, but the math background and problem-solving skills learned as an undergraduate provide a solid foundation for further studies in this field.
Honors Program

Students that demonstrate high aptitude in mathematics are invited to participate in the Mathematics Honors Program. The program provides intensive mentoring and preparation for graduate studies. Students are invited to join the program if they are recommended by a teacher in an upper-level math course and have a GPA of 3.5 in math. To complete the program, students must take MA 426, at least three graduate level math courses, and do a research project. Math Honors students often study abroad at programs such as the Budapest Semesters in Mathematics or Math in Moscow and participate in funded summer research at other universities.

Awards

The department recognizes its superior students with the following annual awards: the Hubert V. and Mary Alice Park Scholarship, for an outstanding rising junior or senior in mathematics; the John W. Cell Scholarship, for an outstanding rising junior or senior in mathematics; Carey Mumford Scholarship, for an outstanding sophomore, junior, or senior in mathematics; Levine-Anderson Award, for the student who has the best performance in the William Lowell Putnam Examination (not restricted to math majors); Charles N. Anderson Scholarship, for an outstanding sophomore in mathematics; Charles F. Lewis Scholarship, for an outstanding senior who is a double major in mathematics/mathematics education; Mrs. Roberts C. Bullock Scholarship, for an outstanding mathematics major with a demonstrated interest in the English language; the Dr. Rebecca R. Bullock Memorial Scholarship Endowment, for an outstanding mathematics major with a demonstrated interest in the English language; the Howard A. Petrea Scholarship, for an outstanding junior or senior in mathematics; H. Thomas and Sue Banks, outstanding undergraduate pursuing degrees in one of the departments of the college; Marvin and Mary Chaney and Fulton and Ruby H. Starling.

The department also has a chapter of the National Mathematical Honorary Fraternity Pi Mu Epsilon. Membership is open to those students with superior performance in mathematics courses.

Minor in Mathematics

The minor program consists of the successful completion with a grade of C- or better of any 15 hours selected from the Department of Mathematics’ list of approved courses. The list includes MA 225 Foundations of Advanced Mathematics as well as any MA courses at the 300, 400, and 500 levels.

DEPARTMENT OF PHYSICS

Riddick Hall, Room 421
phone: (919) 515-2521
http://physics.ncsu.edu

M. A. Paesler, Head
K. Warren, Assistant Head
J.M. Blondin, Director of Undergraduate Programs
H.W. Ade, Director of Graduate Programs


Physics is the fundamental science of observation, measurement and description of the natural world. Physicists seek to establish a mathematical description of all physical phenomena, ranging from the interactions of quarks in nuclei to the collisions of galaxies in the universe. Together with scientists in engineering and other physical, biological, and mathematical sciences, physicists collaborate to develop new materials and new insights in all areas of modern science and technology.

Curricula

The Physics undergraduate curricula provide a strong background in the fundamentals, and offers course options for deeper studies in areas of interest. Undergraduates have the opportunity to work in research laboratories with faculty in: astrophysics, atomic physics, biological physics, physics education, nuclear and particle physics, synchrotron radiation, near-field optics, and materials physics, solid-state and condensed-matter physics. Undergraduates are frequently co-authors on scientific papers. Physics majors are part of a close-knit community- a small highly motivated group of people who have wide-ranging interests and a passion for solving problems.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Bachelor of Science in Physics
This degree equips students with a broad technical background, providing a solid basis for graduate study in physics or related sciences, enrollment in professional schools such as law or medicine, and employment in government or industrial laboratories.

Bachelor of Arts in Physics
This degree offers a flexible course of studies for students who may not plan to become professional physicists but who desire an interdisciplinary program with a strong emphasis on physics. The proper choice of electives will help to prepare the graduate for professional careers in education, law, business, journalism, or graduate school in an allied science. It is especially suitable as part of a double major or as preparation for high-school teaching. Since the first four semesters are essentially identical to those of the B.S. program, students may enter the B.A. program either directly from high school or at some later point after entering the university.

Honors Programs
The Department of Physics Honors Program offers students the opportunity to develop their academic potential by increased involvement and participation in physics study and research. A minimum GPA of 3.5 in physics courses and overall GPA of 3.0 is required for admission. Students must complete three (3) hours of PY 499, Independent Research, and submit a written scientific report based on their research. Students must also complete an additional nine (9) hours of upper-level physics courses drawn from the following two categories: 300- and 400-level physics courses taken with the honors option, and 500-level physics courses.

Minor in Physics
The Department of Physics offers a minor in physics to majors in any field except physics. To complete the minor, 17 hours of specified physics courses are required, consisting of PY 205, 208, 407 (or 201, 202, 203) and two of PY 328, 341, 401, 402, 411, 412, 413, 414, 415.

DEPARTMENT OF STATISTICS
SAS Hall, Room 5109
phone: (919) 515-2528
www.stat.ncsu.edu

S. G. Pantula, Head
L. A. Stefanski, Associate Head
J.M. Hughes-Oliver, Co-Director of Graduate Programs for Statistics
P. J. Arroway, Co-Director of Graduate Programs for Statistics, Assistant Head
A. Lloyd, Director of Biomathematics Graduate Program
M. Davidian, Director of the Center for Quantitative Sciences in Biomedicine
Z. Zeng, Director of Bioinformatics Research Center
R.D. Woodard, Director of Undergraduate Programs in Statistics


Statistics is the body of scientific methodology that deals with the logic of experiment and survey design, the efficient collection and presentation of quantitative information, and the formulation of valid and reliable inferences from sample data. The Department of Statistics provides instruction, consultation, and computational services on research projects for other departments of all colleges at North Carolina State University including the Agricultural Research Service. Department staff are engaged in research in statistical theory and methodology. This range of activities furnishes a professional environment for training students in the use of statistical procedures in the physical, biological and social sciences and in industrial research and development.

Opportunities
The importance of sound statistical thinking in the design and analysis of quantitative studies is reflected in the abundance of job opportunities for statisticians. Industry relies on statistical methods to control the quality of goods in the process of manufacturing and to determine the acceptability of goods produced. Statistical procedures based on scientific sampling have become basic tools in such diverse fields as weather forecasting, environmental monitoring, opinion polling, crop and livestock estimation, market research, and business trends prediction. The development and testing of new drugs and therapies requires statistical expertise, and
advances in genomic science provide tremendous opportunities for statistical work. Because one can improve the efficiency and use of increasingly complex and expensive experiment and survey data, the statistician is in demand wherever quantitative studies are conducted.

Scholarships and Awards
The Department of Statistics recognizes the importance of superior academic performance through the awarding of scholarships and certificates of merit. Scholarships are available for the freshman year for the purpose of attracting academically superior students. There are four named departmental scholarships: John L. Wasik Freshman Scholarship, Francis E. McVay Scholarships, Dr. Jackson A. and Viola H. Rigney Scholarship and SAS Institute Scholarships. The department’s NSF Computation for Undergraduate Statistics Program (CUSP) provides advanced training and support for outstanding juniors and seniors. The North Carolina State University chapter of Mu Sigma Rho, the national statistics honorary fraternity, accepts as members students who have had superior performance in statistics courses. Also, outstanding senior statistics students are recognized through the awarding of engraved plaques.

Honors Program
The Department of Statistics allows exceptional undergraduate students to design a program of study that typically includes advanced courses not ordinarily taken by statistics majors and one or two semesters of independent study or research. Students in the program complete a minimum of 9 credit hours in courses drawn from at least two of the following three categories: MA 425, MA 426, or other courses designated as appropriate by the honors adviser, 500-level courses in statistics or mathematics, and 400- or 500-level courses in independent study. Interested students should contact the Honors Adviser in the statistics department for additional information.

Curricula
The undergraduate curriculum provides basic training for a career in statistics or for graduate study and leads to the Bachelor of Science in Statistics. In addition to statistics, the curriculum includes study in mathematics, computer science, and the biological/physical sciences. While fulfilling their major elective requirements, students can either elect a minor or distribute their study across disciplines exploring the application of statistics in other fields such as agriculture and life sciences, computer science, economics and business, industrial engineering, and the social sciences. A cooperative work-study option is also available.

The Department of Statistics also advises students in the Environmental Sciences, Statistics Concentration major. The environmental sciences, whether concerned with basic research or monitoring the status of environmental health, are heavily involved in experimental and/or sampling design, collection of data, data analysis and interpretation. Statistics is the science of designing efficient studies for the collection of data to address specific research questions, and the analysis of these data to provide understanding of the nature of the process or population under study. It is important that environmental scientists be aware of the role of statistics in research and be familiar with basic statistical methods in order to properly plan and execute these studies. The Statistics Concentration will prepare students to become a full member of an interdisciplinary research team attacking an environmental problem. Successful completion of the B.S. in Environmental Sciences, Statistics Concentration will prepare students to perform at the junior statistician level or for graduate study.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula.

Minor in Statistics
The Department of Statistics offers a minor in statistics to majors in any field except statistics. The importance of statistical reasoning to solve real world problems has been recognized by the business, government, and scientific communities. This minor program will provide students with an opportunity to become competent in the use of statistical methods to summarize information and/or provide answers to policy/research questions. Students completing this program of study will also be provided with experience in statistical computing. The typical minor program consists of the successful completion of ST 305, ST 371-372 or ST 421-422, and two other approved Department of Statistics courses with a grade of C or better in each course. A second option would include ST 311-312, ST 371-372 or ST 421-422, and two other approved Department of Statistics courses with a grade of C or better in each course. Other sets of five courses may be acceptable; see the Director of Undergraduate Programs.
Textiles encompasses every aspect of daily lives with applications in medicine, space, recreation and sports, fashion, personal safety, environmental improvement and control, transportation, household and geotextiles. The textile industry continues to become more dynamic with an increased emphasis being placed on the use of new technology. For example, imagine wearing clothes that have electronics incorporated within them that allow them to change colors, monitor your heart rate or track your location; or soldiers wearing uniforms made from nano-fiber that protect them from biological and chemical agents; or artificial arteries, bones, ligaments and skins made from textile substrates and polymers; or getting your apparel custom made in a matter of minutes through body scanning, computer aided design and computer aided manufacturing.

The approximately 9,000 alumni of the College of Textiles hold diverse positions. In the textile and related industries, occupations include executive management positions for major textile organizations, retail buying, manufacturing management, engineering and process improvement, marketing and sales, corporate management, design, research and development, technical service, sourcing, supply chain management, quality control and personnel management. In addition, many students continue studies in graduate programs in a wide range of disciplines. These textile graduates enter an exciting arena, where they bring creativity to the design/development and management decision-making aspects to the industry. Graduates are key strategists in managing global textile-related operations. Engineering systems and products for industry, space, medical textiles, apparel, home textiles, transportation and nonwovens provide exciting opportunities.

Opportunities remain excellent, with the college maintaining one of the university’s best placement records at 95% or better each year. Demand for textile graduates from NC State University is particularly strong, due mainly to the strength of the academic programs and the College’s strong working relationships with industry and government. These programs are offered by two degree granting departments: Textile and Apparel, Technology and Management, and Textile Engineering, Chemistry, and Science.

Degree Programs

The College of Textiles offers a broad choice of curricula from which to choose. Bachelor of Science programs in Textile Technology, Fashion and Textile Management, Textile Engineering, and Polymer and Color Chemistry are available. These programs allow students to choose from a wide range of courses in addition to required core courses. The textile student’s curriculum includes humanities, social sciences and basic sciences and may include concentrations in business, economics, industrial engineering, mathematics, physics, chemistry, computer science, or statistics. Dual degree possibilities are open to textile students, usually requiring at least two semesters of additional study. Since professional textiles study is concentrated in the last two years of the student’s program, it is possible for students from junior or community colleges, or other institutions of higher learning to transfer to the College of Textiles with a minimum loss of time.

The College of Textiles offers the following graduate degrees: Master of Textiles, Master of Science in Textiles, Master of Science in Textile Chemistry, Master of Science in Textile Engineering, Doctor of Philosophy in Fiber and Polymer Science, and Doctor of Philosophy in Textile Technology and Management. For general requirements, consult the Graduate Catalog. By faculty agreement, candidates for the Doctor of Philosophy degree in other schools of this university may specialize in textile-related subjects. In such cases, research is usually done in textiles.

Double/Dual Degree Programs

Dual Degree Program in Textile Engineering and Chemical Engineering

This dual degree program provides for meeting all requirements for bachelor’s degrees in both Textile and Chemical Engineering in only 9 semesters. Students in this dual degree program select the Chemical Processing Concentration of Textile Engineering.

Graduates of this program enjoy the benefits of two engineering degree programs that have long been successful in placing engineers into exciting and well-paying careers. For more information on this dual degree program, contact Jeff A. Joines (JeffJoines@ncsu.edu).

Anni Albers Scholars Program

College of Textiles, Textile Technology Program
College of Design, Art and Design Program

The Anni Albers Scholars Program, a collaboration between the NC State University College of Textiles and the College of Design, provides students simultaneously with exemplary preparation in design and in textile technology. Because NC State University has both renowned Colleges of Textiles and Design, we are in a unique position to provide undergraduate education in textile design that is unparalleled at other institutions in the US. This program improves graduates’ creative flexibility and enhances employment opportunities by combining professional skills in design with high quality technological knowledge. The program is named for textile designer and artist Anni Albers who exemplifies the ideals and goals to which the program aspires.

Students completing the Anni Albers Program will earn two undergraduate degrees: a Bachelor of Art and Design from the College of Design, and a Bachelor of Science in Textile Technology from the College of Textiles.

For more information, contact Dr. Traci May Lamar.

Facilities

The College of Textiles is located on Centennial Campus, which is adjacent to NC State University’s central campus. Centennial Campus is a “technopolis” that combines the university, corporate and government research and development facilities. There is no
other campus or research park quite like this 1,334 acre site. In 2008, Centennial Campus was named top Research Science Park of the Year by The Association of University Research Parks (AURP).

Minors
College of Textiles majors are encouraged to minor in areas outside of textiles. Of particular interest are minors in Design, Business, Foreign Language, Paper Science, and Industrial Engineering.

Honor Society
Sigma Tau Sigma is the scholastic textile fraternity which was founded in the College of Textiles in 1929 to honor students who have a grade point average of 3.250 or higher. The main goal of this fraternity is to create a high standard of scholarship among textile students. Twice every year the local chapter selects as its prospective member junior textile students who meet the above criteria. Sigma Tau Sigma also promotes excellence by awarding a trophy to the graduating senior with the highest overall grade point average in the college.

Scholarships
The Directors of the North Carolina Textile Foundation and friends of the College of Textiles have established an outstanding freshman scholarship program for incoming freshmen, transfer into the College of Textiles and current Textile students. The College of Textiles currently has the largest college-based scholarship program at NC State University.

Centennial Scholarships are currently valued at $10,000 per year for in-state and out-of-state students. This scholarship program also offers a $7,500 enrichment fund per recipient for educational enhancement activities. Candidates must be nominated by his or her high school or home school by November 1st, or must self nominate before November 15th. North Carolina Textile Foundation (NCTF) Scholarships (total value: $20,000) and Textile Prestige Scholarships (total value: $10,000) are also awarded through the Centennial Scholarship Process. Application deadline for all Textile scholarships is December 1. Restrictions do apply. Contact Kent Hester at (919) 515-6530 for full details.

Field Trips
For certain textiles courses, it is desirable for the student to see the marketing, design and/or manufacturing processes under actual operating conditions. When possible, student groups visit marketing, production, and corporate facilities. Trip participation may be required. Transportation costs and other travel expenses, while held to a minimum, are paid by the student in some instances.

Summer Employment
Job opportunities for summer employment are available for textile students. Placement assistance is available through the college career services office and frequently can be arranged in the student’s home community as well as global locations.

Four-in-One Program
The College of Textiles has a program which permits a student with a baccalaureate degree from an accredited college or university to complete the requirements for a Bachelor of Science degree in Textiles, Fashion and Textile Management or Polymer and Color Chemistry after the satisfactory completion of a minimum of one year of study.

Applicants should have completed basic economics, mathematics, physics and chemistry requirements comparable with those required for the textile degree sought. Under these conditions, the student generally may complete the degree requirements in two summer sessions and two regular semesters. Students not meeting specific requirements in business, economics, sciences, or mathematics should remove deficiencies prior to entering a specific degree program, otherwise the program of study may require three or more semesters.

Each applicant’s undergraduate program is considered individually and, in most cases, a complete transfer of credits is possible.

Exchange Program
Students at NC State have the opportunity to study abroad at universities in North and South America, Europe, Asia, Africa, and Australia/Oceania. Students can study abroad for as short a time period as one week or for as long as an entire academic year.

Additional information about exchange opportunities for College of Textiles students can be obtained from www.tx.ncsu.edu/student_services/international or by contacting Dr. Christy Cagle by e-mail at cmcagle@ncsu.edu or by telephone at (919) 513-2410.

Special Services
The College of Textiles offers several services and programs which enrich its academic programs. Textile and Apparel Research is conducted on a wide variety of problems relating to the fiber, textile, apparel, and retail industries. Frequently, the problems are interdisciplinary and involve team effort. Students have an opportunity to participate in the solution to current problems. The Office of Student Services is responsible for career services and scholarship programs of the College of Textiles. The career services office brings together industry recruiters and students for interview sessions for permanent and summer employment. Alumni may also take advantage of the placement office. The scholarship function is operated by a committee. It is possible for any United States Citizen or
College of Textiles

Permanent Resident student to pursue an education in textiles through scholarships, loans or grants, as long as he or she maintains the university’s academic standards.

Textile Off-Campus Program (TOP)
The College of Textiles has a selection of undergraduate courses that are offered by distance education each semester. On campus students may take these courses via the internet with departmental approval. Classes with labs may require the student to enroll in an on campus lab section. For information, please visit our website at www.tx.ncsu.edu/academic/distance or call Carolyn Krustoff at (919) 515-6622.

DEPARTMENT OF TEXTILE AND APPAREL, TECHNOLOGY AND MANAGEMENT

Centennial Campus, Room 3245
phone: (919) 515-6633

Nancy Cassill, Head
A. M. Seyam, Associate Head and Director of Graduate Programs
K.A. Thoney Barletta, Associate Head of Undergraduate Programs


The Department of Textile and Apparel, Technology and Management offers Bachelor of Science degrees in Fashion and Textile Management and in Textile Technology. The degree in Fashion and Textile Management permits the student to specialize in one of three concentrations: Textile Brand Management and Marketing, Fashion Development and Product Management, and Retail and Supply Chain Management in Textiles. The B.S. in Textile Technology degree offers a concentration in Textile Design. Each program requires a common series of foundation courses covering the principles, fundamentals, and applications of textile technology and business.

Curricula

The B.S. in Fashion and Textile Management has three concentrations. The Textile Brand Management and Marketing Concentration focuses on studying textile branding strategies, consumer trends, product trends, licensed products, and the global textile marketplace dynamics. The Fashion Design and Product Management Concentration focuses on design and development of fashion products, integrating trend analysis, computer-aided-design, coloration, silhouette selection, pattern making, fabric selection, consumer research, costing, sourcing and quality assessment. The Retail and Supply Chain Management in Textiles Concentration focuses on sourcing the optimum quantities of textile raw materials and products to supply the brands and retailer to meet consumer demand. The concentration also provides depth in textile product retail buying, merchandising and strategy. The program teaches how to use a series of problem solving approaches to make the logistics and retailing processes of textile products efficient and cost effective. Students in all three Fashion and Textile Management concentrations may pursue global studies, including study abroad, to further enhance their understanding of global market opportunities.

The B.S. in Textile Technology offers the student a background in the technology of product design, manufacturing, product development, and evaluation of textiles. The textile technology program is both flexible and diverse, requiring students to acquire an understanding of textile processes, products, and innovations. The program involves many academic disciplines and offers a well-rounded versatile degree, which prepares graduates to accept design and development positions in industry.

The Department of Textile and Apparel, Technology and Management jointly administers, with the Department of Art and Design, the Anni Albers Scholars Program for students wishing to double major with a B.S. degree in Textile Technology and a B.A. degree in Art and Design.
The Department of Textile and Apparel Technology and Management has state of the art laboratories including Digital Design Laboratory, Nonwovens Pilot Laboratory, Textile Management Sciences Lab, Filament and Technology Lab, Fashion Studio, Anni Albers Design Labs, Specialty Software Computer Lab, and Microscopy and Image Analysis Lab.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula

**Journal**

The department publishes an online electronic journal quarterly, Journal of Textile and Apparel Technology and Management (JTATM), which provides industry, government and academic personnel with the timely dissemination of textile information. With a readership in excess of 10,000 persons (industry, government, and academic professionals), JTATM serves as an effective communication vehicle regarding the latest textile innovations, both management and development, in the field. Faculty and students utilize this resource in coursework and research efforts. The Journal of Textile and Apparel, Technology and Management can be accessed at www.tx.ncsu.edu/jtatm.

**DEPARTMENT OF TEXTILE ENGINEERING, CHEMISTRY AND SCIENCE**

Centennial Campus, Room 3250  
phone: (919) 515-6635

J.P. Rust, Head, Department of Textile Engineering, Chemistry and Science  
J. A. Joines, Associate Head, Director of Undergraduate Programs  
P. J. Hauser, Associate Head, Director of Graduate Programs

Burlington Chair in Textile Technology: R.L. Barker; Ciba Professor of Dyestuff Chemistry: H.S. Freeman; William A. Klopman  

The Department of Textile Engineering, Chemistry, and Science offers Bachelor of Science degrees in Polymer and Color Chemistry and Textile Engineering. Students receive a fundamental knowledge of the science and engineering involved in the production of polymers, fibers, yarns and fabrics, and products based on them, and the process of dyeing and finishing.

**Curricula**

The B.S. in Polymer and Color Chemistry is a flexible and rigorous program that provides courses in fundamental chemistry, while incorporating some unique areas of applied chemistry in polymers and color chemistry. The applied courses are heavily oriented to the chemistry and technology of polymers, including polymer synthesis, extrusion and characterization. In addition, the color chemistry component of the degree includes the synthesis and application of dyes and other compounds associated with the coloration of materials, as well as the science of color perception and color measurement.

The degree program offers two concentrations: American Chemical Society (ACS) Certified, and Science and Operations. The ACS Certified concentration is designed for students wishing to pursue advanced studies in chemistry and related subjects, for instance, medical school, dental school, pharmacy or optometry. Each concentration incorporates a number of electives allowing students to develop focus areas, including medical textiles, polymer chemistry, and color chemistry. More information about the degrees is available online: www.tx.ncsu.edu/pcc.

The B.S. in Textile Engineering provides a broad base of fundamental engineering courses as a foundation for studies in textile engineering. The textile engineering courses deal with the application of scientific and engineering principles to the design and control of all aspects of fiber, textile and apparel processes, products and machinery. These include natural and man-made materials, interaction of materials with machines, safety and health, energy conservation, six-sigma quality, and computer information systems. The B.S. in Textile Engineering is offered jointly with the College of Engineering. For more details about the program, see description under the College of Engineering.

Specific curriculum requirements are available online: www.ncsu.edu/registrar/curricula
Minor in Polymer and Color Chemistry
The minor in Polymer and Color Chemistry is available to majors in any field except Polymer and Color Chemistry. The program is designed to expose students to the technical and scholarly disciplines of polymer chemistry, fiber formation, color physics, dyeing, and chemical modification of fibers and fabrics, and gives them an opportunity to learn how basic disciplines are applied in an industrial environment. Any interested students should contact the Department of Textile Engineering, Chemistry, and Science for information about the minor and its prerequisites.

B.S. Degree in Textile Engineering
(See Textile Engineering curriculum in the College of Engineering)
COLLEGE OF
VETERINARY MEDICINE

4700 Hillsborough Street
NCSU Box 8401
Raleigh, NC 27606
phone: (919) 513-6205, Admissions
phone: (919) 513-6212, Academic Affairs
fax: (919) 513-6197
e-mail: cvm_dvm@ncsu.edu

David G. Bristol, Interim Dean
Keven Flammer, Acting Associate Dean and Director, Academic Affairs
David C. Dorman, Associate Dean and Director, Graduate Studies and Research
Michael G. Davidson, Associate Dean and Director, Veterinary Medical Services
Jeffrey Hackel, Director of Student Services
No specific undergraduate degree track is associated with a preprofessional veterinary medicine program. Faculty members from the College of Agriculture and Life Sciences serve as advisers to undergraduate students interested in veterinary medicine that are enrolled and pursuing a baccalaureate program usually in a science-related field. Preprofessional course requirements are listed below. After completion of the required courses, students may be eligible to apply for the professional veterinary program. Course requirements may be changed annually and are determined by the Faculty Committee on Admissions in the College of Veterinary Medicine.

All courses listed below should be completed by the time of application to the College of Veterinary Medicine, except for two courses which may be pending completion in the spring semester, term, or quarter, of the year of application.

Professional Degree Programs and Career Opportunities

Veterinary medicine is a science career dealing with the recognition, treatment, control and prevention of disease in animals. Career options are unlimited and varied as animal health affects the health and economic welfare of the nation. DVM candidates may select several career options upon graduation. Federal government, private industry, private practice, and research and teaching activities in a university setting are all possible for licensed graduates. Successful completion of the professional training program should prepare students for appropriate North Carolina state licensing examinations. Interested prospective applications should view the college website at www.cvm.ncsu.edu.
**DVM ADMISSIONS**

Preprofessional Course Requirements for the 2010 Admissions Cycle

<table>
<thead>
<tr>
<th>Required Courses</th>
<th>Semester Hrs Required</th>
<th>NC State University Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal Nutrition</td>
<td>3</td>
<td>ANS 225 Principles of Animal Nutrition (3) or ANS 230 Nutrition of Domestic Animals (3) or ANS 415 Comparative Nutrition (3)</td>
</tr>
<tr>
<td>Biochemistry</td>
<td>3 - 4</td>
<td>BCH 451 Principles of Biochemistry (4)</td>
</tr>
<tr>
<td>Biology with Lab</td>
<td>4</td>
<td>BIO 181 Introductory Biology (4)</td>
</tr>
<tr>
<td>Calculus or Logic</td>
<td>3</td>
<td>MA 121 Elements of Calculus (3) or MA 131 Calculus for Life and Management Sciences (3) or MA 141 Calculus I (4) or LOG 201 Logic (3)</td>
</tr>
<tr>
<td>Chemistry, General with Labs</td>
<td>8</td>
<td>CH 101 Chemistry- A Molecular Science (3) w/lab CH 102 (1) and CH 201 Chemistry-A Quantitative Science (3) w/lab CH 202 (1)</td>
</tr>
<tr>
<td>Chemistry, Organic with Labs</td>
<td>8</td>
<td>CH 221 Organic Chemistry I (3) with lab CH 222 (1) and CH 223 Organic Chemistry II with lab CH 224 (1)</td>
</tr>
<tr>
<td>Composition &amp; Writing, Public Speaking, Communications</td>
<td>6</td>
<td>Any combination of the following: ENG 101 Academic Writing and Research (4), COM 110 Public Speaking (3), COM 112 Interpersonal Communications (3), COM 211 Argumentation and Advocacy (3)</td>
</tr>
<tr>
<td>Genetics</td>
<td>3 or 4</td>
<td>GN 311 Principles of Genetics (4)</td>
</tr>
<tr>
<td>Humanities and/or Social Sciences</td>
<td>6</td>
<td>Humanities courses include history, foreign language, arts, music, language, and literature. Social Science courses include psychology, sociology, and anthropology.</td>
</tr>
<tr>
<td>Microbiology with Lab</td>
<td>4</td>
<td>MB 351 General Microbiology (3) and MB 352 General Microbiology Lab (1) MB 411 Medical Microbiology (3) and MB 412 Medical Microbiology Lab (1)</td>
</tr>
<tr>
<td>Physics with Labs</td>
<td>8</td>
<td>PHY 211 College Physics I (4) &amp; PHY 212 College Physics II (4) or PY 205 Physics for Engineers and Scientists I (4) and PY 208 Physics for Engineers and Scientists II (4)</td>
</tr>
<tr>
<td>Statistics</td>
<td>3</td>
<td>ST 311 or ST(BUS) 350 Introduction to Statistics</td>
</tr>
</tbody>
</table>

*Required courses must be completed with a “C-” or higher grade at time of application. All but two of the required courses must be completed by the end of the fall semester during which the applicant applies. The remaining two courses must be completed in the spring semester of the application cycle year. Required courses can not be completed in the summer sessions immediately preceding matriculation.*
DEPARTMENT OF CLINICAL SCIENCES
E. Hardie, Head
phone: (919) 513-6230


DEPARTMENT OF MOLECULAR BIOMEDICAL SCIENCES
C. McGahan, Head
phone: (919) 513-6220


DEPARTMENT OF POPULATION HEALTH AND PATHOBIOLOGY
M. Roberts, Interim Head
phone: (919) 513-6240

OTHER ACADEMIC AND ADMINISTRATIVE UNITS

Biotechnology Program
Robert M. Kelly, Director

The Biotechnology Program at NC State includes nearly 200 faculty representing 24 departments in the Colleges of Agriculture and Life Sciences, Engineering, Natural Resources, Physical and Mathematical Sciences, Veterinary Medicine, and Humanities and Social Sciences. The program administers minors in Biotechnology at the undergraduate, M.S., and Ph.D. levels, and a Graduate Certificate Program. Research in biotechnology is multidisciplinary encompassing three main areas: molecular biology, biomolecular engineering, and cell culture. One of the unique aspects of our program is the focus on laboratory techniques, including recombinant DNA technology, PCR, gene chip/microarray technology, protein purification, and more. Many curricula offer a great deal of theory about molecular biotechnology, but few allow for the level of hands-on experience that our program does. For more information about the Biotechnology Minor and Graduate Certificate Program, please visit www.ncsu.edu/biotechnology.

Computer Training Unit
Judson Hair, Executive Director
Chip Futrell, Associate Director
phone: (919) 515-8163

Since 1989, the NC State Computer Training Unit has been a leading provider for the IT training needs of the Triangle. CTU operates out of McKimmon Center, utilizing four dedicated, state-of-the-art labs. New classes are introduced on a tri-mester basis and tomorrow’s technology is becoming a reality to hundreds of people today.

Whether an individual is looking for a single class to become familiarized with an operating system or is committed to eight weeks of certification training, the Computer Training Unit can address all computer training needs. With a hands-on approach to technology, quality training is provided to each participant.

Visit the NC State Computer Training Unit website today at www.ncsu.edu/ctu for a complete course schedule and certification information.

Continuing and Professional Education
Judson Hair, Executive Director
Chip Futrell, Associate Director
phone: (919) 515-2261
website: www.mckimmon.ncsu.edu/cpe.

In keeping with the land-grant tradition of the university, Continuing and Professional Education offers noncredit education and training to all the people. CPE encompasses three sub-units: Office of Professional Development, The Computer Training Unit, and McKimmon Conference and Training Center, focusing on the development, facilitation, and delivery of continuing education and professional programs for business, industry, and other organizations. Up-to-date computer training is also available on a variety of different levels and on a wide range of topics. Special efforts are made to meet the training needs of industry and government agencies through general as well as customized offerings. The university awards Continuing Education Units to participants in qualified programs. Continuing Education Units are part of a nationwide system that provides a uniform measure of attainment in noncredit educational programs.

Distance Education and Learning Technology Applications (DELTA)
Thomas K. Miller III, Vice Provost for DELTA
Lou Harrison, Associate Vice Provost, Educational Technology Services
Donna Petherbridge, Associate Vice Provost, Instructional Support Services
Christine Hare, Assistant Vice Provost for Finance & Business
Rebecca Swanson, Associate Vice Provost of Distance Education
Kay Zimmerman, Associate Vice Provost of Marketing & Partnership Development

Vision. We seek to improve the quality of education by harnessing technology to provide ready access for all learners. In this way we hope to meet the challenges of a changing society.

Mission. Education is the key to a prosperous future for North Carolina. DELTA promotes the quality of education by extending the reach of the faculty, collaboratively applying expertise in technology and pedagogy in an efficient, effective, and service-oriented environment.

DELTA's role within the Office of the Provost is to foster the integration and support of learning technologies in NC State’s academic programs, both on the campus and at a distance. DELTA coordinates the funding and production of all distance-based credit programs and courses for the university, and promotes the quality of education by extending the reach of the faculty, collaboratively applying expertise in technology and pedagogy in an efficient, effective, and service-oriented environment. DELTA manages the university’s learning technology infrastructure, including various asynchronous learning management systems.
North Carolina State University

(Wolfware, Moodle, Vista); Elluminate, a tool for synchronous online teaching and learning, and several campus video classrooms. DELTA offers various programs and services that provide training, support, and resources for all instructors teaching and learning with technology. These services may range from developing and/or funding distance education courses and programs, to creating technology resources and providing support for face-to-face instruction, to working with colleges to create specialized, technology-delivered education programs in support of critical constituencies in our state, such as the U.S. military. For more information, please visit DELTA's website at delta.ncsu.edu.

Division of Undergraduate Academic Programs

Park Shops website: www.ncsu.edu/uap
NC State Box 7105 phone: (919) 515-3037
Raleigh, NC 27695-7105 fax: (919) 515-4416

John T. Ambrose, Interim Dean
Roger A. E. Callanan, Assistant Dean
Pat Cellini, Assistant Dean


NC State University’s Division of Undergraduate Academic Programs (DUAP) promotes excellence and effectiveness in undergraduate education. DUAP is charged with the development of a coherent vision for undergraduate education, the coordination of academic policy and curricular programming, and the strengthening of all academic support programs. DUAP seeks to engage undergraduate students in a wide range of academic activities that enhance their learning and result in more profound intellectual and civic development.

Academic Support Program for Student Athletes

200 Case Athletics Center website: www.ncsu.edu/aspsa
NC State Box 7104 phone: (919) 515-2464
Raleigh, NC 27695-7104 fax: (919) 515-1619

Philip Moses, Executive Director
Carrie Leger, Director

ASPSA is a comprehensive support program for more than 560 student-athletes who represent NC State. ASPSA strives to meet the academic, personal and professional development needs of all student-athletes, promoting excellence and effectiveness in undergraduate education, computer literacy, leadership, and civic engagement.

ASPSA is committed to extending the educational experience of student-athletes with particular emphasis on empowering students to become strong self-advocates; providing specialized initiatives to facilitate a smooth transition from high school to college while successfully integrating student-athletes into the campus community; enhancing academic skills for student athletes at all skill levels; and providing academic support personalized to the needs of each student-athlete.

Cooperative Education Program

300 Clark Hall website: www.ncsu.edu/co-op_ed
NC State Box 7110 phone: (919) 515-2300
Raleigh, NC 27695-7110 fax: (919) 515-7444

Arnold Bell, Executive Director of Development & Experiential Learning
Kelly H. Laraway, Director of Short-Term Experiential Partnership (STEP) Program

This optional program is structured so that students will alternate semesters of study with semesters of practical work as sophomores and juniors. Academic work is spread over a three-year period to permit alternating academic semesters with work-experience semesters. Students earn a salary while they are in industry. This income can prove useful in offsetting college expenses. The Co-op plan can be completed in five years, during which time the student receives 12 to 18 months of industrial experience.

NC State University offers undergraduate students formal opportunities for valuable experiential learning through the STEP (Short-Term Experiential Partnership) Program. STEP is an educational option that allows students to gain real workplace experience in corporate settings, schools, hospitals, government agencies, and non-profit organizations. The STEP Program is open to all NC State undergraduate students who are in good academic standing.
Students in all curricula may apply for the Co-op program if they have a grade point average of 2.5 or better. Application for admission into the Co-op program should be made early in the spring semester of the freshman year, however, it will be considered during the sophomore year or the first semester of the junior year. Undesignated students must be admitted into a degree program prior to beginning the first Co-op assignment. Further information may be obtained from the Office of Cooperative Education, 300 Clark Hall.

**First Year College**

2751 Cates Avenue  
FYC Commons  
NC State Box 7925  
Raleigh, NC 27695-7925  
website: www.ncsu.edu/fyc  
phone: (919) 515-8130  
fax: (919) 515-8267

Carrie McLean, Director

The First Year College at North Carolina State University provides a point of entry for students who are undecided about their choice of major, but interested in the institution’s mix of science, technology, professional, and liberal studies offerings.

The program employs a student-centered approach to the development of an effective teaching and learning environment. As part of that effort, the First Year College takes into account critical adjustments necessary for successful transition from the demands of high school to those of college. Based on a cognitive-developmental model that promotes the total university experience, the program brings into closer alignment the in-class and out-of-class experiences of students with the intellectual environment to achieve academic success through active involvement and responsibility for their own learning.

At the core of the program are elements of access to quality academic advising, formal and informal interactions with university faculty, support from academically successful upper-class students, guided exploration of the university and its colleges, structured reality-based discussions of issues associated with transition from high school to college and deliberate reflection on the cultural and social offerings available at the university. These elements are addressed through an orientation course taught each semester of the first year, cross-curricular advising, and a specialty programmed living/learning experience in the FYC Village. The program is structured so that time to graduation for students entering through the First Year College is the same as for students who enter the university directly through a major, though FYC students take a year to explore.

**First Year Inquiry Program**

300 Park Shops  
NC State Box 7105  
Raleigh, NC 27695-7105  
website: www.ncsu.edu/firstyearinquiry  
phone: (919) 515-3037  
fax: (919) 515-4416

Richard Slatta, Interim Director

The First Year Inquiry Program (FYI) is designed specifically for first year students who will take general education courses during their first year at NC State. Each FYI course, which is designated with the “Q” suffix, fulfills a general education program (GEP). FYI faculty, for whom teaching and student success are priorities, engage FYI students through the use of “inquiry-guided” teaching methods. The three student-learning objectives for which the FYI program strives are sharpening of critical thinking skills, enhancing development of intellectual maturity and increasing student responsibility for his or her own learning. Students further benefit from experiencing classes with a small faculty/student ratio that fosters a closer relationship among students and professor.

**New Student Orientation**

204 Park Shops  
NC State Box 7525  
Raleigh, NC 27695-7525  
website: www.ncsu.edu/orientation  
phone: (919) 515-1234  
fax: (919) 515-5844

Gabe Wical, Director

New Student Orientation provides newly admitted first-year and transfer undergraduate students introductory assistance and continuing services that will aid in their transition to NC State. Our programs expose students to broad educational opportunities, academic expectations and resources, as well as social and developmental opportunities. Most importantly, we begin the process of integrating students into the life of the institution.

**Office of Advising Support, Information, and Services (OASIS)**

211 Park Shops  
NC State Box 7577  
Raleigh, NC 27695-7577  
website: www.ncsu.edu/oasis  
phone: (919) 513-1723  
fax: (919) 513-7542

Roxanna McGraw, Director
The mission of the Office of Advising Support, Information and Services (OASIS) is to:

- Provide academic information to current and prospective undergraduate students through virtual and face-to-face cross-curricular advising;
- Serve as a resource for faculty, staff and advisers regarding academic policies, procedures, advising practices and adviser development;
- Coordinate communication across the University advising community;
- Develop resources that enhance the quality and effectiveness of advisers in their work with students; and
- Contribute to the professional discipline of academic advising within and beyond NC State University.

OASIS is largely responsible for working with undecided students seeking direction and clarification of academic majors, those returning to school and those in academic difficulty. We extend our advising support to current and prospective first-year and transfer students, and non-degree studies students. OASIS provides assistance and strives to be respectful and inclusive in the work we do each and every day. Underrepresented, first generation, military (active or veteran), and non-traditional students are some examples of the diverse student population we serve at NC State University.

OASIS understands that adviser training is the foundation of any advising program; therefore, it has developed a comprehensive adviser development program that includes virtual services, access to a resource library, teleconferences, workshops, and seminars. With the collaboration of our partners in both academic and student affairs, over 30 workshops are available for faculty and staff.

**Office of Assessment**

305 Park Shops  
NC State Box 7105  
Raleigh, NC 27695-7105

website: [www.ncsu.edu/assessment/assess.htm](http://www.ncsu.edu/assessment/assess.htm)  
phone: (919)515-7153  
fax: (919) 515-4416

Allen Dupont, Director

The office of Assessment in the Division of Undergraduate Academic Programs provides support for continuous program improvement for all departments and units serving undergraduate students. The Assessment staff provides training, analysis, and support for on-going assessment of student learning and development. Assessment of student learning outcomes aligns directly with the NC State mission and promotes a culture of learning, improvement, and accountability.

**Transition Program**

211 Park Shops  
NC State Box 7014  
Raleigh, NC 27695-7014

website: [www.ncsu.edu/transition](http://www.ncsu.edu/transition)  
phone: (919) 515-7053  
fax: (919) 513-7906

Frankye Artis, Director

The Transition Program is a program of support and challenge, which is designed to help students who demonstrate academic or transitional need attain academic success. Students do not apply to the Transition Program; rather, the Office of Admissions refers to the Director of the Transition Program a select set of applications from students who meet criteria for admission to North Carolina State University, but do not meet the requirements for acceptance into the first and second choice majors to which they applied. The Director reviews applications and offers a pre-determined number of students’ admission to the university through the Transition Program. All students admitted to the program must sign a program contract that commits them to participate in specially designed activities, both personal and academic, during their freshman year.

**Undergraduate Courses and Curricula**

308 Park Shops  
NC State Box 7105  
Raleigh, NC 27695-7105

website: [www.ncsu.edu/uap/academic-standards](http://www.ncsu.edu/uap/academic-standards)  
phone: (919) 515-9769  
fax: (919) 515-4416

The office Undergraduate Courses and Curricula manages the implementation of the General Education Program (GEP) and the approval of all undergraduate course and curricula offerings at NC State. The office also maintains all related guidelines, instructions, forms, and archives. The office serves as a point of contact for on-campus as well as off-campus entities and works directly with the University of North Carolina General Administration (UNC-GA), the University Courses and Curricula Committee (UCCC), the Council on Undergraduate Education (CUE), Registration and Records, the colleges, and the office of the Provost regarding undergraduate courses and curricula related matters.

**Undergraduate Research**

410 Clark Hall  
NC State Box 7576  
Raleigh, NC 27695-7105

website: [www.ncsu.edu/undergrad-research](http://www.ncsu.edu/undergrad-research)  
phone: (919) 513-4187  
fax: (919) 515-4416

George T. Barthelmus, Director

The office of Undergraduate Research supports and promotes excellent undergraduate opportunities in discovery-, inquiry- and creativity-based scholarship through mentored research experiences with NC State faculty and other national and international scholars and professionals. Undergraduate Research is scholarly study in any discipline in which independent scholarship culminates
Any student chosen by a mentor may participate in undergraduate research. Students from any discipline can engage in the excitement of scholarly research and present their work at quarterly symposia. Research and travel grants are available. Motivated students from high schools, community colleges, and universities from North Carolina, the nation, and the world are invited to participate.

**Undergraduate Tutorial Center**

101 Park Shops  
NC State Box 7118  
Raleigh, NC 27695-7118  
phone: (919) 515-3163  
fax: (919) 515-5844

Barbara B. Windom, Director

The Undergraduate Tutorial Center provides free academic assistance to NC State undergraduate students enrolled for credit in many 100- and 200- level math, physics, chemistry, and physics classes. Several types of assistance are available that are designed to best meet the students’ needs, including tutoring by appointment, group tutoring, and Supplemental Instruction (SI). In addition, Writing and Speaking Tutorial Services (WSTS) provides assistance to all undergraduate students who need help at any stage of the writing process.

Students are eligible to become a tutor for the UTC if they have an established GPA of 3.0 or better and least a B+ in the course(s) they wish to tutor. All new tutors are required to take ECI 210, Introduction to College Tutoring, during the first semester of employment. All tutors are trained in techniques that are designed to help students become independent learners.

**University Honors Program**

219 Clark Hall  
NC State Box 8610  
Raleigh, NC 27695-8610  
website: www.ncsu.edu/honors  
phone: (919) 513-4078  
fax: (919) 513-4392

Richard L. Blanton, Director

The University Honors Program (UHP) is a highly selective program of great expectations. The program exists to encourage and enable outstanding students to engage in research and scholarship in their chosen discipline. It is an opportunity for motivated students to craft for themselves a unique undergraduate education that draws on the full range of opportunities that exist at a major research, land-grant university such as NC State. Undergraduates can pursue research and scholarship in any discipline. In fact, there are students from every undergraduate college at NC State in the UHP.

Application to the University Honors Program is by invitation only. Incoming freshmen are invited to apply after they have been accepted to the university. All invitations are issued on a rolling basis throughout the university’s admissions process (typically mid-December through February). If you do not receive an invitation, but believe you are a strong candidate for the University Honors Program, you can contact us and request an invitation to apply. Admission is competitive and based on evidence of motivation to pursue research and scholarship in the discipline, academic achievement, extracurricular activities, and our desire to maintain an Honors community that includes students who apply to the university by early admission deadline. Current NC State students may also be invited to apply following the first and second semesters of their freshman year.

**The Graduate School**

D. K. Larick, Dean  
R. C. Rufty, Associate Dean  
M. Carter, Associate Dean  
L. Borbye, Assistant Dean  
D. M. Shafer, Assistant Dean  
R. Liston, Assistant Dean  
G. Hodge, Interim Assistant Dean  
D. Willits, Interim Assistant Dean

The Graduate School supports advanced study and research in the fields of agriculture and life sciences, design, education, engineering, natural resources, humanities and social sciences, management, physical and mathematical sciences, textiles, and veterinary medicine.

The school is currently composed of more than 2,500 graduate faculty members. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the university’s more than 7,000 Master’s and doctoral students from all areas of the United States and many other countries.

The faculty and students have available exceptional facilities including libraries, laboratories, modern equipment, and special research areas. For a list of graduate degrees offered at NC State and details on programs and admissions, consult the Graduate Catalog.
As a key component of Extension, Engagement, and Economic Development, the McKimmon Center for Extension and Continuing Education (MCE&CE) facilitates and enhances access to the academic resources of the campus by a wide range of audiences. Units within MCE&CE provide professional expertise in the identification of educational needs and the development of relevant programming in collaboration with the faculty, departments, colleges and external constituents; in the management and implementation of noncredit offerings; in the operation of a full-services, state-of-the-art conference facility; in the delivery of technical assistance and applied research; and in the evaluation and outcome assessment of programs and services delivered.

Specifically, the McKimmon Center for Extension and Continuing Education

- develops and delivers noncredit continuing education programs to meet the professional development or training needs of business/industry, governmental agencies and nonprofit organizations and communities,
- offers customized programs for diverse clients,
- stimulates interest in the development and delivery of relevant noncredit distance education offerings,
- identifies opportunities for joint initiatives and assists in measuring learning outcomes and impacts,
- provides a wide array of software-specific and certification courses for individuals and organizations,
- operates the McKimmon Conference and Training Center which is a large, flexible facility that hosts educational meetings for groups ranging in size from 5 to 1,200,
- provides opportunities for lifelong enrichment for people over the age of 50 through a robust learning-in-retirement program,
- conducts program evaluation and outcomes research, survey research, technology application and customized consulting services for federal/state/local governmental agencies and nonprofit organizations,
- performs a key role in the public schools statewide testing and accountability program,
- serves as the campus provider of Continuing Education Units (CEUs) that are earned through participation in approved noncredit courses, and
- coordinates and manages the annual Connecting-in-North Carolina (CINC) tour for faculty and key administrators to enhance the three-fold mission of our land-grant institution, and
- affords opportunities for students in collaboration with the University Honors Program and Service Learning Program.

The McKimmon Conference and Training Center

Judson Hair, Executive Director
Valerie Jones, Assistant Director, Reservations and Client Relations Department
Freddie Sinclair, Assistant Director, Physical Environment and Technical Services
phone: (919) 515-2277
website: www.mckimmon.ncsu.edu/mckimmon

The McKimmon Center provides the meeting facilities, audiovisual equipment, and support services for adult education programs. Administrative services are available to organizations that desire assistance in planning and implementing conferences, short courses and other educational activities. Catering coordination provided by the staff is beneficial to the planning and successful implementation of banquets and related functions. The center accommodates small meeting groups and large national and international conferences. There are 15 meeting rooms (which can be divided into 20 areas) that can be arranged for any type or size audience ranging from a typical conference room to an 1100-person theatre style hall. Four rooms are dedicated as Computer Training Unit teaching labs. Downlink teleconferencing, two-way audio-video delivery, and other technical services are available in a video production room to enhance the total learning experience.

The NCSU Libraries

S. K. Nutter, Vice Provost and Director
C. D. Argentati, Assoc. Vice Provost and Donald E. Moreland Deputy Director of Libraries

The NCSU Libraries’ website (www.lib.ncsu.edu) is a rich source of information and serves as a gateway to resources and services.

The D.H. Hill Library is open 24 hours/day in the fall and spring semesters. Branch libraries include: Burlington Textiles Library, Harrye B. Lyons Design Library, Natural Resources Library, and William Rand Kenan, Jr. Library of Veterinary Medicine.

The collection contains over 4 million volumes of books, bound journals, and government documents; approximately 63,000 print and electronic serials; over 5.4 million microforms; full-text databases in all disciplines and extensive digital collections; numerous video, audio, and multimedia titles; unique and rare materials in the Special Collections Research Center. The Libraries’ participation in the Triangle Research Libraries Network (TRLN) provides convenient access to the collections of Duke University, UNC-Chapel Hill, and NC Central University.
The library has approximately 270 public workstations and a full complement of equipment for audio, video, and digital resources. PC and Macintosh laptop computers, digital cameras, camcorders, GPS units, and digital audio players and recorders are available for loan.

The popular Learning Commons in D.H. Hill Library is a technology-equipped space for both individual and group work. The library offers equipment and assistance for working with digital images and other materials. The Libraries has a variety of study spaces for groups and individuals.

The Libraries’ website (www.lib.ncsu.edu) provides information about and access to many services, including reference assistance, interlibrary loan, and electronic reserves. Library Tools web pages are available for every course offered at NC State (www.lib.ncsu.edu/course). These customized pages include e-reserves, article databases, librarian recommendations, citation tools, IM a Librarian for help, and more. The Libraries’ Course Books on Reserves program makes over 4,500 required texts available on Course Reserves each year.

Construction is now under way on a state-of-the-art facility on Centennial Campus, the James B. Hunt Jr. Library. Slated for completion in 2012, the Hunt Library has been designed to foster learning and collaboration and will be one of the finest academic libraries anywhere in the world.

North Carolina Japan Center
J.W. Baugh, Director

The North Carolina Japan Center was established in July 1980 by Governor James B. Hunt to strengthen the state’s academic, economic, scientific, and cultural ties with Japan. In its many aspects, the Center serves as a focal point for interaction between Japanese and North Carolinians. It is a statewide resource intended to assist all citizens, universities, companies, and public and private institutions in relations with the Japanese. The North Carolina Japan Center works to inform people of the state about modern Japan and its people. It also provides information and resources for Japanese citizens living in North Carolina.

A unit of the University Asia Initiative in the Office of International Affairs, the Japan Center includes an Academic Advisory Committee consisting of faculty from colleges across the university who provide guidance and direction for academic exchange and development. An external Board of Advisors includes prominent citizens of North Carolina who have a strong interest in Japan and US-Japan relations. The Japan Center cooperates closely with the NC State Japanese language program and provides study abroad scholarships for summer language study and full year exchange programs in Japan. For more information, please contact John Baugh at (919) 515-3450.

Office of Information Technology

M.I. Hoit, Vice Chancellor for Information Technology and Chief Information Officer
E.D. Sills, Director, Advanced Computing
G. W. Sparks, Director, Communications Technology
G.T. Hazelhurst, Director, Enterprise Application Services
J.L. Black, Director, Infrastructure, Systems & Operations
S. N. Martin, Director, Outreach, Communications & Consulting
M.S. Bell, Director, Security and Compliance
S. W. Klein, Director, Technology Support Services

NC State has a tradition of offering its students a leading-edge academic computing environment. Information technology is now an important part of most aspects of NC State student life as well as student learning. Many NC State college, administrative and academic units are involved in providing online services, information, and other resources for students.

The Office of Information Technology Division is the campus unit that designs and supports campus-wide data network infrastructure and the computing, software, telephone, cable, TV, and information systems and services that are available to all NC State students, faculty and staff. These include the campus multi-gigabit network backbone and wireless computing infrastructure: high-speed Internet access (ResNet) for students living in campus housing; MyPack Portal; the campus distributed computing system called Unity; hundreds of software packages available for student use from computing labs; e-mail services, the university’s central web servers; file space; classroom technology support; high performance computing (HPC) for researchers and students in computational science; and the friendly Help Desk support staff available to help students and others use the resources available.

All NC State students, automatically receive Unity computing accounts (or Eos/Unity accounts for engineering students), Unity IDs and passwords. These provide access to the campus-wide academic computing environment, e-mail and collaborative tools provided by Google Apps, an allocation of network file space, Unity computing labs and software applications, MyPack Portal, online course materials, the campus wireless network, NC State’s leading-edge Virtual Computing Lab for remote access to high-end applications from the Internet and much more. Information about your Unity account, ID and password and help with learning the system are provided during student orientation sessions, in Unity computer labs, from the NC State University Help Desk and online at oit.ncsu.edu.

All NC State students may use Unity computer labs. They are equipped with Windows, Linux, and Macintosh workstations that provide direct access to the resources of the Unity computing environment. Colleges and academic departments support additional computing facilities, and overall there are more than 110 student-computing labs on campus, with over 2500 workstations with high-speed network connections available for student use. NC State does not require all students to own computers, although specific
North Carolina State University

colleges or programs may make this requirement. Information about computer recommendations, specifications, and purchasing options are published online and updated each semester.

For the most current information about NC State’s computing resources, including online tutorials, student-owned computer recommendations, and acceptable use rules and regulations, see oit.ncsu.edu. Visit the NC State Help Desk Walk-in Center located in the West Dunn Building at the corner of Dan Allen and Thurman Drives. Check the online Help database at: help.ncsu.edu or call 515-HELP (4357), or send e-mail to help@ncsu.edu.

Office of Professional Development
Judson Hair, Executive Director
Chip Futrell, Associate Director
website: www.ContinuingEducation.ncsu.edu
phone: (919) 515-2261

The Office of Professional Development (OPD) develops, promotes, and coordinates noncredit seminars, certificate programs, and conferences to a broad market on a wide range of topics. Program areas include: GMAT, GRE and LSAT test preparation; accounting and taxation; agriculture; communications; education; engineering; English as a second language; environmental; management; textiles; and general interest. Events management services are available to help both campus and non campus groups more efficiently and productively administer educational seminars, workshops, and conferences.

Office of Research and Graduate Studies
Terri Lomax, Vice Chancellor
Chris Brown, Associate Vice Chancellor for Research Development
Bill Houghteling, Director, Office of Technology Transfer
Steve Lommel, Assistant Vice Chancellor for Research and Development - Kannapolis
Duane Larick, Dean of the Graduate School and Associate Vice Chancellor for Research
Matt Peterson, Director, Federal Research Affairs
Matthew K. Ronning, Associate Vice Chancellor for Research Administration
Dennis Kekas, Associate Vice Chancellor for Centennial Campus Partnerships

The Vice Chancellor for Research and Graduate Studies acts for the Chancellor and Provost in the general area of research administration for the university. The Dean of the Graduate School reports jointly to the Vice Chancellor and to the Provost. The Vice Chancellor acts as the principal liaison representative between granting agencies (federal, state, foundations, industry) and the university; assists faculty, department heads, and deans in identifying support for research programs, preparing and processing proposals, negotiating contracts, grants and cooperative agreements and developing intercollegiate and interinstitutional research programs and projects including Centennial Campus; manages the technology transfer activities of the university, administers the allocation of faculty research development funds; manages university compliance of state and federal laws, and policies; advises the Provost and Chancellor on the coordination of intercollegiate and interinstitutional research programs and facilities; and provides general information on all grant and contract activities.

University Advancement
Nevin E. Kessler, Vice Chancellor for University Advancement

The Office of University Advancement at NC State strives to enhance the perception of and knowledge about the university’s programs and accomplishments; to provide alumni, students, and friends with programs and services that instill loyalty and pride; to secure resources which will enhance the academic quality of the institution; to be good stewards of its endowments and advance the growth of investment at NC State; to promote advocacy of the university and to effectively integrate advancement efforts across the university’s divisions, colleges, programs and affiliated foundations. The office oversees a division that includes development, alumni relations, university communications, and advancement services. Visit the University Advancement website at www.ncsu.edu/univ_relations/univadv.html.

Advancement Services supports all components of University Advancement, as well as other units involved in advancement activities throughout NC State, through management of the primary prospect/donor/alumni/friend database, conducting donor research, processing and receipting private pledges, gifts and grants, generating official fundraising activity reports, managing prospect management and tracking systems, providing donor stewardship and endowment reporting, and organizing donor recognition activities. Other initiatives include management of the University online giving website, support of the alumni association alumni web portal, conducting education and training in the areas of national best practices and rules and regulations pertaining to fundraising activities, ethics, and accountability, and management of an international listserv dedicated of the furtherance of the entire advancement services profession.

The NC State Alumni Association engages alumni through programs and services that foster pride and enhance lifelong connections to NC State. The Association encourages alumni to be Red and White for Life — with connections to the university and fellow alumni no matter where they live. The Association links alumni to the university through membership, a statewide, national, and growing international network of alumni, programming for special-interest groups and students, events and an array of communication tools, including the award-winning alumni magazine. The Alumni Association offers membership options and benefits for alumni and students who join. The Association supports a growing student alumni association, STAT — Students Today
Alumni Tomorrow — with events and programming that builds connections and enhances their student experience. The Association also sustains the prestigious Caldwell Fellows Scholarship Program, funded by alumni contributions and designed to foster academic excellence, leadership, personal growth and service learning. It upholds campus traditions, such as the official class ring, Homecoming, Founders’ Day, Legacy Luncheon, the Evening of Stars Gala to celebrate NC State’s distinguished alumni and the Faculty Awards to recognize the achievements of the university’s faculty. The Association offers services such as alumni travel, apparel, the NC State credit card and insurance. Students and alumni can visit the Alumni Association in the Dorothy and Roy Park Alumni Center on Centennial Campus. To contact the Alumni Association, call (919) 515-3375 or (800) 627-2586. For a complete overview of programs, services and events, visit www.alumni.ncsu.edu. To book space in the Park Alumni Center for events, contact Wendy Dorman at the State Club at wendy@thestateclub.org.

University Development works with the colleges and programs at North Carolina State University to secure private financial support for priority projects and programs. This support may come from individuals (alumni, parents, students, faculty, staff, and friends), corporations, philanthropic foundations and other organizations.

University Development provides services to the colleges and programs in capital campaigns, gift planning, corporate, and foundation relations and annual giving. University Development also facilitates external and internal communication among fundraisers, and coordinates approaches to prospective donors.

The Office of University Communications provides research-based public relations and marketing planning and implementation for the university, assisting and supporting the efforts of individual colleges. The goal of the unit is to build long-term relationships with key publics to strengthen the university’s identity and brand image.

University Communications includes the offices of News Services, Creative Services and Web Communications. News Services promotes the university’s achievements via various communication efforts, news releases, and the Web. Creative Services provides publications and design as well as video production for campus units. Web Communications assists in optimizing the use of electronic communications and oversees the university’s core Web presence. University Communications also is responsible for coordinating community relations, providing marketing support for fund-raising efforts, assisting with special events for University Advancement and the Chancellor’s Office, and working closely with the Chancellor’s Office on external affairs projects.

MUSIC DEPARTMENT

Price Music Center
Campus Box 7311
Raleigh, NC 27695-7311
phone: (919) 515-2981
fax: (919) 515-4204
www.ncsu.edu/music/
e-mail: musicinfo@ncsu.edu

J. M. Scearce, Director
R. M. Foy, Associate Director
J. A. Fuller, Assistant Director, Outreach and Assessment

Teaching Professors: J.M. Scearce, R.M. Foy, J.C. Kramer; Teaching Associate Professors: J.A. Fuller, P.D. Garcia;

The Music Department is committed to providing broad-based educational opportunities for NC State students through a variety of musical experiences and introductory and upper-level academic courses. Departmental faculty seek to assist students in developing musical insights, musical skills, and the capacity to perceive and respond to music in its historical and cultural contexts.

Opportunities for direct student participation as performers include many choral and instrumental organizations. Membership in any ensemble is open to students with a disciplined interest in music. Auditions are scheduled during summer orientation, at the beginning of each semester, and by appointment with the conductor of the group. For further information, please call the Music Department at (919) 515-2981.

The department offers a variety of courses, most of which may be taken to fulfill specific general education program. Any course may be taken as a free elective. A twenty hour music minor is offered for qualified undergraduate students who wish to engage in the serious study of music. Emphases include history, liberal arts, composition, and performance—piano, vocal, or instrumental.

The department also serves as a cultural resource for the university community and the public at large through concerts presented by student musical organizations, music faculty, and visiting artists. Concerts are open to students and the public. (Also see Arts NC State pg 47).

Music

The Music Department offers a 20-hour minor in Music for qualified undergraduate students who wish to engage in the serious study of music within a curricular framework. This minor is designed to foster creative thought, aesthetic understanding, and artistic self-expression. Students may choose one of four emphases: History, Liberal Arts, Composition, Performance. Core courses include one music theory, aural skills, class piano and a survey of music in Western Civilization. Applications are available in Price Music
DEPARTMENT OF PHYSICAL EDUCATION

Carmichael Gymnasium, Room 2000

Tom Roberts, Professor & Head


All North Carolina State University students are required to complete two semesters of physical education to meet the university General Education Requirement (GER). Students must take a Physical Education 100-level course in Fitness and Wellness and one additional Physical Education activity course.

Students may choose a class that offers a familiar skill, or may opt to experience a new activity. Students with disabling conditions will be assisted by the Department of Physical Education, Student Health Service, and Disability Services for Students to choose appropriate classes. Only “activity” courses, not elective “theory” courses, may be used to satisfy the NC State GER physical education requirement.

Minor in Sports Science

The Department of Physical Education offers a 16-17-hour minor in Sports Science, designed for students who desire a greater understanding of the physiological and biomechanical principles of exercise and fitness. The minor provides coursework in anatomy, physiology, nutrition, biomechanical principles, prevention and treatment of athletic injuries, exercise leadership, and health behavior. For additional information, contact Angie Montcalm (919) 513-1554.

Minor in Outdoor Leadership

The Department of Physical Education offers a 17-hour minor in Outdoor Leadership that is designed for undergraduate students desiring to pursue careers as outdoor leaders of adventure-based programs or for those who wish to enhance their personal development and enjoyment. Students will develop a foundation of essential leadership skills and experience through course work focusing on outdoor skills and leadership training. Students will also have an opportunity to apply theory to practice through a practicum. For additional information, contact Terry Dash (919) 515-1392.

Minor in Coaching Education

The Department of Physical Education offers a 17-hour Minor in Coaching Education designed to prepare students to assume coaching responsibilities with a sound theoretical and practical background. The minor provides students with a foundation of essential coaching skills and concepts as well as the basic principles of coaching philosophy, sport psychology, sport management, and prevention and care of sport related injury. The practical application of sport science, physiology, and kinesiology, as well as strategies involved in coaching specific sports, are also addressed. For additional information, contact Dr. Debra Williamson, (919) 513-6384.

Minor in Health

The Department of Physical Education offers a 16-hour minor in Health which is designed for undergraduate students wishing to pursue careers in health-related professions and for students wishing to gain in-depth knowledge in various contemporary health-related topics for their personal development. The minor provides students with theories, concepts, and practical skills concerning health behavior and includes a practicum to apply theory to practice. For additional information, contact Christopher Ousely (919) 515-6868.
MILITARY SCIENCES

DEPARTMENT OF AEROSPACE STUDIES (AIR FORCE ROTC)

Lieutenant Colonel Christopher Froeschner, Professor of Aerospace Studies

Instructors: Lieutenant Colonel Christopher Froeschner, Captain Susan Keely, Captain Timothy Peedin, Captain Nathan Zahn and other active duty officers from diverse professional backgrounds that enrich the learning environment.

Air Force Reserorce Officer Training (AFROTC) Program

The AFROTC program at NCSU is geared toward students who desire to earn a commission as a Second Lieutenant in the U.S. Air Force. However, any NCSU student who wishes to learn about the U.S. Air Force (USAF) can take any Air Force ROTC course with no obligation or commitment. Typically students enter the program throughout their freshman and sophomore years. All students must be attending college in “full time” status.

The four-year AFROTC program that leads to a commission as a U.S. Air Force Officer allows freshmen to enroll in Aerospace Studies courses in the same manner as other college courses for the first two years. Students take these courses as free electives and incur no military obligation unless they are receiving an AFROTC scholarship. The first two years in the AFROTC program are called the General Military Course (GMC). The last two years of AFROTC comprise the Professional Officer Course (POC) where cadets lead each other through a time-tested leadership laboratory training environment that instills both character and leadership skills needed in preparation for life as an active duty officer. The pinnacle training event for AFROTC occurs in the summer between the sophomore (AS200) and junior (AS300) year when a cadet attends intense field training held at Maxwell AFB, Alabama and Camp Shelby, Mississippi.

The four-year program can be compressed to as little as two and one half years for those who do not complete all four AS100 and AS 200-level courses (AS121 and AS221 are offered in the fall semester, AS122 and AS222 are offered in the spring semester) while enrolled in the Air Force ROTC program. Interested students must contact the Professor of Aerospace Studies to determine eligibility requirements. Accepted students will attend a five-week (versus the standard four-week) summer field training encampment after their sophomore year.

Students at every level have numerous opportunities to further their knowledge of the Air Force, and develop leadership. A variety of summer programs allow cadets to visit bases and participate in programs such as the US Air Force Academy Free Fall program, manned glider training, and cadet combative activities. POC students have similar opportunities, focusing primarily on programs related to the cadet’s desired active duty career area, both in the U.S. and abroad. Throughout the school year, cadets have opportunities to examine all aspects of life in the Air Force and gain leadership experience through Air Force base visits, flying opportunities, and social activities.

Upon graduation and satisfactory completion of the POC, the student is commissioned a second lieutenant in the USAF and is obligated to serve a minimum of four years on active duty.

All students who complete the academic program of study with a minimum of 15 hours in aerospace studies are eligible to receive a Aerospace Studies minor.

Financial Aid

Students enrolled in the program are encouraged to apply for Air Force ROTC scholarships. Scholarships pay for tuition, fees, books, and provide students a stipend each month during the academic year for miscellaneous expenses. Stipends vary according to the student’s year of academic enrollment in AFROTC. For example, freshmen currently receive $300 per month, sophomores $350 per month, juniors $450 per month, and seniors $500 per month. Scholarships are awarded by the Air Force based primarily on college academic achievement and displayed leadership capabilities. All scholarships have minimum academic standards that must be maintained. Other than scholarship students, students enrolled in the GMC receive no monetary allowance. Students who complete field training and are enrolled in the POC receive a stipend regardless of whether or not they are on academic scholarship. Additionally, special scholarships are awarded to fill critically needed academic majors within the Air Force. Currently, Electrical Engineering, Computer Engineering, Environmental Engineering and Meteorology students who meet basic eligibility, minimum grade point average, medical and physical fitness standards qualify for these scholarships.

Curriculum

The AFROTC educational program provides professional preparation for future Air Force officers. Courses in the first two years focus on Air Force missions, organization, other career opportunities, and the history of airpower. The focus in the last two years is on leadership and management, methods for managing conflict, in-depth examination of national security, American defense strategy. A progressive development of communicative skills, oral and written, is integrated into each course. Officership is developed through
lessons taught in the classroom environment and then applied in the associated leadership laboratory. In addition, traditional military social functions, base orientation trips, and cadet-centered programs further enhance student understanding of the USAF.

Eligibility
All full-time freshmen and sophomores may enroll in the GMC without obligation to the Air Force through enrollment in the AS100 (AS121) and AS200 (AS221 and AS222) blocks of Aerospace Studies curriculum. To enter the POC, students must pass the Air Force Officer Qualification Test, meet physical, medical and academic requirements, and successfully complete field training (typically between your second and third year). In addition, some age citizenship and background restrictions apply; contact the department for more details. Students desiring to enter the four-year program simply register for the AS100 course (either AS 121 or 122 depending on the semester). All students interested should contact the ROTC office on campus in room 133 Reynolds Coliseum, (919) 515-2417, by e-mail at airforce@ncsu.edu or write to: Professor of Aerospace Studies, NC State, Box 7308, Raleigh, NC 27695-7308.

Organization
The Air Force ROTC Cadet Corps, nicknamed “Wolfpack Warriors,” is organized as a cadet wing staffed entirely by cadets for leadership development. They are assisted and advised by the instructors, experienced officers and non-commissioned officers. Three collateral organizations, Arnold Air Society, Wolfpack Warrior Booster Club and Honor Guard, support the cadet wing organization as well as the university and community.

Uniforms
Uniforms are provided by the federal government and are worn on the day of Leadership Laboratory (Wednesday) or as specified by class instructors (if class is not on Wednesdays) and cadet corps leadership.

View the NC State Air Force ROTC website at the following address: www.ncsu.edu/afrotc.

DEPARTMENT OF MILITARY SCIENCE (ARMY ROTC)

Lieutenant Colonel Ken Ratashak, Professor of Military (PMS)

Instructors: Captain Patrick Preston, Captain Howard Gwin, Captain Neely Mahoney, Captain Jeremiah Naylor, Captain Leland Pearson, Captain Justin Sisneros, Master Sergeant Alpert Lampkins, Master Sergeant Michael Matheney, Master Sergeant Jose Ramos, Sergeant First Class Matthew Higgins

Mission
The mission of the Army ROTC Program is to train college men and women to become commissioned officers in sufficient numbers to meet Active Army, Army Reserve and National Guard requirements.

Program of Instruction
The Army ROTC program consists of a voluntary Basic Course (freshmen and sophomore level) and a two-year Advanced Course (junior and senior level) that includes a six-week Leadership Development Assessment Course in the summer prior to the senior year. One may enter the Advanced Course without participating in the Basic Course by any of the following methods:

Simultaneous Membership Program (SMP): Members of Reserve or National Guard units may take advantage of this program and, if accepted, enroll directly into the Advanced Course. SMP participants will be assigned to a unit near NC State or home for part-time monthly officer training and will receive the ROTC Advanced Course subsistence payment of $450 per month for Juniors and $500 for Seniors, plus approximately $200 per month for the one weekend of Reserve or Guard training. In addition, two weeks of Annual Training will be required for which the individual will receive full pay.

Prior Service: Service veterans are eligible for placement into the Advanced Course.

Leader’s Training Course (LTC): Successful completion of the four-week basic summer camp, held at Ft. Knox, Kentucky is an alternative to the Basic Course. Students with strong academic credentials may receive a scholarship after completing this course.

Transfer Credit: Students entering as transfer students from other institutions may receive credit for work completed at other Senior ROTC units.

Junior ROTC: Students who have participated in a Junior ROTC in high school may receive placement credit as determined by the Professor of Military Science.

Eligibility
All full-time freshmen and sophomores may enroll in any Military Science Basic Course offering without obligation to the Army. To be eligible for participation in the Advanced Course, applicants must be in good academic standing and demonstrate satisfactory performance in the Basic Course. Additionally, applicants for commissioning must be able to be commissioned by their 30th
Professional Military Education

There are five Professional Military Education (PME) courses which must be taken or have an approval of a waiver obtained for them. All but one content area (Military History) are automatically met by completion of the university's General Education Distribution Requirements. PME requirements must be completed or waived prior to commissioning.

Delays for Graduate Study

Qualified ROTC graduates may delay their entry into active service in order to obtain advanced academic degrees. Fellowships for advanced academic study are available to selected ROTC graduates, allowing up to two years of graduate study while receiving full pay and allowances plus payment for tuition, all fees, textbooks, and required supplies.

Financial Aid

Army scholarships of two to four years which pay for tuition, all fees and textbooks are available on a competitive basis to students who are strongly motivated and academically qualified. Students in the Advanced Course who are preparing for commissioning receive a subsistence allowance of $450 per month for Juniors and $500 per month for Seniors (tax free) up to a maximum of $4500. All Advanced Course cadets are paid approximately one-half the basic pay of a second lieutenant while attending the six-week Advanced Camp, plus travel allowances to and from camp.

Service Opportunities

Scholarship recipients may serve four years active duty upon commissioning or eight years in the United States Army Reserve or National Guard. Service consists of one weekend drill per month and two weeks annual training.

Program Features

Army ROTC classes are unique, offering instruction and a practical, working knowledge of leadership. Students are challenged early in the ROTC training to enable them to develop sound judgment, the desire to achieve, acceptance of responsibility, personal confidence, and to learn the principles of personnel management. The primary vehicle for this training during the academic year is Leadership Laboratory, where cadet officers and non-commissioned officers conduct instruction under the supervision of the Department of Military Science’s faculty. The intensive summer Leadership Development Assessment Course is extremely effective in developing an individual emotionally, mentally and physically. All Army ROTC training is focused on preparing the student to meet the challenges of tomorrow’s society, whether in a military or civilian career.

Distinguished Military Students

The university names outstanding Army ROTC students as Distinguished Military Graduates.

Uniforms

Uniforms for ROTC are provided by the federal government.

Departmental Offices

Our Administrative Office is located in Room 145 Reynolds Coliseum.

DEPARTMENT OF NAVAL SCIENCE (NAVAL ROTC)

Captain Stephen Matts, Professor of Naval Science

Associate Professor: LtCol Daniel Spano USMC; Instructors: LT Matt Burich, LT Kyle McVay, LT Josh Robertson, LT Jacob Joubert, Maj Todd Gillingham USMC

Mission

The purpose of the Department of Naval Science is to develop midshipmen and enlisted “officer candidates” mentally, morally, and physically and to imbue them with the highest ideals of duty, honor, and loyalty in order to commission college graduates as Navy and Marine officers who possess a basic professional background, are motivated toward careers in the naval services, and have a potential for future development in mind and character so as to assume the highest responsibilities of command, citizenship, and government.
4-year NROTC Program

There are basically two NROTC programs leading to a commission as a Navy or Marine Officer upon graduation: the Scholarship Program and the College Program.

Scholarship Program: The Scholarship Program leads to a commission in the Navy or Marine Corps. For students who receive a Navy/Marine Corps scholarship, the Navy will pay tuition and fees, provide a $375 book allowance each semester, supply uniforms, and pay a monthly tax-free subsistence allowance (currently $250 to $400 on a graduated scale; refer to https://www.nrotc.navy.mil for updates), to help defray the cost of normal board at the university. During the summers between school years, Navy scholarship students receive 4-6 weeks of at-sea training conducted on ships and submarines. For select students, training with aviation squadrons or mobile Explosive Ordnance Disposal (EOD)/SEAL teams is also possible during the summer prior to their senior year. Marine scholarship students participate in a mountain warfare training course between sophomore and junior year and complete Marine Officer Candidate School between junior and senior year. The minimum active duty obligation following graduation for scholarship students is five years.

College Program: For those students who are interested in a commission and do not desire a scholarship, or for those who are seeking an opportunity to qualify for a scholarship after entering NC State, the College Program is available. Selection for the College Program is made from students already enrolled at NC State with applications being accepted and considered by the staff of the NROTC unit. Students enrolled in the College Program are provided uniforms and Naval Science textbooks. College Program students compete for selection to continue NROTC as “Advanced Standing” students at the end of their sophomore year. Selection is based on academic and demonstrated professional performance. Those selected for Advanced Standing receive a monthly subsistence allowance during the final two years of the program (refer to https://www.nrotc.navy.mil for amounts). College Program midshipmen participate in a single summer training cruise between the junior and senior year. Except for administrative differences, no distinction is made between Scholarship and College Program midshipmen. The minimum active duty commitment following graduation for College Program students is three years.

Students in the College Program are eligible to compete for scholarships at regular intervals.

Two-Year Programs

The Two-Year Programs offer an opportunity to participate in NROTC in the final two years of university study. Both Scholarship and College Programs exist, offering the same advantages to the student having two years of college remaining as the respective four-year programs.

Applications for this program must be completed by March 15 prior to the starting year. Upon selection, the candidate attends a six-week training course at Newport, Rhode Island, during the summer between the sophomore and junior years so that he or she may receive instruction in the Naval Science subjects normally covered in the first two years at NC State. Participants in this training course receive uniforms, room and board, and officer candidate pay during the summer period and, upon satisfactory completion of training, enter the NROTC program as third year students. The application process can be time consuming. In order to meet the March 15 deadline, students are encouraged to contact the Department of Naval Science before December 1 of their sophomore year.

Commissioning and Service

Graduates of the Navy program are commissioned as Ensigns and are selected to serve in one of the Navy’s first line warfare communities (surface warfare, submarine/nuclear power, pilot, naval flight officer, special operations/EOD, or special warfare/SEAL). Graduates of the Marine program are commissioned as Second Lieutenants and attend the Marine Officer Basic School at Quantico, Virginia where they select their Military Occupational Specialty (MOS).

Curriculum

Due to the increasingly advanced technologies being employed by the Navy and Marine Corps, candidates for Navy Commissions are encouraged to select academic majors in mathematics, engineering, or scientific disciplines. However, each student in the NROTC program is free to choose his or her area of major study.

The NROTC training program emphasizes academics, leadership, military organization, and physical fitness. Required Naval Science courses are fully accredited, taken for free elective credit and include Introduction to Naval Science, U.S. Naval History, Leadership and Management, Navigation, Naval Engineering, Naval Weapons Systems, Naval Operations, and Leadership Ethics. Marine Option midshipmen substitute Evolution of Warfare and Amphibious Warfare for selected courses. Additional University courses may be required depending upon one’s major, however, all Navy option scholarship midshipmen must complete one year of calculus (MA 141 and 241) and physics (PY 205 and 208). In addition to the courses taken for University credit, midshipmen attend leadership laboratory and physical training each week. At the completion of the four-year period students will have earned enough credit to apply for a minor in Naval Science.

Midshipmen Life

Academic excellence is emphasized and commensurate participation in the full range of campus extra curricular activities is encouraged. The NROTC unit is organized as a midshipmen battalion to facilitate leadership development. The battalion is staffed entirely by midshipmen under the supervision of staff instructors. Additionally, midshipmen have opportunities to examine all aspects of life in the Navy and Marine Corps and gain leadership experience through field trips, summer cruise, sail training, and social activities. Further information regarding application for and admission into the NC State Naval ROTC may be obtained on
campus in Room 186 Reynolds Coliseum or by writing to the Professor of Naval Science, Box 7310, NC State, Raleigh, North Carolina 27695-7310 or by contacting the unit recruiting officer, LT Burich at msburich@ncsu.edu.

The Department of Military Science (Army ROTC), the Department of Aerospace Studies (Air Force ROTC), and the Department of Naval Science (Naval ROTC) are separate academic and administrative subdivisions of the institution. Students in the ROTC programs will receive free elective credit for Aerospace Studies (AS), Military Studies (MS), or Naval Science (NS) courses up to the limit of free electives in their curriculum.
RESEARCH CENTERS AND FACILITIES

The Research Triangle Park

NC State is one of the three Triangle area top-tier research universities along with Duke University in Durham and the University of North Carolina at Chapel Hill. Within the 30 mile triangle formed by the three universities is The Research Triangle Park, a 7,000-acre research park founded in 1959 by leaders from academia, business and government. Today, The Research Triangle Park is home to some of the most innovative and cutting-edge research based companies in the world.

The unique “Research Triangle” area of North Carolina has captured national and international attention. The “triangle” is formed by the three geographic points of Raleigh, Durham and Chapel Hill that are home to the area’s top-tier research universities: NC State, Duke University and University of North Carolina at Chapel Hill. Because of this wealth of educational and research opportunities, the triangle contains one of the highest concentrations of Ph.D. scientists and engineers per capita, in the nation. The highly educated workforce in the Triangle is extremely attractive to companies, many of which engage in collaborative programs within the area universities.

Since it was established, The Research Triangle Park has witnessed a steady and stable increase in the number of companies and employees. Currently, there more than 170 organizations located in The Research Triangle Park. More than 40,000 people work in the Park, with combined annual salaries of over $2.7 billion.

Organizations in the Park include government research laboratories of the National Institute of Environmental Health Sciences, and the U.S. Environmental Protection Agency. Private companies such as IBM, GlaxoSmithKline, Nortel, Cisco, and RTI International are located in the Park. Talented scientists, engineers and managers from RTP companies frequently hold adjunct faculty appointments in one or another of the Triangle universities.

The Analytical Instrumentation Facility (AIF)

D.P. Griffis, Director, Analytical Instrumentation Facility

The Analytical Instrumentation Facility (AIF) provides NC State faculty and students with the highest level of modern microanalysis instrumentation currently available as well as trained specialists to assist with teaching, training, instrument operation, and experimental design. The unique combination of extensive analytical instrumentation and specialized staff makes AIF a valuable asset to both teaching and research at all levels. AIF staff provides the expertise to access AIF’s state of the art analytical capabilities, conducts training and provide guidance to students. AIF is located in the Larry K. Monteith Engineering Research Center on the NC State Centennial Campus. This laboratory space, located in the mixed-use (private industry/academics) environment of Centennial Campus, provides the optimum environment for teaching, research and technology transfer. AIF analytical capabilities encompass analyses of materials including ceramics, metals, semiconductors, polymers, and biological materials. The Variable Pressure Scanning Electron Microscope (VPSEM), which can operate at high chamber pressure for charge neutralization, provides electron microscopy and EDS (Energy Dispersive X-Ray Spectroscopy) elemental analysis on uncoated non conductive samples including biological, polymeric, textile, and other materials. The VPSEM facility is used extensively by undergraduate students in a wide range of disciplines. AIF has extensive capabilities in the areas of Atomic Force Microscopy (AFM) for high resolution surface topography measurement, Field Emission Scanning Electron Microscopy (FESEM) and Field Emission Transmission Electron Microscopy (FETEM) for high resolution imaging, dynamic Secondary Ion Mass Spectrometry (SIMS) for trace analysis, Time of Flight SIMS for molecular surface analysis, X-Ray Photoelectron Spectrometry (XPS) for chemical surface analysis, and Focused Ion Beam nanomachining for sample preparation and fabrication of nanostructures and a metallography laboratory. In addition, AIF has extensive facilities for specimen preparation for all of the above mentioned analytical techniques.

Animal and Poultry Waste Management Center

C. M. Williams, Director
Box 7608, 212 Scott Hall
Raleigh, NC 27695-7608

phone: (919) 513-0469, (919) 515-5387
e-mail: mike_williams@ncsu.edu
website: www.cals.ncsu.edu/waste_mgt

The Animal and Poultry Waste Management Center (APWMC) within the College of Agriculture and Life Sciences (CALS) at North Carolina State University (NCSU) was established in 1996. The APWMC primary mission is to support, conduct and administer programs for research, development and outreach objectives targeting environmental and social issues associated with animal production agriculture. Historically, this program has included establishment of research-based partnerships with land grant universities in the states of Alabama, Georgia, Iowa, Kentucky, Michigan, Mississippi, Missouri, Ohio, Oklahoma, Oregon, and Virginia, as well as with a number of agribusiness companies, environmental groups, and commodity associations in the food-animal industries throughout the world. APWMC current efforts are specifically targeting waste management technologies applicable for all food animal species, however the primary focus is on concentrated swine and poultry production. Broad topics include: a) air, soil and water quality protection impacting animals, production workers and society in general; b) animal and human health issues associated with pathogens of animal origin including zoonotic diseases; c) recovery of value-added products from animal waste/ residuals (including energy); d) development and verification of economically feasible ‘environmentally superior technology’ per legislative mandates in N.C.
Center for Advanced Processing and Packaging Studies
K. P. Sandeep, Site Director

The Center for Advanced Processing and Packaging Studies (CAPPS) was established in October 1987 to promote cooperative research between university and industrial researchers and to further scientific knowledge in areas of food and pharmaceutical aseptic processing and packaging. The mission and focus of the center is to conduct industrially relevant research directed at developing methods and technologies for the safe production of marketable, high quality aseptic and refrigerated extended shelf-life products. The center is funded by industrial members from the food processing and has packaging industries and received support from the National Science Foundation and the universities involved. Students working on CAPPS projects will be exposed to industrial concerns and be given the opportunity to work first-hand with companies in solving problems and making practical application of their research. Cooperative research opportunities are available in the Department of Food, Bioprocessing and Nutrition Sciences at NC State and also at other universities, which are a part of the center.

Center for Chemical Toxicology Research and Pharmacokinetics
J. E. Riviere, Director

The Center for Chemical Toxicology Research and Pharmacokinetics performs scientific research on cutaneous function and structure focused on cutaneous toxicology, metabolism and pharmacokinetics and transdermal drug delivery, employing innovative animal and mathematical models and other predictive systems including cell cultures and novel analytical techniques. Current research is focused on the absorption of chemical mixtures and the toxicology of nanomaterials. This provides the necessary research base to support a rigorous graduate and post-graduate training program in comparative pharmacology and toxicology designed to produce health scientists for academia, industry and government. Besides laboratory research, CCTRP also operates the US and global Food Animal Residue Avoidance Databank (FARAD), performs the residue avoidance data analysis, and provides assistance to those who have questions about how to prevent residues in animal-derived food.

Center for Engineering Applications of Radioisotopes
Robin P. Gardner, Director

The Center for Engineering Applications of Radioisotopes was established in 1980 within the Department of Nuclear Engineering and associated with the Department of Chemical Engineering. It is composed primarily of faculty and their graduate students and post-doctoral students doing research related to the measurement applications of radiation and radioisotopes in industry. This includes the use of short-lived radioactive tracers, radiation gauges, radiation analyzers, industrial and medical tomography, and radiation detection physics. CEAR has devoted much effort to the development and use of Monte Carlo simulation for the design and inverse analysis use of these applications. Excellent experimental facilities are available including solid state and very large NaI detectors and the NC State PULSTAR Nuclear Reactor. In addition, CEAR has its own computer cluster, which was donated by Weatherford. The center’s programs are financed largely by an Associates Program for oil well logging and grants from industry and federal agencies such as NIH and DOE.

Center for Research in Mathematics and Science Education
Glenn Kleiman, Acting Director
Braska Williams, Pre-College Program Coordinator
Bernice Campbell, Evaluation Coordinator

The Center for Research in Mathematics and Science Education is a part of the College of Education’s Friday Institute and conducts program evaluation for the North Carolina Mathematics and Science Education Network. CRMSE conducts evaluations of the programs, projects, and services offered by the seven MSEN centers and nine Pre-College Programs throughout the state that provide professional development and student outreach for North Carolina’s teachers and strive to improve Science, Technology, Engineering, and Mathematics teaching and learning (STEM).

In addition, CRMSE is one of nine UNC System Universities with a Pre-College Program component. The mission of the NCSU NC-MSEN Pre-College Program is to prepare undeserved students at the middle and high school levels (grades 6-12) for careers in education and science, technology, engineering and mathematics (STEM). The NCSU NC-MSEN Pre-College Program currently serves 450 students in Franklin, Granville, Johnston, Nash, and Wake Counties through year-round enrichment activities. The program partners with school districts to recruit students from underserved populations who have not been prepared to pursue college preparatory level mathematics and science based courses. Students participate in exciting, uplifting and challenging activities throughout the school year.

website: www.ncsu.edu/crmse.

Center for Research in Scientific Computation
H. T. Banks, Director

The Center for Research in Scientific Computation (CRSC) is a formally recognized, multidisciplinary center of the greater University of North Carolina System. The CRSC is administered by NC State and the College of Physical and Mathematical Sciences. The purpose of the center is to promote research in scientific computing and to provide a focal point for research in computational science, and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for
training and graduate students in applied mathematics. With advanced computing methodologies students and post doctoral fellows address important issues in applications involving model development and control design.

Research topics of interest to CRSC faculty include a variety of problems in scientific computation, numerical analysis, and numerical optimization with applications to such areas as fluid mechanics and flow control, smart materials and structures, nondestructive testing, acoustics, material sciences and manufacturing processes, population dynamics, environmental sciences, signal processing, computer performance evaluation and nuclear reactor physics.

The CRSC, in cooperation with the Department of Mathematics, sponsors a university/industrial research project program. The main goal of the Industrial Applied Math Program (IAMP) is to provide substantive non-academic research related experiences for graduate students, postdoctoral and faculty participants while contributing to the research efforts of industrial participants.

Center for Transportation and the Environment
Downey Brill, Director

The Center for Transportation and the Environment conducts programs of research, education, and technology transfer that seek to mitigate the impacts of surface transportation on the environment. Funded in part by the U. S. Department of Transportation and the North Carolina DOT, CTE is the only university transportation in the country that pursues ways to improve surface transportation systems while protecting the environment. CTE is considered a national resource for current information about transportation and environmental research, policies, and best practices. The center conducts an innovative and aggressive outreach program, using satellite- and computer-based technologies, to assist transportation and environmental professionals with their most critical information needs. For more information, visit CTE’s website at: cte.ncsu.edu.

Electron Microscope Facilities

There are three electron microscope facilities at NC State available to graduate students and faculty for research purposes. The College of Agriculture and Life Sciences Center for Electron Microscopy is located in Gardner Hall, and the Analytical Instrumentation Facility on Centennial Campus is in the Monteith Engineering Research Center. The College of Veterinary Medicine Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is located at 4700 Hillsborough Street in Raleigh.

The College of Agriculture and Life Sciences Center for Electron Microscopy
J. M. Mackenzie, Jr., Coordinator, CALS Center for Electron Microscopy

The College of Agriculture and Life Sciences Center for Electron Microscopy occupies approximately 300 square feet in the basement of Gardner Hall. It is a centralized facility that services the ultra-structural needs of twenty-two departments. The College of Agriculture and Life Sciences Center for Electron Microscopy offers complete service support in all areas of Biological Electron Microscopy. The Center has a JEOL 5900LV scanning electron microscope, which has low vacuum capabilities and two transmission electron microscopes: a JEOL 100S and a Philips 400T. The Center is equipped with all of the necessary biological, preparatory equipment including a new Cressington Cryo-Fracture, Deep-Etch System.

The Center provides advanced, digital imaging capabilities. We provide access for Macintosh, PC and UNIX based systems allowing transparent information transfer regardless of user’s platform preference.

Formal instruction is provided through the Microbiology curriculum for transmission electron microscopy, scanning electron microscopy, ultramicrotomy and digital imaging. The Center also provides support, service, and training in a wide variety of advanced digital imaging. Advanced techniques are usually taught on an individual basis. The Coordinator invites any prospective users to discuss the most effective strategy for completing their imaging project.

The College of Agriculture and Life Sciences Center for Electron Microscopy
M. J. Dykstra, Director, LAELOM

The LAELOM is a full-service facility providing clinical and research support for the CVM as well as the full NC State campus. The LAELOM houses a FEICO/Philips EM208S/Morgagni transmission electron microscope and a JEOL JSM-6360LV low vacuum scanning electron microscope with all the necessary support equipment for tissue preparation as well as extensive darkroom facilities for the production of electron microscopy images. The LAELOM also houses an extensive collection of light microscopy instruments, including an Olympus Vanox motorized compound light microscope that can capture images with film, a 3 CCD video cameral (live images) or a high-end SPOT RT Slider cooled CD camera. Bright field, polarized, and epifluorescence images can be recorded with this microscope. A motorized Zeiss AxioImager upright microscope with polarizing, bright field, phase, DIC epifluorescence and deconvolution capabilities is available. A Wild photomicroscope with a digital camera is also available for viewing and recording images from larger specimens with bright and dark-field optics. A Nikon C-1 confocal scanning laser microscope system with a heated stage coupled to a Nikon Eclipse 2000E motorized inverted photomicroscope is equipped for bright field, polarized, and epifluorescence image capture with a digital camera. We also have a Nikon 2000S inverted microscope equipped with Hoffman optics (for looking through plastic vessels producing interference contrast-like images) and for epifluorescence with a digital camera. For morphometry needs, the program Image-Pro Plus is available.
Institute for Emerging Issues
Anita Brown-Graham, Director

The Institute for Emerging Issues (IEI) is a public policy, think-and-do-tank at NC State University. Through research, ideas, debate and action, IEI is a catalyst for innovative public policy, engaging students, faculty and the private sector in its ongoing programs of work. Encouraging civic leadership in business, government and higher education, IEI frames future challenges for North Carolina by identifying and researching emerging issues, specifically around topics that relate to the state’s growth and economic development.

The Institute brings together new combinations of leaders to debate and refine ideas mobilizing and supporting champions through programs of work that turn ideas into action.

To learn more about IEI, please visit www.emergingissues.org or call (919) 515-7741.

Institute for Transportation Research and Education (ITRE)
Nagui M. Rouphail, Ph.D., Director

The Institute for Transportation Research and Education is an inter-institutional center of the University of North Carolina system. Chartered by the North Carolina General assembly in 1978, ITRE conducts research and training for numerous public agencies at the federal, state, and local levels of government and private industry. Additionally, the Institute provides financial and research support for undergraduate and graduate students from various disciplines. The Institute is comprised of several specialty groups including public transportation, highway systems, commercial vehicle and safety, and pupil transportation. The Institute is also the home of the Center for Transportation and the Environment and the North Carolina Local Transportation Assistance Program (LTAP), both federally-funded centers. To learn more about ITRE, please visit us at http://itre.ncsu.edu, or call us at (919) 515-8899.

Integrated Manufacturing Systems Engineering Institute
T. J. Hodgson, Director

The Integrated Manufacturing Systems Engineering (IMSE) Institute was established in 1984. IMSE provides multidisciplinary graduate-level education and practical training opportunities in the theory and practice of integrated manufacturing systems engineering at the masters level. IMSE focuses on providing a manufacturing presence and a program environment in the College of Engineering where faculty, graduate students and industry can engage cooperatively in multidisciplinary graduate education, basic and applied research, and technology transfer in areas of common interest related to modern manufacturing systems technology. The objective of the IMSE program is to offer students with traditional discipline backgrounds in engineering and the physical sciences an opportunity to broaden their understanding of the multidisciplinary area of manufacturing systems. Core areas of concentration are offered in manufacturing systems, logistics, and mechatronics, and bio and medical device manufacturing.

Nanofabrication Facility
M.C. Ozturk, Director

The NC State University Nanofabrication Facility offers NC State faculty, students and industry the ability to fabricate micro and nanostructures for research and educational purposes. The facility operates in a 7,400 sq. ft. Class 100/1000 clean room located in Monteith Research Center of the Centennial Campus. The facility provides state-of-the-art equipment and processes to support a large spectrum of interdisciplinary projects from different colleges and departments. The facility is also used as a teaching laboratory for a variety of undergraduate and graduate level courses.
Nonwovens Cooperative Research Center

B. Pourdeyhimi, Director

The Nonwovens Institute is the world’s first accredited academic program for the interdisciplinary study of engineered fabrics through an innovative partnership of industry, government, and academe. The institute was established February 2007 to develop, educate, and train the next generation of industry professionals. The Nonwovens Institute serves the nonwovens and affiliated industries through research, training, product development, and test-bed facilities.

The research arm of the institute is the Nonwovens Cooperative Research Center (NCRC). NCRC was founded in 1991 as a State-Industry University Cooperative Research Center from matching grants from the National Science Foundation, the State of North Carolina, and the Industry. NCRC supports over 30 graduate students from engineering, textiles, and natural resources. The center provides opportunities to gain hands-on experience in nonwovens research to students studying toward various degrees. An undergraduate minor in the science of nonwovens is offered as well as a Graduate Certificate in Nonwovens. Faculty members from NC State, Georgia Tech, University of Illinois at Chicago, University of Akron, etc., are involved in several research projects funded by NCRC. Over 65 companies are industrial members. This includes the seven top roll goods producers representing over half of all worldwide sales in this area. Industrial members come from many countries including Germany, Italy, Japan, Korea, and Canada.

Nuclear Reactor Program

Ayman I. Hawari, Director

The mission of the Nuclear Reactor Program is to enhance, promote, and utilize the PULSTAR research reactor and associated laboratory facilities for research, teaching, and extension. Specialized facilities are available to university faculty, students, state and federal agencies, and industry. The laboratory contains the 1 megawatt steady-state, pool-type, PULSTAR nuclear reactor with a variety of associated academic, testing, and research facilities including: Distance Learning through Video and Internet Teleconferencing; an ultracold neutron source, a neutron radiography facility; an intense slow positron beam facility; a powder neutron diffraction facility; a neutron activation analysis and radioisotope laboratory; a low level counting laboratory equipped with high purity germanium gamma spectrometers and beta liquid-scintillation systems; and a Cobalt-60 gamma irradiation facility.

The 50,000 square-foot Burlington Engineering Laboratory complex on the NC State campus houses the Department of Nuclear Engineering and the 1 MW PULSTAR Nuclear Research Reactor Facility.

Contact: e-mail: ayman.hawari@ncsu.edu; website: www.ne.ncsu.edu/NRP/reactor_program.html; phone: (919) 515-7294

Oak Ridge Associated Universities (ORAU)

NC State has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of 99 doctoral granting colleges and universities and a management and operating contractor for the U. S. Department of Energy (DOE) with principle offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops facilities crucial to the nation’s technology infrastructure, particularly in energy, education, health, and the environment. ORAU works with and for its member institutions to help faculty and students gain access to federal research facilities; to keep members informed about opportunities for fellowship, scholarship, and research appointments; and to organize research alliances among our members in areas where their collective strengths can be focused on issues of national importance.

ORAU’s Office of Partnership Development seeks opportunities for partnerships and alliances among ORAU’s members, private industry, and major federal facilities. Activities include facility development programs, such as the Ralph E. Powe Junior Faculty Enhancement Awards, the Visiting Industrial Scholars Program, consortium research funding initiatives, faculty research and support programs as well as services to chief research officers (see www.orau.org).

Through the Oak Ridge Institute for Science and Education (ORISE), undergraduates, graduates, postgraduates, as well as faculty enjoy access to a multitude of opportunities for study and research. Many of these programs are designed to increase the numbers of students from underrepresented groups pursuing degrees in science — and engineering-related disciplines. A comprehensive listing of these programs and other opportunities, can be found in the ORISE Catalog of Education and Training Programs, which is available at www.orau.gov/orise/educ.htm. Contact Ray Fornes (NC State Councilor to ORAU), (919) 515-7865 for more information about ORAU programs or see www.orau.org.
Plant Disease and Insect Clinic

website: www.ncsu.edu/pdic

The Plant Disease and Insect Clinic (PDIC) at North Carolina State University provides accurate and timely plant and insect identification services. The PDIC receives approximately 3,600 samples from North Carolina and other states each year for diagnosis. County Agents, Extension Specialists, consultants and growers submit samples from nurseries, greenhouses, agricultural crops, forests, urban landscapes, and home lawns and gardens. The Plant Disease and Insect Clinic is an integral part of the extension program in the Departments of Plant Pathology and Entomology. Through sample diagnosis and control recommendations, we educate clientele about the importance and management of plant diseases and insect pests. Participation in the National Plant Diagnostic Network (NPDN) assures that new or unusual outbreaks of plant diseases and insects will be detected quickly, helping to promote safeguard plant health and human well being in North Carolina and the United States.

Power Semiconductor Research Center

B. J. Baliga, Director

The Power Semiconductor Research Center was established as an industrial consortium at NC State University on July 1, 1991. It has garnered support from around the world with more than a dozen companies participating in the venture. The mission of the center is to perform fundamental studies on semiconductor technology for power electronics applications. Although many centers have been established in the past for performing research in the area of microelectronics, PSRC was the first center to focus the research towards power electronics applications. The power electronics that will benefit from this research have widespread utility in society. These applications are computer power supplies and automotive electronics at relatively low operating voltages (50 to 100 volts); displays, telecommunications, appliance controls, and motor drives at medium operating voltages (300 to 1,500 volts); and traction (electric trains), and power transmission systems at high operating voltages (2,000 to 10,000 volts). Power semiconductor devices determine the pace for technological advancements in power systems because of the continuing trend to reduce size and weight and to improve the efficiency. This has important social implications in terms of conservation of fossil fuels and reduction of environmental pollution.

The applications require three basic components: (1) three terminal power switches, (2) power rectifiers, and (3) power/high voltage integrated circuits. The research program at PSRC was structured with the goal of developing improved power semiconductor chips in all of these three categories from a short and long term perspective. The following research thrust areas have been worked on since the inception of the center: (a) Power rectifiers, (b) Power MOS-Gated Thyristors, (c) Large Area Power MOS Technology, (d) Dielectrically Isolated Devices for Power Integrated Circuits, (e) Silicon Carbide Technology for Power Devices, and (f) Cryogenic Operation of Power Devices. Although the research is directed toward the development of generic, pre-competitive technology, care has been taken to maintain strong industrial relevance. Silicon devices have been developed which allow 2 to 20 fold improvement in performance for low voltage applications. This technology has already been licensed for product introduction. Theoretically projected performance of silicon carbide high voltage devices has been confirmed experimentally. This technology is expected to play an important role in the 21st century. The research has been documented and shared with the sponsors in the form of 45 patents and 259 technical reports provided to them over the last 10 years of operation. Due to the strong support of the international industrial community, this center is now recognized as the premier research organization for power semiconductor technology in the world.

In 2008, the research activities at PSRC have been integrated into the research program within the recently awarded NSF Gen-III Engineering Research Center "FREEDM."

Precision Engineering Center

Thomas A. Dow, Director

website: www.pec.ncsu.edu

The Precision Engineering Center, established in 1982, is a multidisciplinary research and graduate engineering program dedicated to providing new technology for high precision manufacturing. Research activity in the PEC involves measurement and fabrication of optical, biological, electronic, or mechanical devices where the tolerances required for operation are on the order of 1 part in 100,000; that is, for a 25 mm (1 inch) long part the error must be less than 250 nm (250 x 10-9m). Components that require this technology include contact lenses and other optical components, hard disk heads for computer memory devices, integrated circuits, space telescopes, injection molding dies, bearings and gears. Current projects in the center involve development of new mechanical designs and control algorithms, novel actuators that include piezoelectric or magnetic drivers, unique fabrication and measurement techniques and high-speed controllers to implement these concepts. With support from government and industry, the PEC pulls together faculty, staff, and students from across the university to develop new ideas and transfer those ideas to US industry.
**North Carolina State University**

**Sea Grant College Program**

Michael P. Voiland, Executive Director  
1575 Varsity Drive, Varsity Research Bldg., Module 1  
NC State University  
Raleigh, NC 27695  
(919) 515-2454  
www.ncseagrant.org

The North Carolina Sea Grant College Program is a state/federal partnership program involving all campuses of the UNC system, and, as appropriate, other universities in North Carolina. Headquartered at NC State, NC Sea Grant also has regional extension offices in three NC coastal communities. Sea Grant combines the universities’ expertise in research, extension and education to focus on practical solutions to coastal problems. Graduate and undergraduate research opportunities are available through Sea Grant funded faculty researchers and through two North Carolina fellowships and two national fellowship programs.

**Southeastern Plant Environment Laboratory—Phytotron**

C.H. Saravitz, Director

The Southeastern Plant Laboratory, commonly called the Phytotron, is a facility especially designed for research dealing with the response of biological organisms to their environment. The high degree of control within 60 growth chambers makes it possible to duplicate any climate from tropical rain forests to arid desert.

The NC State Phytotron concentrates on applied and basic research related to agricultural problems encountered in the southeastern United States. The ability to control all phases of the environment, however, allows inclusion of research dealing with all aspects of plant science. The facilities are available to the resident research staff, participants in NC State’s graduate research program, and to foreign visiting scientists.

**Triangle National Lithography Center**

Mehmet C. Ozturk, Director

Operating under the NC State University Nanofabrication Facility offers state-of-the-art lithography services. The facility is equipped with a 193 nm deep-UV stepper capable of forming nano-structures down to 80 nm.

**Triangle Universities Laboratory**

Calvin R. Howell, Director

TUNL is a laboratory for nuclear physics research, funded by the US Department of Energy. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and students from Duke University, UNC-Chapel Hill, and NC State. There is extensive collaboration between the participating universities and with visiting physicists from the United States and abroad. The accelerators are a 15-MeV tandem Van de Graaff accelerator and low-energy accelerators dedicated specifically to nuclear astrophysics studies. The newest addition to the TUNL accelerators is the High-Intensity Gamma-ray Source (HIGS) at the Duke Free-Electron Laser Laboratory. Polarized and pulsed beams are available as well as cryogenically polarized targets. In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities.

**Water Resources Research Institute**

Michael Voiland, Director  
website: www.ncsu.edu/wrri/

The Water Resources Research Institute (WRRI) of the University of North Carolina administers and promotes federal/state partnerships in research and information transfer on North Carolina’s water research needs. Located at NC State, WRRI serves all campuses of the UNC system and funds research conducted by faculty and students of senior colleges and universities in North Carolina. Findings from research funded by the Institute help local, state, and federal agencies make better decisions in managing water resources. Graduate and undergraduate research opportunities are available through WRRI funded faculty researchers and student internships are available through its partnership with the U.S. Geological Survey. WRRI also sponsors students to present oral and poster presentations each spring at its annual conference.
UNIVERSITY OF NORTH CAROLINA SYSTEM

History of the University of North Carolina

In North Carolina, all the public educational institutions that grant baccalaureate degrees are part of the University of North Carolina. The University of North Carolina is composed of the 16 constituent institutions which form the multi-campus state university.

The University of North Carolina, chartered by the N.C. General Assembly in 1789, was the first public university in the United States to open its doors and the only one to graduate students in the eighteenth century. The first class was admitted in Chapel Hill in 1795. For the next 136 years, the only campus of the University of North Carolina was at Chapel Hill.

In 1877, the N.C. General Assembly began sponsoring additional institutions of higher education, diverse in origin and purpose. Five were historically black institutions, and another was founded to educate American Indians. Several were created to prepare teachers for the public schools. Others had a technological emphasis. One is a training school for performing artists.

In 1931, the N.C. General Assembly redefined the University of North Carolina to include three state-supported institutions: The campus at Chapel Hill (now the University of North Carolina at Chapel Hill), North Carolina State College (now North Carolina State University at Raleigh), and Woman’s College (now the University of North Carolina at Greensboro). The new multi-campus University operated with one board of trustees and one president. By 1969, three additional campuses had joined the University through legislative action: the University of North Carolina at Charlotte, the University of North Carolina at Asheville, and the University of North Carolina at Wilmington.

In 1971, the General Assembly passed legislation bringing into the University of North Carolina the state’s ten remaining public senior institutions, each of which had until then been legally separate: Appalachian State University, East Carolina University, Elizabeth City State University, Fayetteville State University, North Carolina Agricultural and Technical State University, North Carolina Central University, the North Carolina School of the Arts, Pembroke State University, Western Carolina University, and Winston-Salem State University. This action created the current 16-campus University. (In 1985, the North Carolina School of Science and Mathematics, a residential high school for gifted students, was declared an affiliated school of the University.)

The UNC-Board of Governors is the policy-making body legally charged with “the general determination, control, supervision, management, and governance of all affairs of the constituent institutions.” It elects the president, who administers the University. The 32 voting members of the Board of Governors are elected by the General Assembly for four-year terms. Former board chairmen and board members who are former governors of North Carolina may continue to serve limited periods as non-voting members emeriti. The president of the UNC Association of Student Governments, or that student’s designee, is also a non-voting member.

Each of the 16 constituent institutions is headed by a chancellor, who is chosen by the Board of Governors on the president’s nomination and is responsible to the president. Each institution has a board of trustees, consisting of eight members elected by the Board of Governors, four appointed by the governor, and the president of the student body, who serves ex-officio. (The NC School of the Arts has two additional ex-officio members.) Each board of trustees holds extensive powers over academic and other operations of its institution on delegation from the Board of Governors.

Equality of Opportunity: The University of North Carolina and all of its constituent institutions are committed to equality of opportunity. There shall be no discrimination within the University against applicants, students, or employees on the basis of race, color, religion, sex, age, handicap, or national origin, consistent with the provisions of applicable state and federal law.

Promoting Racial Integration: The University of North Carolina actively seeks to promote racial integration at each of its constituent institutions.

University of North Carolina Board of Governors

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<td>Hannah D. Gage</td>
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<td>Peter D. Hans</td>
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<td>Estelle “Bunny” Sanders</td>
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North Carolina State University

Officers of the University of North Carolina

Erskine B. Bowles, President of the University
Alan Mabe, Senior Vice President for Academic Affairs
L.B. Corragnati, Jr., Secretary of the University
Ernie Murphrey, Vice President for Finance
Kimrey Rhinehardt, Vice President for Federal Relations
Anita S. Watkins, Vice President for Government Relations
Jeffrey R. Davis, Chief of Staff
Vacant, Vice President for Academic Planning and University-School Programs
Celeste Parrish, Executive Assistant to the President
John Leydon, Vice President for Information Resources and Chief Information Officer
Laura Berstein Luger, Vice President and General Counsel
Joni B. Worthington, Vice President for Communications

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Kelly Hook, Student Body President
Stephen Kouba, Student Senate President
Ali Kefeli, President, Graduate Student Association
POLICY ON ILLEGAL DRUGS

The following policy on illegal drugs was adopted by the North Carolina State University Board of Trustees April 16, 1988 - Last Revised, April 16, 1999.

For the most current information regarding this regulation, please visit the following website:
www.ncsu.edu/policies/campus_environ/health_safety_welfare/POL04.20.5.php

1. Purpose
1.1 Reflecting its concern over the threat which illegal drugs constitute to higher education communities, the Board of Governors of the University of North Carolina adopted a policy on illegal drugs on January 15, 1988. The Board of Governors’ policy requires each constituent institution’s Board of Trustees to develop a policy on illegal drugs applicable to all students, faculty members, administrators, and other employees. The policy for each campus must address particular circumstances and needs while being fully consistent with specified minimum requirements for enforcement and penalties.

1.2 To assist North Carolina State University in its continuing efforts to meet the threat of illegal drugs, and to comply with the Board of Governors’ policy, the Board of Trustees adopts the policy set forth below. This policy is intended to demonstrate the University’s primary commitment to education, counseling, rehabilitation, and elimination of illegal drugs, as well as its determination to impose penalties in the event of violation of state and federal drug laws consistent with due process.

2. Education, Counseling, and Rehabilitation

2.1 North Carolina State University shall maintain a program of education designed to help all members of the University community avoid involvement with illegal drugs. The educational program shall emphasize the incompatibility of the use of distribution of illegal drugs with the goals of the University, the legal consequences of involvement with illegal drugs, the medical and psychological implications of the use of illegal drugs, and the ways in which illegal drugs jeopardize an individual’s present accomplishments and future opportunities. Specific elements of the education program are:

2.1.1 Publicizing the University’s policy in the Student Code of Conduct, the undergraduate and graduate catalogs, and other publications distributed to students, faculty, administrators, and other employees.
2.1.2 Continuing and expanding the drug education program conducted by Student Health Services
2.1.3 Continuing development of courses on drug education
2.1.4 Continuing the drug education component of the employees’ Wellness Program
2.1.5 Increasing the awareness and utilization of the University’s Employee Assistance Program (EAP)

2.2 The University shall disseminate information about drug counseling and rehabilitation services that are available to members of the University community. Persons who voluntarily avail themselves of such services shall be assured that applicable professional standards of confidentiality will be observed and that such participation will not be the basis for disciplinary action. Specific counseling and rehabilitation efforts include:

2.2.1 continuing the evaluation and referral services of the Counseling Center for out-patient and in-patient rehabilitation;
2.2.1.1 continuing the consultation and evaluation portions of the Student Health Service’s drug education program
2.2.2 using the Employee Assistance Program’s referral to existing community-based counseling and rehabilitation services.

3. Enforcement and Penalties

3.1 Students, faculty members, administrators, and other employees are responsible, as citizens, for knowing about and complying with the provisions of North Carolina law that make it a crime to possess, sell, deliver, or manufacture those drugs designated collectively as “controlled substances” in Article 5 of Chapter 90 of the North Carolina General Statutes. The University shall promote its own disciplinary proceeding against a student, faculty member, administrator, or other employee when the offense is deemed to affect the interests of the University. Penalties will be imposed by the University in accordance with procedural safeguards applicable to disciplinary actions against students, faculty members, administrators, and other employees, as required by Section 503D(3) and Section 603 of the University Code, by Board of Governors’ policies applicable to other employees exempt from the State Personnel Act and by regulation of the State Personnel Commission. The penalties to be imposed by the University may range from written warnings with probationary status to expulsions from enrollment and discharges from employment. However, the following minimum penalties, as prescribed by the Board of Governors, shall be imposed for the particular offenses described.

3.2 Trafficking in Illegal Drugs

3.2.1 For the illegal manufacture, sale, or delivery, or possession with intent to manufacture, sell, or deliver, of any controlled substance identified in Schedule 1, N.C. General Statutes 90-89, or Schedule 11, N.C. General Statutes 90-90 (including, but not limited to: heroin, mescaline, lysergic acid diethylamide, opium, cocaine, amphetamine, methaqualine), any student shall be expelled and any faculty member, administrator, or other employee shall be discharged.

3.2.2 For the first offense involving the illegal manufacture, sale, or deliver, or possession with intent to manufacture, sell, or deliver, of any controlled substance identified in Schedules III through VI, N.C. General Statutes 90-91 through 90-94 (including, but not limited to, marijuana, phenobarbital, codeine), the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent. (Employees subject to the State Personnel Act are governed by regulations of the State Personnel Commission. Because the minimum penalty specified in this section and required by the Board of Governors exceeds the maximum period of suspension without pay that is permitted by the State Personnel Commission regulations, the penalty for a first offense for employees subject to the State Personnel Act is discharge. For a second offense, any student shall be expelled and any faculty member, administrator, or other employee shall be discharged.

3.2.3 For the second or subsequent offenses involving the illegal possession of controlled substances, progressively more severe penalties shall be imposed, including expulsion of students and discharge of faculty members, administrators, or other employees.
3.3 Illegal Possession of Drugs

3.3.1 For a first offense involving the illegal possession of any controlled substance identified in Schedules III through IV, N.C. General Statutes 90-89, or Schedule II, N.C. General Statutes through 90-90, the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent (Employees subject to the State Personnel Act are governed by regulations of the State Personnel Commission. Because the minimum penalty specified in this section and required by the Board of Governors exceeds the maximum period of suspension without pay that is permitted by the State Personnel Commission regulations, the penalty for a first offense for employees subject to the State Personnel Act is discharge.)

3.3.2 For a first offense involving the illegal possession of any controlled substance identified in Schedules III through VI, N.C. General Statutes 90-91 through 90-94, the minimum penalty shall be probation, for a period to be determined on a case-by-case basis. A person on probation must agree to participate in a drug education and counseling program, consent to regular drug testing, and accept such other conditions and restrictions, including a program of community service, as the Chancellor or the Chancellor’s designee deems appropriate. Refusal or failure to abide by the terms of probation shall result in suspension from enrollment or from employment for any unexpired balance of the prescribed period of probation.

3.3.3 For a second or other subsequent offenses involving the illegal possession of controlled substances, progressively more severe penalties shall be imposed, including expulsion of students and faculty members, administrators, or other employees.

3.4 Suspension Pending Final Disposition

When a student, faculty member, administrator, or other employee has been charged by the University with a violation of policies concerning illegal drugs, he or she may be suspended from enrollment or employment before initiation or completion of regular disciplinary proceedings if, assuming the truth of the charges, the Chancellor or, in the Chancellor’s absence, the Chancellor’s designee concludes that the person’s continued presence within the University community would constitute a clear and immediate danger to the health or welfare of other members of the University community; provided, a hearing on the charges against the suspended person shall be held as promptly as possible thereafter.

4. Coordinator of Drug Education

The Associate Vice Chancellor for Human Resources and the Director of Student Judicial Programs will serve as the coordinators of drug education for employees (faculty and staff) and students respectively. Acting under the authority of the Chancellor, each will be responsible for overseeing all actions and programs relating to this institutional policy in their respective areas.

5. Reporting

Annually the Chancellor shall submit to the Board of Trustees a report on campus activities related to illegal drugs for the preceding year. The report shall include, as a minimum, the following: (1) a listing of the major education activities conducted during the year; (2) a report on any illegal drug-related incidents, including any sanctions imposed; (3) an assessment by the Chancellor of the effectiveness of the campus program; (4) any proposed changes in the policy on illegal drugs. A copy of the report shall be provided to the President.
The course descriptions are arranged first in alphabetical order according to course prefix reflecting the department or discipline of the course. Some courses are cross-listed, indicating that they are offered in two or more departments or disciplines. Within each of the prefix groups, the course descriptions are arranged by course number. Numbers 100-299 are courses intended primarily for freshmen and sophomores. Numbers 300-499 are courses intended primarily for juniors and seniors; numbers 490-498 are seminar, project, or special topics courses; number 499 is for undergraduate research.

Courses numbered 500 - 600 are taught at the Masters level and most are available to advanced undergraduates. Doctoral courses are numbered 700 - 800. Graduate courses numbered at the 500 and 700 levels are letter graded (A+ through F), while 600 and 800 level courses are S/U graded. Courses regularly letter graded (A+ through F) may not be taken for S/U grading by graduate students. Courses numbered in the 900 series are open to College of Veterinary Medicine students.

A typical course description shows the prefix, number, and title followed by prerequisite, credit and offering information. Prerequisites are courses or levels of achievement that a student is expected to have completed successfully prior to enrolling in a course. Corequisites are courses which should be taken concurrently by students who have not previously completed the Corequisites. Prerequisites or Corequisites for a given course may be waived by the instructor of the course or section. It is the student’s responsibility to satisfy prerequisites, or obtain from the instructor written waiver of prerequisites, for any course in which he or she may enroll. Failure to satisfy prerequisites may result in removal from enrollment in the course. Consent of the department is required for all practicum and individual special topics or special problems courses as well as internships and thesis or dissertation research. Some courses also have restrictive statements, such as “Credit in both MA 141 and MA 131 is not allowed.” Restrictive statements for a given course may be waived only by a college dean.

An example of credit information is: 4(3-2-1). The 4 indicates the number of semester hours credit awarded for satisfactory completion of the course. The (3-2-1) normally indicates that the course meets for three hours of lecture or seminar each week and for two hours of laboratory, and one hour of problem or studio each week. Some courses are offered for variable credit, and a listing of 1-6 indicates that from one to six semester hours of credit may be earned as arranged by the department writing the course.

Course Codes

| ACC  | Accounting          | D  | Design                  |
| ADN  | Art and Design      | DAN| Dance                   |
| AEE  | Agricultural and Extension Education | DF | Design Fundamentals  |
| AFS  | Africana Studies    | DS | Design Studies          |
| ALS  | Agricultural and Life Sciences | E  | Engineering             |
| ANS  | Animal Science      | EAC| Adult and Higher Education|
| ANT  | Anthropology        | EC | Economics               |
| ARC  | Architecture        | ECD| Counselor Education     |
| ARE  | Agricultural Economics | ECE| Electrical and Computer Engineering |
| ARS  | Arts Studies        | ECI| Curriculum and Instruction |
| AS   | Aerospace Studies   | ED | Education               |
| BAE  | Biological & Agricultural Engineering | EDP| Educational Psychology |
| BBS  | Bioprocessing       | EGM| Engineering - Mechatronics |
| BCH  | Biochemistry        | EI | Entrepreneurship Initiative |
| BEC  | Biomanufacturing    | ELM| Elementary Education   |
| BIO  | Biology             | ELP| Educational Leadership & Program Eval |
| BIT  | Biototechnology     | EMS| Math & Science Education |
| BME  | Biomedical Engineering | ENG| English                |
| BUS  | Business Management | ENT| Entomology              |
| CE   | Civil Engineering   | EOE| Occupational Education  |
| CH   | Chemistry           | ES | Environmental Science   |
| CHE  | Chemical Engineering| ET | Environmental Technology |
| CL   | Comparative Literature | FL | Foreign Languages     |
| CNR  | College of Natural Resources | FLA| Foreign Languages - Arabic |
| COM  | Communication       | FLC| Foreign Languages - Chinese |
| CS   | Crop Science        | FLE| Foreign Languages - English|
| CSC  | Computer Science    | FLF| Foreign Language - French|

continued on next page
ACC 200 Introduction to Managerial Accounting 3. Offered in Fall Spring Summer. Analysis of accounting data that are useful in managerial decision making and in the control and evaluation of the decisions made within business organizations. An introduction to basic models, financial statement analysis, cost behavior analysis and cost control procedures.

ACC 210 Concepts of Financial Reporting 3. Offered in Fall Spring Summer. Financial reporting concepts, the accounting information generating process, reporting practices, financial statement preparation, and the interpretation and analysis of financial statements. Basic accounting principles and concepts, the accounting cycle, income measurement, and internal controls.


ACC 311 Intermediate Financial Accounting II 3. Offered in Fall Spring Summer. Prerequisite: ACC 310 with grade of C- or better. A continuation of topics introduced in Intermediate Financial Accounting I (ACC 310). Topics include accounting for investments in equity and debt securities, measurement and recognition of current and non-current liabilities, accounting for operating and capital leases, accounting for pension and post-retirement benefit plans, determination and classification issues related to deferred income taxes, and accounting for various forms of stock-based compensation plans.

ACC 330 An Introduction To Income Taxation 3. Offered in Fall Spring Summer. Prerequisite: ACC 210 with a grade of C- or better. Basic income tax principles and procedures (including research and planning) with an emphasis on all types of entities and business transactions. Exposure to a range of tax concepts within the framework of financial reporting.

ACC 340 Accounting Information Systems 3. Offered in Fall Spring Summer. Prerequisite: ACC 200 and ACC 210 with a grade of C- or better and M 110. Introduction to the importance of accounting and computer-based controls in an organization's enterprise systems. Focus on business processes, entity-wide information systems controls and security, database modeling and design focused on accounting, and contemporary issues involved in providing assurance services for systems reliability.

ACC 410 Governmental and Nonprofit Accounting 3. Offered in Fall and Spring. Prerequisite: ACC 210 and M 110. Accounting for state and local governments, including budgeting, audit issues, and financial analysis. Accounting for nonprofit organizations, including colleges and universities and healthcare organizations.

ACC 411 Business Valuation 3. Offered in Fall Spring Summer. Prerequisite: ACC 210, BUS 320, M 110 and (BUS/ST 350 or ST 302 or ST 361 or ST 370 or ST 372). Conceptual framework of how businesses work, value generation and reporting. Interpretation of financial statements and their use in valuation of the firm.

ACC 420 Strategic Finance and Planning 3. Offered in Fall Spring Summer. Prerequisite: ACC 200 with C- or better and (BUS/ST 350, or ST 302 or ST 361 or ST 370 or ST 372) and M 110. Strategic finance in planning, control, and evaluating organizational activities and in designing and implementing business strategies. Use of accounting in corporate management and business planning. Integration of performance measurement and cost control with corporate strategy.

ACC 440 Enterprise Resource Planning Systems 3. Offered in Spring Only. Prerequisite: ACC 340 with grade of C- or better and M 110. An Enterprise Resource Planning (ERP) system is business software that is cross-functional, process-centered and uses a relational database. As NCSU is a member of the SAP University Alliance, you will obtain hands-on training with SAP, the ERP market leader. This knowledge will give business and IT students a competitive and advantage in the workplace. This course covers the managerial, accounting, and technical issues of ERP systems. Course content includes evolution of ERP systems, reengineering, process mapping, the ERP life cycle, functionality, bolt-ons, and auditing ERP systems. Credit will not be allowed for both ACC 440 and MBA 515.

ACC 450 Risk and Assurance 3. Prerequisite: ACC 311 with a C- or better and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372), and M 110. Introduction to assurance services objectives, theory, and practices. Focuses on developing skills for interpreting business strategies and identifying related business risks, describing internal control solutions to those risks, identifying evidential sources, providing assurance about those risks and controls, and designing strategies to provide assurance services about the reliability of business information.

ACC 451 Internal Auditing 3. Prerequisite: ACC 210 with grade of C- or better and M 110. The theory, practice and design of internal audit activities. Examination of industry standards as a guide to the internal audit field. Evaluation of internal controls, information technology and fraud risks and controls, audit evidence and assurance, communicating audit results and consulting engagements. Emphasis on the professional practice of the discipline of internal auditing.

ACC 470 Accounting Theory 3. Prerequisite: (ACC 410 or ACC 312) and M 110. Major concepts, problem areas and trends in accounting thought and practice, including a review of the most prominent controversies in current publications and the most recent relevant pronouncements of professional institutions.

ACC 480 Accelerated Survey of Financial and Management Accounting 3. Offered in Fall Only. Prerequisite: M 110. Accelerated survey of basic concepts underlying accounting in profit-oriented firms: data measurement, summarization and reporting practices as a background for use of accounting information; content of published financial statements; and uses of accounting for management decisions in product costing, budgeting, and operations. Credit may not be received for both ACC 480 and ACC 220 or 280. Intended for graduate students and advanced undergraduates not majoring in Accounting or Management.

ACC 490 Senior Seminar in Accounting 3. Offered in Spring Only. Prerequisite: Accounting Majors in final semester of study or PBS status admitted by permission of department head. Successful completion of M 110. Integration of financial, managerial, tax, and governmental accounting. Application of appropriate accounting methods to problem resolution.

ACC 495 Special Topics in Accounting 1-6. Prerequisite: M 110. Presentation of material not normally available in regular course offerings, or offering of new courses on a trial basis.

ACC 498 Independent Study in Accounting 1-6. Offered in Fall Spring Summer. Prerequisite: M 110. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction on a tutorial basis. Credits and content determined by faculty member in consultation with the associate department head.
and/or end products. Awareness of industrial processes. Use of fabric dyes. Production of fabric samples, studies, yardage, painted and pattern-dyed fabrics. Development of design abilities (color and composition). Design and production of screen printed, painted and pattern-dyed fabrics. Development of design abilities (color use, pattern generation) and technical skills (screen printing, painting, use of fabric dyes). Production of fabric samples, studies, yardage, and/or end products. Awareness of industrial processes. Students will learn a variety of textile techniques utilizing traditional and experimental methods. Emphasis will be on technical exploration and development.

ADN 274 Basic Woven and Constructed Textiles 3. Offered in Fall and Spring. Hands-on introduction to structures and techniques of hand weavings and related off-loom textile structures. Focus on basic hand weaving structures, including plain weave, twills and satins, acquired through threading the loom and weaving with a variety of materials. Off-loom techniques explore a variety of structures made with simple hand tools. Projects focus on materials choice; color experimentation and control; pattern manipulations; scale and balance; and the design process as applied to hand constructed textile artifacts.

ADN 239 Introduction to Animation 3. Offered in Fall and Spring. An intensive introduction to animation which integrates traditional hand generated animation, digital techniques and technology. Students will explore animation's fundamental principles of linear formats, sequenced movement and time-based imaging.

ADN 372 Surface Embellishment 3. Offered in Fall and Spring. Hands-on experimentations with classic hand, machine, and digital stitching techniques on fabric; personal exploration of non-traditional materials and applications at different scales; and examination of historic and contemporary stitching through visits to the Gregg Museum and directed library and internet research.

ADN 384 Basic Painting 3. Offered in Fall Only. Prerequisite: DF 102; or both ADN 111 and ADN 112. Introduction to the principles of traditional and experimental methods. Emphasis will be on technical exploration and development.

ADN 275 Color, Pattern, and Cloth 3. Offered in Fall and Spring. Introduction to the essential elements and skills of design; color mixing; color relationships; applied color; color and pattern relationships; fabric analysis and redesign; yarn windings and color bleeding; cloth structures and their functions. Hands-on work with simple cloth structures such as plaiting, tapestry, bead weaving, pattern repeats, and fiber characteristics.

ADN 291 Special Topics in Design 1-3. Offered in Fall and Spring. Prerequisite: Design Majors: DF 102; Non-Design Majors: ADN 111, 112. Basic activities that relate to the major design areas in the School of Design. Study of visual communication skills in areas of illustration, printmaking, and life drawing. The student elects instructor and area(s) of activity.

ADN 219 Digital Imaging 3. Offered in Fall and Spring. Prerequisite: DF 102. Introduction to exploring, creating, and modifying images through the use of computers. Emphasis is on creativity, experimentation, and intuitive image-making using various computer techniques.

ADN 272 Introduction to Printing and Surface Design 3. Offered in Fall and Spring. Prerequisite: A grade of C- or better in DF 101, ADN 111 or ADN 112. Design and production of screen printed, painted and pattern-dyed fabrics. Development of design abilities (color use, pattern generation) and technical skills (screen printing, painting, use of fabric dyes). Production of fabric samples, studies, yardage, and/or end products. Awareness of industrial processes.
painting through class projects that expose students to different painting materials and techniques. Students learn to build a stretcher, size and prime a canvas as well as other rigid painting surfaces. Acrylic and oil paint used; projects assigned and open themes.

ADN 386 Basic Sculpture 3. Offered in Fall Only. Prerequisite: DF 101, ADN 112. Studio course introducing basic concepts, materials, and processes of sculpture. Instruction incorporates both traditional and contemporary form generation with emphasis on developing formal perception and projection.

ADN 400 Design Studio 6. Offered in Fall and Spring. Prerequisite: ADN 102. Studio offering upper-level undergraduates the opportunity to intensively study general design issues (form, color, structure, proportions, scale, etc.). Course may be used to partially satisfy studio requirement in all undergraduate degree programs in the School of Design.

ADN 402 Senior Studio 6. Offered in Spring Only. Prerequisite: Seven studios and ADN 219. Advanced Design studio emphasizing the exploration of past, current, and potential future technologies within Design Department content areas (e.g., painting, sculpture, fibers, jewelry, color and light, etc.). Students are expected to work independently, develop their own problem statements.

ADN 411 Visual Laboratory I 3. Offered in Fall and Spring. Prerequisite: DF 102; or both ADN 111 and ADN 112. Visual communication skills in the areas of life drawing, illustration, painting, print making and sculpture. May be taken for a minimum of 12 credit hours by School of Design students.

ADN 413 Synthetic Drawing 3. Prerequisite: DF 102; or ADN 111, ADN 112. Orthographic and axonometric projections, coordinating and perspective systems, and diagramming to facilitate the drawing of shapes and forms conceived by the designer in order to make visually precise simulations of design ideas.

ADN 414 Color and Light 3. Offered in Fall and Spring. Physical and perceptual nature of color, color awareness, sensitivity and skills in visual communication with color as a designer's tool.

ADN 418 Contemporary Issues in Art and Design 3. Offered in Spring Only. Explores a range of issues about contemporary art and design ideologies. Concentration on selected readings which provide a platform for discussion of various ideas, approaches, perspectives and practices in the contemporary fields of art and design.

ADN 419 Multimedia and Digital Imaging 3. Offered in Fall and Spring. Prerequisite: DF 102, ADN 219. Intensive hands-on investigation of the tools, techniques, and processes for the development of interactive multi-media projects. Media teams will emphasize shaping an idea into a well thought-out design that works as an interactive experience.

ADN 428 Art and Design: Theory and Practice 3. Offered in Fall Only. Conceptual basis for developing a personal philosophy regarding the practice of art and design. Theory based history of diverse cultures and forces of change: political, economic, religious, social, intellectual and philosophical as they affect the fields of art and design.

ADN 454 Geometry for Designers 3. Offered in Spring Only. Geometry and its application to the various fields of design, mathematical and drawing skills required.

ADN 455 Building Workshop 3. Prerequisite: DF 102 or both ADN 111 and ADN 112. Process and logic of producing one's own design. Structural behavior, geometry, and materials in the construction of physical form usually at a large scale. Evaluative testing with critical support.

ADN 460 Multimedia and Advanced Digital Imaging Studio 6. Offered in Fall and Summer. Prerequisite: ADN 219. An intensive study of advanced image-making processes, software, and various computer platforms used in the creation of multimedia. In a studio mode, students will place emphasis on creating interactive programs and finally transfer images to CD Rom and video with audio and special effects.

ADN 470 Fibers and Surface Design Studio 6. Offered in Fall and Spring. Prerequisite: A grade of C- or better in DF 101 or ADN 111 and ADN 112: Design Majors or Design Minors. Practice of widely varying textile techniques with the solving of practical and conceptual design problems. Textile end products are designed and produced at full scale in appropriate materials. Focus includes weaving, knitting, printing and dyeing of fabrics, and a wide variety of fabric construction and embellishment processes. Textile history is an ongoing part of the study. Emphasis on synthesis of techniques and ideas.

ADN 472 Advanced Surface Design 3. Offered in Fall and Spring. Prerequisite: DF 101, ADN 272. Advanced problems in the design and production of hand-printed and pattern-dyed fabrics. Experimentation with advanced color application techniques. Exploration of pattern and image production on fabric and development of design abilities in textilemedia. Specific focus changes each semester.

ADN 473 Advanced Three-Dimensional Fibers Forms and Structures 3. Offered in Fall and Spring. Prerequisite: ADN 273 or equivalent. Advanced explorations of three-dimensional textiles forms and structures including works small and large scale installations and sculptures, planar structures in space, and textiles that interact with interior or exterior architecture, the body, or public or site-specific spaces. Technical focus on construction, joining mixed materials, armatures, integration of found materials, and both traditional and experimental structures and applications. Use of hand and power tools.

ADN 474 Advanced Digital Hand Weaving 3. Offered in Fall and Spring. Introduction to use of the computer as a tool for designing, drafting, and hand weaving, using simple software packages. Hand weaving on 24-harness computer assisted looms, 8 harness hand looms, and TC-1 digital hand Jacquard looms. 4 to 24 harness woven structures including twill, satin, shadow weave, double weave, woven shibori, dyed warps, and other weave structures. Focus on designing, technical skills, and solving technical problems.

ADN 475 Pre-Industrial Weave Techniques 3. Research on and discussion of hand-made textiles of the world, introducing major textile traditions from Africa, Asia, Europe, North and South America. Focus on geographic and cultural contexts, developments in making, and design characteristics, including impact of 20th century fiber art movements. Seminar format.

ADN 480 Intermediate Studio 6. Prerequisite: DF 101 and DF 102; or ADN 111, ADN 112 and ADN 311. Studio format offering upper level undergraduates the opportunity to intensively study general design issues (form, color, structure, proportions, scale, etc.) through individual study in drawing, painting, sculpture, photography, or printmaking.

ADN 481 Intermediate Drawing 3. Offered in Spring Only. Prerequisite: ADN 281. An intermediate-level drawing course that further develops the designer's graphic, analytic, observational, and conceptual skills.

ADN 484 Intermediate Painting 3. Offered in Spring Only. Prerequisite: DF 102; or both ADN 111 and ADN 112. An
intermediate-level painting course that through slide lectures, class projects, and assigned readings exposes students to contemporary painting art movements. Special emphasis given to the formal and interpretative analysis of a painting. Acrylic and oil paint are used; Projects have assigned and open themes.

ADN 486 Intermediate Sculpture 3. Offered in Spring Only. Prerequisite: ADN 386. An intermediate-level sculpture course that further develops the designer's analytic, observational, and conceptual skills.

ADN 487 Sculpture: Life Modeling 3. Offered in Fall Only. Prerequisite: DF 102 or ADN 486. A studio course with direct observation of nature a primary concern. In-depth study of specific modeling concepts and processes.

ADN 490 Art and Design International Studio 6. Offered in Fall Spring Summer. Define Art and Design problems and develop design solutions in an international setting. Studio projects related to design, culture, and traditional and contemporary art forms. Focus on artifact making through direct studies. Taught off campus.

ADN 491 Special Seminar in Design 1-3. Offered in Fall and Spring. Seminars on subjects of current interest in design.

ADN 492 Special Topics in Design 1-3. Offered in Fall and Spring. Topics of current interest in Design & Technology. Used to develop new courses.

ADN 494 Internship in Design 1-6. Offered in Fall Spring Summer. Supervised field experience in design offices, galleries, museums and other organizations. Maximum of 6 credit hours.

ADN 495 Independent Study in Design 1-6. Offered in Fall and Spring. Special projects in art and design developed under the direction of a faculty member on a tutorial basis. Maximum 6 credit hours.

AGRICULTURAL EDUCATION

AEE 101 Introduction to Career and Technical Education 1. Offered in Fall Only. Overview of career and technical education programs, objectives, and outcomes in secondary schools. Philosophy of career and technical education and how career and technical education programs fit into the overall mission of secondary education. Mission of agricultural education, major program objectives, and introduction to the curricula taught within the state. Roles and responsibilities of CTE teachers with specific emphasis on agricultural education teachers' roles and responsibilities. Historical context of agricultural education and other career and technical education programs, including major legislation affecting development of career and technical education.

AEE 103 Fundamentals of Agricultural and Extension Education 1. Offered in Fall Only. Introduction to the scope, purpose, and objectives of university education with an emphasis on agricultural education, extension education, and agricultural communications. Students will explore College and departmental resources, academic policies and procedures, the agricultural industry, career opportunities, and current trends and issues in agriculture. Cannot receive credit for both AEE 103 and ALS 103.

AEE 206 Introduction to Teaching Agriculture 3. Offered in Fall Only. Introduction to teaching agricultural education in middle and secondary schools and collaborative efforts for teaching agricultural education to adults as rural community situations dictate. Field experiences include three hours per week of structured observations of classroom teachers, teacher assistant activities, and reflections of the experience.

AEE 208 Agricultural Biotechnology: Issues and Implications 3. Offered in Spring and Summer. Trends and issues of agricultural biotechnology in today's society are addressed while covering the basic biological science behind the technology. Applications of and policy issues associated with plant, animal, and environmental biotechnology used in the agricultural industry are examined from an interdisciplinary approach.

AEE 226 Computer Applications and Information Technology in Agricultural & Extension Ed 3. Offered in Fall and Spring. Use of computers and commercially produced agricultural software; the computer as a management tool; agricultural occupational applications of the computer; a multimedia instructional tool in agricultural classrooms and training situations; use of technology for processing information and imaging; network access; and electronic communications.

AEE 230 Introduction to Cooperative Extension 3. Offered in Fall Only. This course is designed for all students who are interested in pursuing a career with the cooperative extension service. An introduction to the cooperative extension mission, philosophy, history, organization, structure, administration, program areas, extension program development, extension teaching and delivery methods, and the involvement and use of volunteers. Students are expected to provide their own transportation for outside of class activities and assignments.

AEE 303 Administration and Supervision of Student Organizations 3. Offered in Spring Only. Prerequisite: AEE 206. Principles and techniques for organizing, administering and supervising student organization activities.

AEE 311 Communication Methods and Media 3. Offered in Fall Only. Prerequisite: ENG 101. Foundations of agricultural communications. Technologies of agricultural communication and the systematic approach to the development of agricultural communication materials. Development of applied skills in design, production, evaluation, and dissemination of information unique to agricultural sciences and media.

AEE 322 Experiential Learning in Agriculture 3. Offered in Fall Only. Prerequisite: AEE 206. Planning, organizing, implementing, supervising and evaluating Supervised Agricultural Experience (SAE) programs in agriculture.

AEE 323 Leadership Development in Agriculture and Life Sciences 3. Offered in Fall Only. Leadership development in agricultural and related settings; foundations of leadership theory and practice; techniques for developing leadership skills; development of understanding of group interactions and group leader roles, technical communication skills, interpersonal influence, commitment, and goals achievement strategies necessary for effective leaders.

AEE 325 Planning and Delivering Non-Formal Education 3. Offered in Fall Only. Adult learning theory and practice, including planning non-formal educational programs for adults, methods of instructional delivery, effective use of instructional technology, marketing educational programs, and evaluation of educational outcomes. Microteaching (practice teaching presentations) and group presentations required as part of laboratory assignments.

AEE 326 Teaching Diverse Learners in AED 3. Offered in Spring Only. Prerequisite: AEE 206; junior standing; and AED Majors only. Legislation and issues regarding diverse learners in middle and high
school agricultural education are examined. Discussion and practice in planning and facilitating teaching strategies to help those with special needs in an agricultural setting are emphasized. Techniques to integrate reading and writing into the curriculum are identified and practiced. Field trips are required.

**AEE 327 Conducting Summer Programs in Agricultural Education 1. Offered in Fall Only. Prerequisite: AEE 206, AEE 303, AEE 322, and Corequisite of AEE 426. Field experience emphasizing summer agricultural education programs. Individualized instruction for students during supervised agricultural experience visits and youth organization activities. Professional development and program improvement activities.**

**AEE 323 Youth Leadership Dev 3. Offered in Fall Only. Prerequisite: AEE 323-Leadership Development in Agriculture. This course is intended to prepare students to be effective facilitators of youth leadership development programs. Theory will be emphasized in the course because it is essential to be grounded in theory in order to apply it. Major course topics include but are not limited to: understanding the unique leadership development needs of young people, learning how to develop programs that meet those needs, and the evaluation of youth leadership programs. Students will be required to be active in and outside of class sessions. In this course you will learn by doing! Students must provide their own transportation for field trips and outside of class activities.**

**AEE 333 Youth Program Development and Management 3. Offered in Spring Only. This course is intended to prepare students to be effective youth program facilitators. Application of theory related to youth program management will be emphasized. Major course topics include but are not limited to: understanding various educational delivery modes used in youth programming, selecting and using developmentally appropriate curriculum, using the experiential learning model to teach young people. Students will be required to be active in and outside of class sessions, including outside preparation for the lab component of the course. Students must provide their own transportation for field trips and outside of class activities. Students are encouraged to have successfully completed AEE 323 prior to enrolling in this course.**

**AEE 350 Personal Leadership Development in Agriculture and Life Sciences 3. Offered in Spring Only. This course focuses on the impact of personal leadership on agricultural organizations and society. The best leaders are those who have internalized personal leadership concepts and apply them to the practical situations in their environment. This course teaches individuals to achieve optimal results by changing their fundamental approach to work, relationships, and problem solving, using time-honored principles in time management, leadership, and effectiveness. Restricted to CALS students.**

**AEE 360 Developing Team Leadership in Agriculture and Life Sciences 3. Offered in Fall Only. Prerequisite: AEE 323-Leadership Development in Agriculture. Students in this course will study the impact of organized teams and team leaders on the development of agricultural organizations. Principles and techniques involved in creating, organizing and directing teams will be explored. Students will develop skills in team decision-making and communication. Topics of discussion will include: components of a group and team, relationships of group and team members, effectiveness of groups and teams, and communication within groups and teams. This course is designed for students who are interested in positions of leadership and who want to learn more about making the groups and teams they work with more effective. Restricted to CALS students.**

**AEE 423 Practicum in Agricultural Extension/Industry 8. Offered in Spring and Summer. Prerequisite: AEE 230, AEE 325, and Corequisite of AEE 490. Participation in professional work experiences in preparation for effective leadership positions in the Cooperative Extension Service or the agribusiness industry.**

**AEE 424 Planning Agricultural Educational Programs 3. Offered in Spring Only. Prerequisite: AEE (ED) 426, Corequisite: AEE (ED) 427. Principles of program planning applied to educational programs in agriculture; includes theory and field experiences in planning, organizing, and evaluating high school and adult education programs.**

**AEE 426 Methods of Teaching Agriculture 3. Offered in Fall Only. Discussion and practice in planning and presenting instruction in agriculture in formal and informal settings. Principles and application of approaches to teaching and organizing instruction, motivating students, developing instructional objectives, selecting and using teaching techniques, evaluating instruction, and managing classroom and laboratory instruction.**

**AEE 427 Student Teaching in Agriculture 3. Offered in Spring Only. Prerequisite: AEE (ED) 426. Admission to Professional Semester, Corequisite: AEE (ED) 490, AEE (ED) 424. Skills and techniques involved in teaching vocational agriculture through practice in a public school setting with concurrent on-campus seminars.**

**AEE 433 Leadership and Management of Volunteers in Agricultural and Extension Education 3. Offered in Fall Only. This course is intended to prepare students to be effective managers of volunteer programs, or to challenge those students already engaged in those roles to improve on their existing skills. Students will be required to be active in and outside of class sessions while exploring course topics including but not limited to recruitment, training, reward and evaluation of volunteers. Limited to students with graduate level status only.**

**AEE 434 Collaborative Leadership: Building Partnerships Across Community Programs 3. Offered in Spring Only. This course is intended to prepare students to become collaborative leaders at home, at school and within their communities. Theory will be emphasized in the course because it is essential to be grounded in theory in order to apply it. Topics covered in the course include but are not limited to: what is community, how do partnerships form, challenges and opportunities for successful collaborations. This is an active course where students will be required to be engaged in and outside of class sessions. Students are encouraged to have successfully completed AEE 323 prior to enrolling in this course. Students must provide their own transportation for field trips and outside of class activities. AEE 323 encouraged but not required.**

**AEE 435 Professional Presentations in Agricultural Organizations 3. Offered in Spring Only. This course teaches effective listening strategies, communication strategies, interpersonal skills and presentation strategies essential for use in today's workplace. AEE 435 includes strategies and techniques for effective presentations in the food, agricultural, natural resources, as well as other professions, with emphasis on oral and visual presentation techniques. Presentation skills and strategies for formal and informal situations including conferences, poster presentations along with leadership, conflict resolution, interviewing, negotiation, and group communication theory and strategies will be discussed. Restricted to CALS students; Jr or Sr level status required.**

**AEE 460 Organizational Leadership Development in Agriculture and Life Sciences 3. Offered in Spring Only. Prerequisite: AEE 323-Leadership Development in Agriculture. This course focuses on the impact of effective leadership in organizations in both theory and practice. Students will examine the major theories and studies that are most relevant and informative with the regard to leadership in organizations. Students will develop skills in decision-making.**
management of organizations, and ethical leadership related to agricultural organizations. Restricted to CALS students.

**AEE 470 Agricultural Communications 3. Offered in Spring Only.** Prerequisite: AEE 311, Senior standing. Use of agricultural communication materials. Emphasis on application of principles, materials and processes of B&W and color photography to problems of communication and the development of visual presentation materials for instruction and training.

**AEE 478 Extension as Non-Formal Education 3. Offered in Spring Only.** Extension as a system of non-formal education, how it functions in USA and other countries (with special attention to agricultural extension), historical antecedents and philosophical foundations, mission, organization, methods, problems dealt with, how technology and behavioral sciences are can be utilized; provides actual experience with extension and with conceptual/theoretical ideas that undergird practice.

**AEE 490 Seminar in Agricultural and Extension Education I. Offered in Spring and Summer.** Analysis of opportunities and challenges facing educational leaders in agriculture.

**AEE 492 External Learning Experience in Agricultural and Extension Education I-6. Offered in Fall Spring Summer.** Learning experience within an academic framework that utilizes facilities and resources external to the campus. Contact and arrangements with prospective employers initiated by the student and approved by the faculty adviser, prospective employer, and the departmental teaching coordinator prior to the experience. Not intended for teaching licensure for students in AEE.

**AEE 493 Special Problems in Agriculture and Extension Education I-6. Offered in Fall Spring Summer.** A learning experience in agriculture and extension education within an academic framework that utilizes departmental campus facilities and resources. Arrangements must be initiated by the student and approved by a faculty adviser and the departmental teaching coordinator. Not intended for teacher licensure for students in AEE.

**AEE 495 Special Topics in Agricultural and Extension Education I-3. Offered in Fall Spring Summer.** Offered as needed to present material not normally available in regular course offerings or for offerings of new courses on a trial basis. Not intended for teacher licensure for students in AEE.

**AFS 230 Introduction to African-American Music 3. Offered in Fall Only.** Comprehensive survey of African-American music in the United States from Colonial times to the, with emphasis on its unique features and contributions to American culture.

**AFS 240 African Civilization 3.** An interdisciplinary study of centers of African civilization from antiquity to the 1960s. Such centers include ancient Egypt, Nubia, Axum, Ghana, Mali, Songhai, Kilwa, Malinda, Sofola, Zinzibar and Monomotapa.

**AFS 241 Introduction to African-American Studies II 3. Offered in Fall Spring Summer.** Second in a two semesters sequence in the interdisciplinary study of sub-Saharan Africa, its arts, culture, and people, and the African-American experience.

**AFS 248 Survey of African-American Literature 3. Offered in Fall and Spring.** African-American writing and its relationships to American culture and history. Covers such writers as Wheatley, Douglass, Chesnutt, Dunbar, DuBois, Hughes, Hurston, Wright, and Morrison.

**AFS 260 History of Jazz 3.** History of jazz and the contributions of major artists. Emphasis of the various styles that have contributed to this American art form. Investigation of structural forms in the jazz idiom.

**AFS 275 Introduction to History of South and East Africa 3. Offered in Fall Spring Summer.** The African kingdoms (Lunda, Buganda, and Zulu); the European encroachment; the origins of colonialism and the character of colonial societies and economies, South African apartheid; African protest, nationalism and independence.

**AFS 276 Introduction to History of West Africa 3. Offered in Fall and Spring.** The history of Western Africa. Forest civilizations and the slave trade, trade and the expansion of Islam, colonialism in West Africa; African nationalism and the achievement of independence; and postcolonial West Africa.

**AFS 305 Racial and Ethnic Relations 3. Offered in Fall Spring Summer.** Prerequisite: 3 cr. in SOC, 200 level. Study of the nature of the relationships among racial and ethnic groups in societies around the world but with emphasis on the United States. Explores topics such as inequalities of wealth, power, and status, racism, conflict, and social boundaries among groups. Current trends in intergroup relations are discussed.

**AFS 340 African American Theatre 3. Offered in Spring Only.** This course examines African American dramaturgy and its impact on American theatre. We will study plays from the early period, 1847-1938, and from the recent period, 1936-present. This course will investigate the thematic structure of each section of plays including family life, social protest, and religion. The course will also help students to better understand the social milieu that shaped the content of each play.

**AFS 342 Introduction to the African Diaspora 3. Offered in Spring Only.** Exploration of the global experiences of people of African descent. Geographical areas include the Americas, Europe, Asia, and the Caribbean. Exploration of the web of interrelated histories, social dynamics, and politico-economic processes affecting and reflecting world cultures and histories. Foundational course for the exploration of methodological issues and theoretical concerns in the field of African Diaspora Studies.

**AFS 343 African Religions 3. Offered in Spring Only.** Examination of African Religions on the African continent and throughout the African Diaspora. Focus on traditional religious practices, African reformulation of Islam and Christianity, New Orleans and Haitian vodun, Cuban Santeria, and Brazilian Candomble. Designed to de-mystify African religion without divesting it of its cultural uniqueness and richness.

**AFS 344 Leadership in African American Communities 3. Offered in Fall and Spring.** Historical, cultural and political examination of the dynamics of leadership in African American communities. Focus on structure of Leadership in the context of gender, ideology, and style. Interdisciplinary examination of impact of leaders on broader American society.

**AFS 345 Psychology and the African American Experience 3. Offered in Fall Only.** Prerequisite: PSY 200 or PSY 201. Historical and
AFS 455 History of the Civil Rights Movement
A multidisciplinary examination of the psychological experiences of African American descent throughout the world. Particular focus on the experiences of slavery, artistic expression, gender practices, and the impact of the nation state.

AFS 497 Topics in African-American Studies
3. Offered in Fall and Spring. Prerequisite: AFS 490. Multidisciplinary examination of selected topics in African-American studies.

AGRICULTURE & LIFE SCIENCES

ALS 110 Career Exploration Seminar 1. Offered in Spring Only.
Students learn about the career decision-making process through integration of self-knowledge and research in the world of work. Emphasis is placed on Agriculture and Life Sciences careers. Course is targeted towards undeclared majors, or those who desire experiences in career exploration and planning. Students assess interests, values, skills, and personal strengths while learning about a variety of occupational resources. Effective career management and job seeking skills emphasized. Career mentors are utilized for each student.
ALS 295 Special Topics in Agriculture and Life Sciences 1-3. Offered in Fall Spring Summer. Offered as needed to present material not normally available in regular departmental course offerings, or for offerings of new courses on a trial basis.

ALS 303 Professional Development and Career Opportunities in Agriculture and Life Science. Offered in Fall and Spring. Prerequisite: External transfers or NC State students with 45 hours or more. CALS Majors. Transfer students receive an overview of academic policies and career services. Students learn strategies to reach their career goals. Students design a resume and a cover letter and participate in mock interview. Students research and identify internships and begin to construct a skills portfolio. Professional skills are enhanced. Students increase their understanding of career and graduate school options after graduation. Students will not receive credit for both ALS 103 and ALS 303.

ALS 398 Agriculture and Life Sciences Honors Seminar 2. Offered in Spring Only. A seminar/discussion honors course with emphasis on a team approach to scientific research into topics that link science with issues in society; exposure to leadership skills and bioethics; requirement of detailed written or oral reports; career development in the agricultural and life sciences; required participation in on- and off-campus scholarly retreats.

ALS 494 International Learning Experience in Agriculture and Life Sciences 1-6. Course offered as needed for international learning experiences in agriculture and life sciences involving international travel and immersion in an international culture. A written report is required and student must identify a faculty member to work with them. Travel expenses may be incurred by the student. Departmental Approval Required.

ALS 495 Special Topics in Agriculture and Life Sciences 1-3. Offered in Fall Spring Summer. Offered as needed to present material not normally available in regular departmental course offerings or for offering of new courses on a trial basis.

ALS 498 Honors Research or Teaching I 1-3. Offered in Fall Spring Summer. Prerequisite: ALS 398, GPA 3.25 or higher. Honors research or teaching for students in Agriculture and Life Sciences. First of a two-course sequence. Identification of a project and development of a proposal; literature search, planning, and work initiation. A maximum of 6 credits for ALS 498 & ALS 499 combined.

ALS 499 Honors Research or Teaching II 1-4. Offered in Fall Spring Summer. Prerequisite: ALS 498, GPA 3.25 or higher. Honors research or teaching for students in Agriculture and Life Sciences. Completion of work initiated in ALS 498. Analysis of results. Preparation and presentation of written and oral reports. A maximum of 6 credits for ALS 498 and ALS 499 combined.

ANS 105 Introduction to Companion Animals 3. Offered in Fall and Spring. Introduction to animals that people keep as companions. Variation, behavior, anatomy, physiology, disease, and training of animals as diverse as fish, snakes, mice, rats, birds, cats, and dogs. Special relationships between humans and companion animals in a societal context.

ANS 110 Introduction to Equine Science 3. Offered in Fall Only. History, management, and use of horses and their profound impact on society. Selection, care, and enjoyment of horses with emphasis on genetics, nutrition, reproduction, behavior, and health.

ANS 150 Introduction to Animal Science 3. Offered in Fall and Spring. Fundamental principles of animal management; contributions of animals and animal products to humanity; application of science to animal production; issues regarding animal production.

ANS 151 Introduction to Animal Science Lab 1. Offered in Fall and Spring. Corequisite: ANS 150. Hands-on experience and demonstrations with livestock and horses; identification of common management equipment and knowledge of proper use; animal tracts, organs, skills, feeds, breeds, and other animal-related items or topics. The lecture (ANS 150) must be taken concurrently or have been passed previously with a C-minus or higher. This lab course is restricted to the following majors: SAS, IAS, AEX, AGS, and AED. Transportation is provided to the off-campus labs, and students will be returned to campus prior to the end of the scheduled lab period.

ANS 201 Techniques of Animal Care 2. Offered in Spring Only. Prerequisite: ANS 150 or ANS 230, IAS Majors or SAS Majors. A laboratory course in the applied management of beef cattle, dairy cattle, swine and small ruminants with participatory assignments of common techniques utilized in livestock production.

ANS 205 Physiology of Domestic Animals 3. Offered in Fall and Spring. Prerequisite: ZO 160, BIO 181, or BIO 183. This course is designed to introduce students to mammalian physiology (structure and function) with emphasis on livestock species. Students will gain a basic understanding of body systems including circulatory, muscular, skeletal, digestive, and reproductive systems and functions of those systems with relevance to the whole animal and maintenance of homeostasis.

ANS 206 Anatomy of Domestic Animals Lab 1. Corequisite: ANS 205. This lab course is designed for Animal Science majors to take with the ANS 205 lectures (Physiology of Domestic Animals). Students will learn to identify major anatomical and cellular structures from domestic animal (livestock) specimens through examination of gross and microscopic anatomy. SAS and IAS majors only.

ANS 208 Agricultural Biotechnology: Issues and Implications 3. Offered in Spring and Summer. Trends and issues of agricultural biotechnology in today’s society are addressed while covering the basic biological science behind the technology. Applications of and policy issues associated with plant, animal, and environmental biotechnology used in the agricultural industry are examined from an interdisciplinary approach.

ANS 215 Basic Agricultural Genetics 3. Offered in Fall Only. Prerequisite: ZO 160 or BIO 183. Basic principles of inheritance in plants and animals of agricultural significance. Transmission genetics and its effects on the usefulness of plants and animals. Basic principles of plant and animal improvement.

ANS 220 Reproduction and Lactation in Domestic Animals 3. Offered in Fall and Spring. Prerequisite: ANS 205. Biological processes in reproduction and lactation with emphasis on domestic mammals such as cattle, sheep, goats, horses, swine, dogs, and cats. Environmental and genetic factors that affect these processes. Identification, evaluation and solutions of problems in these physiological areas.

ANS 221 Reproduction and Lactation in Domestic Animals Lab 1. Offered in Fall and Spring. Prerequisite: ANS 205 and Corequisite of ANS 220. ANS 221 is a laboratory course that introduces students to the application of principles of reproduction and lactation in domestic mammals. Students must have either completed or concurrently be enrolled in ANS 220. This course is restricted to Animal Science majors (SAS, IAS).
ANS 225 Principles of Animal Nutrition 3. Offered in Summer. This online Principles of Animal Nutrition course is designed for non-Animal Science majors and off-campus students. It includes: feed classification, gastrointestinal tract anatomy of domestic mammals, nutrients and their functions, digestion and metabolism, feed regulations, and feeding/nutrition of cattle, small ruminants, horses, swine, poultry, dogs, cats, and rabbits. For on-campus students, ANS 225 counts toward the Animal Science minor but only counts as a Free Elective for Animal Science majors.

ANS 230 Nutrition of Domestic Animals 3. Offered in Fall and Spring. Prerequisite: ANS 150 or BIO 183; ANS 205 is also recommended. Introduction to nutrition, digestion, and absorption in domestic mammals. Major nutrient classes and their functions in the body, feed classification and chemical analysis, feed processing, and nutrient requirements.

ANS 231 Nutrition of Domestic Animals Lab 1. Offered in Fall and Spring. Corequisite: ANS 230. ANS 231 is a laboratory course that introduces students to the application of principles of nutrition and applied feeding of domestic mammals. Students must have either completed or concurrently be enrolled in ANS 230. This course is restricted to Animal Science Majors (SAS, IAS).

ANS 291 Animal Science Study Abroad 1-6. Offered in Summer. Course sections offered as needed for international learning experiences in Animal Science involving international travel and N.C. State University Faculty-supervised learning in the non-U.S. location. A maximum of one credit hour per week of supervised study will be assigned, and the faculty member will provide students with a syllabus outlining the requirements for successful completion (grade of “S”). This course counts as a free elective. All expenses including travel, are the responsibility of the student. The student is also responsible for obtaining a valid passport.

ANS 292 Australian Animal Agriculture 3. Offered in Summer. This course involves travel to Australia through N.C. State University’s Study Abroad Program. Participants will have the opportunity to increase their knowledge and understanding in the principle areas of animal and veterinary sciences and Australian studies. Species studied include cattle (beef and dairy), sheep, goats, pigs, native Australian animals, and non-native feral animals (such as rabbits). All expenses, including the Study Abroad fee and airline travel, are the responsibility of the student. The student is also responsible for obtaining a valid passport.

ANS 301 Introduction to Human Nutrition 3. Offered in Fall Spring Summer. Functions, dietary sources and deficiencies of essential nutrients in humans; a balanced diet; role of nutrients in heart disease, cancer, hypertension, osteoporosis; weight control and eating disorders; vegetarianism; food safety; dietary supplements; government regulation of food supply; food quackery. Food science majors may use as a free elective only.


ANS 304 Dairy Cattle Evaluation 2. Offered in Spring Only. Prerequisite: ANS 150. The first half of this course covers basic aspects of dairy cattle breeds, dairy character, form and function including type traits and linear scoring of dairy cattle, interpreting and using judging scorecards, comparing/evaluating dairy cattle, and placing animals in a class. The second half of the course develops the student’s ability to correctly evaluate dairy cattle classes, but more importantly to support their opinions through oral communication.

ANS 309 Livestock Evaluation 3. Offered in Spring Only. Prerequisite: ANS 150. Students will be exposed to basic concepts associated with growth, development and value determination of livestock. Familiarization with official USDA grading standards for cattle, sheep, swine and goats is emphasized. Introduction to judging terminology, placing classes of livestock and justification through oral reasons.

ANS 322 Muscle Foods and Eggs 3. Offered in Fall Only. Prerequisite: ZO 160, BIO 181 or BIO 183. Processing and preserving fresh poultry, red meats, seafood, and eggs. Ante- and post-mortem events as they affect quality, yield, and compositional characteristics of muscle foods. Principles and procedures involved in the production of processed meat items.

ANS 324 Milk and Dairy Products 3. Offered in Fall and Spring. Prerequisite: BIO 181 or 183, CH 101. Introduction to the manufacture of dairy products. Dairy processing procedures from the farm, through the dairy plant, and to the consumer are studied. The course consists of 15 learning modules, three exams, and a project.

ANS 330 Laboratory Animal Science 3. Offered in Spring Only: A sophomore to senior level course designed to cover the basics of laboratory animal science, a specialty dealing with the use of vertebrate animal species in intensive research. Some topics to be covered are: husbandry, facility management, animal health and welfare, diagnostics, surgical area management, research methods and administrative duties. Students will use the material for studying for the certification as a Laboratory Animal Technician via the American Association For Laboratory Animal Science (AALAS). A separate fee is required for certification; this fee is not covered by tuition for ANS 330. Must hold sophomore standing or higher.

ANS 350 Introduction to HACCP 3. Offered in Fall and Spring. Introductory course on the Hazard Analysis and Critical Control Points System (HACCP) which is designed to decrease hazards in foods. An International HACCP Alliance approved curriculum which covers prerequisite programs. A step by step approach for developing and implementing a HACCP plan for USDA regulated food processing plants. Offered only as a world wide web course through the Office of Instructional Telecommunications.

ANS 400 Companion Animal Management 3. Offered in Spring Only. Prerequisite: ANS 105 and Junior standing. Anatomy, physiology, nutrition, genetics, and health of companion animals including cats, dogs, rabbits, rats, mice, reptiles, amphibians, and fish. Problem solving and enterprise management skills in laboratories.

ANS 402 Beef Cattle Management Lecture 2. Offered in Spring Only. Prerequisite: ANS 150 and Junior standing. ANS 402 integrates technical information in animal nutrition, breeding, genetics, and reproductive physiology and incorporates this into information on management skills, business practices, and decision-making processes. This integration requires competency in oral and written communication skills; therefore, a major strategy is to practice and improve students' communication skills during the semester.

ANS 403 Swine Management 3. Offered in Fall Only. Prerequisite: ANS 150 and Junior standing. Management principles associated with swine production. Emphasis on interactions of health, equipment, nutrition, reproduction and genetics during nursery, finishing, farrowing and breeding phases of production. Waste management practices and alternatives, development of marketing strategies and economic evaluation of management practices.

ANS 404 Dairy Cattle Management Lecture 2. Offered in Fall Only. Prerequisite: (ANS 225 or ANS 230) and Junior standing. ANS
404 covers nutritional requirements of the dairy cow, digestive physiology, practical applications of balancing rations, feeding systems, and management tools for effective feeding strategies. Students will also receive information on labor management and efficient record keeping tools.

ANS 408 Small Ruminant Management 3. Offered in Fall Only. Prerequisite: ANS 150, Junior standing. Principles and practices of production, management, and marketing of sheep and goats. Role of genetics, nutrition, reproduction and animal health. Hands-on experience and field trips during labs.

ANS 410 Equine Management 3. Offered in Spring Only. Prerequisite: ANS 110 and Junior standing. Equine anatomy, physiology, nutrition, genetics and health. Laboratory emphasis on reproductive management, breeding, problem solving, and management skills. Field trips required.

ANS 411 Management of Growing and Performance Horses 3. Offered in Fall Only. Prerequisite: ANS 110. This course is an overview of scientific applications used in management of growing and performance horses. Topics include: nutrition and feeding; disease prevention, exercise conditioning, and methods of evaluation and selection. Students required to provide their own transportation to labs. Must hold junior or senior standing.

ANS 415 Comparative Nutrition 3. Offered in Fall Only. Prerequisite: CH 220 or both 221 and 223. Principles of nutrition, including the classification of nutrients and the nutrient requirements of and metabolism by different species for health, growth, maintenance and productive functions.

ANS 419 Human Nutrition and Chronic Disease 3. Offered in Spring Only. Prerequisite: Junior standing. ANS 230, or ANS/FS/NTR 301 or FS/NTR 400 or ANS/NTR/PO 415. Current concepts regarding, and physiological basis for the roles of nutrition in the prevention and treatment of acute and chronic disease states in humans with emphasis on the process of scientific discovery, reading of original research and transformation of research findings to public policy.

ANS 425 Feed Manufacturing Technology 3. Offered in Spring Only. Prerequisite: ANS(NTR,PO) 415 or ANS 230 or ANS 225. Feed mill management, feed ingredient purchasing, inventory, storage, and quality evaluation, computerized feed formulation, feeding programs for poultry and swine, feed mill design, equipment, maintenance, operation, safety, state and federal regulations pertaining to feed manufacture.

ANS 440 Selection of Domestic Animals 3. Offered in Fall Only. Prerequisite: ANS/HS 215 or GN 411, ST 311 or ST/BUS 350. Modern evaluation and selection procedures for domestic animals; selection goals, estimation of breeding values and performance testing; their impact on genetic changes.

ANS 452 Advanced Reproductive Physiology and Biotechnology 3. Offered in Spring Only. Prerequisite: ANS 220. Comparative approach to examining aspects of reproductive physiology in selected vertebrate species. Detailed examination of current reproductive biotechnologies and ethical issues associated with the application of reproductive biotechnologies. Credit will not be given for both ANS 452 and ANS (PHY) 552.

ANS 453 Growth and Development of Domestic Animals 3. Offered in Fall Only. Prerequisite: ANS 230, Junior standing. Introduction to the basic concepts of growth with emphasis on domestic mammals. Growth of the major classes of animal tissues and regulation by endogenous and exogenous factors. Relationship to efficiency of animal production. Credit will not be given for both ANS 453 and 553.

ANS 454 Lactation, Milk and Nutrition 3. Offered in Spring Only. Prerequisite: ANS 230 or FS/NTR 400; BCH 451 or ZO 421. Nutritional properties of milk as a high-quality food with nutritional diversity. Principles of physiology, biochemistry and cell biology in the mammary gland. Procedures of milk production and milk collection for milk quality and nutrition. Human lactation vs. that of domestic animals. Impacts of biotechnology and food safety on dairy production. Credit will not be given for both ANS 454 and 554.

ANS 462 Beef Cattle Management Lab 1. Offered in Spring Only. Corequisite: ANS 402. ANS 462 is a hands-on lab held at the Beef Educational Unit of N.C. State University. This lab is required for Animal Science majors who have taken or are taking ANS 402. Beef Cattle Management Lecture. AND 462 is restricted to Animal Science majors and minors. In ANS 462, students learn proper cattle handling techniques and management practices that are important for beef cattle management.

ANS 464 Dairy Cattle Management Lab 1. Offered in Fall Only. Corequisite: ANS 404. ANS 464 lab is hands-on guide to principles of modern dairy cattle management. It will provide students an overview of a complete dairy enterprise. All students will receive instruction on the nutritional requirements of the dairy cow, digestive physiology and practical applications to balancing rations, feeding systems and management tools for effective feeding strategies, records keeping and role of diary record management system, post harvest technology including milk supply, milk processing and marketing and milk products. Restricted to Animal Science majors and minors.

ANS 480 Judging Team 1. Offered in Fall Only. Prerequisite: ANS 303 or ANS 304 or ANS 309. Students practice judging techniques for livestock, horses, or dairy animals, including ranking animals and providing oral reasons to defend the rankings. Students meet weekly with a coach to practice locally and will also travel to compete in one or two regional or national competitions. Each team (livestock, horse, dairy) is expected to raise funds to finance the trips. Students earn 1 credit for being on a team, and can earn up to 3 credits of Free Elective for ANS 480 by serving on the judging team for different species. Field trips that last several days are required. Departmental Approval Required. Course may be taken up to 3 times (once per species).

ANS 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, and the departmental teaching coordinator prior to the experience.

ANS 493 Special Problems in Animal Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes departmental campus facilities and resources (Arrangements must be initiated by student and approved by a faculty adviser and the departmental teaching coordinator).

ANS 495 Special Topics in Animal Science 1-3. Offered in Fall Spring Summer. Offered as needed to present material not normally available in regular course offerings or for offering of new courses on a trial basis.
ANTHROPOLOGY


ANT 252 Cultural Anthropology 3. Offered in Fall Spring Summer. Comparative study of contemporary human culture, social institutions and processes that influence behavior. The range of human cultural variation shown throughout the world, including the student’s own cultural system.


ANT 254 Language and Culture 3. Offered in Fall Spring Summer. Focus among the aspects of human language and between aspects of language and culture. Topics such as: descriptive and comparative linguistics, structuralism, language and thought, sociolinguistics, bilingualism, culture change and linguistic changes.

ANT 261 Technology in Society and Culture 3. Offered in Fall and Spring. Processes of social and cultural change with a focus on role of technological innovation. Cross-cultural emphasis. Workplace changes and societal risks associated with technological innovations. Special attention to the role of scientists and engineers in socio-cultural change. Topical case studies apply course concepts and principles. Core sociological and anthropological concepts, methods, theories.

ANT 295 Special Topics in Anthropology 1-3. Offered in Fall Spring Summer. Offered as needed to present 200-level subject materials not normally available in regular course offerings or for new courses on a trial basis.

ANT 310 Native Peoples and Cultures of North America 3. Prerequisite: ANT 252 or HI 365. Native North American peoples and cultures including Eskimos and Aleuts. Theories of origin and selected prehistoric cultural manifestations. People and cultures at the time of European contact and post-contact cultural change. Contemporary problems and prospects.

ANT 325 Andean South America 3. Prerequisite: ANT 252 or HI 215 or HI 216. The societies, cultures, politics, economics and ecology of the Andean countries of South America (Peru, Bolivia, Ecuador, Chile, Colombia). Special attention to the development of pre-Columbian Andean Societies.

ANT 330 Peoples and Cultures of Africa 3. Offered in Spring Only. Prerequisite: ANT 252 or HI 275 or HI 276. African peoples and cultures, especially in sub-Saharan Africa; past and present social patterns of indigenous African populations from a cross-cultural perspective.

ANT 346 Peoples and Cultures of Southeast Asia 3. Offered in Fall Only. Prerequisite: ANT 252. Southeast Asian peoples and cultures; past and present social patterns of selected mainland and insular Southeast Asian peoples; culture change; relations between minorities and dominant ethnic groups; development of nationalism.

ANT 348 Peoples and Cultures of Italy 3. Prerequisite: ANT 252. Italian peoples and cultures; social institutions in selected regions; social change; regional and national diversity/identities; effects of and responses to immigration.

ANT 351 Contemporary Culture in Japan 3. Offered in Spring Only. Introduction to basic aspects of cultural practices in Japanese society, including education, work life, family relationships, everyday religious practices, aesthetic traditions, national identity, and gender. Students will develop an understanding of the interrelationships between language and culture.

ANT 354 Peoples and Cultures of the Pacific 3. Offered in Fall Only. Prerequisite: ANT 252. The Pacific Ocean contains thousands of inhabited islands. This course examines the millions of people and thousands of societies that live in the Pacific and its three subregional areas Melanesia, Micronesia and Polynesia. Course topics include the Pacific environment, peopling of the Pacific, regional cultural variation, social organization, Exchange systems, politics, conflict, modernization, globalization and global warming in the Pacific region.

ANT 370 Introduction to Forensic Anthropology 3. Offered in Fall Only. Prerequisite: ANT 251. Broad overview of forensic anthropology—an applied field of biological anthropology. Application of the science of biological anthropology to the legal process and humanitarian arena. Identification of skeletal remains to determine age, sex, ancestry, stature, and unique features of a decedent. General identification techniques addressed but proficiency not expected.

ANT 371 Human Variation 3. Offered in Fall Only. Prerequisite: ANT 251. Survey of basic principles of population genetics with emphasis on mechanisms that shape human biological variation. Analysis of laws of heredity exhibited in modern human populations via microevolution and adaptation. Historical development of concepts with specific application to physical and forensic anthropology. Discussion of most current research.

ANT 373 The Human Fossil Record 3. Prerequisite: 3hrs of physical anthropology or archaeology. Analysis of the human fossil record and consideration of alternate theories of human evolution.

ANT 374 Disease and Society 3. Prerequisite: ANT 251 or ANT 252. Survey of diseases that affect human beings and human societies past and present. Analysis of how diseases affect societies with different economies (gathering/hunting, pastoral, agricultural, industrial) and of different social complexity. Impact of diseases on human evolution.

ANT 385 Island Archaeology 3. Prerequisite: ANT 253. Exploration of the archaeology of islands. Analysis of the conditions and phenomena surrounding human adaptation to and impact on island environments. Geographic areas include Oceania, Caribbean, Mediterranean, Japan, and the Americas.


ANT 395 Special Topics in Anthropology 1-3. Offered in Fall Spring Summer. Prerequisite: 3 credits of 200-level Anthropology. Offered as needed to present 300-level subject materials not normally available in regular course offerings or for new courses on a trial basis.

ANT 411 Overview of Anthropological Theory 3. Offered in Fall Only. Prerequisite: ANT 252 and one of the following: ANT

ANT 416 Research Methods in Cultural Anthropology 3. Offered in Fall Only. Prerequisite: ANT 252 and one of the following: ANT 310,325,330 or 346. A systematic overview of cultural anthropological research methods including designing research projects, research techniques, field work methods, and cross-cultural comparison. Reviews relevant ethical questions and anthropologists' reports of their own field work.

ANT 419 Ethnographic Field Methods 3. Offered in Summer. Prerequisite: Six hours of cultural anthropology. Ethnographic research methods as part of a summer field school abroad. Topics: research design, participant observation, field note writing, interviewing, sampling, coding, computers in ethnographic research, analysis and ethics.

ANT 420 Biological Bases for Human Social Behavior 3. Prerequisite: ANT 251 or 3 hrs. biological sciences. Applicability of sociobiology to the study of the human condition. Nature and uniqueness of human behavior as compared to the social behavior of nonhuman animals.

ANT 421 Human Osteology 3. Prerequisite: ANT 251 and any ANT 300 Level. Survey of all the bones of the human skeleton from an anthropological perspective, including their names, important features useful in recognizing fragmentary specimens from an archaeological context, and techniques for determining the side of the body they come from. Skeletal development and its relationship to skeletal abnormalities. Issues relating to the study of archaeological skeletons.

ANT 424 Bioarchaeology 3. Prerequisite: ANT 421. Survey of approaches used by bioarchaeologists to understand past lifeways through the study of excavated human remains. Analysis of the ways in which bioarchaeologists reconstruct health and disease patterns, mortality rates, diet, degree of interpersonal violence, and social structure in the human past.

ANT 429 Advanced Methods in Forensic Anthropology 4. Prerequisite: ANT 370, ANT 421. Advanced methods in forensic anthropology—an applied field of biological anthropology. Application of the science of biological anthropology to the medicolegal process. Identification of skeletal remains to determine age, sex, ancestry, stature, and unique features of a decedent. Analysis of human skeletal remains. Identification techniques addressed and proficiency expected. Students must provide their own transportation to the laboratory site.

ANT 431 Tourism, Culture and Anthropology 3. Offered in Fall and Summer. Prerequisite: Three hours of cultural anthropology. Anthropological approach to tourism studies with emphasis on cross-cultural aspects of international tourism. Attention to impact of mass tourism as compared to alternative tourism; environmental and economic impact of tourism; impact of international tourists and tourism on local communities. Principal theories of leisure in relation to tourism. Theories of culture change in relation to travel and tourism. Credit not given for both ANT 431 and ANT 531.

ANT 433 Anthropology of Ecotourism and Heritage Conservation 3. Offered in Spring Only. Prerequisite: ANT 252. Introduction to how cultures and societies view, utilize, interpret, manage, and conserve environmental and cultural heritage resources; includes examination of theory and concepts of place, identity, sacred heritage, ecotourism, wildlife management as well as the cultural politics and practices of environmentalist and heritage management. Some limited travel to NC heritage sites required at student expense.

ANT 444 Cross-Cultural Perspectives on Women 3. Offered in Spring Only. Prerequisite: ANT 252 and one of the following: ANT 310,325,330 or 346. Comparison of women in a variety of societies: western and non-western; hunting and gathering to industrialized. Cross-cultural perspective on the similarity and diversity of women's statuses and roles. Effect of gender on social position.

ANT 450 Environmental Anthropology 3. Prerequisite: One of the following: ANT 310,325,330 or 346. Examines the myriad ways that culture serves to mediate the human-environmental equation. Focus is given to different belief systems, subsistence strategies, technological achievements, and policy formulations. Topics covered include cultural ecology, gender and the environment, land tenure, development, ethnoscience and cognitive ecology, subsistence and social organization, historical and political ecology, environmentalism, and environmental policy issues.

ANT 460 Urban Anthropology 3. Offered in Fall Only. Prerequisite: ANT 252 and one of the following: ANT 310,325,330 or 346. Anthropological study of cities. Examination of cross-cultural patterns of behavior in urban areas and adaptive strategies that urban dwellers employ. Introduction to major theoretical and methodological approaches relevant to an understanding of contemporary urbanization.

ANT 464 Anthropology of Religion 3. Offered in Spring Only. Prerequisite: ANT 252 and one of the following: ANT 310,325,330 or 346. Examination of various anthropological perspectives on the role of religion in social life, and discussion of theoretical and methodological issues pertaining to the study of ritual and belief.

ANT 475 Environmental Archaeology 3. Prerequisite: ANT 253. Archaeological investigation of human-environmental interactions. Focuses on various techniques archaeologists and paleoecologists use to reconstruct prehistoric environments. Topics include the analysis of animal remains (e.g., shellfish, fish, marine mammals, birds), soils, and plants, dating techniques, and stable isotopes.

ANT 495 Special Topics in Anthropology 3. Detailed investigation of a topic in anthropology. Topic and mode of study determined by faculty member(s).

ANT 496 Anthropology Internship 6. Offered in Spring Only. Prerequisite: ANT 412, ANT 416. Senior standing in Anthropology (B.A.). Supervised observation and experience in work settings appropriate to anthropological perspectives. Study of the relationships between internship setting and relevant anthropological theory, methods and research. Weekly seminars, individual conferences and an integrative report. Students are responsible for arranging their own transportation to internship sites.

ANT 498 Independent Study in Anthropology 1-6. Offered in Fall Spring Summer. Prerequisite: Six hours of ANT. Independent study of a topic in anthropology. Topic and mode of study determined by faculty member(s) and student(s).
ARCHITECTURE


ARC 140 Experiencing Architecture 3. Offered in Fall Only. Contemporary and historic houses, public buildings and cities illustrate the practical and aesthetic aspects of architecture. The basic elements of architectural form, design process, and architectural criticism.

ARC 162 An Introduction to Architecture 3. Offered in Spring Only. The purpose of architecture examined through its practices, theories and key principles. Lectures, projects, and readings expose students to the diverse world of ideas, creative work and practical considerations which make up the discipline of architecture.

ARC 201 Architectural Design: Environment 6. Offered in Spring Only. Prerequisite: DF 102, ARC 141 and ARC 142, Corequisite: ARC 211. Investigation of the relationships between environment and built form. Solar orientation, topography, vegetation, and constructed context in relationship to user needs as parameters for justifying design proposals. Particular emphasis on architectural conventions of communication.


ARC 211 Natural Systems and Architecture 3. Offered in Fall Only. Prerequisite: DF 102. Restricted to students in BEDA Program. Relationship between natural and architectural systems. Exploration of the implications of natural forces - sun, wind and daylight-on architecture. Energy-conscious architectural design and site planning strategies to fulfill thermal comfort requirements of people in designed environments.

ARC 232 Structures and Materials 3. Offered in Spring Only. Construction materials related to structural applications. Theory of structures and introduction to quantitative analysis. Implications for design. Historical examples and current practices. Laboratory and field trips required.

ARC 241 Introduction to World Architecture 3. Offered in Fall Only. History of the built environment (buildings, urban planning, and associated arts) in western and non-western cultures, ranging from dawn of civilization to dawn of modern era, including high-style architecture, vernacular buildings, and traditional forms.

ARC 242 History of Western Architecture 3. Offered in Spring Only. Prerequisite: ARC 241. History of western architecture (including some landscape architecture and city planning) from the beginnings of the Renaissance in early 15th century to late 19th century in the United States.

ARC 251 Digital Representation 3. Offered in Spring Only. Project based methodological investigation of digital representation in architecture including: two- three- and four-dimensional media. Purchase of laptop and necessary software required.

ARC 289 Architectural Travel Study I 3. Offered in Fall Spring Summer. Prerequisite: ARC 141 and ARC 142. The study of cities, architectural sites, buildings, building complexes, and architectural elements conducted independently by students as part of a planned travel-study tour. Includes advance research and approval of proposed study topic and itinerary. Students will document study through sketches, analytical notations, and a summary paper. Departmental Approval Required.

ARC 292 Special Topics in Architecture 1-3. Offered in Fall Spring Summer. Topics of current interest in Architecture. Normally used to develop new courses.

ARC 301 Architectural Design: Intermediate 6. Offered in Fall Only. Prerequisite: Bachelor of Environmental Design (EDA) Majors or Junior studio Standing. Studies in architectural design. Projects of many types and scales are employed to investigate issues in architecture. Emphasis is on independent exploration of design values and their implications.

ARC 302 Architectural Design: Technology 6. Offered in Spring Only. Prerequisite: Bachelor of Environmental Design in Architecture majors. ARC 301, ARC 331, Corequisite: ARC 332, ARC 414. An investigation of technical systems of building - structure, environmental control/energy, materials, enclosure, and circulation, their fabrication and assembly and their capacity to affect form and tectonic structure- as fundamental elements of the design process. Particular emphasis on physical models.

ARC 331 Architectural Structures I 3. Offered in Fall Only. Prerequisite: ARC 232. Structural design process. Combined role of imposed loads and architectural function in shaping the form of the building. Interaction of elements in structural systems containing beams, columns, trusses, space frames, slabs, arches, vaults, domes, cables, cable networks, fabrics and diaphragms. Case studies emphasized.


ARC 401 Architectural Design: Urban 6. Offered in Fall Only. Prerequisite: Bachelor of Environmental Design (EDA) Majors, ARC 302. An architectural design studio intended to explore and integrate design issues of all types within an urban environment. Emphasis will be placed on both formal and technical issues of urban sites including transportation and land use planning, phasing of projects over time, relationships to other structures, and the application of development codes, regulations, and urban design principles to the fabric of the city.

ARC 402 Architectural Design: Advanced 6. Offered in Spring Only. Prerequisite: Bachelor of Environmental Design (EDA) Majors, ARC 401. Advanced architectural design studios in which projects of many types and scales are employed to investigate a range of educational, theoretical and professional studies. Particular emphasis on independent research and exploration of design issues and their implications as defined by faculty.

ARC 403 Architectural Design Fundamentals: Environment 6. Offered in Fall Only. Prerequisite: M. Arch Track 3 student, Corequisite: ARC 211. An introductory architectural design studio for
M. Arch, Track 3 students investigating the relationship between environmental design and built form. Solar orientation, climate, topography, vegetation, and constructed context in relationship to user needs as parameters for design proposals. Particular emphasis on design fundamentals and conventions of architectural communication.

ARC 404 Architectural Design Fundamentals: Form 6. Offered in Spring Only. Prerequisite: M. Arch Track 3 student, ARC 403, ARC 252, Corequisite: ARC 261. An introductory architectural design studio for M. Arch. Track 3 students investigating relationships between idea and form. Composition and precedent as parameters for generating, developing, and justifying architectural form. Particular emphasis on electronic media in drawing and modeling.

ARC 405 Architectural Design Fundamentals: Technology 6. Offered in Spring Only. Prerequisite: M. Arch Track 3 student, ARC 404, Corequisite: ARC 331. An introductory architectural design studio for M. Arch. Track 3 students in which the technical systems of building - structure, environmental control/energy, materials, enclosure, and circulation; their fabrication and assembly; and their capacity to affect form and tectonic expression - are explored as fundamental elements of the design process. Particular emphasis on physical models.

ARC 414 Environmental Control Systems 3. Offered in Spring Only. Prerequisite: ARC 211, Junior standing. Studies in light, heat, moisture, air motion, and sound in architectural environments. Mechanical, electrical and/or electronic equipment for illumination, heating, cooling, ventilation, vertical transportation and communication in buildings. Water and waste, fire protection and safety, and acoustic systems in architecture.

ARC 432 Architectural Construction Systems 3. Offered in Fall Only. Prerequisite: ARC 232. Building construction systems related to architectural design. Historical and current building practices. Implications for design and systems selection. Case studies. Field trips are required.

ARC 441 History of Contemporary Architecture 3. Offered in Fall Only. A survey and critical examination of modern architecture from its origins in 19th-century philosophy and technology to the most recent developments in world architecture.

ARC 442 History of NC Architecture 3. Offered in Spring Only. Prerequisite: ARC 141, 142, Junior standing in COD. Survey of NC Architecture from 17th-century settlement to World War II. Coverage of a wide range of building types and development patterns.

ARC 450 Architectural Drawing 3. Offered in Fall Only. Introduction to freehand and constructed drawing including planimetric drawing and three-dimensional techniques of axonometric, isometric, and perspective. Freehand on-site drawing in various media and the art of the design sketch. Basics of visual composition and diagramming.

ARC 490 Architecture International Studio 6. Offered in Fall Spring Summer. Prerequisite: ARC 262. Exploration of architectural problems and development of design solutions in an international setting. Studio projects focused on current conditions found in the host culture, profession, and community.

ARC 492 Special Topics in Architecture 1-3. Offered in Fall Spring Summer. Topics of current interest in Architecture. Normally used to develop new courses.

ARC 495 Independent Study in Architecture 1-3. Offered in Fall Spring Summer. Special projects in architecture developed under the direction of a faculty member on a tutorial basis.

AGRICULTURE ECONOMICS

ARE 201 Introduction to Agricultural & Resource Economics 3. Offered in Fall and Spring. Introduction to economic principles of marginal benefits and costs with application to consumer and producer decisions. Functions of market exchange systems in determining prices and quantities and creation of wealth. Property rights and opportunities for exchange. Role of government in dealing with agricultural and resource problems. Macroeconomic analysis including inflation, unemployment, money and banking system. Credit will not be given for both EC 205 and either EC 201 or ARE 201.


ARE 301 Intermediate Microeconomics 3. Prerequisite: MA 121 or 131; ARE 201 or EC 205 or EC 201. Functioning of the market economy, role of prices in determining the allocation of resources, the functioning of the firm in the economy, forces governing the production and consumption of economic goods. Credit not allowed in more than one of EC 301, 310, 401.

ARE 303 Farm Management 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. Analytical and planning techniques for making business decisions centered around farm business applications. Economic principles and management concepts such as budgeting, accounting, finance credit, investment analysis, business organization, risk, and taxes as related to practical problems of operating a farm business.

ARE 304 Agribusiness Management 3. Offered in Spring Only. Prerequisite: ARE 201 or EC 201 or EC 205. Management decision-making by food, fiber, horticulture, and forestry firms. Emphasis on current agribusiness topics such as information utilization, strategic planning, organization structures, competitor intelligence, pricing, leadership, crisis management, ethics, and human resource management. Business communications, agribusiness case studies, and a computerized management simulation game.

ARE 306 Agricultural Law 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. Legal principles of practical importance in an agricultural setting: the court system; tort, contract and real and personal property law, legal aspects of organizing an agribusiness; environmental and labor regulations affecting agriculture; income and estate taxation of agriculture. Credit for both ARE 306 and BUS 307 is not allowed.

ARE 309 Environmental Law & Economic Policy 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. Current federal and state environmental laws and regulations and their common law foundations. Relationship of the law and its regulatory mechanisms to economic policy issues: externalities, pollution taxes,
incentives, permit trading, and cost-benefit analysis. Major environmental topics including water and wetlands, solid and hazardous wastes, pesticides, clean air, endangered species and nuisance actions. Overview of the legal system.

ARE 311 Agricultural Markets 3. Offered in Fall Only. Prerequisite: ARE 201 or EC 201 or EC 205. Agricultural marketing system and economic forces affecting its structure and efficiency. Public policy issues affecting agricultural markets. Emphasis on the analysis of current sources of agricultural market information. Marketing and storage problems over time; futures markets and the management of risk; transportation and international trade; government agricultural programs.

ARE 312 Agribusiness Marketing 3. Offered in Spring Only. Prerequisite: ARE 201 or EC 201 or EC 205. Application of marketing and economic principles to decision making in contemporary agribusiness firms. Marketing strategies, marketing research and information, segmentation and targeting, marketing mix, and market plans within food, fiber, natural resource, and production input industries. Professional selling skills and knowledge. Off-campus field experience and visiting lecturers from the agribusiness industry.

ARE 321 Agricultural Financial Management 3. Offered in Fall Only. Prerequisite: ARE 201 or EC 201 or EC 205. Fundamental concepts for financial management decision in agricultural/farm businesses. Emphasis on financial statement analysis of profitability, efficiency, liquidity, repayment capacity, risk, leverage, growth. Capital budgeting, investment decisions, farmland bid price determination, farm real estate appraisal. Financial markets and credit institutions serving agriculture, lending policies, loan analysis, interest rate determination. Financial structure, performance, condition of farm sector.

ARE 332 Human Resource Management for Agribusiness 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. General introduction to human resource management in agribusinesses. Skills for agribusiness owners for efficient productivity from employees in a legal and ethical manner. Topics on labor economics, human resource legislation, employee planning and recruitment, and migrant labor issues. Emphasis on techniques for training, motivating, leading, and disciplining employees.

ARE 336 Introduction to Resource and Environmental Economics 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. Application of basic demand and evaluate environmental/resource policies. Concepts such as property rights, non-market goods, allocation over time, externalities, and public goods. Current policy issues such as global climate change, evaluating natural resource damages from oil spills, reducing the costs of regulations, protecting estuaries, and dealing with non-point source pollution.

ARE 403 Economics of Consumer Decisions 3. Prerequisite: ARE 201 or EC 201 or EC 205. Application of economic theory of the consumer to lifetime personal resource allocation decisions intended for non-major graduate students at the master's level. Emphasis on dynamic considerations in consumption and saving, replacement of consumer durables, and evaluation of consumer protection policies. Not open to undergraduates majoring in the Department of Agricultural and Resource Economics or the College of Management. Credit not allowed for both ARE 210 and ARE 403.

ARE 404 Advanced Agribusiness Management 3. Prerequisite: (ARE 303 or ARE 304), ARE 321, and (ARE 311 or ARE 312). An advanced course in business planning that integrates the risk and uncertainty associated with production, marketing, and financial management strategies of agribusiness firms. Focuses on the fundamental components required to develop a strategic business plan and design a viable business strategy in the context of the firm's market and its internal environment. Special attention is given to the application of economic theory and analysis to business decision-making processes. 80% of enrollment is restricted to Agricultural & Resource Economics students with the remaining 20% open for all other majors.

ARE 412 Marketing Analysis and Plans for Agribusiness and Life Sciences 3. Offered in Fall Only. Prerequisite: ARE 312 or BUS 360, and ST 311 or BUS/ST 330. ARE 412 uses step-by-step marketing plan development for agribusiness, agricultural, and/or life sciences products. Student groups research, develop, and present a written market plan. The course focuses on collection and analysis of information pertaining to a product's environment, customers, and competitors. An integrative course, ARE 412 brings together concepts learned in marketing, finance, management, law and policy areas.

ARE 423 Futures and Options Markets 3. Offered in Spring Only. Prerequisite: ARE(EC) 301 and ARE 311 or BUS 320. Operation and business uses of futures and options markets. Emphasis on market institutions, arbitrage price relationships, risk analysis, hedging theory and practice, portfolio evaluation and market regulation. Similarities among commodity, bond and stock index futures emphasized.

ARE 433 U.S. Agricultural Policy 3. Offered in Fall Only. Prerequisite: ARE(EC) 301 or ARE(EC) 401. Government economic policies and programs affecting agricultural inputs and farm products. Analysis of the rationale, objectives, and major types of agricultural programs and their effects on resource allocation and income distribution within agriculture and between agriculture and the rest of the economy.

ARE 436 Environmental Economics 3. Offered in Spring Only. Prerequisite: ARE(EC) 301. Usefulness of economics in understanding pollution, congestion, conservation and other environmental problems. Relevant economic tools such as pricing schemes, abatement cost curves, damage functions and benefit-cost analysis. Pollution taxes, regulations, marketable permits and subsidies considered in designing alterations, in the incentive system. Current public policy alternatives in the context of non-market decision-making.


ARE 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

ARE 493 Special Problems/Research Exploration 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

ARE 495 Special Topics in Agricultural and Resource Economics 1-6. Presentation of material not normally available in regular course offerings or offering of new courses on a trial basis.
ARTS STUDIES

ARS 233 Makeup Design for the Stage 3. Offered in Fall Only. The process of design and application of makeup for the stage including techniques for character and age makeup, making and applying facial hair and other specialized techniques. Taught from the play script to production with emphasis on historical research, play analysis, and applications techniques. The course includes hands-on experience with makeup. May not be taken concurrently with ARS 236 or ARS 333. May not be taken concurrently with ARS 236 or ARS 333.

ARS 236 Text to Stage 3. Offered in Fall and Spring. Study of script preparation beginning with the directors' and designers' collaborative efforts through rehearsal process, to the production itself and ending with the final evaluation. Directors' methods and designer processes in theory and practice. Attendance at one rehearsal and two productions is required. May not be taken concurrently with ARS 233 or ARS 333. May not be taken concurrently with ARS 233 or ARS 333.

ARS 251 The Arts of a World Capital: London 3. Offered in Summer. Multidisciplinary course introducing students to the architecture and museums and the musical, dance, and theatrical performances of London. Historical and social context of these works of art. The infrastructure in London that makes its unusual artistic vitality and quality possible. Taught in London.

ARS 252 The Arts of Vienna 1900 3. Offered in Summer. Interdisciplinary study of art, architecture, music and theater in turn-of-the-century Vienna and of the political and scientific thinking that surrounded these arts. Taught in Vienna.

ARS 253 Arts of NC State 3. Offered in Fall and Spring. Study of the arts in the context of the university community, utilizing university arts programs and resources. Core concepts and methods for aesthetic experience in several disciplines including dance, theater, music, visual art, and craft through performance and exhibition attendance, readings, lectures, and discussion. (Modest fees for performance tickets might be required.)

ARS 257 Technology in the Arts 3. Offered in Fall Only. The interaction between technology and the arts with an emphasis on developments in Western art of the twentieth century. Historical and emerging issues include: sound and film recordings, the addition of sound to films, the impact of films and television on theater, the impact of radio, computer applications to music, the visual arts, and literature.

ARS 258 Mathematics and Models in Music 3. Offered in Spring Only. Use of mathematics and models in the composition of western music of various time periods with an emphasis on the twentieth century. Critical analysis of trivial and non-trivial uses of mathematics; differentiation between mathematics as an analytical tool and mathematics as a compositional tool. Survey of models including geographical, grammatical, and graphic.

ARS 259 The Arts and Politics 3. Offered in Fall Only. Interactions between the arts and politics. Specific instances and types of political art from the past and the present. Patronage, censorship, propaganda, art in times of war, the artist's options and powers, aesthetics and criticism.

ARS 306 Music Composition with Computers 3. Offered in Fall Spring Summer. Survey of the theory and history of computer music, compositional algorithms, digital synthesis techniques, composition of at least one computer music work -- a computer-assisted composition for traditional instruments, a piece for computer music on tape, a real-time piece, or a piece that combines tape and instrument(s).

ARS 333 Costume Design and Technology 3. Offered in Spring Only. Prerequisite: COM 103 or ARS 236. The process of designing costumes taught from the perspective of both the play's script and the anticipated production with emphasis on historical research, play analysis, rendering technique, and basic construction. Hands-on experience required. May not be taken concurrently with ARS 233 or ARS 236. May not be taken concurrently with ARS 233 or ARS 236.

ARS 346 Black Popular Culture 3. Offered in Fall Spring Summer. A multidisciplinary examination of contemporary black cultural expression in film, music, art, and the media. Emphasis on race, class, gender, and political discourse.

ARS 351 Arts, Ideas and Values 3. Offered in Fall Only. An examination of the way works of art embody a particular understanding of what is real and what is worthwhile and shape their viewers' ideas and values. Case studies approach.

ARS 352 Dress, Style, Change 3. Interdisciplinary course focusing on historical and cultural principles of style as related to dress and fashion. Examination of fashion and stylistic trends in cycles of dress.

ARS 353 Arts and Cross-Cultural Contacts 3. Offered in Spring Only. Study of works of art that allude to or combine two or more traditions. Examples from film, dance, music, theater and visual arts. Analysis of the role of the exotic in art. The role of arts of multiple traditions in inaugurating new artistic movements, such as Ming landscape painting. Impact of electronic media on contemporary multicultural arts, such as Nepali pop.

ARS 354 The Arts and the Sacred 3. The support and critique of religion through the arts. Study of religious symbolism embodied in works of art from a number of traditions and genres. The interrelationship between art and religion, history, culture, spirituality, and ritual.

ARS 433 Period Styles in Acting 3. Offered in Spring Only. Prerequisite: COM 493. Interpreting daily lives in earlier eras through reading, discussion, research, and performance. Plays of complex heightened language, in verse and prose, studied from perspective of character's daily lives and their relevance to contemporary performance skills. Scenes, monologues, and soliloquies rehearsed and performed.

ARS 494 Topics in Arts Studies 2. Offered in Fall and Spring. Multi-arts course focusing on selected works of art in various media, related by theme, place or date. Capstone course for students with an extensive background in one of the arts. Topics may vary.

ARS 498 Independent Study in Arts Studies 1-3. Offered in Fall Spring Summer. Prerequisite: Nine hours of course work in Arts Studies. Independent study or project directed by a faculty member in the student's area of interest.

AEROSPACE STUDIES

AS 121 The Foundation of the United States Air Force 1. Offered in Fall Only. Part I of a survey course designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions and organization of the Air Force.
AS 122 The Foundations of the United States Air Force II 1. Offered in Spring Only. Part II of a survey course designed to introduce students to the United States Air Force and provides an overview of the basic characteristics, missions and organization of the Air Force.

AS 221 The Evolution of USAF Air and Space Power I 1. Offered in Fall Only. Part I of a course featuring topics on Air Force heritage and leaders; introduction to air and space power through examination of competencies and functions; and continued application of communication skills. Its purpose is to instill an appreciation of the development and employment of air power and to motivate students to transition from AFROTC cadet to Air Force ROTC officer candidate.

AS 222 The Evolution of USAF Air and Space Power II / AS 421 National Security Affairs/Preparation for Active Duty I 1. Offered in Spring Only. Part II of a course featuring topics on Air Force heritage and leaders; introduction to air and space power through examination of competencies and functions; and continued application of communication skills. Its purpose is to instill an appreciation of the development and employment of air power and to motivate students to transition from AFROTC cadet to Air Force ROTC officer candidate.

AS 321 Air Force Leadership Studies I 3. Offered in Fall Only. Part I of a course that teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 322 Air Force Leadership Studies II 3. Offered in Spring Only. Part II of a course that teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 421 National Security Affairs/Preparation for Active Duty I 3. Offered in Fall Only. Part I of a course designed for college seniors and that gives them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

AS 422 National Security Affairs/Preparation for Active Duty II 3. Offered in Spring Only. Part II of a course designed for college seniors and that gives them the foundation to understand their role as military officers in American society. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level.

AS 495 Special Topics in Aerospace Studies 2. Offered in Fall and Spring. Offered as needed to treat new or special subject matter relating to the Department of the Air Force.

BAE 100 Introduction to Biological Engineering 1. Offered in Spring Only. Technical topics and career options in Biological Engineering with concentrations in Agricultural, Bioprocess, and Environmental Engineering are introduced. Information is provided about career services, internships, and study abroad and co-op opportunities in these areas. Students develop a plan of work.

BAE 200 Computer Methods in Biological Engineering 2. Offered in Fall Only. Prerequisite: MA 141 and E 115. Students develop computer-based problem solving techniques to solve introductory problems in Biological and Biomedical Engineering. Emphasis is on developing solution algorithms and implementing these with spreadsheets, equation solvers, and computer programming.

BAE 201 Shop Processes and Management 3. Offered in Fall and Spring. Safety practices, materials, equipment, processes, procedures, and management techniques related to operation and maintenance of a mechanized agricultural enterprise or agriculture-related industry. Theory and practice through basic shop operations and procedures.

BAE 202 Introduction to Biological and Agricultural Engineering Methods 4. Offered in Spring Only. Prerequisite: BAE 200. Introduction to experimental design methodology, basic engineering design and problem solving methodology for Biological Engineering. Visualization skills, computer-aided 3-D solid modeling of parts, 3-D assembly of solid part geometries, computation of mass properties, 2-D engineering drawings, engineering design process, safety, tools and fabrication processes and design, and hands-on shop fabrication of semester project.

BAE 311 Agricultural Machinery and Power Units 4. Offered in Spring Only. Prerequisite: CH 101, CH 102 and PY 211 or PY 131. Agricultural machinery principles, energy requirements, operation, calibration and environmental considerations. Diesel engine principles and their application to engine power, efficiencies and systems. Power trains and hydraulic systems. Application of basic machinery and power principles to mechanical needs in environmental systems.

BAE 315 Properties of Biological Engineering Materials 3. Offered in Spring Only. Prerequisite: PY 208, BIO 183 or ZO 160, Corequisite: MAE 308 or CE 382 and MAE 314 or CE 313. Physical properties of biological and non-biological engineering materials, their uniqueness and variability within systems. Relationships between plant, animal, and human tissues, property measurement, and evaluation of dimensional, mechanical, rheological, thermal, electrical, and optical properties.

BAE 323 Water Management 3. Offered in Fall Only. Water management principles applied to agriculture; hydrologic cycle, runoff, surface and sub-surface drainage, soil conservation measures to reduce erosion and sedimentation, irrigation, pond construction, open channel flow, water rights and environmental laws pertaining to water management. Emphasis on problem solving.

BAE 324 Elementary Surveying 1. Offered in Fall Only. Theory and practice of plane surveying to include measuring distances as well as record keeping differential leveling, profile leveling, topographic mapping, stadia surveying and the use of these tools in agricultural applications.

BAE 325 Introductory Geomatics 3. Offered in Fall Only. Theory and practice of plane and satellite-based surveying. Includes distance measurement, differential leveling, profile leveling, topographic surveying, and record keeping. Introduction to tapes, levels, total stations, surveying software, the global positioning system, GPS receivers and methods (stand-alone, DGPS, RTK), data collection, data processing, and applications.

BAE 332 Animal Facilities and Environmental Management 4. Offered in Spring Only. Prerequisite: PY 211 or PY 131. Environmental relationships, design methods, materials and construction procedures as they relate to agricultural animal production facilities. Problem situations integrating structural design, environmental control, and waste handling.
BAE 333 Processing Agricultural Products 4. Offered in Spring Only. Prerequisite: CHE 315. Application of the principles of fluid flow, heat transfer, refrigeration, psychrometrics, and materials handling to the processing of agricultural products. Pump sizing, heat exchanger selection, refrigeration analyses, fan sizing, crop drying, and selection of materials handling equipment.

BAE 343 Agricultural Electrification 3. Offered in Fall Only. Corequisite: PT 212. Practical and efficient use of electrical energy for agricultural and home application. Energy conservation, electric rates, farm and house wiring, circuit design, single-phase and three-phase distribution systems, electric motors, lighting, space and water heating, electric controls, safety and protective devices.

BAE 344 Circuits and Controls 1. Offered in Fall Only. Corequisite: PT 212; BAE 343 or ECE 211. Applied laboratory covering energy conservation, farm and home wiring, circuit design, single-phase and three-phase distribution systems, electric motors, lighting, heating, electric controls, safety and protective devices, and home water systems.


BAE 401 Instrumentation for Biological Systems 3. Offered in Fall Only. Prerequisite: ECE 331. Basic concepts of instrumentation for monitoring of biological systems. Study of transducers and circuits utilized in biological and agricultural engineering applications. Demonstration of concepts of error, accuracy and precision, linearity and other instrument characteristics by electronic models. Provision of hands-on experience for reinforcing lecture concepts in laboratories. Credit will not be given for both BAE 401 and BAE 501.

BAE 402 Transport Phenomena 3. Offered in Fall Only. Prerequisite: MA 341; MAE 301, Corequisite: CE 382 or MAE 308. Theory and application of heat and mass transfer in biological, food, and agricultural systems. Topics include fluid flow, conduction, convection, radiation, psychrometrics, and refrigeration.

BAE 422 Introduction to Food Process Engineering 3. Offered in Spring Only. Prerequisite: BAE 402; MAE 308 or CE 382; MAE 301 or CHE 315. Introductory principles and practices of handling and preserving food products. Coverage includes the design and analysis of handling systems for discrete and continuous flow material handling systems, the selection and specification of automatic controls, food preservation principles and considerations relevant to the design of food handling systems, and the principles and practices of drying and storing grain.

BAE 425 Industrial Microbiology and Bioprocessing 3. Offered in Spring Only. Prerequisite: Junior or higher standing in CALS or COE; MB 351. Introduction to the structure and functions of microbial cells and their cultivation and utilization in bioprocess engineering. Fermentation systems and downstream processing methods. Enzyme kinetics, production and application. Biomanufacturing of fuels, industrial chemicals, pharmaceuticals, food additives and food products such as beer, wine, cheese and yogurt Microbial biomass production. Introduction to environmental biotechnology including waste water treatment, bioremediation and biominning. Biodegradation and its control. Product development, regulations and safety. Field trip(s) are an essential educational component of the course and are required. Credit will not be given for both BAE(BBS) 425 and BAE 525.

BAE 432 Agricultural and Environmental Safety and Health 3. Offered in Fall Only. Safety and health issues for agricultural and environmental occupations. Hazard recognition, injury and illness prevention, regulations, and safety and health management strategies for agricultural production, chemical handling, and waste management. Environmental factors which affect human health and safety.

BAE 435 Precision Agriculture Technology 3. Offered in Spring Only. Overview of technology available for implementation of a comprehensive precision agriculture program. Topics include computers, GPS, sensors, mechanized soil sampling, variable rate control system, yield monitors, and postharvest processing controls. Applications of precision agriculture in crop planning, tillage, planting, chemical applications, harvesting and postharvest processing. Credit may not be received for BAE/SSC 435 and BAE/SSC 555.

BAE 440 Geographic Information Systems in Production Agriculture 3. Offered in Spring Only. Prerequisite: SSC 341. Fundamentals of the global positioning system, geographic information systems, and site-specific management. Geospatially linked soil sampling strategies will be addressed as well as appropriate interpolation methods for point-sampled data. The course will cover variable rate fertilizer recommendation models and the technology necessary for variably applying fertilizer. Spatial measurement of crop yields.

BAE 442 Systems Approach to Agricultural and Environmental Issues 3. Offered in Spring Only. Prerequisite: ENG 331 or ENG 332 or ENG 333; Senior standing; Systems approach to complex agricultural and environmental issues and problematic situations including people's views. Multiple stages of soft systems approach: open inquiry into and description of issues, conceptual modeling, feasibility and implementation of changes. Individual project using systems approach to a complex issue in agriculture or the environment.

BAE 451 Engineering Design I 3. Offered in Fall Only. Prerequisite: BAE 202 and 3 of the following courses - BAE 315, 361, 401, 402, 422, 425, 471, 472, or 481. Design concepts of engineering problems; objectives, specifications, manufacturing, prior art and analysis. Oral and written exercises in reverse engineering, national and international standards, quality control, intellectual law and engineering ethics. Team projects from agricultural, biomedical, bioprocess and environmental engineering. Must be within 36 credit hours of completing the BE degree.

BAE 452 Engineering Design II 3. Offered in Spring Only. Prerequisite: BAE 451. Continuation of BAE 451; Project analysis, design, scheduling, construction, tests and reports. Teamwork and the function of engineering design in society.

BAE 462 Machinery Design and Applications 3. Offered in Spring Only. Prerequisite: BAE 361. Machinery design for effective use of energy and labor in agricultural production. Engine cycles, power transmission, hydraulics, traction, combined stresses, finite element analysis, computer-aided-engineering, and engineering economics. Machinery design of agricultural field equipment and other agricultural machinery systems.

BAE 471 Land Resources Environmental Engineering 3. Offered in Fall Only. Prerequisite: SSC 200, Corequisite: CE 382 or MAE 308. Hydrology and erosion principles. Designing structures and selecting practices to control land runoff, erosion, sediment pollution and flooding.

BAE 472 Irrigation and Drainage 3. Offered in Spring Only. Prerequisite: SSC 200, BAE 471. Design, management and evaluation of irrigation and drainage systems; concepts and processes of system design. Credit will not be given for both BAE 472 and BAE 572.
BCH 101 Introduction to Microbiology and Biochemistry Laboratory Practices 3. Offered in Spring Only. Curricular bridge between high school and college for high school and transitional students. A "hands on" introduction to fundamentals in Microbiology and Biochemistry. Bacterial isolation, identification and growth using aseptic technique, microscopy, and metabolic analysis. Experiments with DNA isolation and analysis, protein isolation, and purification, and enzyme kinetics. Lectures and readings on background, theory and applications of these techniques. Field trips to university and industry research laboratories. This course is part of the Summer College in Biotechnology and Life Sciences (SCIBLS) as well as other pre-college, transitional and early-college programs and is offered as a 4 week intensive course. Applicants should have completed high school courses in biology and chemistry. Students must have completed no more than 30 credit hours. Departmental approval is required for current NCSU students.

BCH 220 Role of Biotechnology in Society 2. Offered in Summer. Prerequisite: BIO 181, CH 101. Biotechnology and Society is an introductory science course that takes a semi-technical look at the emerging role of biotechnology in human society. Expectations are that students will gain an appreciation for biotechnology, the ability to understand how biotechnology works. Offered only in Poland through Study Abroad (4-week course). Departmental approval required.

BCH 351 General Biochemistry 4. Offered in Fall Spring Summer. This course is an introduction to the basic principles of biochemistry. It emphasizes biochemical structures, properties, and functions, including enzyme kinetics and major metabolic processes. It discusses amino acids and proteins, carbohydrates, lipids, and nucleic acids. The pathways discussed will include glycolysis, gluconeogenesis, and the Krebs cycle. It can serve as a prerequisite for BCH 452 with permission of the department. This course is designed for those students who are not majoring in Biochemistry and do not require a more comprehensive introduction to biochemistry. It is not intended for graduate students. Credit is not allowed for both BCH 351 and BCH 451.

BCH 451 Principles of Biochemistry 4. Offered in Fall Spring Summer. Prerequisite: CH 223. Introduction to the fundamental principles of biochemistry. Emphasis on biochemical structures, properties, functions and interactions, including enzyme kinetics and central pathways of metabolism.


BCH 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and academic dean prior to the experience.

BCH 493 Special Problems in Biochemistry 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

BCH 495 Special Topics in Biochemistry 1-5. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular BCH departmental courses or for new BCH courses on a trial basis.

BIOMANUFACTURING

BEC 180 Introduction to Applied Bioprocessing 3. Offered in Summer. Curricular bridge between high school and college for high school and transitional students. Fundamental cell biology concepts pertaining to biomanufacturing. Students gain an understanding of the basic principles of microbiology, culture preparation, physiology, and genetics of microbial cell cultures. Team-based decisions, collaborations and consideration of multiple perspectives are emphasized. Practical experience in laboratory and culture techniques used in biomanufacturing. Transportation will be provided for field trips. This course is part of the Summer College in Biotechnology and Life Sciences (SCIBLS), as well as other pre-college, transitional and early-college programs. Suitable for students with less than 30 credit hours.

BEC 220 Introduction to Drug Development and Careers in Biomanufacturing 1. Offered in Fall and Spring. Prerequisite: BIO 183 and Corequisite of CH 221. Introduction to discovery and development of biopharmaceuticals, industrial enzymes, food ingredients and biologics. Discussion of majors that prepare students for positions in the biotechnology industry. Lectures from staff and from professionals in the biotechnology industry focus on drug development, biopharmaceutical process development, design of biomanufacturing facilities, overview of methods used for manufacturing biopharmaceuticals, drug and enzyme purification, formulation, as well as careers in FDA compliance documentation related to manufacturing products using microbial biotechnology.

BEC 320 Fundamentals of Microbial Cell Culture 2. Offered in Fall Spring Summer. Prerequisite: BIO 183. This is a half-semester course. This introductory module addresses fundamental cell biology concepts and enables students to gain an understanding of the basic principles of microbiology, culture preparation, physiology and genetics of microbial cell cultures. The lab portion of the course provides students with practical experience in basic laboratory and culture techniques. Students who have completed MB 352 may not take this course for credit.

BEC 330 Principles and Applications of Bioseparations 2. Offered in Fall and Spring. Prerequisite: CH 221. Objectives, strategies, and approaches for recovery and purification of biomolecules, especially recombinant proteins. Description of common purification equipment, processes and materials used for cell lysis, precipitation, flocculation, membrane filtration, column chromatography, and centrifugation. Laboratories provide students with exposure to various techniques and the parameters that control protein isolation and purification of a recombinant protein. This is a half-semester course. Students who have completed BIT(CHE) 464 may not complete this course for credit.

BEC 420 Fundamentals of Microbial Cell Biotransformations 2. Offered in Fall and Spring. Prerequisite: MB 352 OR Corequisite of BEC(MB) 320. This is a half-semester course. Basic microbial cell culture theory and practice: cell physiology, mass balances, and metabolic control as seen in a dynamic bioreactor process to be scalable, consistent, and robust. The lab portion of the course provides students with hands-on experience in culture techniques using bioreactors. Students who have completed BIT(CHE) 463 may not take BEC (MB) 420 for credit.

BEC 436 Introduction to Downstream Process Development 2. Offered in Fall Spring Summer. Prerequisite: MB 352 OR graduate standing. Objectives, strategies, and approaches for recovery and purification of biomolecules, especially recombinant proteins. Laboratories in the intermediate-scale pilot plant provide students with exposure to various unit operations and the parameters that control protein isolation and purification of a recombinant protein produced by an E. coli. This is a half-semester course. Students who have completed BEC 436 may not take BEC 536 for credit.

BEC 440 Expression Systems in Biomanufacturing 3. Offered in Fall Only. Prerequisite: BEC(MB) 320 or MB 351/552. Introduction to various expression systems, their advantages and disadvantages. Basic techniques in DNA cloning, cell transformation and optimization of protein expression. Selection, archiving and characterization of production line. Media development and parameters affecting expression and yield. The lab portion of the course provides students with practical experience in DNA cloning and protein expression techniques in diverse expression systems.

BEC 442 Insect Cells Protein Expression 2. Offered in Spring Only. Prerequisite: BEC(MB) 320 or BIT410/510. Introduction to the insect cells expression system, and its advantages and disadvantages. Introduction to expression of recombinant proteins with baculovirus. Outline of antibody and antibody fragments as well as other complex proteins. Basic techniques used for growth and maintenance of insect cell cultures. The lab portion of the course provides students with practical experience in protein expression techniques in the insect cells expression system. This is a half-semester course. Students who have completed BEC 442 may not take BEC 542 for credit.

BEC 462 Fundamentals of Bio-Nanotechnology 3. Offered in Fall Only. Concepts of nanotechnology are applied in the synthesis, characterization, recognition and application of biomaterials on the
nanoscale. Emphasis will be given to hands-on experience with nanostructured biomaterials; students will also be familiarized with the potential impact of these materials on different aspects of society and potential hazards associated with their preparation and application.

BEC 463 Fermentation of Recombinant Microorganisms 2. Offered in Fall and Spring. Prerequisite: CH 223 and Corequisite: (BEC 320 or BIT 410 or BCH 452 or MB 352). Introduction to fermentation and protein chemistry. Theory behind laboratory techniques and overview of industrial scale expression systems. Laboratory sessions involve use of microbial expression vectors, fermentation systems, and large-scale purification of recombinant protein. Half semester course, first part.

BEC 475 Global Regulatory Affairs for Medical Products 3. Offered in Spring Only. This lecture-based course introduces students to the quality systems used to meet the regulatory requirements for developing, testing, manufacturing, and selling medical products in the global marketplace. It provides a general background for those going into the medical products field, but is especially useful to students preparing for a career in the Regulatory Affairs or Quality Assurance Department within a pharmaceutical, biomanufacturing, or medical device company.

BEC 480 cGMP Fermentation Operations 2. Offered in Fall and Spring. Corequisite: BBS/BEC 426. Application of microbial fermentation techniques at production scale and evaluation of the inherent issues resulting from the integration of microbial fermentation unit operations, scale-up/production, and current Good Manufacturing Practice (cGMP) compliance. Lectures prepare students for pilot-scale laboratory experiences in media preparation, bioreactor operation, process utilities, and manufacturing quality systems that simulate microbial cell growth and product expression in a commercial cGMP facility. This is a half-semester course. Students who have completed BEC 480 may not take BEC 580 for credit.

BEC 483 Tissue Engineering Technologies 2. Offered in Fall Only. Prerequisite: BIT 466 or permission of instructor. In this half-semester laboratory module, students will gain practical experience with two key elements of tissue engineering: tissue building and angiogenesis. Using advanced culture techniques, students will construct a complex living tissue that closely resembles its natural counterpart, then assess its ability to support ingrowth of capillaries (angiogenesis). The effects of different biomaterials and angiogenic factors will be evaluated. The engineered tissue will be embedded, sectioned and stained for histological analysis.

BEC 485 cGMP Downstream Operations 2. Offered in Fall and Spring. Corequisite: BEC 436. Application of downstream bioprocessing techniques at production scale and evaluation of the inherent issues resulting from the integration of recovery and purification unit operations, scale-up/production issues, and current Good Manufacturing Practice (cGMP) compliance. Lectures prepare students for pilot-scale laboratory experiences in cell removal, cell disruption, purification, and manufacturing quality systems that simulate downstream bioprocessing in a commercial cGMP facility. This is a half-semester course. Students who have completed BEC 485 may not take BEC 585 for credit.

BEC 488 Animal Cell Culture Engineering 2. Offered in Spring Only. Design and operation of animal cell culture bioreactors for therapeutic protein production. Topics include: batch, fed-batch and perfusion bioreactors, agitation and aeration for mixing and oxygen mass transfer, bioreactor monitoring and control, optimizing bioreactor performance, and single-use (disposal) bioreactors. This is a half-semester course.

BEC 495 Special Topics in Biomanufacturing 1-4. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis. Departmental approval required.

BEC 497 Biomanufacturing Research Projects 1-3. Offered in Fall Spring Summer. Introduction to biomanufacturing research through experimental, theoretical, and literature studies. Oral and written presentation of reports. Departmental approval required.

BIO 105 Biology in the Modern World 3. Principles and concepts of biology including cellular structure and function, metabolism and energy transformation, homeostasis, reproduction, heredity, diversity of life, ecology, evolution and animal behavior. Emphasis on human affairs and human examples. For non-science students. Students may not receive credit for both BIO 105 and (BIO 115 or BIO 181 or BIO 183).

BIO 106 Biology in the Modern World Laboratory 1. Offered in Fall Spring Summer. Corequisite: BIO 105. Laboratory experience in biological principles to complement BIO 105. For non-science students. Students may not receive credit for both BIO 106 and (BIO 116, BIO 181 or BIO 183).

BIO 115 Issues in Biology 3. Offered in Fall and Spring. Corequisites: BIO 116. Concepts in biology taught from the perspective of civically engaging issues or problems. Themes and topics of wide interest, such as global warming, stem cells and cloning, antibiotic resistance, evolution, and human health. Lecture and the corresponding laboratory are designed to deepen an appreciation for the connections between science and "real-world" issues. For non-science majors. Students cannot receive credit for both BIO 115 and BIO105 or BIO181 or BIO 183.

BIO 116 Issues in Biology Lab 1. Offered in Fall and Spring. Corequisites: BIO 115. Corresponding laboratory for Issues in Biology (BIO 115). Activities and experimentation with biological concepts, designed to complement BIO 115. For non-science majors. Students cannot receive credit for both BIO 116 and BIO 106 or BIO 181 or BIO 183.

BIO 140 Survey of Animal Diversity 3. Classification and phylogeny of animals; patterns of diversification in body design and the environment; study of selected animal assemblages. Students may not receive credit for both BIO 140 and BIO 350 or ZO 150.

BIO 141 Animal Diversity Laboratory 1. Prerequisite: BIO 140. Observation of living animals, dissections of preserved specimens, and microscopy; emphasis on classification of animals, patterns of diversification in body design, and relationship between body design and the environment.

BIO 181 Introductory Biology: Ecology, Evolution, and Biodiversity 4. Emphasis on interactions of organisms with their environments, evolutionary change and role of natural selection in the evolution of life forms, biological diversity in the context of form and function of organisms, and on critical thinking, problem-solving, and effective communication. Cannot receive credit for both BIO 181 and (BIO 105 or BIO 106 or BIO 115 or BIO 116).

BIO 183 Introductory Biology: Cellular and Molecular Biology 4. Prerequisite: BIO 181 or (CH 101 and sophomore standing). Basic
concepts and principles of molecular, cellular, and developmental biology. Emphasis will be on the physical basis of life, the cell as the fundamental unit of life, the mechanisms involved in the development of multicellular organisms and on critical thinking, problem solving, experimental design, and effective communication. Cannot receive credit for both BIO 183 and (BIO 105 or BIO 106 or BIO 115 or BIO 116).

BIO 212  Basic Human Anatomy and Physiology 4. Offered in Fall and Summer. Prerequisite: BIO 183 or ZO 160. Major emphasis on structure and function of the muscular, skeletal, circulatory and nervous systems of humans. Credit in both BIO 212 and BIO 301 or BIO 302 is not allowed.

BIO 220  Marine Biology 3. Offered in Spring Only. Prerequisite: MEA 200 or BIO 181. Introduction to marine plants and animals, their adaptations to life in the sea and ecological interactions in selected marine environments (e.g. coral reefs, deep sea, salt marshes). Interactions of man with the sea: food from the seas, biology of diving. Optional trip.

BIO 221  Conservation of Natural Resources 3. Offered in Fall Spring Summer. Importance of natural resources and their role in human environment. Physical, biological and ecological principles underlying sustainability of natural resources with attention to consequences of human impacts while meeting society needs.

BIO 233  Human-Animal Interactions 3. Offered in Fall Only. This course is designed to explore the relationship humans share with other animals and nature. We will study the early history of animal domestication and the influence of animals on human culture and religion. We will also explore our relationships to animals as pets, food, research subjects, and wildlife. All subjects will be covered through interaction with guest speaker, assigned readings, case studies, and class discussion.

BIO 250  Animal Anatomy and Physiology 4. Prerequisite: BIO 183 or ZO 160. Roles of physical laws, environmental challenges, and evolutionary history in shaping animal structure and function. Selected examples from invertebrates and vertebrates. Laboratory in anatomy and physiology, hypothesis generation and testing and data analysis and presentation.

BIO 295  Special Topics in Biology 1-4. Experimental offerings in Biology.

BIO 315  General Parasitology 3. Offered in Spring Only. Prerequisite: BIO 181 or BIO 183 or ZO 150 or ZO 160. General principles of parasitic symbiosis. Emphasis on life cycles, epidemiology, and pathology of major parasites of humans and domestic animals.

BIO 317  Primate Ecology and Evolution 3. Offered in Spring Only. Prerequisite: BIO 181 & BIO 183, and one of the following courses: ANT 251, BIO 212, BIO 250, BIO/PB 330, BIO 350, BIO/PB 360, BIO 410, BIO 422, BIO 424, or BIO 488. A comprehensive survey of the behavior, evolution, and ecology of nonhuman primates. Special emphasis will be placed in the evolution of cognitive abilities, social systems, and behavioral patterns that are unique to primates, including the evolution of language. Topics include primate taxonomy, evolution of the extant primates, geographic distribution, social behavior, reproductive behavior and strategies, parental behavior, communication, and cognitive. Classes will consist of interactive lectures, films, and class discussions.

BIO 330  Evolutionary Biology 3. Offered in Fall Only. Prerequisite: BIO 181, BIO 183. Principles and patterns of organic evolution. Topics will include the origin of life, patterns of genetic variation and selection, natural selection, and the formation of species, the relationship between micro and macroevolution, and the importance of evolution to humans and medicine.

BIO 333  Captive Animal Biology 3. Offered in Spring Only. This course serves to introduce interested students to historical and current captive animal conservation efforts. We will discuss in detail a variety of issues essential to the management of wild animals in a captive setting including ethics, nutrition, reproduction, behavior, and population management.

BIO 350  Animal Phylogeny and Diversity 4. Prerequisite: BIO 181 and Sophomore standing. Phylogenetic history and adaptive radiation of animals; contrast of environmental determinants of biodiversity in tropical and polar regions; modern approaches to phylogeny; role of humans in influencing biodiversity. Students may not receive credit for both BIO 350 and BIO 140 or ZO 150.

BIO 353  Wildlife Management 3. Offered in Fall Only. Prerequisite: BIO 181 or ZO 150. Historical development of Wildlife Management from anecdotal, observational practices to modern, scientific approaches used around the world. Principles of population analysis, management, protection and conservation of animals, particularly those of conservation, aesthetic, sport or food values in urban, rural and wilderness areas. Ethics of hunting and trapping. Contradictory objectives challenging modern wildlife managers.

BIO 360  Ecology 4. Offered in Fall Spring Summer. Prerequisite: BIO 181. The science of ecology, including factors which control distribution and population dynamics of organisms, structure and function of biological communities, and energy flow and nutrient cycling in ecosystems; contrasts among the major biomes; and principles governing ecological responses to global climatic and other environmental changes.

BIO 361  Developmental Biology 3. Offered in Spring Only. Prerequisite: BIO 183 or ZO 160. In this course students will discover the amazing journey that cells must take to get from an egg to an embryo, form a mature adult, and reproduce in order to continue the life cycle. Students will relate science to everyday life using developmental biology as a forum to integrate many aspects of biology from the molecules in single cells to the complete organism and how it is influenced by evolution and the environment.

BIO 370  Developmental Anatomy of the Vertebrates 3. Offered in Spring Only. Prerequisite: BIO 181 or BIO 140 or ZO 150. An integrated study of the functional anatomy, phylogeny, and embryonic development of organ systems in vertebrate animals.

BIO 375  Developmental Anatomy Laboratory 2. Offered in Spring Only. Prerequisite: BIO 181 or BIO 140 or ZO 150. A hands-on study of embryonic development and organ systems in vertebrate animals, utilizing microscopic examination of living and preserved embryos, demonstrations of skeletons and mammalian organs, and dissections of preserved shark, salamander, and mink.

BIO 402  Invertebrate Zoology 2. Offered in Spring Only. Prerequisite: (BIO 181 or ZO 150) and (BIO 183 or ZO 160). Survey of invertebrate phyla, excluding the Protista, emphasizing their functional biology.

BIO 403  Invertebrate Zoology Laboratory 2. Offered in Spring Only. Corequisite: BIO 402. Examination of living and preserved invertebrates to study their distinguishing characteristics and to observe anatomical modifications for function.
BIO 405 Functional Histology 3. Offered in Summer. Prerequisite: BIO 183 or ZO 160. Offered only as a distance education course via the internet. Functional Histology describes the cellular structure of tissues and organs. Human organs are emphasized, with brief consideration given to variation in other mammals. Tissue and organ structure is related to function, including examples of malfunction (histopathology). The course is especially appropriate for students planning a career in veterinary science, medicine, or allied health fields. Credit not allowed for both ZO 371 and ZO 405. Offered by distance education only.

BIO 410 Introduction to Animal Behavior 3. Offered in Fall Only. Prerequisite: BIO 181 or ZO 260 or ZO 150. Studies of animal behavior in vertebrates and invertebrates including physiological mechanisms and adaptive significance.

BIO 412 Human Anatomy 4. Offered in Spring Only. Prerequisite: (BIO 183 or BIO 212), and Junior or Senior standing. Study of the structure of the human body, utilizing a systems approach. Focus on gross anatomy, with reference to microanatomy and embryonic development as needed to understand gross morphology. Emphasis on the interrelationship of structure and function. Laboratory study facilitated through use of human skeletons, anatomical models, and electronic media as well as dissection of mammalian systems and selected organs.

BIO 414 Cell Biology 3. Prerequisite: (BIO 183 or ZO 160) and CH 221. The chemical and physical bases of cellular structure and function with emphasis on methods and interpretations.

BIO 419 Limnology 4. Offered in Fall Only. Prerequisite: BIO 260 or PB 360. Structure and function of lakes and ponds, including physical, chemical and biological controls of productivity and species composition of aquatic plants and animals, and effects of pollution on water quality. One local weekend field trip is required. Credit in both ZO 419 and ZO 519 is not allowed.

BIO 420 Introduction to Fisheries Science 3. Offered in Spring Only. Prerequisite: BIO 181 or ZO 150, BIO 260 or PB 360. Role of fish in aquatic ecosystems, fish biology, fish ecology, fisheries management and conservation. Emphasis on aquatic ecosystems and food webs, life history and ecology of important sport and commercial fishes, population and community dynamics, and theory and practice of fisheries management and conservation. Case studies from freshwater, estuarine and marine systems.

BIO 421 Advanced Human Anatomy and Physiology 3. Offered in Fall Spring Summer. Prerequisite: (BIO 230 or BIO 212 or BIO 412) and CH 223. A comprehensive survey of the processes involved in the function of specialized cells, tissues and organ systems. Emphasis on basic concepts with orientation toward mammalian and human systems.

BIO 422 Biological Clocks 3. Offered in Spring Only. Prerequisite: BIO 250. The anatomy, physiology, and development of biological clocks in a variety of organisms, including humans. Credit in both BIO 422 and ZO 522 is not allowed.


BIO 424 Endocrinology 3. Prerequisite: BIO 250. This course will explore the function of hormones and bioactive compounds in regulating animal physiology and homeostasis. Topics will include a study of hormones and their mechanism of actions in regulating various biological processes including development and growth, reproduction, feeding, digestion and metabolism; ion and water balance; stress and immunity; and sex determination. The methods used to study hormones and their physiological functions will also be addressed. 80% of enrollment is restricted to Biological Sciences and Zoology students with the remaining 20% open for all other majors.

BIO 425 General Entomology 3. Offered in Fall and Summer. Prerequisite: BIO 181 or BIO 140 or BIO 150. Explores the science of entomology by focusing on the basic principles of systematics, morphology, physiology, development, behavior, ecology, and control of insects. Field trips provide opportunities to collect insects and study their adaptations to a wide variety of natural environments.

BIO 426 Advanced Human Anatomy & Physiology Lab 1. Offered in Fall and Spring. Prerequisite: BIO 212 or BIO 250; Corequisite: BIO 421. A comprehensive laboratory course surveying the process involved in the function and structure of specialized cells, tissues, and organ systems. Emphasis will be on problem solving and critical thinking skills.

BIO 430 Fisheries and Wildlife Administration 3. Offered in Spring Only. Prerequisite: PS 201, PS 202; FW/BIO 420, FW/BIO 353. Describes and compares the administrative structures and programs of federal and state fish and wildlife agencies and develops an understanding of the basis on which these agencies function. Evaluates the interrelationships that fisheries-wildlife professionals, special interest groups, public agencies and legislative bodies play in resource management programs.

BIO 441 Biology of Fishes 3. Offered in Fall Only. Prerequisite: BIO 260 or PB 360. Behavior, evolution, physiology and ecology of fishes, emphasizing their adaptations for life in streams, lakes, and oceans.

BIO 442 Biology of Fishes Laboratory 1. Offered in Fall Only. Corequisite: BIO 441. Field and laboratory exercises with the common fish species and communities of North Carolina. Field trips to local streams and lakes plus weekend trips to coastal, estuarine, and mountain habitats.

BIO 449 Principles of Biological Oceanography 3. Offered in Fall Only. Biological productivity and trophic relationships in plankton, nekton and benthos; community ecology of selected habitats (estuaries, intertidal zones, coral reefs, deep sea); and adaptation of organisms to the marine environment. Credit is not allowed for both MEA/BIO 449 and MEA/BIO 549.

BIO 460 Field Ecology and Methods 4. Prerequisite: ST 311; BIO 260 or PB 360/365. Field Ecology and Methods will expose senior students with interests in Ecology and Evolution to the diverse field approaches used to address ecological questions. The course considers and implements a variety of field approaches ranging from microcosm experiments to global studies of patterns and diversity. Course is restricted to seniors.

BIO 488 Neurobiology 3. Offered in Fall Only. Prerequisite: BIO 250 or BIO 301/302 or BIO 212 or (BIO 183 and Junior or Senior standing). Overview of the neurosciences, with a focus on fundamental principles in the function, structure, and development of the nervous system. Topics include neuroanatomy, electrical signaling, synaptic transmission, sensory and motor systems, neural development, neural plasticity, and complex brain functions. Multiple levels of analysis, from molecular to behavioral, with an emphasis on the mammalian nervous system.
BIO 491 Seminar on Professional Development in Biological Sciences 1. Offered in Fall Only. Planning and analyzing strategies for professional development in the biological sciences utilizing discussion, guest lecturers, and field trips to nearby research laboratories and industrial plants. Intended primarily for juniors and seniors in anybiological discipline.

BIO 492 External Learning Experience 1-6. Offered in Fall and Spring. Learning experience in agriculture and life sciences within an academic framework with facilities and resources external to the campus. Contact and arrangements with prospective supervisors by the student. Prior approval by faculty advisor, prospective supervisor, and departmental teaching coordinator.

BIO 493 Special Problems in Biological Sciences 1-6. Offered in Fall and Spring. Learning experience in agriculture and life sciences within an academic framework with campus facilities and resources. Contact and arrangements with prospective supervisors by the student. Prior approval by faculty advisor, prospective supervisor, and department teaching coordinator.

BIO 495 Special Topics in Biology 1-6. Offered in Fall Spring Summer. Individualized study, under faculty supervision, of biological topics, and developmental course on a trial basis.

BIOTECHNOLOGY

BIT 100 Current Topics in Biotechnology 4. Offered in Spring Only. This course provides non-science majors as an opportunity to learn about current issues in biotechnology that play a role in our society. From alternative fuel sources to the ramifications of the elucidation of the human genome on health care issues, advances in biotechnology are constantly reshaping the world we live in. Students will give presentations and participate in discussions in the classroom, as well as be engaged in the laboratory on a variety of different topics in biotechnology that affect all our lives. This is offered as a 5 week summer course. Transportation to the field trips will be provided. Students in the course should have completed high school biology.

BIT 210 Phage Hunters 3. Offered in Fall Only. This course offers first-year students an opportunity for mentored research. Students will apply the scientific method to make novel discoveries. Students will isolate and characterize naturally-occurring bacteriophage (viruses that infect bacteria, but not humans) from the environment. They will present their data to each other, and the genome of one phage will be sequenced. Students have the option to continue in a second semester to annotate that genome, culminating in a submission to Genbank and a poster presentation. Students in the course are part of the National Genome Research Initiative funded by The Howard Hughes Medical Institute. Student should have had a high school biology course before taking this course.

BIT 211 Phage Genomics 2. Offered in Spring Only. Prerequisite: BIT/MB 210. This course offers first-year students an opportunity for mentored research. Student will apply the scientific method to make novel discoveries. Students will build on the work they began in BIT/MB 210. The novel phage isolated in the previous semester will undergo genome sequencing over winter break, and in this course students will learn to analyze and annotate the genome sequence. This semester will culminate in a submission to Genbank and a poster presentation. Students in the course are part of the national genome research initiative funded by the Howard Hughes Medical Institute.

BIT 295 Special Topics in Biotechnology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

BIT 410 Manipulation of Recombinant DNA 4. Offered in Fall and Spring. Prerequisite: BIO 183 or ZO/BIO 160 and CH 223 with a C- or better. Introduction to molecular biology and protein chemistry. Theory behind laboratory techniques and overview of cloning strategies starting from nucleic acid or protein sequence data. Laboratory sessions involve subcloning, preparation of competent cells, transformation, screening recombinant DNA by colony hybridization and PCR, SDS-PAGE of recombinant protein, affinity purification, and western blots.

BIT 461 Sequencing cDNA Libraries 2. Offered in Fall Only. Prerequisite: BIT 410 or BIT 510 or BCH 454. Basic techniques in automated DNA sequencing and robotics. Colony picking and ordering cDNA libraries, use of PCR to amplify insert DNA, and strategies for large-scale automated sequencing. Principles of database management for ordering and accessing sequencing information. Half semester course, first part.

BIT 462 Gene Expression Analysis: Microarrays 2. Offered in Fall Only. Prerequisite: BIT 410 or BIT 510. Microarray analysis is an evolving technique with its basis in the dynamic properties of the nucleic acid hybridization. We will review current theory, techniques, instrumentation, troubleshooting, analysis tools, and advanced protocols for microarray analysis. Students will have the opportunity to utilize skills learned during lecture in a laboratory environment and have access to exceptional instrumentation. At the conclusion of this course, students should feel comfortable with microarray experimental design, its tools, an analysis of generated data. This is a half-semester course. Student must register for both lecture and lab sections.

BIT 464 Protein Purification 2. Offered in Spring Only. Prerequisite: BIT 410 or BIT 510 or BCH 454. Comparison of several different chromatography techniques for protein purification. Construction of purification tables and SDS-and native-PAGE analysis. Cost-benefit analysis of industrial-scale procedures. Half semester course, second part.

BIT 465 Real-time PCR Techniques 2. Offered in Spring Only. Prerequisite: BIT 410 or BIT 510. Real-time PCR is an evolving technique with its basis in the dynamic properties of the polymerase chain reaction and fluorescence detection. We will review current real-time theory, techniques, machinery, troubleshooting, tools, and advanced protocols for sequence detection including SYBR green, TaqMan, Beacons, multiplexing, and single nucleotide polymorphism analysis. Students will have the opportunity to utilize skills learned during lecture in a laboratory environment. At the conclusion of this course, students should feel comfortable with real-time experimental design, its tools, and analysis of generated data. This is a half-semester course. Student must register for both lecture and lab sections.

BIT 466 Animal Cell Culture Techniques 2. Offered in Spring Only. Prerequisite: BIT 410 or BIT 510 or BCH 454. Introduction to animal cell culture techniques. Aspetic technique for vertebrate cell culture, media formulation, primary cell culture, long-term maintenance of cell lines, application of molecular techniques to in vitro situations. Half semester course, second part.

BIT 467 PCR and DNA Fingerprinting 2. Offered in Fall Only. Prerequisite: BIT 510. Introduction to polymerase chain reaction. Optimization of PCR reactions and primer design for DNA sequences using DNA databases available on the web. Laboratory sections include using rapid techniques for isolating and sequencing DNA from small amounts of sample and forensic identification of individuals using isolated human hairs. Credit is not allowed for both BIT 467 and BIT 567.
BIT 468 Genome Mapping. Offered in Spring Only. Prerequisite: BIT 410 or BIT 510 or BCH 454. Students will be introduced to basic techniques in genetic and physical mapping. The principles of DNA marker development, marker detection, genetic and physical mapping and DNA sequencing will be addressed from a practical view with an emphasis on agricultural applications. This is a half-semester course. Student must register for both lecture and lab sections.

BIT 470 Advanced Animal Cell Culture: Bioreactor Culture 2. Offered in Spring Only. Prerequisite: BIT 466 or BIT 566 or PO 566. Principles of scaling animal cell seed-stock from frozen storage to three liter culture. Students will learn to assemble and operate a three-liter bioreactor to produce antibodies, as well as assess final product quantity using antibody techniques. This is a half-semester course.

BIT 471 RNA Interference and Model Organisms 2. Offered in Fall Only. Prerequisite: BIT 410 or BIT 510 or BCH 454. Introduction and history of RNA interference technology. Principles, mechanism, and applications of RNA interference in model organisms. Laboratory sessions include RNA interference-mediated silencing of genes in plants, C. elegans, and mammalian cell culture. This is a half-semester course (8 weeks). Student may not earn credit for both BIT 471 and BIT 571.

BIT 473 Experimental Analysis of Protein-Protein Interactions 2. Offered in Fall and Spring. Prerequisite: BIT 410 or BCH 454. The interactions of proteins mediate numerous biological processes of cells. This course focuses on ways to identify and study protein-protein interactions, focusing on the advantages and limitations of each technique and how to apply the methods in a laboratory setting. In lab, students will perform a yeast two-hybrid experiment and a co-immunoprecipitation from proteins expressed in mammalian cell culture to confirm detected interactions. This a half-semester course.

BIT 474 Plant Genetic Engineering 2. Offered in Fall Only. Prerequisite: BIT 410 or BIT 510 or BCH 454 or PR 421. This course covers fundamental hands-on techniques and strategies in plant genetic engineering. Plants are major sources of food, fiber and fuel and provide model systems for both fundamental and applied research. Students will learn techniques for stable and transient transformation of plants and plant cell cultures and selection and detection of transgene expression. Additional topics covered will include methods to generate and screen for mutants, synthetic biology and applications of plant genetic engineering. This is a half-semester course.

BIT 476 Applied Bioinformatics 2. Offered in Fall Only. Prerequisite: BIT 410 or BCH 454 or GN 311. The haploid human genome occupies a total of just over 3 billion DNA base pairs. This information is not contained in books, but stored in electronic databases. Computational biology utilizes infer function by comparative analysis. This course is designed for life scientists from all fields to introduce them to the power of bioinformatics and enable them to access and utilize biological information in databases for their own research.

BIT 481 Plant Tissue Culture and Transformation 2. Offered in Spring Only. Basic techniques in plant tissue culture and transformation. Empirical approaches to techniques in plant tissue culture, designing transgenes for expression in specific plant cell organelles and tissues, use of reporter genes to optimize transformation, and troubleshooting transformation. Laboratory sessions provide hands-on experience with plant tissue culture and transformation. Use of reporter genes, fluorescence microscopy and digital imaging. Half semester course, first part.

BIT 492 External Learning Experience 1-6. Offered in Fall Spring Summer. A learning experience in the area of biotechnology within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, and the departmental teaching coordinator prior to the experience. Project must be approved by the Academic Coordinator or Program Director of the Biotechnology Program.

BIT 493 Special Problems in Biotechnology 1-6. Offered in Fall Spring Summer. A learning experience within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective mentor(s) must be initiated by student and approved by a faculty adviser, the prospective mentor, and the departmental teaching coordinator prior to the experience. Project must be approved by the Academic Coordinator or Program Director of the Biotechnology Program.

BIT 495 Special Topics in Biotechnology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

BME 201 Computer Methods in Biomedical Engineering 3. Offered in Spring Only. Students develop computer-based problem solving techniques using Excel and MATLAB to solve introductory problems in Biomedical Engineering. Emphasis is on developing solution algorithms, implementing these with spreadsheets and computer programming, and presenting results in a clear and concise manner. Students registered for BME 201 who fail to matriculate into BME will be dropped from the course.

BME 203 Introduction to the Materials Science of Biomaterials 3. Offered in Fall Only. Prerequisite: C- or better in CH 101, CH 102 and PY 205. This course introduces fundamental physical principles governing the structure, processing, properties and performance of metallic, ceramic and polymeric materials. Relationships are developed defining how mechanical, physical and chemical properties are controlled by microstructure and chemistry. Material failure modes are developed with an emphasis on biocompatibility and the applications/performance of materials in the human body. Basic aspects of material biocompatibility are presented, leading into studies of the current and future applications of biomaterials.

BME 204 Biomedical Measurements 3. Offered in Spring Only. This course will introduce students to modern topics in biomedical engineering and areas of emphasis in the biomedical engineering curriculum through the study and use of biomedical measurement tools. The course will include a lecture and a laboratory component.

BME 210 Biomedical Electronics 4. Offered in Spring Only. Prerequisite: MA 242, PY 208. For BME Majors only. Fundamentals of analog and digital circuit analysis and design as applied to biomedical instrumentation and measurement of biological potentials. Passive circuit components, node and mesh analysis, transient behavior, operational amplifiers, frequency response, analog filter design, diode, transistors, biological signal acquisition, binary math and logical operators, digital circuit design, circuit simulation tools and techniques. Laboratory exercises supplement the topics presented in class lectures.

BME 252 Biomedical Engineering Design and Manufacturing I 1. Offered in Fall and Spring. Students will learn the basic tools of design such as solid modeling by means of web-based tutorials and a series of small CAD project assignments. Students will learn to use current software for design, analysis, and computer-aided manufacturing (CAM). Students will also be introduced to modern manufacturing through the transition from CAD (Computer-Aided
Design) to CAM using modern rapid manufacturing equipment to carry out one small, well-defined design and manufacturing project.

BME 301 Human Physiology for Engineers 1. Offered in Fall Only. Prerequisite: BME 201 and either ZO 160 or BIO 183, BME Majors. Corequisite: BME 311. This course includes a quantitative approach to human physiology from the biomedical engineering perspective with an emphasis on understanding clinical and biomechanical aspects of physiology. The course includes study of the cardiovascular system, respiratory system, gastrointestinal system, renal system, endocrine system, and reproductive system. Topics include the physiological behavior of the cardiovascular, respiratory, gastrointestinal, renal, endocrine, and reproductive systems.

BME 302 Human Physiology for Engineers II 3. Offered in Spring Only. Prerequisite: BME 301. For BME Majors only. This course explores a quantitative approach to human physiology from the biomedical engineering perspective with an emphasis on systems physiology described using mechanical principles. Topics include the physiological and mechanical behavior of the blood vessels, lungs, kidney muscles and larynx. In the course lab exercises, students investigate mechanical properties of fluids, electrolyte exchange in dialysis, spirometry and blood pressure measurement among other topics. The course culminates with the design of a novel laboratory experiment.

BME 311 Linear Systems in Biomedical Engineering 3. Offered in Fall Only. Prerequisite: BME 201 and (ECE 331 or BME 210). Corequisite: BME 301 and MATH 341. For BME Majors only. Fundamentals of linear systems analysis as applied to problems in biomedical modeling and instrumentation. Properties of biotechnical systems and signals. Representation of continuous- and discrete-time signals and system response. Convolution. Fourier analysis in continuous and discrete domains. Laplace transform. Frequency response and its application in biomedical systems. Filter design. Circuit analogs to mechanical and thermodynamics systems and their applications in modeling biomedical systems. Applications in biomedical instrumentation. Students use MATLAB to simulate and analyze biomedical linear systems.

BME 312 Analog and Digital Circuits Laboratory 1. Offered in Fall Only. Prerequisite: ECE 331. BME Majors. Laboratory in analog and digital circuit analysis. Electrical safety; Exercises in resistor networks, capacitors and inductors, steady-state and dynamic circuit behavior, active circuits, amplifiers, logic gates, combinatorial and sequential circuits, elementary digital system design, A/D conversion, biomedical applications.

BME 342 Analytical and Experimental Methods for Biomedical Engineers 3. Offered in Spring Only. Prerequisite: BME 201; MATH 208 or CE 215; MATH 314 or CE 313; MA 341. Experimental and analytic tools are developed and used to solve problems in biomedical engineering. Techniques include kinematic analysis, closed form, and finite element analysis of stresses and strains in a body, and failure analysis. Transducers necessary for experimental analysis and testing are introduced. Students learn advanced software packages such as ANSYS and the dynamic analysis program ADAMS to assist in their analyses.

BME 352 Biomedical Engineering Design and Manufacturing II 2. Offered in Spring Only. Prerequisite: BME 252; BME majors. Students will be required to continue their use of the tools learned in Biomedical Design and Manufacturing I in the context of modern design practices and manufacturing processes. The organizational and project management tools of modern design will be introduced, and a technical discussion of a modern manufacturing technology will be introduced each week.


BME 422 Fundamentals of Biomedical Instrumentation 3. Offered in Spring Only. Prerequisite: BME 210 or BME 312. Fundamentals of biomedical instrument design and implementation. Sensing mechanisms, sensor microfabrication methods, sensor interfacing circuits, analog-to-digital conversion, biosignal capture and storage, embedded microprocessors, data compression methods, system integration and prototyping. Laboratory exercises using LabVIEW and MATLAB, supplement the topics presented in class lectures. Students build a sensor using cleanroom facilities in the BME department as part of a semester-long design project.

BME 425 Bioelectricity 3. Offered in Spring Only. Prerequisite: BME 302 or (ZO 421 and a course in electrical circuits). Quantitative analysis of excitable membranes and their signals, including plasma membrane characteristics, origin of electrical membrane potentials, action potentials, voltage clamp experiments, the Hodgkin-Huxley equations, propagation, subthreshold stimuli, extracellular fields, membrane biophysics, and electrophysiology of the heart. Design and development of an electrocardiogram analysis system.

BME 441 Biomechanics 3. Offered in Fall Only. Prerequisite: ZO 160 or BIO 183. BME 342; ST 370. Students study human body kinematics, force analysis of joints, and the structure and composition of biological materials. Emphasis is placed on the measurement of mechanical properties and the development and understanding of models of biological material mechanical behavior.

BME 443 Cardiovascular Biomechanics 3. Offered in Spring Only. Prerequisite: BME 302, BME 342 and (MAE 308 or CE 382). Engineering principles as applied to the cardiovascular system. Anatomy of cardiovascular system; form and function of blood and blood vessels. Electric analogs; continuum mechanics with derivation of equations of motion; and constitutive models of soft tissue mechanics, with attention to normal, diseased, and adaptive processes. Programming project required. Credit is not allowed for both BME 443 and BME 543.

BME 451 Biomedical Engineering Senior Design I 3. Offered in Fall Only. Prerequisite: BME 302, BME 352, and either ENG 331 or ENG 333; and completion of two of the suggested BME electives for their area of emphasis - BME majors. Design concepts of engineering problems: objectives, specifications, manufacturing, prior art, and analysis. Oral and written exercises in reverse engineering. Lectures in national and international standards, quality control, intellectual property law, and engineering ethics. Team projects to design, build, and deliver a prototype device to aid a disabled person or other appropriate biomedical engineering project that provides an opportunity for real world engineering design and community outreach.

BME 452 Biomedical Engineering Senior Design II 3. Offered in Spring Only. Prerequisite: BME 451, BME Majors. Continuation of BME 451. Project analysis, design, scheduling, construction, and testing. Advanced written and oral technical communication. Teamwork and the function of engineering design in society. Major team project with a biomedical engineering theme.

BME 466 Polymeric Biomaterials Engineering 3. Offered in Fall Only. Prerequisite: PY 208 and (TE 200 or CH 220 or CH 222).

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221) and (MAE 206 or CE 214). In-depth study of the engineering design of biomedical polymers and implants. Polymeric biomaterials, including polymer synthesis and structure, polymer properties as related to designing orthopedic and vascular grafts. Designing textile products as biomaterials including surface modification and characterization techniques. Biodegradable polymers.

BME 467 Mechanics of Tissues & Implants Requirements 3. Offered in Spring Only. Prerequisite: (ZO 160 or BIO 183) and (MAE 314 or CE 313). Application of engineering and biological principles to understand the structure and performance of tendons, ligaments, skin, and bone; bone mechanics; viscoelasticity of soft biological tissues; models of soft biological tissues; mechanics of skeletal muscle; and tissue-derived devices as well as interfaces between native tissues and synthetic devices.

BME 480 Biomedical Microcontroller Applications 3. Offered in Fall Only. Prerequisite: BME 422. BME Majors only. Overview of microcontroller-based systems, including applications, architecture, number systems, and languages. Students gain experience using a PIC-based microcontroller to input information from a user and output information using LEDs and LCD displays. Student will learn capabilities of the PIC through in class exercises and weekly programming assignments. Both assembly language and PIC-based C are used. Students will develop a PIC-based heart rate monitor and work in pairs on a BME-related project of their choice.

BME 483 Tissue Engineering Technologies 2. Offered in Fall Only. Prerequisite: BIT 466 or permission of instructor. In this half-semester laboratory module, students will gain practical experience with two key elements of tissue engineering: tissue building and angiogenesis. Using advanced culture techniques, students will construct a complex living tissue that closely resembles its natural counterpart, then assess its ability to support ingrowth of capillaries (angiogenesis). The effects of different biomaterials and angiogenic factors will be evaluated. The engineered tissue will be embedded, sectioned and stained for histological analysis.

BME 484 Tissue Engineering Fundamentals 3. Offered in Spring Only. Prerequisite: (ZO 160 or BIO 183), CH 221, and (MAE 301 or MSE 301) or CHE 315 or (TE 303). This course covers essential concepts of organ and tissue design and engineering using living components, including cell-based systems and cells/tissues in combination with biomaterials, synthetic materials and/or devices. Topics include: In vivo tissue structure and function; Isolation and culture of primary cells and stem cells; Principles of cellular differentiation; Mass transport processes in cell culture systems; Design, production and seeding of scaffolds for 3D culture; Design of bioreactors to support high-density cell growth; State-of-the-art engineered tissue systems; Clinical translation; and Ethics.

BME 495 Special Topics in Biomedical Engineering 1-4. Offered in Fall Spring Summer. Offered as needed for presenting material not normally available in regular BME Department courses or for new BME courses on a trial basis.

BME 498 Undergraduate Research in Biomedical Engineering 3. Offered in Fall Spring Summer. Opportunity for hands-on faculty mentored research project in biomedical engineering. Course may be a stand-alone project completed in one semester/summer or serve as part of a two-semester project. Approved plan of work required with significant independent research culminating in a final paper and presentation at the NC State Undergraduate Research Symposium or other appropriate venue. Students must identify an advisor from within the BME faculty with whom to work on a regular basis. The advisor must approve the student prior to the student registering for the course. The BME Undergraduate Coordinator must approve the use of the course as a restricted elective for the BME degree. Departmental Approval Required.

BUS 225 Personal Finance 3. Offered in Fall and Spring. Economic and financial strategies used to accumulate, manage and protect personal assets. Emphasizing income generation, expense reduction, investment selection, and wealth creation to meet future needs and goals. Topics include investing (mutual funds, stocks, etc.), annuities, deferred savings, insurance, retirement planning, estate planning, and real estate finance.

BUS 295 Special Topics in Business Management 1-6. Experimental course development. Special topics in Business Management at the introductory level.

BUS 305 Legal and Regulatory Environment 3. Offered in Fall and Spring. Introduction to contract, tort, and agency law, the judicial system, common law, statutory law, and constitutional law. Review and discussion of the major legal and regulatory issues affecting business including ethics, fiduciary duty, white collar crime, dispute resolution, intellectual property, international, and product safety laws.

BUS 320 Financial Management 3. Offered in Fall and Spring. Prerequisite: ACC 210 and EC 201 or ARE 201 or EC 205; College of Management Majors must have passed Software Applications Proficiency Requirement. Financial decision making by businesses, including capital structure and dividend decisions, capital budgeting and working capital management. Basic financial concepts are covered such as risk and return measurement, portfolio theory and the time value of money.

BUS 340 Information Systems Management 3. Offered in Fall and Spring. Prerequisite: M110. Fundamentals of information systems development and use in organizational setting. Information systems (IS), concepts, hardware, software, telecommunications, database management. IS development, applications and management in telecommunications, database management, various business processes, global issues, security and ethical challenges.

BUS 350 Economics and Business Statistics 3. Offered in Fall Spring Summer. Prerequisite: MA 114; College of Management Majors must have passed Software Applications Proficiency Requirement. Introduction to statistics applied to management, accounting, and economic problems. Emphasis on statistical estimation, inference, simple and multiple regression, and analysis of variance. Use of computers to apply statistical methods to problems encountered in management and economics.

BUS 360 Marketing Methods 3. Offered in Fall and Spring. Prerequisite: BUS 201, Sophomore standing. College of Management Majors must have passed Software Applications Proficiency Requirement. Examination of decisions affecting marketing of goods and services in consumer, industrial and international markets. Emphasis on the role of marketing in a managerial context. Areas studied include: the activities of marketing research, identification of marketing opportunities, and the development of marketing mix strategies including the decisions concerning pricing, distribution, promotion and product design.

BUS 370 Operations Management 3. Offered in Fall and Spring. Concepts in planning, controlling, and managing the operations function of manufacturing and service firms. Topics include operations strategy, process choice decisions, forecasting, production planning and control, and trends in operations management. Common tools for informed decision-making in these areas.
BUS 406 Sports Law 3. Offered in Fall Only. Fundamental principles of law, especially tort and contract law, applied to sports situations. Analysis of liability of sports personnel in various roles including participant, coach, promoter, trainer and official. Analysis of common law court decisions in sports contexts as well as key state and federal statutory legislation such as civil rights and antitrust.


BUS 422 Investments and Portfolio Management 3. Offered in Fall and Spring. Prerequisite: BUS 320 and (BUS/ST 350, or ST 302, or ST 311, or ST 361, or ST 370, or ST 372). Analysis of the investment process, dichotomized into security analysis and portfolio management. Background information on financial assets, securities markets, and risk-return concepts. Analysis of valuation theory and techniques, modern portfolio theory and portfolio performance.

BUS 425 Advanced Personal Financial Management 3. Offered in Fall and Spring. Prerequisite: BUS 320. Detailed economic, financial and legal analysis of risk management, retirement planning, nontraditional investments, estate planning. Strong emphasis on professional financial planning for those interested in personal finance as a career. Directly applicable for needs of small business.

BUS 426 International Financial Management 3. Offered in Spring Only. Prerequisite: BUS 320 and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372). Foreign exchange markets and their implications for direct and portfolio investment abroad. International capital markets. Multinational company exchange rate exposure measurement and management. Techniques and instruments of financing international trade and investment. Multinational capital budgeting and capital cost measurement. Techniques of international cash management. Credit for both BUS 426 and EC 449 not allowed.

BUS 440 Database Management 3. Prerequisite: BUS 340. The fundamentals of database management within business applications. Data structures, user requirements, structured query language, query by example, application development, user interface design.

BUS 441 Business Data Communications and Networking 3. Offered in Fall and Spring. Prerequisite: BUS 340. The fundamentals of computer networking and the use of computer networks in business applications. Client-server networks, architecture, network hardware and software, key issues in network management, network security, and the fundamentals of telecommunications.

BUS 442 Information Systems Development 3. Offered in Fall and Spring. Prerequisite: BUS 440. Concepts and skills necessary for developing information systems to aid in managerial decisions. Hands-on experience with development theory and concepts; object-oriented design concepts, graphical user interface design concepts, algorithm design concepts, and data structures.

BUS 443 Decision Support Systems 3. Prerequisite: BUS 340. This is an introductory course in designing and building Decision Support Systems (DSS) for business applications. The course is directed to business school students seeking a career with a company that is a user of technology or is a member of a technology driven industry.

BUS 444 Systems Analysis and Design 3. Prerequisite: BUS 340. Overview of methodical approaches to developing information systems throughout the systems analysis, design and implementation processes. Topics include SDLC, project management, feasibility studies, requirements analysis, etc.

BUS 449 Information Technology Capstone 3. Offered in Spring Only. Corequisite: BUS 442. This is a completely project-oriented course. Students will work on real applications for national or local firm(s) to solve “live” IT problems. Students will work in teams to develop client deliverables and present their final work to an appropriate industry-based management team. Field trips and/or outside class activities (including client/consultant work) are a major part of this course. Students who are unable to participate in these types of events should not enroll in this course.

BUS 455 Quantitative Methods for Management 3. Offered in Spring Only. Prerequisite: (EC 201 or ARE 201) and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372). Formulation and use of quantitative techniques for analyzing management problems. Linear programming, decision making under uncertainty and forecasting methods applied to problems in operations management, marketing, finance, human resource management, accounting, other areas. Use of computer software.

BUS 461 Services Marketing 3. Prerequisite: BUS 360. This course focuses on the unique challenges of managing services and delivering quality service to customers. The attraction, retention, and building of strong customer relationships through service quality and customer satisfaction is at the heart of the course content.

BUS 462 Marketing Research 3. Offered in Fall and Spring. Prerequisite: BUS 360 and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372). The use, collection, organization and analysis of information pertinent to marketing decisions. Use of qualitative and quantitative data in the solution of specific marketing problems.

BUS 464 International Marketing 3. Offered in Spring Only. Prerequisite: BUS 360. Explores moving from a national marketing approach to a global marketing strategy, and discusses competitive advantages and challenges in making the transition. Both traditional countries of Western Europe and emerging markets will be examined. Students will analyze culture considerations when evaluating the impact on local business strategies. In addition to learning the impact on the world’s economy through globalization, emphasis will also be placed on developing necessary professional skills.

BUS 465 Integrated Marketing Communications Management 3. Offered in Fall and Spring. Prerequisite: BUS 360. Development of marketing communication theory and exploration of integrated marketing communication (IMC) practice. Topics include: IMC planning, management and budgeting; IMC strategy development and execution; media strategy and research; advertising research; ethical and legal issues; creativity; IMC ideation, campaign development; and campaign presentation. This is partially web-based course.

BUS 466 Personal Selling 3. Offered in Fall and Spring. Prerequisite: BUS 360. Revolves around the art of people-to-people interaction, which applies not only to the business-to-business sales environment but is also applicable to other professions. The selling process will be examined along with activities necessary to be successful in sales. With a common thread of developing and nurturing relationships, students will examine building partnerships, implications of ethical and legal issues, adapting the approach to the situation and identifying social styles with associated behaviors. Attention will also be focused on the steps involved in the sales cycle and how to be successful in their execution.
BUS 467 Product and Brand Management 3. Prerequisite: BUS 360. Provides an in-depth understanding of marketing planning and implementation involved in product and brand management. The course places emphasis on developing specific marketing strategies to support the creation and launch of new products and to successfully manage existing products and brands.

BUS 468 Marketing Strategy 3. Prerequisite: BUS 360. This course is designed to build on the core marketing principles you learned in your introductory marketing course and to enhance your understanding of their strategic implications.

BUS 469 Integrated Marketing Communication Project 3. Offered in Spring Only. Prerequisite: BUS 360 and either BUS 462 or BUS 465. Development of an Integrated Marketing Communications (IMC) project, including marketing research, marketing and IMC planning, media planning, budgeting, creative strategy development, creative production, plansbook writing and final competitive presentation to marketing communications professionals.

BUS 472 Operations Planning and Control Systems 3. Offered in Fall Only. Prerequisite: BUS 370. Design and management of operations planning and control systems for manufacturing and service firms. Forecasting, capacity management, production and work force scheduling, project management, just-in-time and time-based competition, the impact of information technologies on planning and control systems.


BUS 474 Logistics Management 3. Offered in Fall and Spring. Prerequisite: BUS 370. Management of physical flows of goods between firms, management of inventories that support those flows, and assessment of the effects of freight transportation choices on these management activities. A variety of conceptual frameworks and quantitative tools are used to formulate the basis for effective logistics decision making and relate those decisions to broader issues in managing the entire supply chain and fulfilling the strategic objectives of a firm. A nominal fee for simulation software may be required.

BUS 475 Purchasing and Supply Management 3. Prerequisite: BUS 370. This course is designed to help students develop knowledge of basic principles in purchasing and supply management. Students will be able to explain the potential contributions of these efforts to the competitiveness of the firm.

BUS 478 Business Process Management 3. Offered in Fall Only. Prerequisite: BUS 370 and (BUS/ST350 or ST 302 or ST 361 or ST 370 or ST 372). Major tools, techniques, and strategies used for designing and improving business processes, including process mapping, process analysis, continuous process improvement tools and techniques, strategies for process design, and process reengineering. Major group project in process analysis and improvement.

BUS 479 Supply Chain Management Undergraduate Practicum 3. Prerequisite: BUS 370 and one 400-level Operations/Supply Chain Management course. This course is comprised of a team-based project working on a Supply Chain Resource Consortium (SCRC) partner company's supply chain management issues. These projects vary in scope as are company's supply chain issues and improvement initiatives. Student groups need to provide their own transportation to off-campus sites.

BUS 495 Special Topics in Business Management 1-6. Prerequisite: BUS 360. Presentation of material not normally available in regular course offerings, or offering of new courses on a trial basis.

BUS 498 Independent Study in Business Management 1-6. Offered in Fall Spring Summer. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction on a tutorial basis. Credits and content determined by faculty member in consultation with Department Head.

CIVIL ENGINEERING

CE 214 Engineering Mechanics-Statics 3. Offered in Fall Spring Summer. Prerequisite: Minimum GPA >/= 2.5, C- or better in PY 205, Corequisite: MA 242. Basic force concepts and equilibrium analysis; distributed force; centroids; moments of inertia; application to structural elements. Credit will not be given for both CE 214 and MAE 206.

CE 215 Engineering Mechanics-Dynamics 3. Offered in Fall Spring Summer. Prerequisite: Minimum GPA >/= 2.5, Grade of C- or better in CE 214, and MA 242. Kinematics and kinetics of particles; mass flow; vibrations; plane kinematics and kinetics of rigid bodies; selected topics from three-dimensional rigid body dynamics, and orbital motion.

CE 261 Construction Engineering Systems 3. Offered in Spring Only. Prerequisite: CEM Majors; Corequisite: ST 370. Introduction to engineering economy, and principles and techniques of optimization for Construction Engineering and Management, including risk assessment. Credit may not be received for both CE 261 and CE 375.

CE 297 Current Topics in Civil Engineering 1-4. Offered in Fall Spring Summer. Presentation of material not normally available in regular course offerings, or offering of new courses on a trial basis. Credits and content determined by faculty member in consultation with Department Head.

CE 301 Civil Engineering Surveying and Geomatics 3. Offered in Fall and Spring. Plane surveying, topographical surveying, horizontal and vertical curves, topographic surveys, construction surveys, earthwork, route surveying. Data collection using sight-based, laser-based, and global positioning system equipment. Methods for analysis and presentation of surveying and positioning data, including dealing with errors. Use and applications of GPS information. Limited to CEM, CE, ENE majors. Credit will not be given for both BAE 325 and CE 301.

CE 305 Traffic Engineering 3. Offered in Fall and Spring. Prerequisite: CE or CEM Majors, and ST 370. Integrated approach to planning, design, and operation of transportation systems with an emphasis on highway and street systems. Roadway design, traffic operations and performance, and control systems.

CE 313 Mechanics of Solids 3. Offered in Fall Spring Summer. Prerequisite: Minimum GPA >/= 2.5, Grade of C- or better in CE 214, and MA 242. Elementary analysis of deformable solids subjected to force systems. Concepts of stress and strain; one, two and three-dimensional stress-strain relationships for the linear elastic solid. Statically determine and indeterminate axial force, torsion and bending members. Stress transformations, pressure vessels, combined loadings. Introduction to column buckling.
CE 324 Structural Behavior Measurement 1. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CE 313. Theory and application of strain, displacement, and acceleration measurements. Verification of structural theories. Error Analysis. Bending of determinant and indeterminate beams, twisting of circular tubes, buckling of columns, and vibration of shear buildings.

CE 325 Structural Analysis I 3. Offered in Fall and Spring. Prerequisite: CSC 112; Grade of C- or better in CE 313. Analysis of determinate and indeterminate bars, trusses, beams and frames using the matrix displacement method. Qualitative deflected shapes and shear and bending moment diagrams. Computer implementation of analysis procedures using MATLAB and commercial structural analysis software.

CE 327 Reinforced Concrete Design 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CE 313; CE 332. Behavior, strength, and design of reinforced concrete members subjected to moment, shear, and axial forces. Introduction to the design of reinforced concrete structures.

CE 332 Materials of Construction 3. Offered in Fall and Spring. Prerequisite: MSE 200; CSC 112; Junior standing in CE or CEM. Manufacture and properties of mineral and bituminous cements and mineral aggregates. Mechanical properties and durability of Portland cement concrete, bituminous mixtures, masonry units, timber products, and miscellaneous construction materials. Materials testing.

CE 337 Civil Engineering Computing 3. Offered in Spring Only. Prerequisite: CSC 112 and Corequisite: MA 341 or MA 305. Computational approaches to modeling with applications in construction, structures, transportation, water resources and other civil engineering areas; matrix computations, digital terrain modeling, network applications and algorithms, heuristic optimization.

CE 339 Civil Engineering Systems 3. Offered in Fall Only. Prerequisite: CSC 112 and Corequisite: MA 341 or MA 305. A broad perspective, systematic approach to civil planning, analysis, evaluation and design for large scale projects in construction, structures, transportation, water resources and other civil engineering areas.

CE 342 Engineering Behavior of Soils and Foundations 4. Offered in Fall and Spring. Prerequisite: C- or better in CE 313, Corequisite: CE 382. Description, identification, and engineering classification of soils. The basic principles and mechanics of flow of water through soils, deformation and strength of soils, and the processes of consolidation and compaction. Effective stress concepts, stress and settlement analyses, and evaluation of shear strength. Methods of analysis and geotechnical engineering design concepts.

CE 367 Mechanical and Electrical Systems in Buildings 3. Offered in Spring Only. Prerequisite: CE 382. Introduction to mechanical and electrical systems in building construction. Includes HVAC, lighting and electrical systems, focusing on design concepts, equipment application and design of the construction process for modern buildings systems.


CE 374 Environmental Engineering Laboratory 2. Offered in Fall Only. Prerequisite: Junior Standing in ENE, C- or better in CE 373, MEA 323. Experimental techniques for the analysis of water and wastewater quality parameters; interpretation of the laws of the environment based on measurements such as acidity, alkalinity, solids, DO, BOD, COD, plate counts and volatile organics.

CE 381 Hydraulics Systems Measurements Lab 1. Offered in Fall and Spring. Corequisite: CE 382. Introduction to experimental techniques for the analysis of hydraulic systems; measurement of viscosity, fluid pressures, velocity distributions, flow rates; investigations into the friction, momentum transfer, and turbulence on fluid flow.

CE 382 Hydraulics 3. Offered in Fall and Spring. Prerequisite: CE 214, Junior standing in CE, CEM, ENE, BE, or BME. Corequisite: MA 341, MA 305, or ST 370. Fluid properties; mass, energy and momentum conservation laws; dimensional analysis and modeling; laminar and turbulent flows; surface and form resistance; flow in pipes and open channels; elementary hydrodynamics; fluid measurements; characteristics of hydraulic machines. Credit will not be given for both CE 382 and MAE 308.

CE 383 Hydrology and Urban Water Systems 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CE 382; For CE, ENE, and CEM Majors. Study of engineering hydrology and design of elements of urban stormwater systems. Commonly encountered applications in urban stormwater management, flood control and groundwater engineering. Familiarization with effects of watershed development on quantity and quality of streamflow.

CE 390 Engineering Economics 1. Offered in Fall and Spring. Prerequisite: CSC 112 and Corequisite: MA 341 or MA 305. Fundamental principles of engineering economics and their application to civil engineering planning and evaluation. Time value of money, interest and equivalence, and methods for assessing the feasibility and relative economic value of alternatives.

CE 400 Transportation Engineering Project 3. Offered in Spring Only. Prerequisite: C- or better in CE 305 and CE 390, and one of the following courses: CE 401, 402, 403, or 413. Integrated team approach to design of major transportation engineering projects. Professional topics in transportation engineering practice.

CE 401 Transportation Systems Engineering 3. Offered in Fall Only. Prerequisite: C- or better in CE 305. Multi-modal transportation systems; railroads, airports, highways, and other modes. Planning, analysis, and design. Fundamental concepts; supply, demand, flows, impacts, and network optimization.

CE 402 Traffic Operations 3. Offered in Fall Only. Prerequisite: C- or better in CE 305. Highway capacity; traffic control systems; intelligent vehicle/highway systems; and other advanced topics. Credit for both CE 402 and CE 502 is not allowed.

CE 403 Highway Design 3. Offered in Spring Only. Prerequisite: C- or better in CE 305. Corridor selection; highway alignment; design of roadsides, intersections, and interchanges. Completion of research paper for students taking course for graduate credit. Credit will not be given for both CE 403 and CE 503.

CE 413 Principles of Pavement Design 3. Offered in Fall Only. Prerequisite: CE 332, and Corequisite: CE 342. Basic principles of analysis, design and performance of highway and airport pavements with critical evaluation of current design and maintenance strategies.

Planning, analysis and design of complete structural systems composed of steel and reinforced concrete. Professional topics in structural engineering practice.

CE 421 Structural Engineering Senior Project - Bridge Design 3. Offered in Fall Only. Prerequisite: CE 327, CE 390, and CE 426. Corequisite: CE 425. This structural engineering senior project course covers the fundamentals of bridge analysis and design including conceptual design, superstructure analysis, AASHTO-LRFD bridge specifications, flat slab bridge design, pre-stressed concrete bridge design, strut and tie modeling, column design, and foundations. A series of three bridges will be designed including a cable stay or suspension pedestrian bridge, flat slab bridge, and girder bridge. At the conclusion of the course, students will be able to analyze and design simple, but complete concrete bridge structures.

CE 425 Structural Analysis II 3. Offered in Fall Only. Prerequisite: C- or better in CE 313. Analysis of beam, 2D and 3D truss, 2D and 3D frame and plane strain structures using the matrix displacement method. Introduction to the finite element method of analysis by deriving the element stiffness matrices using Virtual Work. Beam and frame elements include shear deformation and geometric stiffness effects. Computer implementation of analysis procedures using MATLAB and commercial structural analysis software. Modeling issues include convergence, symmetry and antisymmetry. Introduction to structural dynamics. Credit not given for both CE 425 and CE 525.

CE 426 Structural Steel Design 3. Offered in Fall and Spring. Prerequisite: C- or better in CE 313. Design and behavior of structural steel members and their connections subjected to moment, shear, and axial forces. Introduction to the design of steel structures.

CE 435 Engineering Geology 3. Offered in Spring Only. Prerequisite: MEA 101 and Junior standing in colleges of Agriculture and Life Sciences, Engineering, Natural Resources, Physical and Mathematical Sciences or Textiles. Application of both geology and geotechnical engineering to engineering projects. Illustrations of relevant materials properties and techniques utilized in describing subsurface conditions.

CE 440 Geotechnical Engineering Project 3. Offered in Fall Only. Prerequisite: C- or better in CE 342, CE 390. Integrated team approach to design of building foundations involving site selection, analysis and design of shallow and deep foundations, establishment of performance criteria, economic analysis, identification of potential construction problems and matters regarding professional practice and ethics.

CE 443 Seepage, Earth Embankments and Retaining Structures 3. Offered in Fall and Spring. Prerequisite: C- or better in CE 342, CE 390. Review of shear strength concepts; ground water hydraulics; slope stability; lateral earth pressure problems; placement of fills.

CE 463 Construction Estimating, Planning, and Control 3. Offered in Fall Only. Prerequisite: CE 261. Overview of the construction industry; life cycle of construction projects, work breakdown structure, activity cost and time estimation, computerized planning and scheduling methods, resource leveling, time-cost tradeoff; computerized cost estimating, bidding and negotiation strategies; and cost/schedule control systems.

CE 464 Legal Aspects of Contracting 3. Offered in Fall Only. Legal aspects of contract documents, drawings and specifications; owner-engineer-contractor relationships and responsibilities; bids and contract performance, Labor laws; governmental administrative and regulatory agencies; torts; business organizations; ethics and professionalism.

CE 465 Construction Equipment and Methods 3. Offered in Spring Only. Corequisite: CE 261 or equivalent and ST 370. Study of construction operations as dynamic production processes. Utilization of equipment and other resources to achieve highest levels of productivity, safety, and quality. Covers a wide range of traditional and state-of-the-art construction methods.

CE 466 Building Construction Engineering 3. Offered in Fall Only. Corequisite: CE 327. Construction processes for buildings and other structures including codes and standards, structural and architectural components and systems, form work and bracing design, erection and assembly methods.

CE 468 Construction Engineering Laboratory 1. Offered in Fall and Spring. Prerequisite: CE 322, Corequisite: CE 327 or CE 426. Measurements with and calibration of measurement instruments used in construction engineering field tests for quality and safety of the construction process. Interpretation of ANSI, ASTM, ACI and AISC specifications and standards. Credit for both CE 468 and CE 568 is not allowed.

CE 469 Construction Engineering Project 3. Offered in Fall and Spring. Prerequisite: CE 463. Last semester in CEM, Corequisite: CE 464. Capstone course involving integrated team approach in the design of the construction process, utilizing computerized tools for cost estimation, planning, scheduling, process design, and management of two construction projects. Each student also selects an individual project. Lecture topics include: ethics, professionalism, marketing, bid presentations, business planning, finance, and other appropriate topics by guest speakers from industry.

CE 470 Physical Processes of Environmental Engineering 3. Offered in Spring Only. Prerequisite: CE 280, CHE 225 and Grade of C or better in CE 382, Corequisite: CE 381, and MAE 301 or CHE 315. The fundamentals of physical processes of mass, momentum and energy transfer in fluid systems as applied to environmental engineering. Examples drawn from wastewater treatment, air pollution, surface and groundwater pollution, and solid and hazardous waste.

CE 476 Air Pollution Control 3. Offered in Fall Only. Prerequisite: CE 373, CE 390, MAE 301 and Corequisite: ST 370 or CHE 430 (CHE majors). Introduction to air pollution control fundamentals and design. Fundamentals include the physics, chemistry and thermodynamics of pollutant formation, prevention and control. Design will include gas treatment, process modification, and feedstock modification. Pollutants to be addressed include sulfur dioxide, nitrogen oxides, particulate matter, volatile organic compounds, hydrocarbons, and air toxics. Credit for both CE 476 and CE 576 will not be given.


CE 479 Air Quality 3. Offered in Spring Only. Prerequisite: CE 373,CE 382, or CHE 311 (CHE Majors); or MEA 421 (MEA Majors). Corequisite: ST 370. ST 380 (MEC Majors). Introduction to: risk assessment, health effects, and regulation of air pollutants; air pollution statistics; estimation of emissions; air quality meteorology; dispersion modeling for non-reactive pollutants; chemistry and models for tropospheric ozone formation; aqueous-phase chemistry, including the "acid rain" problem; integrated assessment of air quality problems; and the fundamentals and practical aspects of commonly used air quality models. Credit is allowed only for one of CE/MEA 479 or CE/MEA 579.
CE 480 Water Resources Engineering Project 3. Offered in Spring Only. Prerequisite: CE 390 and Grade of C- or better in CE 382 and CE 383. Engineering design of selected projects in water resources engineering involving interactions with other scientific and engineering disciplines. Discussion of ethical conduct and professional engineering practice. Projects will include site work, storm drainage, water supply, water transmission and water-quality issues.

CE 481 Environmental Engineering Project 3. Offered in Spring Only. Prerequisite: CE 374, 390, 383, 484, Corequisite: Two of: CE 476, 477, 479, 488. Engineering design of selected projects in environmental engineering involving interactions with other scientific and engineering disciplines. Discussion of ethical conduct and professional engineering practice.

CE 484 Water Supply and Waste Water Systems 3. Offered in Fall Only. Prerequisite: CE 373, CE 382. Elements of the design of water supply and wastewater disposal systems.

CE 487 Introduction to Coastal and Ocean Engineering 3. Offered in Spring Only. Prerequisite: Senior standing and CE 382. Introduction to the analysis of civil engineering projects in the ocean and along the coastline. Basic wave mechanics, tides, and ocean dynamics as applied to the understanding of coastal erosion control and other marine problems. An optional two-day field trip to the North Carolina Outer Banks at a nominal student expense is a regular feature of the course.

CE 488 Water Resources Engineering 3. Offered in Fall Only. Prerequisite: CE 339 or equivalent, Corequisite: CE 383. Extension of the concepts of fluid mechanics and hydraulics to applications in water supply, water transmission, water distribution networks and open channels to include water-supply reservoirs, pump and pipe selection, determinate and indeterminate pipe networks, and analysis of open channels with appurtenances.

CE 497 Current Topics in Civil Engineering 1-4. Offered in Fall Spring Summer. Presentation of material not normally available in regular course offerings or offering of new courses on a trial basis. Credits and content determined by faculty member in consultation with the Department Head.

CE 498 Special Problems in Civil Engineering 1-4. Offered in Fall and Spring. Directed reading in the literature of civil engineering, introduction to research methodology, seminar discussion dealing with special civil engineering topics of current interest.

CH 102 General Chemistry Laboratory 1. Offered in Fall Spring Summer. Corequisite: CH 101. Laboratory experience to accompany CH 101. Introduction to basic laboratory equipment and skills.

CH 108 Computer Applications in Chemistry II 1. Offered in Spring Only. Prerequisite: CH 106, CH Majors, Corequisite: CH 201. A supplement to CH 202 laboratory, for chemistry majors. The use of computers in mathematical modeling of chemical concepts; applications of computer graphics to structure drawing, molecular modeling, and scientific illustration.

CH 111 Preparatory Chemistry 3. Offered in Fall and Spring. Preparation for CH 101. Review of main topics from high school emphasizing nomenclature, vocabulary, the periodic table and problem solving. Emphasis on mathematical skills, data handling, reaction types, stoichiometry and solutions. Credit for CH 111 is not allowed if a student has prior credit in CH 101. Credit for CH 111 does not count towards graduation for students in curricula that require CH 101.

CH 201 Chemistry - A Quantitative Science 3. Offered in Fall Spring Summer. Detailed quantitative aspects of solutions, solution stoichiometry, thermodynamics, chemical equilibria, acid-base equilibria, solubility equilibria, electrochemistry, chemical kinetics, and nuclear chemistry.

CH 202 Quantitative Chemistry Laboratory 1. Offered in Fall Spring Summer. Prerequisite: CH 104, CH 102, Corequisite: CH 201. Laboratory experience to complement CH 201. Experimental exploration of thermodynamic, kinetic, and electrochemical behavior.

CH 211 Analytical Chemistry I 3. Offered in Spring Only. Prerequisite: CH 108, Corequisite: CH 212 and PY 208. Methods of quantitative analysis based on solution chemistry, potentiometry, coulometry, chromatography, and molecular absorption and fluorescence spectroscopy. Statistics of measurement precision. Credit not allowed for both CH 211 and CH 315.

CH 212 Analytical Chemistry Laboratory I 1. Offered in Spring Only. Prerequisite: CH 211. Laboratory experiments in volumetric analysis, ion selective electrodes, potentiometry, molecular absorption and fluorescence spectroscopy, acid/base chemistry, and computer applications. Precision, accuracy, and statistical analysis emphasized.

CH 220 Introductory Organic Chemistry 4. Offered in Fall Spring Summer. Prerequisite: Completion of CH 101 with a grade of C- or better. A one-semester course in the fundamental principles of organic chemistry. Preparation, reactions, and physical properties of alkanes, cycloalkanes, alcohols, alkyl halides, aromatic compounds, aldehydes, ketones, organic acids, acid derivatives, and amines. Credit is not allowed for both CH 220 and CH 221.

CH 221 Organic Chemistry I 3. Prerequisite: CH 101. First half of two-semester sequence in the fundamentals of modern organic chemistry. Structure and bonding, stereochemistry, reactivity and synthesis of carbon compounds. Detailed coverage of aliphatic hydrocarbons, alcohols, ethers, and alkyl halides. Introduction to spectral techniques of IR, UV-vis, and NMR.

CH 222 Organic Chemistry I Lab 1. Laboratory experience to accompany CH 221. Introduction to basic organic laboratory equipment and techniques.

CH 223 Organic Chemistry II 3. Prerequisite: CH 221 and CH 222 and a Corequisite of CH 224. Second half of two-semester sequence in the fundamentals of modern organic chemistry. Structure and bonding, stereochemistry, reactivity and synthesis of carbon compounds.
magnetic measurements. Characterization of transition metal complexes, including inert knowledge gained in CH 401, for B.S. chemistry majors. Synthesis and reaction kinetics. For students requiring only a single semester of thermodynamics, physical and chemical equilibrium, electrochemistry. 211.

CH 331 Earth System Chemistry 3. Offered in Spring Only. Prerequisite: CH 201, Corequisite: BIO 125 or any MEA course. Chemistry of the earth with an emphasis on the interactions of the biosphere, geosphere and atmosphere. The origin and chemical evolution of the solar system, chemical cycles in the environment, and the impact of man on biogeochemical processes.

CH 332 Earth System Chemistry 3. Offered in Spring Only. Prerequisite: CH 201, Corequisite: BIO 125 or any MEA course. Chemistry of the earth with an emphasis on the interactions of the biosphere, geosphere and atmosphere. The origin and chemical evolution of the solar system, chemical cycles in the environment, and the impact of man on biogeochemical processes.

CH 333 Physical Chemistry II 3. Offered in Fall Spring Summer. Prerequisite: CH 431, MA 341. An intensive study of physical chemical principles including molecular spectroscopy, statistical thermodynamics, reaction kinetics, kinetic theory, and transport properties. Credit may not be claimed for both CH 433 and CH 437.

CH 341 Physical Chemistry Laboratory 3. Offered in Fall and Spring. Prerequisite: CH 211 or CH 315 or TC 412 ; CH 431, Corequisite: CH 433. A project-oriented course to acquaint students with modern physical chemistry laboratory techniques. Experiments in chemical thermodynamics, kinetics, molecular structure and spectra.

CH 342 Physical Chemistry for Engineers 4. Offered in Fall and Spring. Prerequisite: PY 208, CHE 315, MA 341. Selected physicochemical principles including quantum theory, spectroscopy, statistical thermodynamics, and rates of chemical reactions. Credit may not be claimed for both CH 433 and CH 437.

CH 343 Physical Chemistry II 3. Offered in Fall Spring Summer. Prerequisite: CH 431, MA 341. An intensive study of physical chemical principles including molecular spectroscopy, statistical thermodynamics, reaction kinetics, kinetic theory, and transport properties. Credit may not be claimed for both CH 433 and CH 437.

CH 344 Advanced Synthetic Techniques II 4. Offered in Fall Only. Prerequisite: CH 442. An advanced laboratory class in the synthesis, separation and characterization of organic, inorganic,
polymer and materials compounds. Techniques include literature searches, reactions, under inert atmosphere, column chromatography, fractional distillations, NMR spectroscopy, and other advanced procedures. This course builds upon the skills acquired in CH 442 and has significant independent work.

CH 452 Advanced Measurement Techniques I 3. Prerequisite: CH 431. Modern analytical and physical chemistry laboratory techniques. Emphasis on statistical methods, chemical thermodynamics, chromatography, atomic and molecular spectroscopy, report writing, scientific methodology, and laboratory safety.

CH 454 Advanced Measurement Techniques II 4. Offered in Spring Only. Prerequisite: CH 311 or CH 315. Laboratory course designed on systematic method development in practical applications for the separation and analysis of environmental, pharmaceutical and biologically important samples. Isocratic and gradient elution HPLC separations and temperature programming in GC are covered. In addition to GC, the three major HPLC modes of Reversed Phase, Ion Exchange, and Hydrophilic Interaction will be studied for separations of mixtures of small organic molecules and biologically important molecules such as peptides and carbohydrates.


CH 473 Principles of Chemical Oceanography 3. Offered in Fall Only. Prerequisite: CH 201, MEA 200. Chemical processes controlling the composition of oceans, including discussions of chemical equilibria, biological cycling of nutrients and use of chemical tracers in marine environment; consideration of origin and chemical history of oceans. Credit is not allowed for both MEA 473 and MEA 573.

CH 491 Honors Chemistry 1-4. Offered in Fall and Spring. Prerequisite: CH 223, Admission to Honors Program. Independent study and research projects in chemistry.

CH 499 Undergraduate Research in Chemistry 1-3. Offered in Fall Spring Summer. Independent investigation of a research problem under the supervision of a chemistry faculty member.

CHEMICAL ENGINEERING

CHE 205 Chemical Process Principles 4. Offered in Fall and Spring. Prerequisite: Grade of C- or better in MA 241, PY 205, and (CH 201 or CH 221). Engineering methods of treating material balances, stoichiometry, phase equilibrium calculations, thermophysics, thermochemistry and the first law of thermodynamics. Introduction to equation solving packages and spreadsheets for solving problems related to chemical engineering calculations.

CHE 225 Introduction to Chemical Engineering Analysis 3. Offered in Spring and Summer. Prerequisite: C- or better in CHE 205 and MA 242. Corequisite: MA 341. Introduction of mathematical and computational tools for analyzing chemical engineering problems. Sequential modular and equation-based simulation of steady-state chemical processes using advanced spreadsheet methods and multivariate root-finding algorithms. Material and energy balances on transient processes and their solution using analytical and numerical methods. Introduction to microscopic material and energy balances using the "shell balance" approach to develop the governing differential equations. Solutions to steady-state boundary value problems in heat conduction and Fickian diffusion.

CHE 310 Transport Processes I 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in both CHE 225 and MA 341. Fundamental aspects of momentum and heat transfer, and the use of these fundamentals in solving problems in transport operations.

CHE 312 Transport Processes II 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CHE 311. Fundamental aspects of mass transfer and the use of these basic principles in solving problems in transport operations.

CHE 315 Chemical Process Thermodynamics 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CHE 225. Laws of thermodynamics and their application to chemical engineering problems, both in theory and in practice. Criteria of equilibrium in physical and chemical changes. Behavior of real fluids, including mixtures.

CHE 316 Thermodynamics of Chemical and Phase Equilibria 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CHE 315. Systematic study of chemical reaction equilibria and phase equilibria. Use of fugacity, activity and chemical potential concepts for predicting the effect of such variables as temperature, pressure on equilibrium compositions. Methods for measuring and estimating thermodynamic properties important to equilibrium calculation in real systems.

CHE 330 Chemical Engineering Lab I 4. Offered in Fall and Spring. Prerequisite: CHE 311. Laboratory experiments in unit operations of heat transfer and fluid flow. Laboratory safety, technical report writing, statistics, experimental design, error analysis and instrumentation.

CHE 331 Chemical Engineering Lab II 2. Offered in Fall and Spring. Prerequisite: CHE 312, CHE 330. Laboratory experiments in mass transfer and reaction kinetics. Experimental planning, technical report writing and oral presentations are emphasized.

CHE 395 Professional Development Seminar 1. Offered in Fall and Spring. Professional development and topics of current interest in chemical engineering.


CHE 446 Design and Analysis of Chemical Reactors 3. Offered in Fall Only. Prerequisite: CHE 316. Characterization and measurement of the rates of homogeneous and heterogeneous reactions. Design and analysis of chemical reactors. Credit cannot be received for both CHE 446 and CHE 546.

CHE 447 Bioreactor Engineering 3. Offered in Fall Only. Prerequisite: BCH 451, CHE 312, CHE 316. Design and analysis of chemical reactors with emphasis on enzyme-catalyzed reactions, microbial fermentation, and animal cell culture. Empirical kinetics of enzymatic reactions and cell growth. Design and scale-up of suspension bioreactors. Immobilized-enzyme and immobilized-cell bioreactors, including the classical Thiele reaction-diffusion analysis.
CHE 450 Chemical Engineering Design I. Offered in Fall Only. Prerequisite: CHE 312. Applications of cost accounting, cost estimation for new equipment, manufacturing cost and measures of profitability. Use of computer simulation design and cost programs. Procedures for sizing unit operations commonly encountered in the chemical process industry. Heuristics for selection of separation processes and heat exchanger network synthesis.

CHE 451 Chemical Engineering Design II. Offered in Spring Only. Prerequisite: CHE 430, and (CHE 446 or CHE 447). Chemical process design and optimization. The interplay of economic and technical factors in process development, site selection, project design, and production management. Comprehensive design problems.

CHE 455 Polymer Technology and Engineering. Offered in Spring Only. Prerequisite: MSE 380. This course will cover commercial polymers, polymer blends and miscibility, dynamic mechanical behavior, Boltzmann superposition principle, ultimate properties of polymers, polymer rheology and processing, recycling and design and selection of polymeric materials. Guest instructors from industry will give presentations on contemporary topics in polymer technology and engineering. Field trips are required.


CHE 457 Polymer Sciences and Technology. Offered in Fall Only. Prerequisite: CH 223, CHE 316. Concepts and techniques for polymerization of macromolecules. Structure, properties, and applications of commercially important polymers.

CHE 460 Colloidal and Nanoscale Engineering. Offered in Spring Only. The first part of this course will present the fundamentals of nanoscale colloidal processes, including interactions and self-assembly of particles, surfactants and biomolecules. The applications of these fundamentals to the nanotechnology and engineering on the nanoscale will be discussed. The nanoscience has led to the development of many new technologies with relevance to chemical engineering, including microfluidics, lab-on-a-chip, bioarrays and biosassays. These emerging technologies will be presented and discussed in the second half of this course.

CHE 463 Fermentation of Recombinant Microorganisms. Offered in Fall and Spring. Prerequisite: CH 223 and Corequisite: (BEC 320 or BIT 410 or BCH 452 or MB 352). Introduction to fermentation and protein chemistry. Theory behind laboratory techniques and overview of industrial scale expression systems. Laboratory sessions involve use of microbial expression vectors, fermentation systems, and large-scale purification of recombinant protein. Half semester course, first part.


CHE 465 Diffusion in Polymers. Offered in Spring Only. Prerequisite: CHE 461/543. The theory of small molecule transport in polymers; application of membrane transport processes in the chemical, polymer, textile, coatings and natural fibers industries. Credit will not be given for both CHE 465 and CHE 365.

CHE 466 Polymers, Surfactants, and Colloidal Materials. Offered in Spring Only. Prerequisite: CHE 316, CH 223. Relationships between molecular structure and bulk properties of nonmetallic materials applied to commercial products and chemical engineering processes. Applications of surface and colloidal chemistry and polymer science to product development and process improvement. Credit will not be given for CHE 469 and CHE 769.

CHE 467 Polymer Rheology. Offered in Spring Only. Prerequisite: CHE 311. Theoretical principles and experimental techniques associated with flow and deformation of polymer systems. Systems include: melts and solutions, suspension, gels, emulsions, and thixotropic materials.

CHE 469 Polymers, Surfactants, and Colloidal Materials. Offered in Spring Only. Prerequisite: CHE 316, CH 223. Relationships between molecular structure and bulk properties of nonmetallic materials applied to commercial products and chemical engineering processes. Applications of surface and colloidal chemistry and polymer science to product development and process improvement. Credit will not be given for CHE 469 and CHE 769.


CHE 476 Life Cycle and Sustainability Concepts for the Environment. Offered in Fall Only. Students in this course will learn the principles and constraints of the emerging life cycle field applied to manufacturing and environmental issues. The goal is to provide a basic understanding, an exposure to the current state-of-the-art, and experience in life cycle development. The content and participation in this course should provide the student with new and versatile principles for the management of manufacturing, environment and the supply chain. The applications to and principle of sustainability will also be taught.

CHE 477 Chemical Engineering Projects I. Offered in Spring Only. CHE 488 Animal Cell Culture Engineering. Offered in Spring Only. CHE 364 or CHE 450, and (CHE 446 or CHE 447). Design and operation of animal cell culture bioreactors for therapeutic protein production. Topics include: batch, fed-batch and perfusion bioreactors, agitation and aeration for mixing and oxygen mass transfer, bioreactor monitoring and control, optimizing bioreactor performance, and single-use (disposal) bioreactors. This is a half-semester course.


CHE 497 Chemical Engineering Projects II. Offered in Fall Spring Summer. Introduction to chemical engineering research through experimental, theoretical and literature studies. Oral and written presentation of reports.

CHE 498 Chemical Engineering Projects III. Offered in Fall Spring Summer. Projects in research, design or development in various areas of chemical engineering.

COMPARATIVE LITERATURE

CL 495 Special Topics in Comparative Literature. Offered in Fall Spring Summer. Detailed investigation of a topic in comparative literature. Topic and mode of study determined by faculty member(s) in consultation with Comparative Literature Committee and heads of departments of English and Foreign Languages.
COM 202 Small Group Communication 3. Offered in Fall and Spring. Theory and practice of effective communication in small groups, including: stages of group development, role emergence, leadership functions, decision making strategies, conflict management, and the significance of power.

COM 203 Theory and Practice of Acting 3. Offered in Fall Spring Summer. Basic contemporary theories on acting, with practical application through classroom exercises. Role analysis, adaptation of voice and body to performance demands, and role development through various rehearsal activities.

COM 211 Argumentation and Advocacy 3. Offered in Fall and Spring. Theory-based analysis of public argument in specialized settings of law, politics, academic debate, business and organizations, and interpersonal relations.

COM 215 Introduction to Communication Disorders 3. Offered in Fall and Spring. Normal speech/language development including the anatomical and physiological bases for reception and expression of oral language. Developmental and acquired speech/language problems and basic treatment principles applied to communication disorders.

COM 223 Stagecraft 3. Offered in Fall and Spring. Fundamentals of scenery design, set construction, and related technical activities. Practical applications with use of design media and shop facilities. Required production participation in University Theater presentations.

COM 267 Electronic Media Writing: Theory and Practice 3. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

COM 200 Communication Media in a Changing World 3. Offered in Fall Spring Summer. Musical, theatrical, visual, and literary arts; music, theater, and visual arts; and a history of media. Uses humanistic and social scientific theories to explain the role of human communication in society. Special seminars and group discussions to enrich and broaden student perspectives.

COM 226 Introduction to Public Relations 3. Offered in Fall Spring Summer. Public relations as a communication function of organizations. Public relations process, principles, history, and practice. Analysis of environmental, organizational, communication, and audience influences on public relations practice; career opportunities.

COM 204 Communication and Technology 3. Offered in Fall and Spring. Basic technology skills for the competent communicator. Practical applications with use of design media and shop facilities. Impact of technology and communication policy. Methods of message evaluation. Exposure to technology applications in the discipline. Basic technology skills for the competent communicator. Practical experience in interactive communication technology.

COM 210 Forest Resources Scholars Forum 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

COM 211 Forest Resources Scholars Forum 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

CNR 111 Forest Resources Scholars Forum 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

CNR 211 Forest Resources Scholars Forum 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

CNR 490 Senior Honors Seminar 2. Offered in Spring Only. Oral presentations of the results of the senior honors projects. Additional special seminars and group discussions to enrich and broaden student perspectives.

CNR 211 Forest Resources Scholars Forum 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.
as a social practice. Roles of writing and writers in media production processes. Social, political, economic, and professional conditions that enable or constrain writing and the writer. Specific media writing genres and formats. Research and preparation for media writing. Students write research-based scripts for news, commentary, and fictional genres in radio, television, film, and emerging media.

COM 293 Theater Practicum 1-6. Offered in Fall Spring Summer. Practical experience in one or more of the various areas of artistic and technical theater through active participation in Thompson Theater's play production program.

COM 296 Communication Internship-Non-Local 1. Offered in Spring Only. Non-local directed work experience for Communication majors with supervision from the work site and the University. COM 296 may be taken more than once only with the permission of the Internship Director and the Assoc. Dept. Head.

COM 298 Special Projects in Communication 1-3. Offered in Fall and Spring. A special projects course to be utilized for guided research or experimental classes at the sophomore level, topic determined by instructor.

COM 301 Presentational Speaking 3. Offered in Fall and Spring. Prerequisite: COM 110. Design, organization and delivery of oral presentations for policy determination, policy implementation, and sales.

COM 302 Managing Meetings 3. Offered in Fall Only. Rules and customs of meetings in committees, assemblies and organizations; meeting management and group leadership; parliamentary motions and strategies.

COM 303 Stage Directing 3. Offered in Spring Only. Basic theory of directing and its application to theatrical production. Play reading, evaluation, casting procedure, staff organization, and rehearsal planning and practices. Laboratory productions of short plays.

COM 307 Digital Audio Production 3. Offered in Fall and Spring. Prerequisite: COM 267. Basic principles of digital audio production, including studio operation, performing, writing and producing.


COM 315 Phonetics 3. Offered in Spring Only. Articulatory and acoustic phonetics; application of the International Phonetic Alphabet with vocal and ear training.

COM 316 Communication Techniques for Public Relations 3. Offered in Fall and Spring. Prerequisite: COM 226. Communication processes and procedures of public relations programs. Media techniques, preparation of materials, channels of distribution.

COM 317 Television Production 3. Offered in Fall and Spring. Prerequisite: COM 267. Basic techniques of television studio production, including producing, writing, directing and electronic graphics production.

COM 321 Survey of Rhetorical Theory 3. Prerequisite: COM 201. Principles of rhetorical theory from its classical origins through the modern period to the present time. Key concepts and theories that provide a critical understanding of the processes of persuasive symbol use.

COM 322 Nonverbal Communication 3. Offered in Fall and Spring. Prerequisite: COM 112. Theory and research in nonverbal communication, including: environment; space; physical appearance, movement; eyes and facial expressions; and vocal cues. Nonverbal communication in personal, workplace and cross-cultural setting.

COM 323 Introduction to Scenic Design 3. Offered in Spring Only. Prerequisite: COM 103 or 223. Aesthetics, elements, and principles of scenic design. Theories and applications to the physical stage in relation to the script. Practical applications with the use of design media in University Theater productions.

COM 325 Anatomy and Physiology of Speech 3. Offered in Fall Only. Anatomy and physiology of the speech mechanism including the muscular, skeletal, and nerve system structures involved in respiration, phonation, and articulation.

COM 327 Critical Analysis of Communication Media 3. Offered in Fall and Spring. Prerequisite: COM 240 and COM 257. Corequisite: COM 240. Theoretical frameworks, methods, and aims of various approaches to critical analysis of the media. Critiques of power over media production; social biases of informational, fictional, and hybrid media content; and historical forms of audiences and the public. Critical awareness of the media's effects in politics, public culture, and everyday life.

COM 332 Relational Communication 3. Offered in Fall and Spring. Prerequisite: COM 112. Communication patterns in the development and deterioration of interpersonal relationships. Functional and dysfunctional communication behaviors in family relationships.

COM 333 Advanced Acting 3. Offered in Spring Only. Prerequisite: COM 203 or demonstrated competence in acting. Advanced methods in role preparation through exercises in concentration, imagination, sensory and emotional recall, and other Stanislavskian techniques. Analyses and critiques of plays and in-class performances.

COM 335 Language Development 3. Offered in Fall Only. Syntactic, semantic, morphologic, and pragmatic development from birth through adolescence. The influence of cognitive and social development on language development. First language acquisition versus second language learning.

COM 340 African American Theatre 3. Offered in Spring Only. This course examines African American dramaturgy and its impact on American theatre. We will study plays from the early period, 1847-1938, and from the recent period, 1935-present. This course will investigate the thematic structure of each section of plays including family life, social protest, and religion. The course will also help students to better understand the social milieu that shaped the content of each play.

COM 342 Interviewing 3. Offered in Fall and Spring. Theory and practice of effective communication skills applied in various types of professional interviews. In-class interviewing.


COM 362 Communication and Gender 3. Offered in Fall and Spring. Prerequisite: Junior standing, COM 112. Effects of gender on the interpersonal communication process. Construction of gendered identities via communication practices. Examination of theories of gender and the role of gender in organizational, institutional, and media communication practices.

COM 364 History of Film to 1940 3. Technological developments and aesthetic movements that shaped cinema production and direction from the beginning of the industry to 1940. Evolution in camera movement, editing, sound storyline, and the documentary. Rise to prominence of the Hollywood studio systems and the contributions of foreign filmmakers.


COM 374 History of Film From 1940 3. Technological developments and aesthetic movements that have shaped cinema production and direction from 1940 to the present. Evolution in camera movement, editing, sound storyline, and the documentary. Post-war decline and re-emergence of the Hollywood film industry and the contributions of foreign filmmakers.


COM 377 Television Writing Seminar 3. Offered in Fall Only. Prerequisite: COM 204. Development of advanced skills in writing for television in such formats as news, documentary, commercials and public service announcements, drama and non-broadcast video. Discussions with working professionals.

COM 385 Speech Science 3. Offered in Spring Only. Prerequisite: COM 215 and COM 325. Acoustic properties of speech sounds and the dynamics of speech sound production. Initial experience with basic clinical instrumentation used to measure respiratory, phonatory, and articulatory movements and the acoustic events that result from these movements. Lab assignments using basic instrumentation and computer software are completed outside of class.

COM 387 Advanced Television Production 3. Offered in Spring Only. Prerequisite: COM 224. Television program production utilizing advanced production techniques. Emphasis on refinement of writing, producing, and directing skills through work in TV studio on production of sophisticated program formats.


COM 402 Advanced Group Communication 3. Offered in Spring Only. Prerequisite: COM 202. Communication processes and outcomes in groups with complex, strategic, and critical public or corporate functions. Focus on participating in, intervening in, leading, and constructing group processes. Advanced theory with application.

COM 403 Touring Theatre 3. Offered in Spring Only. A touring performance experience consisting of text analysis, characterization, role development, and performance of scripts.

COM 411 Rhetorical Criticism 3. Rhetorical analysis of public speeches, social movements, political campaigns, popular music, advertising, and religious communication. Neo-Aristotelian criticism, movement studies, genre criticism, dramaturgical analysis, content analysis, fantasy theme analysis.


COM 417 Advanced Topics in Communication and Race 3. Offered in Fall and Spring. Prerequisite: COM 257, Corequisite: COM 250. Advanced topics seminar examining construction of racial and ethnic identities through communication practices. Exploration of theories of race and identity and the ways communication works to construct, undermine, and reinforce understanding across social groups.

COM 421 Communication Law 3. Offered in Fall Only. Explores the historical, philosophical, and legal foundations of communication rights and responsibilities. Philosophies and regulations affecting sources, messages, channels, receivers, and situations provide the central focus of the course.

COM 427 Game Studies 3. Exploration of inter-relations among mobile technologies (cell phones, PDAs), location-based activities, and playful/social spaces. Investigates three main areas: (1) the definition of basic gaming concepts (community, narrative, play, and space); (2) the history of games as social events, with particular emphasis on multi-user domains (MUDs); and (3) the definition of games, which use the physical space as the game environment, such as pervasive games, location-based games, and hybrid reality games. Discussion of inter-connections among games, education, and art. Jr/Sr Standing.

COM 431 Communication in Political Campaigns 3. Offered in Fall Only. Prerequisite: COM 110 or COM 201. Roles of analysis and criticism of oral communication in political campaigns; analysis of special political communication situations; ghostwriting, news conferences, negative advertising.

COM 435 Audiology 3. Offered in Spring Only. Basic terminology in audiology; anatomy and physiology of the ear; types of hearing loss; evaluation of hearing using air and bone conduction, speech audiometry, tympanometry, and acoustic reflexes; interpretation of audiograms. Performance of hearing screening and air conduction threshold testing.
COM 436 Environmental Communication 3. Offered in Fall Only. Prerequisite: COM 230 or STS 214. Critical analysis of environmental discourse in organizational, national, international contexts. Investigates public participation in environmental advocacy and deliberation; environmental conflict management; rhetorical constructions of nature and human relationships with nature; environmental justice; environmental risk communication; and competing ecological paradigms. Must hold Junior/Senior standing.

COM 437 Advanced Digital Video 3. Offered in Spring Only. Prerequisite: COM 357. Hands-on experience in digital video production. Production of instructional videotapes. Practical experience in all phases of production process, including pre-production organization and critical analysis of final product.

COM 441 Ethical Issues in Communication 3. Offered in Spring Only. Prerequisite: COM 110, 112. Critical analysis of ethical problems in interpersonal and public communication practices.

COM 442 Communication and Conflict Management 3. Offered in Fall Only. Prerequisite: COM 112. Examination of conflict styles and theories; conflict management strategies such as negotiation and third party intervention; and relevant contexts for conflict such as workplace, families, and interpersonal relationships. Practical, theoretical and critical analyses of conflict and negotiation in variety of contexts.


COM 446 Problems in Public Relations 3. Offered in Fall Spring Summer. Prerequisite: COM 226 and COM 230. Application of theory, principles, and problem-solving techniques used in public relations to organizational case studies.

COM 447 Communication and Globalization 3. Offered in Fall Only. Corequisite: COM 327. History and current trends in globalization of media, information, and telecommunications technologies, organizations, policies, and contents. Political cultural implications of globalization, including debates over corporate vs. public control of global communication, U.S. dominance vs. international cooperation, and the global influence of American culture. Internet-based group research projects on globalization in collaboration with students in other countries.

COM 451 Visual Rhetoric 3. Offered in Spring Only. Prerequisite: COM 201 or COM 321. Examine the rhetorical strategies employed in various primarily visual forms of communication including advertising, photography, digital images, visual art, and public commemorative artifacts and sites. Explore the concepts and methods used to rhetorically analyze and interpret visual images and artifacts. Includes one or more required field trips to which students will provide own transportation.

COM 455 Clinical Observation in Speech-Language Pathology 3. Offered in Fall and Spring. Prerequisite: COM 215. Observation of a variety of therapy techniques and clinical procedures used in the treatment of speech-language-hearing-impaired individuals in the NC State Speech Clinic and other local sites.

COM 456 Organizational Communication 3. Offered in Fall Spring Summer. Prerequisite: COM 230. Role of human communication in organizations, the assumptions inherent in management philosophies about effective communication, and an investigation of the relationships among communication, job satisfaction, productivity, development, and employee motivation.


COM 462 Cross-Cultural Communication 3. Offered in Fall Only. Prerequisite: COM 112; 3 additional COM credits. Communication across cultural boundaries with emphasis on comparative analysis of communication strategies and tactics as well as overall communication systems of various cultures: problems, barriers, patterns of communication.

COM 465 Advanced Clinical Practicum in Speech-Language Pathology 3. Offered in Fall and Spring. Prerequisite: COM 435. Initial experience for students to assess and treat individuals with speech, language, and hearing problems and to write clinical reports.

COM 466 Nonprofit Leadership & Development 3. Offered in Spring Only. Nonprofit Leadership and Development is a service-learning course in which students will be expected to make a 20-hour commitment to service in a local nonprofit organization. Students will critically examine theories of communication and leadership with concentration on issues pertaining to nonprofits such as working with executive boards, volunteer management, and resource development. Students are responsible for transportation and purchase of internship insurance.

COM 467 Advanced Topics in Gender and Communication 3. Offered in Fall and Spring. Prerequisite: COM 327 or COM 362. Advanced Topics seminar examining construction of gender identities through communication practices. History and analysis of gender representations. Theoretical and critical approaches to social, political, and economic impact of gender constructions.

COM 474 Video in Business and Industry 3. Offered in Spring Only. Prerequisite: COM 224 or COM 334. Planning and controlling the use of video for training, employee communication, public relations, and other purposes in organizations. Applications, organizational variables, and technologies.

COM 476 Public Relations Applications 3. Offered in Fall and Spring. Prerequisite: COM 446, COM 486. Management of the public relations function in organizations and public relations counseling; communication theory and nature of materials emanating from public relations departments and counseling firms, practical analysis and development of public relations publicity and campaigns.

COM 477 Mobile Tech Cultur 3. Mobile communication technologies and their influence on communication patterns and social behavior. Conceptualization of cell phones beyond mobile telephones, as internet access points and gaming devices. History, current uses and future perspectives for the social use of mobile interfaces. The creation of new mobile communities. The influence of mobile images on communication and the creation of mobile networks. Use of mobile phones across cultures and places, such as Asia, Scandinavia, Africa, and Latin America.

COM 486 Communication Research Methods 3. Offered in Fall and Spring. Prerequisite: COM 240. Design and implementation of
Communication, knowledge, and information.

COM 487 Internet and Society 3. Offered in Fall Only. Prerequisite: COM 230 and COM 257. Exploration of major issues involved in the growth of computer-mediated communication and information technologies. Construction of self and body; relation of information technology to social, civic, and political life; gender, race, and class as continuing critical points; knowledge and intellectual property; the implications of software and design on the nature of communication, knowledge, and information.

COM 493 Audition and Interpretation Techniques 3. Offered in Fall and Spring. Cold-reading scenes broken down to meet challenges of theatrical auditions. Personal technique developed to interpret texts through exercises, monologues, and scenes. Promotion of self-awareness, confidence, and understanding of dramatic literature as reflector of contemporary and historic lives.

COM 496 Communication Internship 3. Offered in Fall and Spring. Directed work experience for Communication majors with supervision from the work site and the University.

COM 498 Advanced Topic in Communication J-3. Offered in Fall and Spring. Prerequisite: Nine hours of communication courses, Junior standing. Advanced study of contemporary theories, methods, practices, processes, or issues related to the field of communication. Topic varies.

COM 499 Advanced Independent Study in Communication J-3. Offered in Fall and Spring. Prerequisite: Nine credits in Communication courses. Junior standing or Senior standing in Communication. Special projects in communication developed under the direction of a faculty member on a tutorial basis. Must have permission of department to enroll. May enroll only twice.

CROP SCIENCE

CS 103 Introductory Topics in Crop, Soil and Turfgrass Sciences 1. Offered in Fall Only. Introduction to the scope, purpose, and objectives of a university education with an emphasis on areas related to Crop, Soil and Turfgrass Sciences. Students will explore university, college and departmental resources, academic policies and procedures, opportunities for minors, career opportunities, and current trends and issues in our related disciplines. Students cannot receive credit for both CS 103 and ALS 103. Freshman Only; PAX, PAB, PAC, PAE, PCB, SST, TFG.

CS 200 Introduction to Turfgrass Management 4. Offered in Fall Only. Prerequisite: BIO 181(preferred) or ZO 160(alternate) BO 200, or CS 213. Turfgrass selection, establishment, maintenance, and pest management in lawns, golf courses, athletic fields, and roadside care; Emphasis on understanding the impact of the environment on management practices and turfgrass performance. Field trips in laboratory.

CS 210 Lawns and Sports Turf 3. Offered in Fall Spring Summer. Emphasis on turfgrasses for lawns and recreational areas. The history and benefit of natural and artificial sports fields will also be discussed. Credit will not be awarded for both CS 200 and CS 210.


CS 213 Crops: Adaptation & Production 4. Offered in Fall and Spring. Prerequisite: BIO 181(preferred) or ZO 160(alternate) or BO 200. Fundamental structure and reproductive features of crops. Their adaptation and importance in global agriculture. Practices and inputs needed for economic production of a quality product and interaction of these factors within the constraints of climate, soils, and topography in maintaining a quality environment.

CS 216 Oilseed Crop Production 3. Offered in Fall Only. Fundamental agronomic practices associated with the production of oilseed crops (soybean, peanuts and cotton). Discussions will include crop growth and development stages, variety characteristics, planting strategies, fertility and pest management programs, harvest and storage options, and the use of technologies associated with the production and maintenance of quality oilseed crops.

CS 218 Cereal Grain Crop Production 2. Offered in Spring Only. Fundamental agronomic practices associated with the production of cereal grain crops (corn and small grains). Discussions will include crop growth and development stages, how to choose the best varieties and hybrids, planting strategies, fertility and pest management programs, harvest and storage options, and the use of technologies associated with the production and maintenance of quality grain.

CS 224 Seeds, Biotechnology and Societies 3. Offered in Fall Only. An exploration of seeds, how seeds are the delivery system for crop biotechnology and how a specific culture's perception of science and agriculture influence the acceptance or rejections of modern genetic technologies. Topics include seed germination, survival and preservation; seed industry influence on societies and how societies are influencing the seed industry; seed production - commercially and at home; how our diverse genetic resources are preserved; how biotechnology is applied to agriculture and delivered through seeds; the impact biotech is having on the seed industry and subsequently on us and global agriculture; concerns and potential benefits of biotechnology application to crops.

CS 230 Introduction to Agroecology 3. Offered in Fall Only. Prerequisite: BIO 105 or BIO 181 or BIO/ZO 160 or BO 200 or BO 250 or HS 201 or CS 213. This course will examine the biological and physical attributes of farming systems and their associated ecological and social impacts in temperate and tropical regions. It will address the ecological consequences of indigenous food and fiber production systems, conventional agricultural systems and "alternative" systems that incorporate biological pest control and natural nutrient inputs. Students will examine several case studies that integrate their understanding of concepts.

CS 290 Professional Development in Plant & Soil Sciences 1. Offered in Fall Only. This course is designed to prepare students for careers in Plant and Soil Sciences. Student discussions with faculty and industry professionals will center on structure and requirements for internship and jobs, research and extension opportunities, resume building and writing, professionalism and professional development, interpersonal skills, undergraduate program management, and career planning. Student development of an e-portfolio is required. Must hold sophomore or junior standing in: TAA, TAB, TAC, TSS, TFG.
CS 312 Grassland Management for Natural Resources Conservation. Offered in Fall Only. Prerequisite: BIO 181(preferred) or ZO 160(alternate) CS 213, SSC 200. Basic principles and practices of production and utilization of pasture and forage crops; impact on developing sustainable systems for livestock feed, soil and water conservation; use of computers to assist in whole farm planning and information retrieval.

CS 400 Turf Cultural Systems 3. Offered in Spring Only. Prerequisite: C- or better in CS 200. Topics include: golf course design considerations, fertilizer characteristics and application techniques, irrigation programming, construction of high use turfgrass areas, calibration of spreaders and sprayers, aeration, pesticide fate and development of effective management systems.


CS 413 Plant Breeding 2. Offered in Spring Only. Prerequisite: GN 411 or ANS 215. Discussion of reproductive systems of higher plants; the genetic basis for plant improvement and the selection, evaluation, and utilization of crop varieties.

CS 414 Weed Science 4. Offered in Fall Only. Prerequisite: CH 220. History, current status and fundamentals of weed biology and cultural, biological, and chemical weed control; properties and uses of herbicides; weed identification; proper use of herbicide application equipment; current weed management practices in crops and non-cropland situations.

CS 415 Integrated Pest Management 3. Offered in Fall Only. Prerequisite: BIO 181(preferred) or ZO 160(alternate) or BO 200 or BO 250. History, principles, and application of techniques for managing plant pests. Theory and practice of integrating pest control tactics to manage pests within economic, environmental, and sociological constraints. Topics include pest monitoring methodology, economic aesthetic thresholds, biological control, efficient pesticide use, biotechnology, and global positioning systems.

CS 424 Seed Physiology 3. Offered in Spring Only. Prerequisite: PB 321 or PB 421 or FOR 302. This course will explore the physiological processes associated with seed formation, development, maturation, germination, and deterioration of agronomic and horticultural species. We will also study the physiological aspects of seed dormancy, how dormancy is manifested and overcome in cultivated and noncultivated systems and dormancy's impact on weed seedbank ecology.

CS 430 Advanced Agroecology 4. Offered in Spring Only. This course applies agroecological principles introduced in CS 230 and critical thinking to evaluate various agroecosystems. Students will examine food, fiber, and other commodity production systems for security, productivity, and sustainability and address the simultaneous need to protect natural environments and the biodiversity on which agroecosystems depend. Topics include discussion of national and international government policies, research programs, and education programs that influence the future application of agroecosystem principles.

CS 440 Geographic Information Systems in Production Agriculture 3. Offered in Spring Only. Prerequisite: SSC 341. Fundamentals of the global positioning system, geographic information systems, and site-specific management. Geospatially located soil sampling strategies will be addressed as well as appropriate interpolation methods for point-sampled data. The course will cover variable rate fertilizer recommendation models and the technology necessary for variably applying fertilizer. Spatial measurement of crop yields.

CS 462 Soil-Crop Management Systems 3. Offered in Fall Only. Prerequisite: CS 213, CS 414, SSC 342, SSC 452, Senior standing. Unites principles of soil science and crop science with those of allied areas into realistic agronomic applications; practical studies in planning and evaluation of soil and crop management systems.

CS 465 Turf Management Systems and Environmental Quality 3. Offered in Fall Only. Prerequisite: CS 400 and Senior standing. Integration of turfgrass management systems and the use of BMPs and IPM to protect environmental quality. Examination of water quality issues relative to turf. Application of Best Management Practice and Integrated Pest Management strategies. Credit cannot be received for both CS 465 and CS 565. Senior standing.

CS 470 Advanced Turfgrass Pest Management 2. Offered in Spring Only. Prerequisite: C- or better in CS 200. Characteristics and ecology of turfgrass weed, insect, and disease pests; identification and diagnosis of turfgrass pests, strategies for managing pests including cultural, mechanical, biological, and chemical methods; development of integrated pest management programs, characteristics and modes of action for herbicides, insecticides, fungicides, and plant growth regulators; behavior and fate of pesticides in soil; and the development and management of pesticide resistant pest populations.

CS 490 Senior Seminar in Crop Science and Soil Science I. Offered in Spring Only. Review and discussion of current topics in crop science, soil science, agronomy and natural resource management. Preparation and presentation of scientific information in written and oral format. Senior standing in Agronomy, Plant and Soil Sciences, or Turfgrass Science.

CS 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

CS 493 Special Problems in Crop Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer the departmental teaching coordinator and the academic dean prior to the experience.

CS 495 Special Topics in Crop Science 1-6. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.
CSC 100 Computer Literacy 2. Survey of computer hardware and software systems, how programs are created, how computers are used in organizations, and the effects of the computer society. Four written assignments and a final exam. Credit for CSC 100 is not allowed if student has prior credit in another computer science course or computer-related course. Offered only through Independent study by Extension.

CSC 112 Introduction to Computing-FORTRAN 3. Offered in Fall and Spring. Corequisite: (E115 or PMS 100) and (MA 121 or MA 131 or MA 141). Problem solving through writing FORTRAN programs. Particular elements include: careful development of FORTRAN programs from specifications; documentation and style; appropriate use of control structures, data types and subprograms; abstractions and verification; engineering applications.

CSC 114 Introduction to Computing-C++ 3. Corequisite: (E115 or PMS 100) and (MA 121 or MA 131 or MA 141). An introductory course in computing in C++. Emphasis on algorithm development and problem solving. Particular elements include: careful and methodical development of C++ programs from specifications; documentation and style; appropriate use of control structures, data types and subprograms; data abstraction and verification; numeric and nongraphic applications; introduction to object-oriented programming and design.

CSC 116 Introduction to Computing - Java 3. Offered in Fall and Spring. Corequisite: (E115 or PMS 100) and (MA 121 or MA 131 or MA 141). An introductory course in computing in Java. Emphasis on algorithm development and problem solving. Careful and methodical development of Java applications and applets from specifications; documentation and style; appropriate use of control structures, data types and subprograms; data abstraction and verification; object-oriented programming and design; graphical user interface design.

CSC 200 Introduction to Computers and Their Uses 3. Offered in Fall Spring Summer. Survey of basic principles of computer hardware, communications, operating systems, microcomputer issues, security, impact on society, system development, and use in organizations. Hands-on use of software, including operating system commands, wordprocessing, spreadsheets, and database managers. Demonstration and application of current end-user applications. May not be used by CSC major as a restricted elective.

CSC 214 Programming Concepts 3. Prerequisite: CSC 114 with a grade of C- or better. Software design in a high-level language: abstract data types, modular programming, management of large programs. Dynamic memory management: linked lists, pointers, allocation and deallocation. Alternate programming paradigms: recursive list processing, object-oriented programming.

CSC 216 Programming Concepts - Java 3. Offered in Fall and Spring. Prerequisite: CSC 116 with a grade of C- or better. The second course in computing, intended for majors. Emphasis is placed on interpretation of inductive definitions (functions and data types); testing strategies; specification and implementation of finite-state machine; encapsulation; polymorphism; inheritance; class invariants; and resource management.


CSC 230 C and Software Tools 3. Offered in Fall Spring Summer. Prerequisite: CSC 216 with a C- or better and CSC or CSU Majors and Minors. Details of C programming as compared with Java; Lexical structure, syntax, semantics, and pragmatics (idioms, common uses) of C; Stages of compilation, linking and execution; Strings, arrays, structures, pointers, and memory management; C libraries; Tools for design, maintenance, and debugging of programs; Separate compilation, modular programming; Integrated development environments.

CSC 234 Computer Organization and Assembly Language 3. Prerequisite: CSC 214 with a grade of C- or better. Number systems, von Neuman machines, instruction sets and machine code, data representation, assemblers and assembly language programming, compilers, external and internal processor organization, memory, I/O organization and devices. Detailed study of a contemporary processor architecture.

CSC 236 Computer Organization and Assembly Language for Computer Scientists 3. Offered in Fall and Spring. Prerequisite: CSC 216 with a C- or better and CSC or CSU Majors and Minors. Computer architecture topics required by professional software developers, including binary and hexadecimal numbers, hardware component organization, machine instruction sets, assembler language programming, linking assembler language with high-level languages, program testing, computer hardware design issues, computer software design issues, and trends in current computer design.


CSC 246 Concepts and Facilities of Operating Systems for Computer Scientists 3. Offered in Fall and Spring. Prerequisite: CSC 230; Corequisite: CSC 236. CSC and CSU Majors and Minors. Fundamental concepts of computer operating systems for computer scientists, including memory management, file systems, process management, distributed systems, deadlocks, and basic security and system accounting.

CSC 251 Web Page Development 1. Offered in Spring Only. Prerequisite: E 115 or equivalent knowledge of EOS/Unity system. Syntax and semantics of HTML (HyperText Markup Language). Students will learn necessary skills to develop web pages on their EOS/Unity account. In addition to mechanics, design aspects and bandwidth conservancy are covered. Several pages will be created including a final project.

CSC 252 Introduction to Software Testing 1. Offered in Fall Spring Summer. Prerequisite: CSC 112 or CSC 114 or CSC 116. Introduction to software testing provides an understanding of what software testing is and its key role in determining the quality of a software application for the customer. It covers the software test life cycle phases; test planning, acquisition and execution, how the software test life cycle aligns with the software development life cycle, and the different levels of software testing.
CSC 253 C and C++ for Java Programmers 1. Offered in Fall and Spring. Prerequisite: CSC 116. Programming in the C and C++ languages. Concentrates on aspects of the language that differ from the Java language, with the assumption that students already have a basic knowledge of programming, so builds upon an understanding of loops, conditional logic, and a basic understanding of objects.

CSC 254 Visual C ++ 1. Offered in Fall Only. Prerequisite: CSC 214 or CSC 216. Programming in Windows 95/NT using the Visual C++ compiler and tools. The focus is on using the Microsoft Foundation Classes (MFC), understanding the Win32 API, and modern operating systems concepts.

CSC 255 String Processing Languages 1. Syntax and semantics of a string manipulation language, currently SNOBOL 4. Application of the language to programming problems in non-numeric areas. Discussion of other string processing languages such as PERL.

CSC 256 Leadership in Technology 1. Offered in Fall Only. This "executive seminar" course provides CSC students exposure to highly successful technology leaders, introduces them to the essential leadership skills required to be successful in their own careers in technology, and exposes them to a proven approach and road map for effectively managing change. Development of sound business communications skills.

CSC 257 Introduction to Java 1. Offered in Fall Only. Prerequisite: CSC 214. Introduction to the Java programming language. Object-oriented techniques and language syntax. Java class libraries including strings, graphical interfaces, events, exceptions, arguments, threads, file i/o, and networking.

CSC 295 Special Topics in Computer Science 1-3. Special topics in CSC at the early undergraduate level.

CSC 302 Introduction to Numerical Methods 3. Offered in Fall and Spring. Prerequisite: CSC 116 and MA 305, CSC Majors or 2.75 GPA. Numerical computations with digital computers; floating point arithmetic and implications of round-off error. Algorithms and computer techniques for the numerical solution of problems in: function evaluation; zeros of functions; interpolation; numerical differentiation and integration; linear systems of equations; curve fitting; solutions of non-linear equations; numerical solutions of ordinary differential equations.

CSC 312 Computer Organization and Logic 4. Offered in Fall and Spring. Prerequisite: CSC 236 and a grade of C- or better in CSC 226. Combinational logic circuits and their relation to Boolean algebra. Functional properties of combinational and sequential components and their realizations in integrated circuit forms. Organization of digital computer components; processors, control units, memories, switches, and peripherals. Architecture of computer systems. Computer arithmetic. Microprogrammed control. Interrupt mechanisms. Laboratory exercises involve logical, functional, and electrical properties of components from gates to microprocessors.

CSC 314 Data Structures 3. Offered in Fall Spring Summer. Prerequisite: CSC 214 and CSC 224 with a grade of C- or better. A survey of fundamental abstract data types along with efficient implementations for each. Emphasizes asymptotic running time as a measure of program performance. Lists, stacks, queues, sparse arrays, binary trees, heaps, balanced search trees, and hash tables. Illustrative applications such as graph, text-processing, or geometric algorithms.

CSC 316 Data Structures for Computer Scientists 3. Offered in Fall and Spring. Prerequisite: CSC 216 and CSC 226 with a grade of C- or better; CSC, CSU Majors and Minors and CPE Majors. Abstract data types; abstract and implementation-level views of data types. Linear and branching data structures, including stacks, queues, trees, heaps, hash tables, graphs, and others at discretion of instructor. Best, worst, and average case asymptotic time and space complexity as a means of formal analysis of iterative and recursive algorithms.

CSC 326 Software Engineering 3. Offered in Fall and Spring. Prerequisite: CSC 230 and either CSC 314 or CSC 316. Application of product engineering methods to software: quality assurance, project management, requirements analysis, specifications, design, development, testing, production and maintenance.

CSC 333 Automata, Grammars, and Computability 3. Offered in Fall and Spring. Prerequisite: Grade of C- or better in CSC 226, CSC Majors or 2.75 GPA. Study of three classical formal models of computation--finite state machines, context-free grammars, and Turing machines--and the corresponding families of formal languages. Power and limitations of each model. Parsing. Non-determinism. The Halting Problem and undecidability. The classes P and NP, and NP-completeness.

CSC 340 Information Systems Management 3. Offered in Fall and Spring. Prerequisite: MH110. Fundamentals of information systems development and use in organizational setting. Information systems (IS), concepts, hardware, software, telecommunications, database management. IS development, applications and management in telecommunications, database management, various business processes, global issues, security and ethical challenges.

CSC 342 Applied Web-based Client-Server Computing 3. Prerequisite: CSC 216 with a grade of C- or better. This course explores client-server computing on the World Wide Web. The course focuses on the architecture of web-based client-server applications and accepted industry practices. Students work in teams to develop web applications with dynamic content delivery.

CSC 347 Computing: Professionalism and Social Responsibility 3. Professional and social issues associated with computing, and their ethical dimensions. Basics of ethical theory, including utilitarianism and duty-based ethics. Codes of ethics and professional responsibility. Intellectual property, privacy and security, software safety, Malware, including viruses and worms. Hacking and cracking. The impact of new technologies such as artificial intelligence and virtual reality. Social impacts, including depersonalization, accessibility, gender issues and the "digital divide." Credit may not be earned in both CSC 370 and CSC 379. CSC 370 does not carry CSC restricted elective credit.

CSC 354 Ethics in Computing 1. Offered in Spring Only. Discussion of the concern for the way in which computers pose new ethical questions or pose new versions of standard moral problems and dilemmas. Study of ethical concepts to guide the computer professional. Computer professional codes of ethics. Use of case studies to relate to ethical theory. Ethical and legal use of software. Conflicts of interest.

CSC 391 Data and Computer Communications Networks 3. Offered in Fall and Spring. Prerequisite: SI 370 and CSC 246. Basic concepts of data communication networking and computer communications architectures, including packet/circuit/virtual-circuit switching, layered communication architecture and OSI layers, general description of DLC, network and transport layers, some detailed protocol study of Ethernet, ATM and TCP/IP. Credit is not allowed for both CSC 401 and ECE 407.

CSC 402 Network Projects 3. Prerequisite: CSC 401. Under the supervision of faculty members, students engage in projects that may include communication architecture implementation, networking technology assessment, network performance evaluation, and network...
administration. Comprehensive written and oral project report required. No auditing.

CSC 405 Introduction to Computer Security 3. Offered in Fall Only. Prerequisite: CSC 246. Basic concepts and techniques in information security and management such as risks and vulnerabilities, applied cryptography, program security, malicious software, authentication, access control, operating systems security, multilevel security, trusted operating systems, database security, inference control, physical security, and system assurance and evaluation. Coverage of high-level concepts such as confidentiality, integrity, and availability applied to hardware, software, and data.

CSC 411 Introduction to Artificial Intelligence 3. Offered in Spring Only. Prerequisite: CSC 316. Overview and definitions of Artificial Intelligence (AI). Search, including depth-first and breadth-first techniques with backtracking. Knowledge representation with emphasis on logical methods, Horn databases, resolution, quantification, unification, skolemization and control issues; non-monotonic reasoning; frames; semantic nets; AI systems, including planning, learning, natural language and expert systems. An AI programming language may be taught at the instructor's discretion.

CSC 413 Electronic Commerce Technology 3. Offered in Spring Only. Prerequisite: CSC 316. An introduction to the technologies underlying electronic commerce. Topics include Web protocols and languages, Web mining, product ontologies, security anonymity, privacy, recommendation systems, personalization, auctions, trading agents, and intellectual property.

CSC 416 Introduction to Combinatorics 3. Offered in Spring Only. Prerequisite: MA 225 or CSC 226. Basic principles of counting: addition and multiplication principles, generating functions, recursive methods, inclusion-exclusion, pigeonhole principle; basic concepts of graph theory: graphs, digraphs, connectedness, trees; additional topics from: Polya theory of counting, Ramsey theory; combinatorial optimization - matching and covering, minimum spanning trees, minimum distance, maximum flow; sieves; mobius inversion; partitions; Gaussian numbers and q-analogues; bijections and involutions; partially ordered sets.

CSC 417 Theory of Programming Languages 3. Offered in Fall and Spring. Prerequisite: CSC 316. Theory of programming languages with emphasis on programming language semantics and implementation issues. Formal models of syntax and semantics. Static versus dynamic scoping. Parameter passing mechanisms. Garbage collection. Programming in alternate paradigms such as applicative, functional, logic, and object-oriented programming languages.

CSC 422 Automated Learning and Data Analysis 3. Offered in Spring Only. Prerequisite: ST 370 and MA 305, and a grade of C- or better in either CSC 226 or LOG 201. Introduction to the problems and techniques for automated discovery of knowledge in databases. Topics include representation, evaluation, and formalization of knowledge for discovery; classification, prediction, clustering, and association methods. Selected applications in commerce, security, and bioinformatics. Students cannot get credit for both CSC 422 and CSC 522.

CSC 423 Information Resources Management 3. Prerequisite: CSC/BUS 340. Information Resources Management as a process that encompasses strategic planning, the implementation of new technology, dramatic changes to both the corporate Management Information Services and traditional information systems architecture, and the emerging role of end user computing to enable a business enterprise to operate effectively. May not be used as a CSC restricted elective.

CSC 427 Introduction to Numerical Analysis I 3. Offered in Fall Only. Prerequisite: MA 301 and programming language proficiency. Theory and practice of computational procedures including approximation of functions by interpolating polynomials, numerical differentiation and integration, and solution of ordinary differential equations including both initial value and boundary value problems. Computer applications and techniques.

CSC 428 Introduction to Numerical Analysis II 3. Offered in Fall and Spring. Prerequisite: MA 405 and programming language proficiency; MA (CSC) 427 is not a prerequisite. Computational procedures including direct and iterative solution of linear and nonlinear equations, matrices and eigenvalue calculations, function approximation by least squares, smoothing functions, and minimax approximations.

CSC 431 File Organization and Processing 3. Offered in Fall and Spring. Prerequisite: CSC 230 and CSC 316. Hardware characteristics of storage devices. Basic file organizations including sequential, direct, and indexed sequential; hashing and collision resolution; perfect hashing; signatures; bloom filters; sorting and other bit level structures. Tree structures including binary search trees, B-trees, and tries. Dynamic hashing techniques. Structures including grid files. Applying file structures to practical problems.

CSC 440 Database Management Systems 3. Offered in Fall Only. Prerequisite: CSC 316, CSC Majors. Introduction to database concepts. This course examines the logical organization of databases: the entity-relationship model; the relational data model and its languages. Functional dependencies and normal forms. Design, implementation, and optimization of query languages; security and integrity, concurrency control, transaction processing, and distributed database systems.

CSC 441 Introduction to Simulation 3. Offered in Fall and Spring. Prerequisite: MA 242, ST 372, programming proficiency. Discrete-event stochastic simulation for the modeling and analysis of systems. Programming of simulation models in a simulation language. Input data analysis, variance reduction techniques, validation and verification, and analysis of simulation output. Random number generators and random variate generation.

CSC 450 Web Services 3. Offered in Spring Only. Prerequisite: CSC 316. Concepts, theories, and techniques for Web services. This course examines architectures for Web applications based on the classical publish, find, and bind triangle. It considers the description, discovery, and engagement of Web services. It emphasizes Web service composition. Key topics include semantics, transactions, processes, agents, quality of service, and compliance.

CSC 451 Operating Systems 3. Offered in Fall and Spring. Prerequisite: CSC 246, CSC 230, and CSC 316. Design and implementation of operating system internals. Structure of an operating system kernel, process synchronization primitives, interrupt handlers, and device drivers. Details of the run-time environment supporting high level languages for concurrent programming. Programming required.

CSC 453 Software for Wireless Sensor Systems 3. Offered in Spring and Summer. Prerequisite: (CSC 246 or ECE 306) and CSC 230 and CSC 316. Development of software for wireless computer systems. Software designs for applications and networking in this environment, including algorithms for ad hoc discovery, routing, and secure data transfer. Software interface to related sensors and subsystems including global positioning system. Algorithms for power management. Programming required.
CSC 454 Human-Computer Interaction 3. Offered in Spring Only. Prerequisite: CSC 316. A survey of concepts and techniques for user interface design and human computer interaction. Emphasizes user-centered design, interface development techniques, and usability evaluation.

CSC 456 Computer Architecture and Multiprocessors 3. Offered in Spring Only. Prerequisite: CSC 236 and CSC 316. Major components of digital computers and the organization of these components into systems. Begins with single processor systems and extends to parallel systems for multiprocessing. Topics include computer organization, instruction set design, cache memory, pipelined processors, and multiprocessors. Recent developments in PC and desktop architectures are also studied.

CSC 460 Digital Systems Interfacing 3. Prerequisite: A grade of C- or better in either ECE 206 or CSC 312. Concepts of microcomputer system architecture and applications to fundamental computer hardware. Theoretical and practical aspects of interfacing and a variety of microprocessor peripheral chips with specific microprocessor/microcomputer systems from both hardware and software points of view.

CSC 461 Computer Graphics 3. Offered in Fall Only. Prerequisite: MA 305, CSC 230 and CSC 316. Principles of computer graphics with emphasis on two-dimensional and aspects of three-dimensional raster graphics. Topics include: graphics hardware devices, lines and polygons, clipping lines and polygons to windows, graphical user interface, vectors, projections, transformations, polygon fill. Programming projects in C or C++.

CSC 462 Advanced Computer Graphics Projects 3. Offered in Spring Only. Prerequisite: CSC 461, CSC Majors. Principles of computer graphics with emphasis on three-dimensional graphics. Topics include: 3-D projections and transformations, curves and surfaces, color and texture, animation, visualization, and global illumination techniques. Programming project required.

CSC 467 Multimedia Technology 3. Offered in Spring Only. Prerequisite: CSC 246. Methods of creating, recording, compressing, parsing, editing and playing back on a computer the following media: sound, music, voice, graphics, images, video, and motion. Introduction to basic principles: signal processing, information theory, real-time scheduling. Also includes discussion of standards, programming tools and languages, storage and I/O devices, networking support, legal issues, user interfaces, and applications. Includes significant hands-on experience.

CSC 471 Software Process and Development Tools 3. Offered in Fall Only. Prerequisite: CSC 246 and CSC 316. A study of project software management, development and computer-based software engineering tools. Topics include: team-work, software standards and processes, personal software process, computer-based software engineering (CASE) tools (e.g., CASE tools for classical and object-oriented software specification, analysis, design, verification, validation, testing, and maintenance.)

CSC 474 Information Systems Security 3. Offered in Spring Only. Prerequisite: CSC 230. Basic concepts and techniques in information security and management such as risks and vulnerabilities, applied cryptography, authentication, access control, multilevel security, multilateral security, network attacks and defense, intrusion detection, physical security, copyright protection, privacy mechanisms, security management, system assurance and evaluation, and information warfare. Coverage of high-level concepts such as confidentiality, integrity, and availability applied to hardware, software, and data. Credit not allowed for both CSC 474 and CSC 574.

CSC 481 Computer Game Design and Development 3. Offered in Fall Only. Prerequisite: CSC 316. An introduction to the technologies and practices underlying computer and console game development and the principles involved in effective game design and production. Topics include computer game graphics, sound and audio, level design, principles of gameplay, interactive storytelling, character control and artificial intelligence, user interface design. Programming project required.

CSC 482 Advanced Computer Game Projects 3. Offered in Spring Only. Prerequisite: CSC 481. Principles of computer game development with emphasis on 3D first-person game engines. Topics include: advanced character behavior control, procedural content generation, large scale multi-player game design and infrastructure, serious games for education, training and other applications, the game production pipeline and project built on top of a commercial game engine. Consideration of the game production pipeline, including project pitches, requirements and design detail. Programming project with written and oral reporting is required. Enrollment open to CSC majors only.

CSC 485 Innovating in Technology 3. Offered in Fall Only. Prerequisite: CSC 316. Importance of innovation to the success of the technical individual, State, and Nation. Techniques for becoming more innovative. Innovations important to recent generations. Innovations needed to help humankind. Applying new technologies, e.g. search engines and the Internet, to innovation. Strategies for innovation. Why ideas fail. Why failures are important to successes. Factors influencing success, especially the human interface. Students will develop proof-of-concept prototype or requirements document, write proposal for potential funding, and make oral presentation of innovation. Team work encouraged.

CSC 489 Fundamentals of Computer Science 3. Offered in Fall Only. Provides the background for graduate students who do not have an undergraduate degree in computer science to take selective, graduate-level computer science courses. Computer organization from both hardware and software viewpoints is discussed. Includes computer system organization, digital logic, microprogramming, conventional machine language, operating systems, assembly language, advanced computer architectures, and data structures.

CSC 492 Senior Design Project 3. Offered in Fall and Spring. Prerequisite: CSC 326 ; CSC Majors. Application of software engineering principles and basic computer science to the total development of a software system. Consideration of the software system design process, including requirements and design detail. Development and evaluation of a prototype accomplished through design team activity. Comprehensive written and oral report is required.

CSC 495 Special Topics in Computer Science 1-6. Offered in Fall Spring Summer. Used for the following types of study: readings in the literature of computer science, introductory research projects, major computer programming projects, seminars, or new course development. Work may be done in any CSC area such as software, hardware utilization, programming languages, numerical methods or telecommunications. Departmental Approval Required.

CSC 499 Independent Research in Computer Science 1-6. Offered in Fall Spring Summer. Independent investigation of a research problem under faculty supervision. Departmental Approval Required.
In this second semester studio, the students will further exercise their craftsmanship in the development and making of all studio-based work creatively through design as they secure a skillful level of related to design and students are guided and encouraged to think critically about phenomena such as Light Effects, Mechanics interdisciplinary curricular framework that is a “First Year Experience.” This 4-credit Fall semester course encourages entering freshman with a comprehensive introduction to foundational design concepts and methods representative of creative thought and activity across design and artistic disciplines. An integral component of the design disciplines.

D 104 First Year Studio I 4. Offered in Fall Only. Prerequisite: D100 and D102. First Year Studio I provides College of Design freshman with a comprehensive introduction to foundational design concepts and methods representative of creative thought and activity across design and artistic disciplines. An integral component of the larger interdisciplinary curricular framework that is a “First Year Experience.” This 4-credit Fall semester course encourages entering freshman to think creatively through design and art, and the world around them, as they secure a skillful level of craftsmanship in the development and making of all studio-based work.

D 105 First Year Studio II 4. Offered in Spring Only. Prerequisite: D100, D102, D104 and Corequisite: D101 and D103. First Year Studio II is the continuation of the comprehensive introduction to foundational design concepts and methods representative of creative thought and activity across design and artistic disciplines, started in First Year Studio I. Spring semester is an integral component to the larger interdisciplinary curricular framework that is a “First Year Experience”. This four credit Spring semester course encourages First Year Students to think critically about phenomena such as Light Effects, Mechanics and Motion and Human Measurements and Scale. The topics are related to design and students are guided and encouraged to act creatively through design as they secure a skillful level of craftsmanship in the development and making of all studio-based work. In this second semester studio, the students will further exercise their design thinking abilities and improving their skills, methods and knowledge of design practice through assignments related to more focused and smaller scale than the first semester. The st.

D 231 Design History for Engineers and Scientists 3. Offered in Fall and Spring. Study of historical connections among various disciplines and across cultures from prehistory to the present, with an emphasis on design. Students develop visual timelines of events to better understand how seemingly disparate disciplines affect one another. Special attention paid to scientific, artistic, and philosophical "revolutions" and their impact upon each other and upon other intellectual and practical endeavors.

D 292 Special Topics in Design 1-3. Offered in Fall Spring Summer. Topics of current interest in the college of Design. Used to develop new courses.

D 492 Special Topics in Design 1-6. Offered in Fall Spring Summer. Topics of current interest in the College of Design. Used to develop new courses.

DANCE

DAN 264 Ballet 1. Offered in Fall and Spring. Beginning level ballet technique course. Fundamental ballet concepts and vocabulary introduced through barre and center exercises and combinations.


DAN 274 Modern Dance I 1. Offered in Fall and Spring. Introduction of movement and dance concepts and techniques through theory and analysis, improvisation and composition, structured dance exercises combinations.

DAN 275 Modern Dance II 1. Offered in Fall and Spring. Prerequisite: PE/DAN 274. Continuation of Modern Dance I. Emphasis on design of body in space, movement qualities and musicality through structured technical exercises and combinations.

DAN 290 Special Topics in Dance 1-4. Examination of selected topics in dance. May be repeated for credit provided course content is different each time.

DAN 295 Problems of Dance Performance 2. Offered in Fall and Spring. Practical performing experience in a company setting. Rehearsal, performance and production of concert dance.

DAN 498 Independent Study in Dance 1-3. Offered in Fall Spring Summer. Prerequisite: DAN 272, Dan 295, Dance Program approval required. Independent study in special choreographic or performance projects approved by and done under the direction of the Dance Program.
The course will provide students a way of seeing the parallel development of the arts in these various cultures, while providing insight into the impact of early design on later periods of art and design. Required for all Design Studies majors. 15 seats per year will be reserved for Design Studies majors.

**DS 203 History of Design III: From Newton's Cenotaph to After Apple.** Offered in Spring Only. DS 203 covers the history of design from the Industrial Revolution to the present day. It covers both western or European history, as well as the design history of Asia, India, and the Americas. The course will provide students a way of seeing the parallel development of the arts in these various cultures. Required for all Design Studies majors. 15 seats per year will be reserved for Design Studies majors.

**DS 244 Material Culture and Industrial Design.** Offered in Spring Only. DS 244 covers the history of technology and industrial design. The course is divided into three major units: technology, design, and materials before the industrial revolution; the impact of the industrial revolution; and current and future developments of the field. Required for all Design Studies majors. 15 seats reserved for Design Studies majors.

**DS 251 History of Aesthetics I, From the Pre-Socratic through the Renaissance.** Offered in Spring Only. This course examines in depth and from a cross-disciplinary perspective the history of aesthetics from Plato through the Renaissance. The course focuses on Plato's theory of Beauty and compares it to Aristotle and follows this tradition through the middle ages and the Renaissance. Additionally, time will be spent looking at and studying artifacts from various periods in light of aesthetic theories.

**DS 352 History of Aesthetics II, Seventeenth and Eighteenth Centuries.** Offered in Fall Only. Prerequisite: DS 251. Open university wide, but preference given to Design Studies Majors. This course examines the nascent period of modern aesthetic theory. Beginning with Newton's science and Locke's epistemology, it looks at how this arid, mathematical, and additive view of the physical world and the imagination altered over the course of the eighteenth century to the entirely new vision of the Romantics, engendered by a century of reaction to Locke and systemized by Immanuel Kant, who saw the physical world as fecund and the imagination as a faculty more significant that reason.

**DS 353 History of Aesthetics III, Nineteenth Century.** Offered in Spring Only. Prerequisite: DS 352. Open university wide, but preference given to DS Majors. Beginning with Kant's notion of the imagination the course examines the Idealist tradition in Germany and the rise of the Romantic Movement throughout the Western World. We will also look at opposing traditions including the empirical and scientific tradition supported by the Darwinian Revolution. The course also draws on previous courses in aesthetics to see how early theories of the arts are transformed during the nineteenth century in light of the industrial revolution and the revolutions inscience.

**DS 360 Iconography.** Offered in Spring Only. Prerequisite: DS 251. Preference given to Design Studies Majors. This course is designed to familiarize the student with standard iconography used in both the various fine arts and in design. Students will study Greek, Roman, and Christian pictorial motives and their allegorical meanings. Additionally, students will examine how design artifacts have symbolic meaning without directly using mythological or religious symbols. The topic will then be extended to the present day use of signs and symbols in art, buildings, and various design products.

**DS 454 History of Aesthetics IV, Twentieth Century.** Offered in Fall Only. Prerequisite: DS 353. Open University wide, but preference given to Design Studies Majors. This course examines the rise of Modern Aesthetics. The course analyzes the effects of nineteenth century science on aesthetic theory, and opposing metaphysical theories. Of significant importance to the course will be the contributions of Casteter and Panofsky's Philosophy of Symbolic Form. The idea of Modernism, as embodied in the philosophy of the Bauhaus will form a core component of the course. Towards the end of the course, current theories will be examined, including Marxism and Capitalism, Feminism, and Post-Modernism.

**DS 481 Design Studies Senior Research Seminar.** Offered in Fall Only. Each student in Design Studies will develop a topic for his or her Senior Capstone Research Paper to be done during the Spring term. During the Research semester, each student will develop a comprehensive bibliography for the topic and an outline of the paper. One paper will be written before the end of the term that addresses issues directly related to the Capstone Research paper. Throughout the term, students will share their research with others in the seminar.

**DS 482 Design Studies Capstone Seminar.** Offered in Spring Only. Prerequisite: DS 481. Design Studies Majors. Students will meet on a weekly basis to discuss their individual research papers. Drafts of papers will be due at the end of the eighth week of class. Drafts will be read by the instructor, other instructors of the student's choosing, and by two other members of the class for critical analysis.

**DS 483 Design Studies Capstone Research Paper.** Offered in Spring Only. Prerequisite: DS 481. Design Studies Majors. Course consists of guided independent study resulting in a serious research paper. Students will work on their own, with meetings with faculty advisor(s) at weekly intervals.

**DS 494 Design Studies Internship.** 1-6. Offered in Fall Spring. Supervised internships in museums, galleries, schools, or other approved venues, in which students are engaged in activities related to Design Studies. Students are responsible for transportation to and from internships.
E 101 Introduction to Engineering & Problem Solving 1. Offered in Fall Only. An introduction to the College of Engineering as a discipline and profession. Emphasis on engineering design, interdisciplinary teamwork, and problem solving from a general engineering perspective. Overview of academic policies affecting undergraduate engineering students. Exposure to College of Engineering and university-wide programs and services.

E 110 Engineering Scholars Forum 6. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

E 111 Engineering Scholars Forum 6. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

E 115 Introduction to Computing Environments 1. Offered in Fall Spring Summer. Introduction to the NC State computing system, and to student-owned computing resources. Includes topics such as maintaining your own computer, learning about campus-based computing resources and applications (how to access and use them), ethics and professionalism in the use of computing resources, introduction to web development and other campus resources.

E 123 Engineering 1-2-3: Product and Processing Engineering 2. Offered in Fall and Spring. Introduction to product and process (1) usage, (2) assembly, and (3) engineering calculations and design through the case study approach. Working in teams of two, students explore bar code scanners and inventory systems, compact disc audio and CD-ROM information storage and retrieval, photocopier and FAX devices, optical fiber communications and probes, video camera and video cassette recorder, and water purification technologies.

E 144 Academic and Professional Preparation for Engineering I 1. Offered in Fall Only. Assist new freshmen engineering students in the transition from high school to the collegiate environment. Cover critical-thinking, problem solving techniques, academic skills and time management.

E 145 Academic and Professional Preparation for Engineering II 1. Offered in Spring Only. Engineering as a field of study and profession. Career and professional development, goal setting, decision making and effective communication strategies.

E 210 Engineering Scholars Forum 6. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

E 211 Engineering Scholars Forum 6. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

E 432 Patents, Trademarks and Copyrights 3. Offered in Spring Only. Patent, trademark and copyright problems that arise in engineering, scientific and industrial pursuits. Includes the rights and remedies available to individual inventors and authors as well as companies. Patent Office procedures and practices.

E 490 Fundamentals of Engineering(FE) Exam Preparation 1. Offered in Fall and Spring. Preparation for graduating seniors in engineering to take the Fundamentals of Engineering (FE) Examination. Information on how to register for the FE exam, exam strategy, and a review of selected science and engineering topics through active learning exercises directed at working sample examination problems. Credit may not be counted toward graduation.

E 497 Engineering Research Projects 1-3. Offered in Fall Spring Summer. Projects in research, design or development in engineering or computer science.

EAC 301 Introduction to Leadership Fundamentals 3. Offered in Fall and Spring. This course will provide basic understandings of the components of leadership that can be applied to their current and future leadership experiences on campus or in their individual communities, and to provide a model of critical reflection for those applications.

EAC 496 Special Topics in Adult Learning and Leadership 1-6. Exploration of specialized areas and topics of current interest in adult learning and leadership.

EC 201 Principles of Microeconomics 3. Offered in Fall Spring Summer. Scarcity, production possibilities, and opportunity cost. Supply and demand analysis, free markets, the price system, and government policy. Microeconomic analysis of business decisions in competitive and noncompetitive markets. Labor markets, capital, and natural resource markets, and externalities. Market breakdown, income redistribution, and role of government. Free trade, tariffs, and gains from international trade. Credit will not be given for both EC 201 and either ARE 201 or EC 205.

EC 202 Principles of Macroeconomics 3. Offered in Fall Spring Summer. Prerequisite: EC 201 or ARE 201. Aggregate economic analysis emphasizing current public policy issues. Determinants of level and rate of growth of total output. Causes of unemployment and business cycles, inflation, and exchange rate fluctuations. Effects of monetary policy (money supply) and fiscal policy (government spending, taxes, deficits) on these problems. Trade surpluses/deficits and impact of international events and policies on national economies. Credit will not be given for both EC 202 and EC 205.

EC 205 Fundamentals of Economics 3. Offered in Fall Spring Summer. Fundamental ideas in economics: scarcity, substitution, opportunity cost, marginal analysis, gross domestic product, real and nominal magnitudes. Supply and demand analysis. Microeconomic analysis of pricing in competitive and noncompetitive markets. Macroeconomic analysis of production, employment, the price level, and inflation. Monetary and fiscal policy and the stabilization of the economy. Comparative advantage and international trade. Credit will not be given for both EC 205 and either EC 201 or ARE 201. Credit will not be given for both EC 205 and EC 202.
EC 301 Intermediate Microeconomics 3. Prerequisite: MA 121 or MA 141; EC 201 or EC 205 or ARE 201. Functioning of the market economy, role of prices in determining the allocation of resources, the functioning of the firm in the economy, forces governing the production and consumption of economic goods. Credit not allowed in more than one of EC 301, 310, 401.

EC 302 Intermediate Macroeconomics 3. Offered in Fall Spring Summer. Prerequisite: (EC 201 or EC 205 or ARE 201) and (MA 121 or MA 131 or MA 141). Applied, analytical course in aggregate economics: business cycles, stabilization policy, inflation, costs of disinflation, international trade, and economic growth. Interaction of consumers and businesses with government economic policies; unemployment, interest rates, and output growth. Impacts of government deficits, trade deficits, and monetary policies.

EC 304 Introduction to Financial Markets and Institutions 3. Offered in Fall Spring Summer. Prerequisite: EC 201 or EC 205 or ARE 201. Financial assets, markets and institutions. Stock and bond markets. Measurement and determination of rates of return on financial assets. Banks and other financial intermediaries including their management and regulation. Roles of the Federal Reserve System and monetary policy in determining interest rates, economic activity and foreign exchange rates. Credit will not be given for both EC 304 and EC 404.

EC 305 A Closer Look at Capitalism 3. Prerequisite: EC 201 or EC 205 or ARE 201. Comparison of market allocation to government allocation. Criteria for evaluating economic systems. How markets create value. Relationship of economic freedom to political freedom and economic growth. Applications to policies such as antitrust policy, education policy, and environmental policy.

EC 310 Managerial Economics 3. Prerequisite: EC 201 or EC 205 or ARE 201. Microeconomic principles applied to decision-making in the firm. Present value analysis. The relationship between accounting and economic concepts of cost. Criteria and procedures for decision-making under uncertainty. Economic allocation by markets and the price system. Sources of market power and competitive advantage. Applications to product pricing and advertising. Credit not allowed in more than one of EC 301, 310, 401.


EC 336 Introduction to Resource and Environmental Economics 3. Offered in Fall and Spring. Prerequisite: ARE 201 or EC 201 or EC 205. Application of basic economic tools to understand and evaluate environmental/resource policies. Concepts such as property rights, non-market goods, allocation of economic goods, and public goods. Current policy issues such as global climate change, evaluating natural resource damages from oil spills, reducing the costs of regulations, protecting estuaries, and dealing with non-point source pollution.

EC 348 Introduction to International Economics 3. Offered in Fall Spring Summer. Prerequisite: EC 201 or EC 205 or ARE 201. Application of basic economic analysis to international economic events and policies. Gains from trade, impacts of trade restrictions, international systems of payments, global capital markets, and balancing international with domestic macroeconomic policies. Current policy issues such as economic integration (customs unions and free trade areas), a common European currency, and the role of international trade in economic growth and development.

EC 351 Data Analysis for Economists 3. Offered in Fall Only. Prerequisite: (BUS/ST 350 or ST 302 or ST 361 or ST 370 or ST 372). Tools for describing and analyzing data as used in economics. Probability, random variables, sampling, point and interval estimation. Hypothesis testing and regression analysis with emphasis on economic applications.

EC 372 Evolution of American Business 3. Offered in Fall and Spring. Prerequisite: EC 201 or EC 205 or ARE 201. Historical development of modern business enterprise from the Colonial Era through World War II. Emphasis on the transformation of business practices in response to technological change, evolution of capital markets, growth of international trade, changes in distribution techniques, entrepreneurship, and the influence of government regulation.

EC 377 The Political Economy of the Market Process 3. Offered in Spring Only. Prerequisite: EC 201 or 205 or ARE 201. The institutional, philosophical and economic foundations of markets. Social and political implications of private property, voluntarism and the forms of social cooperation derived from markets. The effects of public policies intended to alter the economic outcomes of markets. The morality of markets, legal and institutional settings, cooperation and the nature of exchange, the social function of prices.

EC 404 Money, Financial Markets, and the Economy 3. Prerequisite: (EC 302 or BUS 320) and (BUS/ST 350, or ST 361, or ST 370, or ST 372). Roles of money, credit, and financial institutions in the modern economy. Determination of level and structure of interest rates and exchange rates, determination of security prices. Management and regulation of financial institutions. Federal Reserve System and monetary policy. Statistical analysis of financial and monetary data. Credit will not be given for both EC 304 and EC 404.

EC 410 Public Finance 3. Offered in Fall and Spring. Prerequisite: EC/ARE 301 or EC 310. A micro-economic analysis of the rationale for public expenditure and taxation. Externalities, pollution and public policy, income redistribution and public welfare, public goods, collective choice and political institutions, public budgeting techniques and cost-benefit analysis, taxation and tax policy, state-local finance and fiscal federalism.

EC 413 Competition, Monopoly and Public Policy 3. Offered in Spring Only. Prerequisite: EC/ARE 301 or EC 310. Current theories of industrial organization with specific reference to such topics as cartels, industrial concentration, vertical integration, franchise contracts, ownership and control of firms, multipart and discriminatory pricing, and tie-in sales. Economic aspects of antitrust law and government regulation of industry.

EC 431 Labor Economics 3. Offered in Fall and Spring. Prerequisite: EC/ARE 301 or EC 310. An economic approach to the labor market and its problems including unemployment and the determination of wages, hours and working conditions under various labor market structures. The economic effects of trade unions. Introduction to human capital theory.


EC 436 Environmental Economics 3. Offered in Spring Only. Prerequisite: EC/ARE 301 or EC 310. Usefulness of economics in understanding pollution, congestion, conservation and other environmental problems. Relevant economic tools such as pricing
schemes, abatement cost curves, damage functions and benefit-cost analysis. Pollution taxes, regulations, marketable permits and subsidies considered in designing alterations, in the incentive system. Current public policy alternatives in the context of non-market decision-making.

**EC 437 Health Economics** 3. Offered in Fall and Spring. Prerequisite: ECARE 301 or EC 310. Application of micro-economic tools to the analysis of public and private policy issues concerning health care financing and delivery in the United States.

**EC 442 Evolution of Economic Ideas** 3. Offered in Fall and Spring. Prerequisite: ECARE 301 or EC 310. General development of economic ideas from ancient times through the post-Keynesian period. Emphasis on the classical school and developments thereafter. The evolution of economic ideas in the context of the changes in technology and the increasing complexity of economic activity.

**EC 448 International Trade** 3. Offered in Fall and Spring. Prerequisite: ECARE 301 or EC 310. Determinants of commodity composition of trade and analysis of tariffs, quotas, and transport costs. Treatment of international investment including multinational corporations. Analysis of the effects of tariffs and quotas. Relationship between international trade and economic growth.

**EC 449 International Finance** 3. Offered in Fall and Spring. Prerequisite: ECARE 301 or EC 310. Study of international markets and their effects on firms, investors and national economics. Topics include: futures and options in foreign exchange, management of foreign exchange risk, exchange rate determination, and macroeconomic policy in an open economy.

**EC 451 Introduction to Econometrics** 3. Offered in Spring Only. Prerequisite: (ECARE 301 or EC 310) and EC 302 and EC/ST 351. The measurement, specification, estimation and interpretation of functional relationships through simple and multiple regression, curvilinear regression and various transformations to demand, cost, production, consumption and investment relationships.

**EC 452 Forecasting for Business and Economics** 3. Prerequisite: EC 351. The use of statistical tools to develop forecasts for business and economics. Data collection problems and types of data. Time series approach to forecasting. Use of regressions and surveys for forecasting. Forecast evaluation and presentation of forecasts.

**EC 471 Evolution of the American Economy** 3. Offered in Spring Only. Prerequisite: ECARE 301 or EC 310. Relationship of modern economic development to the history of America. Analysis of contemporary problems and issues with reference to their origins in the historical growth of the economy.

**EC 472 The Rise of Industrialism** 3. Offered in Fall and Spring. Prerequisite: ECARE 301 or EC 310. Historical development of the modern industrial economy from origins in medieval and early modern Europe. The industrial revolution in England and its diffusion throughout the western world and beyond.

**EC 474 Economics of Financial Institutions and Markets** 3. Offered in Spring Only. Prerequisite: [MA 121 or MA 131 or MA 141], and [BUS 320 or EC 302]. Management, development and regulation of U.S. financial markets and institutions. Management of major financial intermediaries and their historical development. Analysis of major financial assets and their markets. The role and history of the Federal Reserve and other financial regulators.

**EC 480 Introduction to Economic Research** 3. Offered in Spring Only. Prerequisite: (EC 301 or EC 310) and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372). Finding economic data. Critically analyzing newspaper and journal articles using economic reasoning. Developing, writing, and presenting economic analysis.

**EC 490 Research Seminar in Economics** 3. Offered in Fall and Spring. Prerequisite: (EC/ARE 301 or EC 310) and EC 302; and (BUS/ST 350, or ST 302, or ST 361, or ST 370, or ST 372). The final course for students completing the undergraduate programs in economics. Students study a selected economic issue, make classroom presentations related to the seminar topic, and write research papers.

**EC 491 Economics of Business Strategy** 3. Prerequisite EC 351 and Corequisite: EC 452. Capstone course for students in the business economics concentration. Application of analytical economics to strategic decisions in business. Students will analyze and present case studies of strategic issues.

**EC 495 Special Topics in Economics** 1-6. Examination of special topics in economics not normally treated in other courses, or offering of new courses on a trial basis.

**EC 498 Independent Study in Economics** 1-6. Offered in Fall Spring Summer. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction on a tutorial basis. Credits and content determined by faculty member in consultation with Director of Undergraduate Programs.

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**COUNSELOR OF EDUCATION**

**ECD 220 College Student Development and Peer Counseling** 2. Offered in Fall and Spring. Developmental issues of young adulthood with opportunity for the acquisition of paraprofessional counseling skills and crisis intervention skills. Major consideration is given to self-awareness and values clarification through utilization of personality inventories and self-assessment instruments. Priority will be given to resident advisors and students active in student organizations or volunteer programs.

**ECD 221 Career Planning and Personal Development** 3. Offered in Fall and Spring. Knowledge, attitudes, self-understanding, and skills needed to enhance career planning and foster personal development. Study of self-understanding, self-talk, goal setting, the environment, and decision making as ways to adapt more effectively to the challenges of life.

**ECD 223 Orientation Counselor Training** 2. Offered in Spring Only. For new student orientation counselors. Relevant research, student development theory, and shared professional experiences are presented. Class discussion, small group activities, simulations, and journal writing employed. Individual projects and/or out-of-class team building experience are required. Consent of Department.

**ECD 224 Student Development and Peer Mentoring** 2. Offered in Fall Only. For new student peer mentors of primarily African American freshmen. Relevant student development, psychology and counseling research and theory as well as shared professional experiences are presented. Class discussion, group activities, role playing, relevant readings and video are employed. Reaction papers and project are required.

**ECD 296 Special Topics in Education: Counselor Education** 1-3. Offered in Fall Spring Summer. Individual or group study of special
topics in professional education. The topic and mode of study are determined by the faculty member after discussion with the student.

**ECE 109 Introduction to Computer Systems** 3. Offered in Fall Spring Summer. Introduction to key concepts in computer systems. Number representations, switching circuits, logic design, microprocessor design, assembly language programming, input/output, interrupts and traps.

**ECE 200 Introduction to Signals, Circuits and Systems** 4. Offered in Fall Spring Summer. Prerequisite: Cumulative GPA 2.5 or above, C- or better in MA 241 and PY 205. Ohm's law and Kirchhoff's laws; circuits with resistors, photocells, diodes and LEDs; rectifier circuits; first order RC circuits; periodic signals in time and frequency domains, instantaneous, real and apparent power; DC and RMS value; magnitude andpower spectra, dB, DBW, operational amplifier circuits, analog signal processing systems including amplification, clipping, filtering, addition, multiplication, AM modulation sampling and reconstruction. Weekly hardware laboratory utilizing multimeter, function generator, oscilloscope and spectrum analyzer and custom hardware for experiments on various circuits and systems.

**ECE 206 Introduction to Computer Organization** 3. Offered in Fall Spring Summer. Prerequisite: GPA 2.5 or above, with a C- or better in MA 241 and PY 205. Binary number system, computers, processors, instructions, memory, input/output, interrupts and traps, direct memory access, structured program development.

**ECE 209 Computer Systems Programming** 3. Offered in Fall Spring Summer. Prerequisite: Grade of C- or better in ECE 109. Computer systems programming using the C language. Translation of C into assembly language. Introduction to fundamental data structures: array, list, tree, hash table.

**ECE 211 Electric Circuits** 4. Offered in Fall Spring Summer. Prerequisite: C- or better in ECE 200 and Corerequisite: ECE 220. Introduction to theory, analysis and design of electric circuits. Voltage, current, power, energy, resistance, capacitance, inductance. Kirchhoff's laws node analysis, mesh analysis, Thévenin's theorem, Norton's theorem, steady state and transient analysis, AC, DC, phasors, operational amplifiers, transfer functions.

**ECE 212 Fundamentals of Logic Design** 3. Offered in Fall Spring Summer. Prerequisite: C- or better in ECE 109 or ECE 206. Introduction to digital logic design. Boolean algebra, switching functions, Karnaugh maps, modular combinational circuit design, latches, flip-flops, finite state machines, synchronous sequential circuit design, datapaths, memory technologies, caches, and memory hierarchies. Use of several CAD tools for simulation, logic minimization, synthesis, state assignment, and technology mapping.

**ECE 220 Analytical Foundations of Electrical and Computer Engineering** 3. Offered in Fall Spring Summer. Prerequisite: C- or better in ECE 200. The modeling, analysis and solution of circuit theory, control, communication, computer, and other system arising in electrical and computer engineering using various analytical techniques. Numerical solutions to ECE problems using MATLAB and SPICE.

**ECE 292 Special Topics in Electrical and Computer Engineering** 1-3. Offered in Fall Spring Summer. Special topics in electrical and computer engineering at the early undergraduate level.

**ECE 301 Linear Systems** 4. Offered in Fall Spring Summer. Prerequisite: A grade of C- or better in ECE 211 and ECE 220. Representation and analysis of linear systems using differential equations: impulse response and convolution, Fourier series, and Fourier and Laplace transformations for discrete time and continuous time signals. Emphasis on interpreting system descriptions in terms of transient and steady-state response. Digital signal processing.

**ECE 302 Microelectronics** 4. Offered in Fall Spring Summer. Prerequisite: A grade of C- or better in ECE 211. Introduction to the physics of semiconductors, PN Junctions, BJT and MOS field Effect Transistors: Physics of operation, IV characteristics, circuit models, SPICE analysis; simple diode circuits; Single Stage Transistor Amplifiers: Common Emitter and Common Source configurations, biasing, calculations of small signal voltage gain, current gain, input resistance and output resistance; Introduction to Differential Amplifiers, Operational Amplifiers.

**ECE 303 Electromagnetic Fields** 3. Offered in Fall Spring Summer. Prerequisite: A grade of C- of better in ECE 211 and ECE 220. Static electric and magnetic fields. Maxwell's equations and force laws. Propagation, reflection and refraction of plane waves. Transient and steady-state behavior of waves on transmission lines.

**ECE 305 Electric Power Systems** 3. Offered in Fall and Spring. Prerequisite: C- or better in ECE 211. Principles, performance and characteristics of power-system components, including direct-current and alternating-current machinery, transformer banks and transmission lines. Principles and analysis of system power flow.

**ECE 306 Introduction to Embedded Systems** 3. Offered in Fall and Spring. Prerequisite: C- or better in ECE 209 and ECE 212. Introduction to designing microcontroller-based embedded computer systems using assembly and C programs to control input/output peripherals. Use of embedded operating system.


**ECE 380 Engineering Profession for Electrical Engineers I**. Offered in Fall and Spring. Prerequisite: ECE 212, ECE 301, and ECE 302. Introduction to engineering as a profession including issues surrounding electrical engineering. Topics include professional and ethical responsibilities, risks and liabilities, intellectual property, and privacy. Economic issues including entrepreneurship and globalization.

**ECE 381 Engineering Profession for Computer Engineers I**. Offered in Fall and Spring. Prerequisite: ECE 212, ECE 301, and ECE 302. Introduction to engineering as a profession including issues surrounding computer engineering. Topics include professional and ethical responsibilities, risks and liabilities, intellectual property, and privacy. Economic issues including entrepreneurship and globalization.
ECE 383 Introduction to Entrepreneurship and New Product Development 3. Offered in Fall and Spring. This course is part of the Engineering Entrepreneurs Program. Students work as team members on projects being led by seniors completing their senior capstone design. Students will be exposed to many areas of product development and will assist in the design and implementation of the prototype product.

ECE 402 Communications Engineering 3. Offered in Fall Spring Summ. Prerequisite: ECE 301, ST 371. An overview of digital communications for wireline and wireless channels which focuses on reliable data transmission in the presence of bandwidth constraints and noise. The emphasis is on the unifying principles common to all communications systems. Examples include digital telephony, compact discs, high-speed modems and satellite communications.

ECE 403 Electronics Engineering 3. Offered in Fall and Spring. Prerequisite: ECE 401, ECE 402. Design and analysis of discrete and integrated electronic circuits, from single-transistor stages to operational amplifiers, using bipolar and MOS devices. Feedback in operational amplifier circuits, compensation and stability. Laboratory design projects.

ECE 404 Introduction to Solid-State Devices 3. Offered in Fall and Spring. Prerequisite: ECE 302. Basic principles required to understand the operation of solid-state devices. Semiconductor device equations developed from fundamental concepts. P-N junction theory developed and applied to the analysis of devices such as varactors, detectors, solar cells, bipolar transistors, field-effect transistors. Emphasis on device physics rather than circuit applications.

ECE 406 Design of Complex Digital Systems 3. Offered in Fall and Spring. Prerequisite: A grade of C- or better in ECE 212. Design principles for complex digital systems: iteration, top-down/bottom-up, divide and conquer, and decomposition. Descriptive techniques, including block diagrams, timing diagrams, register transfer, and hardware-description languages. Consideration of transmission-line effects on digital systems.

ECE 407 Introduction to Computer Communications 3. Offered in Fall and Spring. Prerequisite: ECE 303. Engineering principles of computer communications: summary of digital transmission, media and switching, error control, layering concept, overview of protocols; architectures for local, metropolitan, and wide-area networks; emerging issues in digital communications systems.

ECE 420 Wireless Communication Systems 3. Offered in Fall and Spring. Prerequisite: ECE 402. A study of applications of communication theory and signal processing to wireless systems. Topics include an introduction to information theory and coding, basics and channel models for wireless communications, and some important wireless communication techniques including spread-spectrum and OFDM, MATLAB exercises expose students to engineering considerations.


ECE 422 Transmission Lines and Antennas for Wireless 3. Offered in Fall Only. Prerequisite: ECE 303. Review of time-varying electromagnetic theory. A study of the analytical techniques and the characteristics of several useful transmission lines and antennas. Examples are coaxial lines, waveguides, microstrip, optical fibers and dipole, monopole and array antennas.

ECE 435 Elements of Control 3. Offered in Fall and Spring. Prerequisite: ECE 301. Analog system dynamics, open- and closed-loop control, block diagrams and signal flow graphs, input-output block diagrams and signal flow graphs, input-output relationships, stability analyses using Routh-Hurwitz, root-locus and Nyquist, time- and frequency-domain analysis and design of analog control systems. Use of computer-aided analysis and design tools. Class project.


ECE 437 Distributed Real Time Control Systems 3. Prerequisite: ECE 301 and ECE 306. Principles for designing an intelligent distributed control system which includes multiple embedded microprocessors communicating over a computer network. Design of basic components, modes, input/output interface, and communication network. Real-time implementation issues, such as sampling, task scheduling, and network traffic control. Lab experiments on design of basic components, plus a major design project.

ECE 442 Integrated Circuit Technology and Fabrication 3. Offered in Fall Only. Prerequisite: ECE 404. Semiconductor device and integrated-circuit processing and technology. Wafer specification and preparation, oxidation, diffusion, ion implantation, photolithography, design rules and measurement techniques.

ECE 452 Renewable Electric Energy Systems 3. Offered in Spring Only. Prerequisite: ECE 305 or ECE 331. Principles and characteristics of renewable energy based electric power generation technologies such as photovoltaic systems, wind turbines, and fuel cells. Main system design issues. Integration of these energy sources into the power grid. Economics of distributed generation.

ECE 453 Power System Analysis 3. Offered in Fall Only. Prerequisite: ECE 305. Long-distance transmission of electric power with emphasis on load flow, economic dispatch, fault calculations and system stability. Applications of digital computers to power-system problems. Major design project.

ECE 454 Frontiers of Nanoelectronics 3. Offered in Fall Only. Prerequisite: ECE 302. This course will discuss frontiers of nanoelectronics including fundamentals of silicon based devices and their impact on scaled logic and memory devices as well as organic based devices such as carbon nanotubes and molecular electronics. Additional topics include recent uses of polymer films for memory and photovoltaic applications, quantum confinement in 1D, 2D, and 3D, quantum dots, nanowires and resonant tunneling devices. Included are methods to create and measure nanostructures.

ECE 455 Computer Control of Robots 3. Offered in Spring Only. Prerequisite: ECE 435. Techniques of computer control of industrial robots: interfacing with synchronous hardware including analog/digital and digital/analog converters, interfacing noise problems, control of electric and hydraulic actuators, kinematics and kinetics of robots, path control, force control, sensing including vision. Major design project.
ECE 456 Mechatronics 3. Offered in Fall Only. Prerequisite: ECE 435. The study of electro-mechanical systems controlled by microcomputer technology. The theory, design and construction of smart systems; closely coupled and fully integrated products and systems. The synergistic integration of mechanisms, materials, sensors, interfaces, actuators, microcomputers, controllers, and information technology.

ECE 460 Digital Systems Interfacing 3. Prerequisite: ECE 406. Concepts of microcomputer system architecture and applications to fundamental computer hardware. Theoretical and practical aspects of interfacing and a variety of microprocessor peripheral chips with specific microprocessor/microcomputer systems from both hardware and software points of view.

ECE 463 Advanced Microprocessor Systems Design 3. Offered in Fall and Spring. Prerequisite: ECE 406. Advanced topics in microprocessor systems design, including processor architectures, virtual-memory systems, multiprocessor systems, and single-chip microcomputers. Architectural examples include a variety of processors of current interest, both commercial and experimental. Major design project.

ECE 464 ASIC Design 3. Offered in Spring Only. Prerequisite: ECE 406, ECE 302. Design of digital application specific integrated circuits (ASICs) based on hardware description languages (Verilog, VHDL) and CAD tools. Emphasis on design practices and underlying algorithms. Introduction to deep sub-micron design issues like interconnections and low power and to modern applications including multi-media, wireless. Telecommunications and computing. Required design project.


ECE 466 Compiler Optimization and Scheduling 3. Offered in Fall Only. Prerequisite: ECE 306 and either ECE 309 or CSC 316. Provide insight into current compiler designs dealing with present and future generations of high performance processors and embedded systems. Investigate dataflow analysis and memory disambiguation, classical and parallelism enhancing optimizations, scheduling and speculative execution, and register allocation. Review of techniques used in current research compilers.

ECE 470 Internetworking 3. Offered in Fall and Spring. Prerequisite: ECE 407 or CSC 401. Introduction, Planning and Managing networking projects, networking elements—hardware, software, protocols, applications; TCP/IP, ATM, LAN emulation. Design and implementation of networks, measuring and assuring network and application performance; metrics, tools, quality of service. Network-based applications, Network management and security.

ECE 480 Senior Design Project in Electrical Engineering 3. Offered in Fall and Spring. Prerequisite: ECE 301, ECE 302, ECE 303, ECE 380, and any two ECE specialization Courses. Applications of engineering and basic sciences to the total design of electrical engineering circuits and systems. Consideration of the design process including feasibility study, preliminary design detail, cost effectiveness, along with development and evaluation of a prototype accomplished through design-team project activity. Complete written and oral engineering report required.

ECE 481 Senior Design Project in Computer Engineering 3. Offered in Fall and Spring. Prerequisite: ECE 381, ECE 301, ECE 302, ECE 303, ECE 406 and an ECE specialization elective. Application of engineering and basic sciences to the total design of computer engineering circuits and systems. Consideration of the design process including feasibility study, preliminary design detail, cost effectiveness, along with development and evaluation of a prototype accomplished through design-team project activity. Complete written and oral engineering report required.

ECE 482 Engineering Entrepreneurship and New Product Development I 3. Offered in Fall and Spring. Prerequisite: ECE 383 (with a grade of C- or better). Applications of engineering, mathematics, basic sciences, finance, and business to the design and development of prototype engineering products. This course requires a complete written report and an end-of-course presentation. This is the first course in a two semester sequence. Students taking this course will implement their designed prototype in ECE 483: Senior Design Project in Electrical Engineering and Computer Engineering II—Engineering Entrepreneurs. Departmental approval required.

ECE 483 Engineering Entrepreneurship and New Product Development II 3. Offered in Fall and Spring. Prerequisite: ECE 301, ECE 302, ECE 303, ECE 383, and any two ECE specialization courses. Applications of engineering, science, management and entrepreneurship to the design, development and prototyping of new product ideas. Based on their own new product ideas, or those of others, students form and lead entrepreneurship teams (eTeams) to prototype these ideas. The students run their eTeams as virtual startup companies where the seniors take on the executive roles. Joining them are students from other grade levels and disciplines throughout the university that agree to participate as eTeam members. Departmental approval required.

ECE 492 Special Topics in Electrical and Computer Engineering 1-4. Offered in Fall and Spring. Offered as needed for development of new courses in electrical and computer engineering.

ECI 102 Introduction to Middle Grades Education 2. Offered in Fall and Spring. Introduction to the Middle Grades Academy and middle school teaching from the perspective of “What do I bring to teaching?” Students will formulate an initial teaching philosophy as well as engage in an introspective examination of their beliefs, attitudes, talents, strengths, and weaknesses in relation to teaching early adolescents. Students are required to provide their own transportation.

ECI 185 Introduction to Academic Discourse & Learning 3. Offered in Fall Only. Socializes students to the intellectual conventions of the university by focusing on the learning process and critical thinking with academic discourse, both written and oral.

ECI 201 Intro to Instructional Technology for Educators 2. Offered in Spring Only. Beginning teachers in North Carolina are required to demonstrate mastery of technology skills, to be able to use that technology in their classrooms and teach the state computer skills curriculum. This hands-on course covers the basic skills included in the National Educational Technology Standards for Teachers. In this course students will begin the process of creating technology artifacts for the teaching portfolio, required for initial licensure.

ECI 205 Introduction to Teaching Humanities and social Sciences 3. Offered in Fall and Spring. For prospective teachers in secondary and middle years social studies, English, language arts, and foreign languages. An emphasis on differing aspects and procedures of instruction and analysis of competencies required of teachers. Field work in a variety of education settings including an extended period in one curriculum area.
ECI 210 Introduction to College Tutoring 1. Offered in Fall and Spring. Development of basic tutoring skills. Areas of emphasis include recognizing and responding to various learning difficulties, implementing a variety of tutoring methods, and developing the ability to self-critique tutoring performance.


ECI 296 Special Topics in Education 1-3. Offered in Fall and Spring. Individual or group study of particular areas of education at the freshman and sophomore levels. Specific topics will vary from semester to semester.

ECI 305 Principles of Teaching Diverse Populations 3. Offered in Fall and Summer. Prerequisite: ECI 205 or EDS 203. Impact of cultural factors on experiences of teachers and students in contemporary schools. Teaching techniques and development of instructional plans to enhance schooling experiences of culturally diverse students.

ECI 306 Middle Years Reading 3. Offered in Spring Only. Prerequisite: Six hours in ED or PSY. Reading skills in middle years education developed with emphasis on application of the reading process to content area.

ECI 307 Teaching Writing Across the Curriculum 3. Offered in Spring Only. Prerequisite: ENG 112. For prospective teachers of all disciplines in middle/high school. Practical strategies for writing as a learning tool and for teaching writing. Lesson plans, assignments, experiences appropriate to content areas. Focus on writing, writing instruction, and technology. Separate sections for Middle Grades (MSL) and English (LITN) majors.

ECI 309 Teaching in the Middle Years 3. Offered in Fall and Spring. Prerequisite: Six hours in ED or PSY. Nature and purposes of middle grades education. Early adolescent development, curriculum, teaching/learning methods, school organization, and characteristics of effective middle years teachers. Includes field experience.

ECI 331 Health Professions 3. Offered in Summer. An examination of key occupations and professions in the health cluster. Emphasis is on educational preparation, requirements for practice, potential advancement, inter- and intra-professional relationships, ethical foundations of practice, and the concept of commitment. Theoretical concept of role structure and function.

ECI 332 Health Promotion and Disease Prevention 3. Offered in Spring Only. Emphasis on education of the public regarding general health concerns including cancer, cardiovascular disease, accident prevention, nutrition, drugs, alcohol, mental health, sexuality, and environmental hazards.

ECI 333 Health Care Delivery 3. The historical basis of healthy care delivery in the U. S. with emphasis on hospitals, health maintenance organizations, ambulatory care centers, ambulatory surgery, nursing homes, and private care practice. Philosophical issues of funding health care, promoting health care, and the training of healthy care workers.


ECI 336 Strategies for Teaching a Health Occupations Course 3. Offered in Spring Only. Planning and implementation of effective instructional strategies for clinical and classroom settings. The nature of the teaching/learning process, psychological and philosophical aspects of teacher choice of various strategies.

ECI 405 Literature for Adolescents 3. Offered in Fall Only. The history, types, and characteristics of literature for adolescents. Emphasizes reading and analyzing the literature by exploring the themes, literary elements, and rationale for teaching literature for adolescents. Adolescents in which literature can be integrated and implemented in English/Language Arts curriculum.

ECI 414 Human Relations and Discipline in the Classroom 3. Prerequisite: PSY 304 or EDP 304 and 6 hours of education. Designed to help prospective teachers foster positive interpersonal relationships in classrooms, build a sense of community and create a purposeful environment for learning. Investigates issues such as group building, active listening, and major approaches to discipline. Uses case studies and problem solving methods.

ECI 415 The Arts and Adolescence 2. Offered in Spring Only. Prerequisite: Six hours ED/PSY. Middle Grades Majors (MSL, MSJ). Relationship of the arts to the academic work of adolescent learners. Arts and adolescent development; arts and learning processes within and outside of the classroom; experimentation and skill development in graphic arts, sculpture, music, drama, dance/movement, film, and poetry.

ECI 416 Teaching Exceptional Students in the Mainstreamed Classroom 3. Offered in Fall Only. Prerequisite: Six hours ED or PSY. Provides classroom teachers in all disciplines and grade levels with a knowledge of various handicapping conditions, as well as with techniques to assist exceptional students within the mainstreamed classroom. Required for MSL majors.

ECI 423 Methods and Materials in Teaching Modern Foreign Languages 5. Offered in Fall Only. Prerequisite: Admission to Professional Semester, Corequisite: ECI 424. Methods and materials for teaching modern foreign languages K-12 including the use of instructional media. Taught M-F during first 7 weeks of the semester.

ECI 424 Student Teaching in French or Spanish 8. Offered in Fall Only. Prerequisite: Admission to Professional semester, Corequisite: ECI 423. Ten-week teaching experience for prospective teachers of French or Spanish in a selected elementary, middle or high school under the supervision of a cooperating teacher and a university faculty supervisor.


ECI 430 Methods and Materials for Teaching Language Arts in the Middle Grades 4. Offered in Fall Only. Inquiry, activity-oriented course provides opportunities for prospective language arts middle school teachers to integrate knowledge of English with effective materials, strategies, methods of instruction. Students observe middle
school classes, plan lessons, and units, practice varied classroom strategies, technologies in micro-lessons. Prepared students for teaching language arts with other content areas in middle schools.

ECI 434 Clinical Supervision in Health Occupations 3. Offered in Spring Only. Prerequisite: Six hours of Health Occupations courses. Supervisory techniques for health care professionals in initial levels of administrative positions. Internal and external factors affecting and staffing and supervision process. Organization of the supervisory process. Government and labor relations in the health industry.

ECI 435 Methods and Materials for Teaching Social Studies in the Middle Grades 4. Offered in Fall Only. For preservice middle school social studies teachers. Focus on: teaching and evaluation skills, adaptation of instruction to individual learner differences, identification and creation of instructional materials appropriate for use in social studies teaching.


ECI 437 Health Occupations Teaching Practicum 1-8. Offered in Fall and Spring. Practical teaching experience in health occupations. Certification majors complete 15 weeks of student teaching in secondary programs (8 credit hours). Non-certification majors teach in a hospital, community college, technical institute, private health industry, or other health-care setting (3-8 credit hours).

ECI 438 Medical Law and Ethics 3. Offered in Fall Only. Ethical and legal issues involved in delivering health care, such as euthanasia, reproductive technology, organ transplants, patients' rights, and confidentiality. Classical ethical theories and principles. Systematic review procedures and current medical law used to examine current case dilemmas in the health professions.

ECI 440 Internship in Teaching English as a Second Language 3. Offered in Summer. Skills and techniques required in teaching ESL in a public school setting. 15 hours of classroom observation and 30 hours in direct instruction. Demonstration of competencies essential for teaching ESL.

ECI 444 Administration of Business and Marketing Education 3. Offered in Fall Only. Prerequisite: Admission to Teacher Education Candidacy; MKE Business and Marketing Education Majors, Corequisite: ECI 446. Development of successful business and information technology, and marketing education programs. Program promotion, managing cooperative education experiences, managing DECA and FBLA chapters, and determining professional development strategies. Primary roles of the business and information technology and marketing education teachers' classroom instruction. Program management, classroom management, management of career-technical student organizations, cooperative education, and program development.

ECI 446 Curriculum and Methods of Teaching Business and Marketing Education 3. Offered in Fall Only. Study of the curriculum common to business and information technology and marketing education and the research behind its development. Methods common to instructional planning, implementation, and evaluation of effective business and information technology and marketing education programs.

ECI 447 Student Teaching in Business and Marketing Education 8. Offered in Spring Only. Prerequisite: Admission to Professional Semester; MKE Business and Marketing Education Majors. Corequisite: ECI 494. Fifteen weeks full time student teaching business and marketing subjects in the public schools under the supervision of a cooperating teacher and university supervisor. Instruction, evaluation, advisement, administration, observation. Students are expected to provide their own transportation to and from assigned public schools.

ECI 450 Methods and Materials in Teaching English 4. Offered in Fall Only. Methods and materials of teaching English in grades 9-12, with an emphasis on lesson planning and demonstrations/practice in teaching literature, study skills, speaking, listening, and writing. Taught during the first seven weeks of the semester.

ECI 451 Improving Reading in Secondary Schools 2. Offered in Fall Spring Summer. Prerequisite: Six hours in ED or PSY. A study of methods and materials for teaching reading in the secondary school, with an emphasis on the effective use of written materials for content area instruction.

ECI 454 Student Teaching in English/Language Arts 1-8. Offered in Spring Only. Prerequisite: Admission to Student Teaching Professional Semester; For MSL students: ECI 430; 416, 446. For LTN students: ECI 450. Provides the prospective teacher with experience in the techniques and skills involved in teaching English or Language Arts. Ten weeks in a selected off-campus station. Students become familiar with the total school program and participate in selected school and community activities.

ECI 460 Methods and Materials in Teaching Secondary Social Studies 4. Offered in Fall Only. Teaching techniques, innovations, and development of teaching and evaluation skills in the area of secondary school social studies. Adaptation of instruction to individual learner differences, and selection and design of instructional materials. Taught during the first six weeks of the semester. Taught during the first six weeks of the semester.

ECI 464 Student Teaching in Social Studies 1-8. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: For LTH, LTP, LTS students: ECI 460. For MSL students: ECI 454, 430, 416. Skills and techniques in teaching social studies in secondary and middle schools. Each student spends ten weeks in a selected off-campus center. The student demonstrates competencies essential for teaching social studies, becomes familiar with the total school program, and participates in a variety of school and community activities.


ECI 472 Interaction of Classroom Management and Instruction 3. Offered in Summer. Prerequisite: ECI 471; NC TEACH Participants. Topics related to teaching in the content area and classroom management. Lesson planning, principles applied to education, measurement and evaluation procedures, behavior therapy, and student motivation. Departmental Approval Required.

ECI 473 Subject Specific Methods 3. Offered in Fall Only. Topics related to cultural factors and how they affect teachers and students in the classroom. Instructional techniques and the development of instructional plans that enhance schooling experiences of culturally diverse students. Departmental Approval Required.

ECI 474 Curriculum and Instruction Practices 1.3. Offered in Fall Only. Prerequisite: ECI 472; NC TEACH participants.
ED 103 Teaching Fellows Seminar 1. Offered in Fall Only. An orientation to academic requirements of higher education, a review of teacher education components and elements of teacher education curricula, identification of characteristics of an effective student, and an introduction to instructional methods and issues in the field of education.

ED 102 Freshman Teaching Fellows Forum II 1. Offered in Spring Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education. Restricted to Students Admitted to the Teaching Fellows Program.

ED 101 Freshman Teaching Fellows Forum I 1. Offered in Fall Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education. Restricted to Students Admitted to the Teaching Fellows Program.

ED 111 Education and Psychology Scholars Forum 1. Offered in Fall and Spring. Interdisciplinary seminar with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

ED 150 Students Advocating for Youth I 1. Offered in Fall Only. Building upon a passion for advocacy. Investigating issues related to youth in today's North Carolina. Exploring youth advocacy and ethics. Exploring youth advocacy and diversity. Exploring youth advocacy as a vocation. Practical youth advocacy field work. Participation in field experiences required. Restricted to students admitted to the SAY program.

ED 151 Students Advocating for Youth II 1. Offered in Spring Only. Prerequisite: ED 150. Continuing to build upon a passion for advocacy. Understanding how legislation and policy affects youth advocacy and youth organizations. Exploring changes within the career field. Exploring peer influence processes among youth. Practical youth advocacy field work. Participation in field experiences required. Field experience may extend beyond normal class time. Restricted to students admitted to the SAY program.

ED 201 Sophomore Teaching Fellows Forum I 1. Offered in Fall Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education.

ED 202 Sophomore Teaching Fellows Forum II 1. Offered in Spring Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education. Restricted to Students Admitted to the Teaching Fellows Program.

ED 210 Introduction to College Tutoring 1. Offered in Fall and Spring. Development of basic tutoring skills. Areas of emphasis include recognizing and responding to various learning difficulties, implementing a variety of tutoring methods, and developing the ability to self-critique tutoring performance.

ED 211 Education and Psychology Scholars Forum 0. Offered in Fall and Spring. Second level of interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

ED 296 Special Topics in Education 1-3. Offered in Fall and Spring. Individual or group study of special topics in professional education. The topic and mode of study are determined by the faculty member after discussion with the student.

ECI 488 Basic American Sign Language 3. Offered in Fall and Spring. Conversational sign language skill development and introduction to aspects of American Sign language, deafness, and deaf culture.


ECI 496 Special Topics in Education 1-3. Offered in Fall and Spring. Individual or group study of special topics in professional education. The topic and mode of study are determined by the faculty member after discussion with the student.

ECI 493 Introduction to Media and Instructional Technology 1-3. Offered in Fall and Spring. Summer. Survey of instructional media and instructional technology, Relationship between media and instructional objectives. Computer based projects in designing and developing instructional materials using software.

ECI 475 Peer Mentoring in Alternative Licensure 3. Offered in Spring Only. Prerequisite: ECI 474 ; NC TEACH Participants, Corequisite: ECI 476. Topics related to observing and evaluating fellow teachers in relation to the national state teaching competencies. Classroom observations, videotaping, and group evaluations that are shared and discussed with fellow teachers. Departmental Approval Required.


ECI 483 An Introduction to Media and Instructional Technology 3. Offered in Fall Spring Semester. Survey of instructional media and instructional technology, Relationship between media and instructional objectives. Computer based projects in designing and developing instructional materials using software.

ECI 478 An Introduction to Media and Instructional Technology 1 2. Offered in Fall and Spring. Survey of instructional media and instructional technology. Relationship between media and instructional objectives. Computer based projects in designing and developing instructional materials using software.

ECI 474 Student Advocacy 3. Offered in Fall and Spring. Field experience may extend beyond normal class time. Restricted to students admitted to the SAY program.


ED 302 Junior Teaching Fellows Forum II 1. Offered in Spring Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education. Restricted to Students Admitted to the Teaching Fellows Program.

ED 301 Junior Teaching Fellows Forum I 1. Offered in Fall Only. Topics related to educational issues and requirements of the Teaching Fellows program. Topics will include current practices, policies and research in education. Restricted to Students Admitted to the Teaching Fellows Program.

ED 310 Tutoring Adolescents 1. Offered in Fall and Spring. Prerequisite: ECI 205 or EOE 207. Corequisite: EMS 203. Developing skills in tutoring adolescent students. Emphases include identifying
adolescent learning difficulties, using a variety of tutoring methods and a tutorial self-evaluation process. Requires off-campus field work.

ED 403 Teaching Fellows Senior Seminar 1. Offered in Fall and Spring. A casebook study of first-year teacher experiences and an examination of professional, ethical, and legal issues in education as found in cases dealing with new teachers.

ED 496 Special Topics in Education 1-3. Offered in Fall and Spring. Individual or group study of special topics in professional education. The topic and mode of study are determined by the faculty member after discussion with the student.

ED 605 Special Problems in Teaching 1-3. In-depth study of topical problems in teaching selected from areas of current concern to K-12 teachers.

EDUCATIONAL PSYCHOLOGY

EDP 304 Educational Psychology 3. Offered in Fall Spring Summer. Psychological principles applied to education, including cognitive and personality development, individual differences, learning and behavior theory, cognitive strategies for learning and remembering, critical thinking and problem-solving strategies, student motivation, classroom management techniques, components of teacher effectiveness, measurement and student evaluation procedures, characteristics of exceptional children, mainstreaming in the classroom, and multicultural education.

EDP 370 Applied Child Development 3. Offered in Fall Only. Students will explore how biological, cognitive, and social/emotional development affects children's learning and behavior. The course will focus on applying important theories and current findings in development to issues in education such as lesson planning, curriculum design, behavior management, motivation, an appropriate assessment. Students will also apply knowledge of development to issues such as creating actively engaging individuated experiences to deal with gifted students, students with diverse ethnic or cultural backgrounds, and students with exceptionalities or disabilities.

EDP 476 Psychology of Adolescent Development 3. Offered in Fall Spring Summer. Prerequisite: PSY 200 or EDP 304. Theories, principles, and issues of human psychological development emphasizing adolescence. Cognitive, social, and physical changes; their interaction. Implications for teaching and parenting adolescents.

ENGINEERING - MECHATRONICS

EGM 180 Introduction to Mechatronics Laboratory 2. Offered in Spring Only. The objective of this course is to introduce students to the mechatronic engineering discipline as a synergistic combination of mechanical and electrical engineering, computer science, control and information technology. Foundational concepts in mechatronics are addressed including analog and digital electronics, sensors, actuators, microprocessors, and microprocessor interfacing to electromechanical systems through hands on laboratory exercises. Offered only at UNCA.

EGM 360 Advanced Mechatronics Design Laboratory 1. Offered in Fall Only. Prerequisite: EGM 180. An introduction to the design and construction of microprocessor-controlled electromechanical systems, this laboratory course builds on fundamental mechatronics concepts. The course is project and design oriented to provide hands on working knowledge of real time software, real time programming, computer interfacing, mechanical design fabrication and control system design and the integration of these areas. For EGM students only; offered only at UNCA.

EGM 482 Senior Design Project in Mechatronics Engineering 4. Offered in Spring Only. Prerequisite: EGM 360, senior standing. Applications of engineering and basic sciences to the total design of electro-mechanical systems. Consideration of the design process including feasibility study, preliminary design detail, cost effectiveness, along with the development and evaluation of a prototype accomplished through design-team activity. Complete written and oral engineering report required. For EGM students only; offered only at UNCA.

ENTREPRENEURSHIP INITIATIVE

EI 201 Exploring Interdisciplinary Entrepreneurial Thinking 3. Offered in Fall and Spring. Course covers the perspectives of entrepreneurial thinking from an interdisciplinary perspective including: expectations and understanding of successful entrepreneurs as well as entrepreneurial opportunities in a variety of disciplines and entities including sciences, technology, humanities and social sciences. Primary focus will be on developing the student's entrepreneurial mindset.

EI 331 Interdisciplinary Entrepreneurial Thinking I: Skills and Planning Basics 3. Offered in Fall and Spring. Prerequisite: EI 201. Course covers the development and application of critical skills in entrepreneurship as well as the fundamentals of entrepreneurial planning including interdisciplinary opportunity identification and feasibility analysis. Some individual off campus travel might be required. Students are responsible for their own transportation to off campus activities.

ELEMENTARY EDUCATION

ELM 250 Introduction to Elementary Education in a Global Society 3. Offered in Spring Only. Introduction to the major conceptual and intellectual foundations of the teaching profession, the sociology and culture of elementary schools and classrooms, and the world of work of elementary teachers. Fieldwork in schools and related settings maybe required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences. Students interested in Elementary Education.

ELM 310 Children's Thinking and Additive Reasoning 3. Offered in Fall Only. Prerequisite: ELM 250, Junior standing. Elementary Education Majors. Examination of mathematical reasoning processes in primary grade children and the theory and practice of active teaching strategies designed to motivate and engage children in mathematics learning in grades K-3. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 320 Teaching Science in the Primary Grades 3. Offered in Fall Only. Prerequisite: ELM 250, Junior standing. Elementary Education Majors. Examination of science knowledge and thinking in primary-age children. Development and application of methods for teaching science in the primary grades that leads to active learning of science as a process of inquiry. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.
ELM 330 Teaching Early Reading in Elementary School: K-12 3. Offered in Fall Only. Prerequisite: ELM 250, Junior standing. Elementary Education Majors. ELM 330 is designed to prepare preservice teachers to teach reading and to lead to licensure in the elementary grades. Specific topics that relate to the theory and practice of teaching reading for early and emergent readers, including literature and struggling readers, will be examined. Fieldwork in schools and related settings may be required in lieu of lecture in occasion. Students are responsible for transportation to and from their school based experiences.

ELM 335 Teaching Reading in the Elementary School: 3-5 5. Prerequisite: ELM 330, Junior standing. Elementary Education Majors. ELM 335 is designed to prepare preservice teachers to teach reading and to lead to licensure in the elementary grades. Specific topics that relate to the theory and practice of teaching reading for upper elementary grade readers, including information and media literacy and literature, will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experience.

ELM 340 Children Design, Create and Invent 3. Offered in Spring Only. Prerequisite: ELM 370, Junior standing. Elementary Education Majors. An active hands-on class where prespective elementary school teachers develop learning activities that children can use to stimulate their imaginations and learn fundamental concepts in science, technology, engineering, and mathematics. Part of a program leading to licensure in Elementary Education.

ELM 350 Assessment of Learning and Behavior 3. Offered in Fall Only. Prerequisite: ELM 250, Junior standing. Elementary Education Majors. Application of knowledge of pedagogy and development to develop high-quality strategies for formative and summative assessment. Best practices using developmentally-appropriate assessment strategies including authentic assessment, portfolios and electronic portfolios, real-time feedback, open- and closed-ended formal assessments, and standardized testing. Particular attention to examining the rationale for assessment and the implications of assessment.

ELM 370 Connections Seminar I The Elementary Classroom and School Community 3. Offered in Fall Only. Prerequisite: ELM 250, Junior standing. Elementary Education Majors. First of four seminars required for undergraduate elementary education majors. This course introduces preservice teachers to the world of public school classrooms, the tasks of teaching, and to their perspectives regarding a career in teaching. Examines relationships between theory and practice of teaching in mathematics, science, literacy, and assessment. Weekly fieldwork in schools and related settings is required 3 hours a week. Students are responsible for transportation to and from their school based experiences.

ELM 375 Connections Seminar II Cultural Identity, Social Justice and Diverse Learners 3. Offered in Spring Only. Prerequisite: ELM 370,Junior standing. Elementary Education Majors. This seminar is the second of four seminars required for undergraduate elementary education majors who are pursuing K-6 teacher licensure. The purpose of the course is to help prospective elementary grades teachers develop competencies for increasing student achievement by focusing on multicultural education, teaching to diversity, and understanding the classroom culture. Weekly fieldwork in schools and related settings is required 3 hours a week. Students are responsible for transportation to and from their school based experiences.

ELM 400 Connections Seminar III Instructional Design and Assessment 3. Offered in Fall Only. Prerequisite: ELM 375, Senior standing. Elementary Education Majors. This seminar is the third of four semesters required for undergraduate elementary education majors who are pursuing K-6 teacher licensure. Preservice elementary educators will examine research-verified practices in instructional design and assessment that are designed to meet the needs of diverse K-6 learners. Candidates will complete a capstone project that will be taught during their student teaching experience. Weekly fieldwork in schools and related settings is required. Students are responsible for transportation to and from their school based experiences.

ELM 410 Children's Thinking and Multiplicative Reasoning 3. Offered in Spring Only. Prerequisite: ELM 310, Junior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to teach math in the intermediate grades and to lead to licensure in the elementary grades. Specific methodologies that relate to the theory and practice of teaching of math will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 420 Teaching Science in the Intermediate Grades 3. Offered in Fall Only. Prerequisite: ELM 320, Senior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to teach science in intermediate grades and to lead to licensure in the elementary grades. Specific methodologies that relate to the theory and practice of teaching science will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 430 Teaching Language Arts in the Elementary School 3. Offered in Fall Only. Prerequisite: ELM 335, Senior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to teach language arts and to lead to licensure in the elementary grades. Specific methodologies that relate to the theory and practice of teaching language arts will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 440 Teaching Children with Special Needs in the Elementary Classroom 3. Offered in Fall Only. Prerequisite: ELM 350, ELM 375, Senior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to teach with special needs and to lead to licensure in the elementary grades. Specific methodologies that relate to the theory and practice of teaching students with special needs will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 450 The Arts for Elementary Education 3. Offered in Fall Only. Prerequisite: ELM 375, Senior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to integrate the arts; visual music, dance and drama, into the content areas. Successful completion of this course leads to licensure in the elementary grades. Specific methodologies that relate to the theory and practice of teaching of arts will be examined. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.

ELM 460 Social Studies for the Young Learner 3. Prerequisite: ELM 370, Junior standing. Elementary Education Majors. This course is designed to prepare preservice teachers to teach social studies and to lead to licensure in the elementary grades. The course is an examination of curriculum, instruction, and learning in K-6 social studies education. Emphasizes development of the social studies; curricular principles and components; teaching strategies; and learner outcomes. Fieldwork in schools and related settings may be required in lieu of lecture on occasion. Students are responsible for transportation to and from their school based experiences.
ELM 480 Connections Seminar IV Linking Theory and Practice 3. Offered in Spring Only. Prerequisite: ELM 400, Elementary Education Majors. Admission to the Professional Semester. Corequisite: ELM 484. ELM 480 Connections Seminar IV is designed as the Capstone Course in the Elementary Education Program. Preservice teachers will meet weekly to reflect on the student teaching experience and connect new learning to previous university coursework. In addition, preservice teachers will complete their Integrated INTASC and technology portfolios. Successful completion of student teaching and portfolio requirements will lead to licensure in the elementary grades; K-6.

ELM 484 Student Teaching in Elementary Education 9. Offered in Spring Only. Culminating experience for Elementary Education majors. A minimum of 10 weeks of supervised teaching in an elementary school classroom, demonstrating competent applications of standards-based practices and other required knowledge, skill, and dispositional outcomes. Taken concurrently with ELM 480. Students responsible for transportation to placement site.

EDUCATIONAL LEADERSHIP & PROGRAM EVALUATION

ELP 296 Special Topics in Education: General Studies 1-3. Offered in Fall Spring Summer. Individual or group study of particular areas of education at the freshman and sophomore levels. Specific topics will vary from semester to semester.

ELP 344 School and Society 3. Offered in Fall Spring Summer. The interrelationship between the school and other institutions, values, and patterns of thought in American society.

ELP 496 Special Topics in Education: General Studies 1-3. Offered in Fall Spring Summer. Individual or group study of special topics in professional education. The topic and mode of study are determined by the faculty member after discussion with the student.

MATH & SCIENCE EDUCATION

EMS 101 Orientation to Mathematics and Science Education 0. Offered in Fall and Spring. Overview of departmental expectations and procedures and introduction to practical aspects of academic life. Opportunity for interaction of students with advisors and with other undergraduates who are nearing completion of programs. Open only to students in Math and Science Education.

EMS 102 Introduction to Middle Grades Education 2. Offered in Fall and Spring. Introduction to the Middle Grades Academy and middle school teaching from the perspective of “What do I bring to teaching?” Students will formulate an initial teaching philosophy as the Capstone Course in the Elementary Education Program. Preservice teachers will meet weekly to reflect on the student teaching experience and connect new learning to previous university coursework. In addition, preservice teachers will complete their Integrated INTASC and technology portfolios. Successful completion of student teaching and portfolio requirements will lead to licensure in the elementary grades; K-6.

EMS 203 Introduction to Teaching Mathematics and Science 3. Offered in Fall and Spring. Introduces prospective teachers to the teaching of mathematics and science in the middle school and high school. As an important part of the course, students serve as teacher assistants to a classroom teacher. Ideas and questions arising from this experience provide an integral part of the classroom instruction on campus.

EMS 296 Special Topics in Education 1-3. Individual or group study of particular areas of education at the freshman and sophomore level. Specific topics will vary from semester to semester.

EMS 373 Instructional Materials in Science 3. Offered in Fall Only. Development and selection of teaching materials that reflect concepts of content and emphasis in middle and secondary school science. Experimental and laboratory approaches, including use of microcomputer and video technologies. 2 lecture hours and 6 lab hours per week for 7 weeks.

EMS 375 Methods of Teaching Science 1. Offered in Fall Spring Summer. Purposes, methods, curricula and evaluation practices for teaching mathematics in middle school and high school. Taught during the first seven weeks of the semester.

EMS 470 Methods and Materials for Teaching Mathematics 3. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: EMS 470. Supervised experience in a selected middle or secondary school for 10 weeks, to develop and practice the skills and techniques for teaching mathematics.

EMS 471 Student Teaching in Mathematics 1-8. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: EMS 470. Supervised experience in a selected middle or secondary school for 10 weeks, to develop and practice the skills and techniques for teaching mathematics.

EMS 472 Teaching Mathematics Topics in Senior High School 3. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: EMS 470. Preparation for teaching mathematics from both the college preparatory (algebra, geometry, trigonometry, advanced mathematics) and general courses (pre-algebra, technical and consumer mathematics) offered in grades 9-12. Taught during the first seven weeks of the semester.

EMS 473 Teaching Mathematics Topics in the Middle Grades 3. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: EMS 470. Methods of teaching arithmetic, geometry, and pre-algebra topics in grades 6-9. Emphasizes approaches that actively involve learners and relate operations on concrete and pictorial representations to mathematical symbols. Taught during the first 7 weeks of the semester.

EMS 474 Teaching Mathematics Methods in the Middle Grades 3. Offered in Fall Only. Prerequisite: Admission to professional semester. Corequisite: EMS 470. Methods of teaching arithmetic, geometry, and pre-algebra topics in grades 6-9. Emphasizes approaches that actively involve learners and relate operations on concrete and pictorial representations to mathematical symbols. Taught during the first 7 weeks of the semester.

EMS 475 Methods of Teaching Science 11. Offered in Fall Only. Prerequisite: EMS 203, ELP 344, PST 304 or EDP 304, Corequisite: EMS 476. Goals, methods, curriculum, and evaluation practices in teaching the physical and biological sciences at the middle and secondary school levels. Taught during the first seven weeks of the semester.

EMS 476 Student Teaching in Science 1-8. Offered in Fall Only. Supervised classroom experience in developing the skills and techniques for teaching science in a selected middle or secondary school for 10 weeks.

EMS 480 Teaching Mathematics with Technology 3. Offered in Fall and Spring. Prerequisite: EMS 203; MA 313 or 141. Prepares prospective mathematics teachers to use technology in their classrooms to assist students in formulating and solving math problems in the middle and high school mathematics curricula.

EMS 495 Senior Seminar in Mathematics and Science Education 1-3. In-depth investigation of one or more teaching areas in mathematics or science education.
ENG 210 Introduction to Language and Linguistics 3. Offered in Fall and Spring. Prerequisite: ENG 101. Linguistics theory and method. Topics include the English sound system, morphology, syntactic structure, semantics, and historical and contemporary dialect variation. Language acquisition, language and the brain, and computer processing and human language.

ENG 214 Introduction to Editing 3. Offered in Fall Spring Summer. Prerequisite: ENG 101. Basic editorial skills with a wide range of publications. Stylistic editing (conventions of written English, consistency, effectiveness of syntax, appropriateness of diction), substantive editing (accuracy, legal issues, ethics), and production editing (layout, typography, electronic publication processing). Introduction to resources such as standard reference works and professional organizations.

ENG 216 Technologies for Texts 3. Offered in Spring Only. Prerequisite: ENG 101. Uses of computers for creating, designing, analyzing, and disseminating texts, both on desktops and on the Internet. Overview of technologies that facilitate reading, writing, and communication; development of skill with various applications and understanding of their capabilities, limitations, and historical analogues. Recommended for students in journalism and technical writing.

ENG 219 Studies in Great Works of Non-Western Literature 3.. Readings, in English translation, or non-Western literary masterpieces from the beginnings of literacy in the Middle East, Asia, and Africa to the modern period, including excerpts from texts such as the Upanishads, the Ramayana, the Sundiata, Gilgamesh, A Thousand and One Nights, and the Quran and such authors as Confucius, Oe Kenzaburo, Omar Khayyam, Rumi, and Amos Oz.

ENG 220 Studies in Great Works of Western Literature 3. Offered in Fall Spring Summer. Readings, in English translation, of Western literary masterpieces, from the beginnings of literacy in the Middle East and Europe towards the present, including such authors as Homer, Sophocles, Virgil, Ovid, Augustine, Danta, Machiavelli, Shakespeare, Cervantes, Moliere, Voltaire, Goethe, Austen, Flaubert, Dickinson, Tolstoy, Kafka, and Woolf. Credit will not be given for both ENG/FL 220 and either ENG/FL 221 or ENG/FL 222.

ENG 221 Literature of the Western World I 3. Offered in Fall Only. Readings from English translations of Biblical, Classical, Medieval, and Early Renaissance literature, including works by such authors as Homer, Plato, Virgil, Ovid, St. Paul, St. Augustine, Marie de France, and Dante.

ENG 222 Literature of the Western World II 3. Offered in Spring Only. Readings from English translations of Renaissance, Neo-Classical, Romantic, and Early Modern literature, emphasizing the cultures of continental Europe from the Renaissance to 1900, and including such authors as Petrarch, Erasmus, Rabelais, Machiavelli, Shakespeare, Moliere, Voltaire, Rousseau, Goethe, Flaubert, and Tolstoy.

ENG 223 Contemporary World Literature I 3. Offered in Fall Only. Twentieth-century literature of some of the following cultures: Russian, Eastern European, Western European, Latin American, Canadian, Australian.

ENG 224 Contemporary World Literature II 3. Offered in Spring Only. Twentieth-century literature of some of the following cultures: Asian, Arabian, African, Caribbean, Native-American.

ENG 232 Literature and Medicine 3. Offered in Fall and Spring. Study of literature about illness, epidemics, and the science and
practice of medicine. Readings will include works by authors such as Boccaccio, Defoe, George Eliot, Kafka, William Carlos Williams, Susan Sontag, and Tony Kushner.

ENG 233 The Literature of Agriculture 3. Offered in Spring Only. A study of writings on the role of farming in the creation of culture and on the connection between the attention to words necessary for good writing and the attention to the land necessary for good farming. Readings may include ancient and modern texts from a variety of cultures and genres. Possible authors include Virgil, Jefferson, Hardy, Cather.


ENG 249 Native American Literature 3. A survey of Native American literatures from before contact with Europeans to contemporary culture. Writers may include: Apess (Pequot), Ridge (Cherokee), Silko (Laguna Pueblo), Momaday (Kiowa), Power (Sioux) Gunn Allen (Laguna-Sioux), Harjo (Creek), and Erdrich (Anishinabe).

ENG 251 Major British Writers 3. Offered in Fall Spring Summer. Significant British authors chosen from among such figures as Chaucer, Shakespeare, Milton, Swift, Pope, Austen, Wordsworth, Coleridge, Tennyson, Browning, Bronte, Dickens, Joyce, Eliot, Woolf, and Yeats. Credit will not be given for both ENG 251 and either ENG 261 or 262.

ENG 252 Major American Writers 3. Offered in Fall Spring Summer. Significant American authors chosen from among such figures as Franklin, Emerson, Thoreau, Hawthorne, Melville, Douglass, Stowe, Whitman, Dickinson, Twain, James, Crane, Wharton, Frost, Eliot, Hemingway, Hurston, Faulkner, Wright, O'Connor, and Morrison. Credit will not be given for both ENG 266 and ENG 252.

ENG 261 English Literature I 3. Offered in Fall Spring Summer. A survey of English literature to 1660, including Old English, Middle English, and Renaissance writing, focusing on such central authors as Chaucer, Spenser, Marlowe, Shakespeare, Jonson, Donne, and Milton. Credit will not be given for both ENG 261 and ENG 251.

ENG 262 English Literature II 3. Offered in Fall Spring Summer. A survey of English literature from 1660 to the present. Poetry, fiction, drama and intellectual prose by such central writers as Dryden, Pope, Swift, Johnson, Wordsworth, Keats, Shelley, Bronte, Carlyle, Tennyson, Browning, Yeats, Woolf, Joyce and Eliot. Credit will not be given for both ENG 262 and ENG 251.

ENG 265 American Literature I 3. Offered in Fall Spring Summer. A survey of American literature from the beginnings to the Civil War, including such central authors as Edwards, Franklin, Irving, Emerson, Hawthorne, Melville, Poe, Douglass, Thoreau, and Whitman. Credit will not be given for both ENG 265 and ENG 252.

ENG 266 American Literature II 3. Offered in Fall Spring Summer. A survey of American literature from the Civil War to the present, including such central authors as Whitman, Dickinson, Twain, James, Crane, Wharton, Frost, Eliot, Hemingway, Hurston, Faulkner, Wright, O'Connor, and Morrison. Credit will not be given for both ENG 266 and ENG 252.

ENG 282 Introduction to Film 3. Offered in Fall and Spring. Examination of basic film techniques and basic methods of film analysis. Emphasis on understanding and appreciating film as a major art form.

ENG 283 Introduction to American Folklore 3. Offered in Spring Only. Principal types of folklore; field work in collecting and assimilating material from various cultural traditions. Emphasis on American folklore and its origins.

ENG 284 Writing About Film 3. Offered in Fall and Spring. Prerequisite: ENG 101. Faculty-guided independent study, or courses on special topics determined by departmental interest or need.

ENG 285 Critical Approaches to Reading Literature 3. Offered in Fall and Spring. Intensive study of criticism from the ancient world through the contemporary period, including ancient, medieval, Renaissance, Romantic, and early modern theories; the modern period is represented by the dominant schools of twentieth-century criticism (e.g. Formalism, Structuralism, Post-structuralism and Deconstruction, Narratology, traditional Historicism, New Historicism, Marxism and Feminism).

ENG 286 Women and Literature 3. Offered in Spring Only. Nineteenth- and twentieth-century women's literature, as shaped by the intersecting and competing claims of gender, race, sexuality, and culture. Focus on fiction, accompanied by critical readings from American studies, feminist literary criticism, and postmodern theory.

ENG 287 Explorations in Creative Writing 3. Offered in Fall and Spring. Prerequisite: ENG 101. Introduction to the basic elements and principles of three genres of creative writing: poetry, fiction and drama. Reading and class discussion of student work. Recommended for students with no prior experience in creative writing.

ENG 288 Fiction Writing 3. Offered in Fall and Spring. Prerequisite: ENG 101. Experience in writing short prose fiction. Class criticising of student work and instruction in techniques of fiction.

ENG 289 Poetry Writing 3. Offered in Fall and Spring. Prerequisite: ENG 101. Experience in writing poetry. Class criticising of student work and instruction in techniques of poetry.

ENG 292 Writing About Film 3. Offered in Fall and Spring. Prerequisite: ENG 101. Comprehensive study of various approaches to writing about film. Primary focus is on the critical and evaluative practice involved in writing film criticism for non-academic audiences. Film screenings, discussion of assigned readings, and in-class writing workshops aid students in preparing a portfolio of film writing that includes film reviews of various lengths.

ENG 294 Special Projects in English 1-3. Offered in Fall Spring Summer. Faculty-guided independent study, or courses on special topics determined by departmental interest or need.

ENG 295 Critical Approaches to Reading Literature 3. Offered in Fall and Spring. Intensive study of criticism from the ancient world through the contemporary period, including ancient, medieval, Renaissance, Romantic, and early modern theories; the modern period is represented by the dominant schools of twentieth-century criticism (e.g. Formalism, Structuralism, Post-structuralism and Deconstruction, Narratology, traditional Historicism, New Historicism, Marxism and Feminism).

ENG 296 Women and Literature 3. Offered in Spring Only. Nineteenth- and twentieth-century women's literature, as shaped by the intersecting and competing claims of gender, race, sexuality, and culture. Focus on fiction, accompanied by critical readings from American studies, feminist literary criticism, and postmodern theory.

ENG 297 Technical Document Design and Editing 3. Offered in Fall Spring Summer. Prerequisite: ENG 214. Layout and design principles for written documents; desktop building; legibility,
readability testing; conventions of proposals, instructions, and reports;
basics of technical editing: usage, vocabulary, style manuals, editing
mathematical equations, graphs, tables.


ENG 317 Designing Web Communication 3. Offered in Fall and Spring. Prerequisite: ENG 214, or ENG 216, or ENG 314. A course in the layout, design, and composition of web-based communication. Students will learn to analyze audiences and their uses of information in order to plan, compose, and critically evaluate web-based communication. Students will acquire skill with HTML coding, screen design, and multimedia authoring and will apply those skills to the composition of a variety of web texts (i.e. websites). Course work will require students to become proficient with commercially available HTML and photoeditors.

ENG 321 Survey of Rhetorical Theory 3. Offered in Fall Only. Prerequisite: COM 201. Principles of rhetorical theory from its classical origins through the modern period to the present time. Key concepts and theories that provide a critical understanding of the processes of persuasive symbol use.

ENG 323 Writing in the Rhetorical Tradition 3. Offered in Fall Spring Summer. Prerequisite: ENG 101. A writing course based on the study of rhetoric. Readings on the principles of invention, arrangement, and style; analysis of written texts; writing of persuasive texts for a variety of audiences and purposes.

ENG 324 Modern English 3. Offered in Fall and Spring. Prerequisite: ENG 101. Study of Modern English at the sentence level. Analysis of grammatical structure. Consideration of language variation in English.

ENG 325 Spoken and Written Traditions of American English Dialects 3. Offered in Spring Only. Prerequisite: ENG 101. Basic issues in the study of language; linguistic terminology and categories; grammatical traditions and topics such as prescriptivism and descriptivism, standard and non-standard, orality and literacy; language acquisition and awareness; language aesthetics and ethics.

ENG 326 History of the English Language 3. Offered in Fall and Spring. Prerequisite: ENG 101. Development of the English language from its Indo-European origins to the present. Emphasis on historical and comparative linguistic methodology and on changes in sound, syntax, and meaning.

ENG 327 Language and Gender 3. Offered in Spring Only. Prerequisite: ENG 101. Introduction to the use of language by men and women. Research in Linguistics and Women's Studies addressing issues such as the acquisition of gender-differentiated language, gender and conversational interaction, sexism in language, gender issues in society, and the relationship between language, gender, and other social constructs (e.g., class, culture, and ethnicity).

ENG 328 Language and Writing 3. Offered in Spring Only. Prerequisite: ENG 101. Study of language structure; specific attention to differences between spoken and written language; print conventions; error analysis; and the application of linguistics to rhetoric and composition. Analysis of a variety of grammatical approaches; how to evaluate grammar textbooks and compositions. Intended for English Education majors. Credit will not be awarded for both ENG 328 and ENG 324.

ENG 330 Screenwriting 3. Offered in Spring Only. Writing for films, story planning, character development, communicating information, building scenes, relationships between script and cinematic dimensions, working with studios and editors.

ENG 331 Communication for Engineering and Technology 3. Offered in Fall Spring Summer. Written communication in industrial and technical organizations, emphasizing internal communication with managers and technical personnel and including external communication with regulators, vendors, and clients. Intensive practice in writing; relationship of writing to oral and visual communication. For students in engineering and other primarily technological curricula. Credit is not allowed for more than one of ENG 331, ENG 332, and ENG 333.

ENG 332 Communication for Business and Management 3. Offered in Fall Spring Summer. Written communication in business and public organizations, including both internal communication (such as instructions, policies, management reports) and external communication with clients, vendors, and publics. Intensive practice in writing; relationship of writing to oral and visual communication. For students in business and management-related programs. Credit is not allowed for more than one of ENG 331, ENG 332, and ENG 333.

ENG 333 Communication for Science and Research 3. Offered in Fall and Spring. Written communication in scientific and research contexts, emphasizing relationship between research and writing in problem formulation, interpretation of results, and support and acceptance of research. Intensive practice in writing; relationship of writing to oral and visual communication. For students who plan careers in scientific research. Credit is not allowed for more than one of ENG 331, 332, and 333.


ENG 350 Internship in Writing and Editing 3. Offered in Fall and Spring. Prerequisite: Any two ENG 214, ENG 215, ENG 216, ENG 314, ENG 315, ENG 317, ENG 421. Directed work experience for English majors including work-site mentoring and evaluation. Department supervision includes course work directed toward designing employment application materials, developing a portfolio of professional work, and reading the literature on workplace socialization.

ENG 359 Topics in Film Studies 3. Offered in Spring Only. Critical approaches to focused film topics involving film genres, directorial styles, or trends within a national cinema. Topics will vary from semester to semester.

ENG 362 The British Novel of the 18th Century 3. Offered in Spring Only. Emphasizes major novelists such as Defoe, Richardson, Fielding, Sterne, and Austen.

ENG 363 The British Novel of the 19th Century 3. Offered in Fall Only. Emphasizes major novelists such as Dickens, Trollope, the Brontes, Eliot, and Hardy.

ENG 364 History of Film to 1940 3. Offered in Fall Only. Technological developments and aesthetic movements that shaped cinema production and direction from the beginning of the industry to 1940. Evolution in camera movement, editing, sound storyline, and the documentary. Rise to prominence of the Hollywood studio systems and the contributions of foreign filmmakers.
ENG 368 American Poetry to 1900 3. Offered in Spring Only.
American poetry written in English from the colonial period to 1900. Development of styles and themes in relation to historical context. Emphasis on poets such as Bradstreet, Taylor, Wheatley, Poe, Sigourney, Emerson, Longfellow, Whitman, Dickinson, and Robinson.

ENG 369 The American Novel of the 19th Century 3. Offered in Fall Only: Major novels illustrating the development of American fiction from Romanticism to Realism and Naturalism. Works by such writers as Brown, Cooper, Hawthorne, Stowe, Melville, Twain, Howells, James, Norris, Crane, Chopin, and Dreiser.

ENG 370 Early Twentieth-Century Fiction 3. Offered in Spring Only. Study of narrative fiction written during the first half of the twentieth century. Typical subjects: James, Conrad, Stein, Hemingway, Woolf, Faulkner, Hurston, Wright, Beckett.


ENG 372 Early Twentieth-Century Poetry 3. Offered in Fall Only. Study of poetry written during the first half of the twentieth century. Typical subjects: Hardy, Robinson, Yeats, Eliot, Pound, H.D., Williams, Hughes, Moore, Stevens.


ENG 374 History of Film From 1940 3. Offered in Spring Only. Technological developments and aesthetic movements that have shaped cinema production and direction from 1940 to the present. Evolution in camera movement, editing, sound, storyline, and the documentary. Post-war decline and re-emergence of the Hollywood film industry and the contributions of foreign filmmakers.

ENG 375 African American Cinema 3. Offered in Fall Only. Survey and analysis of African American film culture from 1900-present. Examination of pre-Hollywood, classical Hollywood, and independent filmmaking. Particular focus on independent filmmakers' response to dominant industry representations and the work of filmmakers who seek to create a specifically African American cinematic style.

ENG 376 Science Fiction 3. Offered in Fall and Spring. Representative works of science fiction. Emphasis on works written in the twentieth century, with some attention to the history and development of the genre.

ENG 377 Fantasy 3. Offered in Fall and Spring. Representative works in the genre of fantasy. Emphasis on works of 19th and 20th centuries. Authors such as Carroll, Lewis, Tolkien, Borges, LeGuin, and Gardner.

ENG 378 Women & Film 3. Offered in Spring Only: This course will introduce students to the rich international history of women's participation in the motion picture industry. Course includes readings, screenings, discussions, and a final examination.

ENG 380 Modern Drama 3. Offered in Fall Only: Major plays and playwrights from Ibsen to Pinter, including at least some of the following: Strindberg, Chekhov, Shaw, O'Neill, Hellman, Pirandello, Brecht, Williams, Miller, Albee.

ENG 381 Creative Nonfiction Writing Workshop 3. Offered in Fall and Spring. Prerequisite: ENG 282. A workshop in creative nonfiction (literary or magazine journalism) for the student with demonstrated understanding of the basic techniques of creative writing and journalism.

ENG 382 Film and Literature 3. Offered in Fall Only. Ways of adapting literary works to film form. Similarities and differences between these two media. Emphasis on the practical art of transforming literature into film. Attention to the impact of film upon literature.

ENG 383 Folklore and Literature 3. Offered in Fall Only. Relationships between traditional culture and written literature. Genre theory; interchanges between print media and oral tradition; nature of plot, character, and form in Western and non-Western cultural traditions; performance theory. Influence of regional traditions and American literature.

ENG 384 Introduction to Film Theory 3. Offered in Fall Only. Prerequisite: ENG 282. Survey of critical approaches to film art. Application of theoretical paradigms—formalist, realist, psychoanalytic, feminist, poststructuralist—to individual films, genres, national cinemas and directors.

ENG 385 Biblical Backgrounds of English Literature 3. Offered in Fall Only. Influences of the Bible-principal forms, genres, and texts—on major English and American writers such as Milton, Spenser, Melville, Eliot, and Faulkner.

ENG 388 Intermediate Fiction Writing Workshop 3. Offered in Fall and Spring. Prerequisite: ENG 288: Students must have earned a "B" or better in ENG 288. An intermediate workshop in creative writing for students with demonstrated understanding of the basic techniques of writing prose fiction.

ENG 389 Intermediate Poetry Writing Workshop 3. Offered in Fall and Spring. Prerequisite: ENG 289: Students must have earned a "B" or better in ENG 289. An intermediate workshop in creative writing for students with demonstrated understanding of the basic techniques of writing poetry.


ENG 391 Special Topics in Modern Drama 3. Offered in Fall Only. Various topics in modern drama covering different cultures, issues, and theatrical practices within the last 100 years. Modern American drama, modern British drama, modern World Drama, and European theatre from World War II to the present.

ENG 392 Major World Author 3. Offered in Fall and Spring. Intensive study in English, of the writings of one (or two) author(s) from outside the English and American traditions. Sample subjects: Homer, Virgil and Ovid, Lady Murasaki, Marie de France and Christine de Pizan, Dante, Cervantes, Goethe, Balzac and Flaubert, Kafka, Proust, Lessing and Gordimer, Borges and Marquez, Neruda, Achebe, Soyinka, Calvino, Walcott and Naipaul. Topics will vary from semester to semester. May be repeated for credit with new topic.
ENG 393 Studies in Literary Genre 3. Offered in Fall and Spring. Concentrated treatment of one literary genre, such as the epic, the lyric, the drama, satire, romance, autobiography, the essay, the novel, or the short story. Treatment of materials from several national or ethnic cultures and several periods. All readings in English. Course may be taken three times for credit. Course may be taken 3 times in different genres.

ENG 394 Studies in World Literature 3. Offered in Fall and Spring. Study of a subject in world literature: for example, African literature, Asian literature, Hispanic literature, East European literature, Comedy, the Epic, the Lyric, Autobiography, the Faust legend, or Metamorphosis. Subjects vary according to availability of faculty. Readings in English translation.

ENG 398 Contemporary Literature I (1900 to 1940) 3. British and American literature from 1900 to World War II, with representative authors such as Conrad, Yeats, Eliot, Joyce, Woolf, Faulkner, Shaw, Stein, O'Neill, and Wright. For comparative purposes, continental authors such as Kafka and Mann.

ENG 399 Contemporary Literature II (1940 to Present) 3. Offered in Spring Only. Literature from World War II to the present, with representative authors such as Murdoch, Beckett, Nabokov, Ginsberg, Achebe, Fuentes, Kundera, Naipaul, and Morrison.

ENG 400 Applied Criticism 3. Offered in Fall Only. Prerequisite: LTN Majors, Senior standing, formal admission to the methods and student teaching courses. Corequisite: ECI 450. Types and methods of literary criticism designed specifically for students intending to teach English in high school.

ENG 405 Literature for Adolescents 3. Offered in Fall Only. The history, types, and characteristics of literature for adolescents. Emphasizes reading and analyzing the literature by exploring the themes, literary elements, and rationale for teaching literature for adolescents. Addresses ways in which this literature can be integrated and implemented in English/Language Arts curriculum.

ENG 406 Modernism 3. Offered in Fall Only. International Modernist movement in literature, from its nineteenth-century origins to its culmination in the early twentieth century. Definitions of modernity, as embodied in a variety of genres. Placement of Modernist texts within a variety of cultures that produced them.

ENG 407 Postmodernism 3. Offered in Spring Only. Literary expressions of Postmodernism, from its origins in the Modernist movement through its culmination in the later decades of the twentieth century. Definitions of post modernity, as embodied in a variety of genres. Placement of Postmodernist texts within a variety of cultures that have produced them.

ENG 410 Studies in Gender and Genre 3. Offered in Fall Only. This course examines the ways in which writers have revised the literary genres to include gendered experience. It will focus on a different generic area, such as poetry, fiction, drama or autobiography, depending on its instructor.

ENG 411 Rhetorical Criticism 3. Offered in Spring Only. Rhetorical analysis of public speeches, social movements, political campaigns, popular music, advertising, and religious communication. Neo-Aristotelian criticism, movement studies, genre criticism, dramatistic analysis, content analysis, fantasy theme analysis.


ENG 417 Editorial and Opinion Writing 3. Offered in Spring Only. Prerequisite: ENG 214, ENG 215. Discussing and writing newspaper and magazine editorials, with added attention to other forms of opinion in print, such as columns and books and music reviews.

ENG 420 Major American Author 3. Offered in Fall Only. Intensive study of the writings of one (or two) American author(s). Developments across the career, relationships between the writing and the life, the writer's participation in a culture and an historical moment. Sample subjects: Emerson and Thoreau, Melville, Whitman, Stowe and Douglass, Dickinson, Twain, James and Wharton, Frost, O'Neill, Fitzgerald and Hemingway, Faulkner, Hurston and Wright, O'Connor, Morrison.

ENG 421 Computer Documentation Design 3. Offered in Fall Only. Prerequisite: ENG 314, 331, 332 or ENG 333. Theory and design of documentation for computer hardware and software, including user guides, reference manuals, quick reference guides, tutorials, online documentation, and CD-based media delivery. Training in alternative documentation testing procedures, usability testing, and collaborative revision.

ENG 422 Writing Theory and the Writing Process 3. Offered in Fall and Spring. Prerequisite: ENG 101. Theory and research on the processes and contexts of written discourse; cognitive, socio-cultural, educational perspectives; reflective and research-based accounts of the writing process; analysis of discourse contexts and communities.

ENG 425 Analysis of Scientific and Technical Writing 3. Offered in Spring Only. Prerequisite: ENG 314, 331, 332, or 333. The role of communication in the creation of scientific knowledge and technical designs and artifacts; methods of analyzing texts and of studying their creation and use; relationships between writing and other forms of communication. Field research in a scientific or technological setting.

ENG 426 Analyzing Style 3. Offered in Fall and Spring. Prerequisite: ENG 101. Development of a greater understanding of and facility with style in written discourse. Theories of style, stylistic features; methods of analysis, imitation.

ENG 430 Advanced Screenwriting 3. Offered in Spring Only. Prerequisite: ENG 330. Advanced Screenwriting students will complete ready-to-sell screenplays over the course of the semester. Workload includes taking home two 100-page scripts each week and giving a thorough critique both in writing and in class discussion. Course included pitch sessions, opening scene workshops, intensive reading and writing.

ENG 439 17th-Century English Literature 3. Offered in Spring Only. Works of major nondramatic literary figures in England during the period 1600-1700, such as Donne, Jonson, Herbert, Marvell, Bacon, and Browne.


ENG 449 16th-Century English Literature 3. Offered in Fall Only. Nondramatic prose and poetry of the sixteenth century, with consideration of literary types and movements. Emphasis on major authors, including Sidney and Spenser.
English 451 Chaucer 3. Offered in Fall and Spring. Introduction to the study of Chaucer through an intensive reading of The Canterbury Tales.

English 452 Medieval British Literature 3. Offered in Spring Only. Readings in the rich poetic, thematic, and generic diversity of Medieval British literature. Representative selections from romance, dream-visions, allegory, fabliau, lyric, chronicle, saint's life, satire, in historical and cultural contexts. Prior knowledge of Middle English unnecessary.

English 453 The Romantic Period 3. Offered in Fall Only. Emphasis on the major poetry of Blake, Wordsworth, Coleridge, Byron, Shelley, and Keats, with selected readings from other poets, prose writers, and dramatists of the period.

English 455 Literacy in the U.S. 3. Offered in Spring Only. Prerequisite: ENG 101; Junior or senior standing. Academic study of the nature, functions, acquisition, institutionalization, and present state of literacy in the U.S., with special focus on issues of cultural diversity and social inequity. Three contexts for literacy - personal, academic, and home/community - provide a range of readings, investigations, and opportunities for reflection and further study. Service-learning component links this academic study to required tutoring (2 hours per week) of children and adults in local community service agencies in addition to attending class. Students will need to provide their own transportation.

English 459 Seminar in Film Studies 3. Offered in Spring Only. Prerequisite: ENG 282, ENG 384 and Junior or Senior standing. Advanced critical approaches to focused film topics involving film genres, director styles, or trends within a national cinema. This seminar-style course will include screenings, readings, regular discussions, and a substantive final research paper. Topics will vary from semester to semester. Junior or senior standing or permission of instructor required.

English 460 Major British Author 3. Offered in Spring Only. In-depth study of the works of one (or two) British author(s) within their historical and literary-historical context. Sample authors might include; Spencer and Sidney, Swift and Pope, Austen, Wordsworth and Coleridge, Keats and Shelley, the Brontes, the Brownings, Dickens, George Eliot, Hardy, Joyce, Woolf.

English 462 18th-Century English Literature 3. Offered in Fall Only. Major figures in English literature between 1660 and 1790. Works studied in relation to social, political, and religious developments. Emphasis on writers such as Dryden, Swift, Pope, Johnson.

English 463 The Victorian Period 3. Offered in Spring Only. Significant British poets, writers of prose non-fiction, and novelists studied in the social, economic, scientific, intellectual, and theological contexts of the Victorian era.

English 464 British Literature, 1900-1945 3. Offered in Spring Only. Variety of writings by British authors between the death of Queen Victoria and the end of World War II. Typical subjects: Hardy, Conrad, Shaw, Yeats, Forster, Joyce, Lawrence, Eliot, Woolf, Beckett.


English 466 American Colonial Literature 3. Offered in Spring Only. Survey of American literature and thought from its beginnings to the adoption of the Constitution. Representative works such as travel and exploration reports, Indian captivity narratives, diaries, journals, autobiographies, sermons, and poetry.

English 468 American Romantics 3. Offered in Fall Only. Major American writers from 1825 to 1865. Relationship between literary developments and social change. Emphasis on such writers as Emerson, Hawthorne, Cooper, Poe, Melville, Douglass, Stowe, Thoreau, and Whitman.

English 469 American Realism and Naturalism 3. Offered in Spring Only. Major American writers from 1865 to 1914, with emphasis on novelists such as Twain, James, Howells, Chopin, and Dreiser.


English 471 American Literature, Since 1945 3. Offered in Fall Only. Study of a variety of writings by U.S. authors since World War II. Typical subjects: Ellison, Lowell, Williams, Welty, Bellow, Baldwin, O'Connor, Barthelme, Albee, Mailer, Ashbery, Morrison, McDermott, Delillo.

English 475 Literature, the Arts, and Mass Culture 3. Offered in Fall and Spring. A review of the debate regarding art and mass culture, with attention to recent developments in cultural theory and practice.

English 476 Southern Literature 3. Offered in Fall Only. Literary traditions of the Southeastern United States from colonization through the present, including study of such major writers as Byrd, Jefferson, Simms, Poe, Douglass, Twain, Chesnutt, Glasgow, Hurston, Tate, Wolfe, Faulkner, Warren, Wright, Welty, Williams, O'Connor, Percy, and Lee Smith.

English 486 Shakespeare, The Earlier Plays 3. Offered in Fall Only. Shakespeare's major works before 1600 with emphasis on his development as a playwright.

English 487 Shakespeare, The Later Plays 3. Offered in Spring Only. Shakespeare's major works after 1600 with emphasis on his tragedies and the late romances.

English 488 Advanced Fiction Writing Workshop 3. Offered in Spring Only. Prerequisite: ENG 388. An advanced workshop in creative writing for students with demonstrated understanding and accomplishment in the techniques of writing prose fiction. This course is restricted to juniors and seniors. Departmental approval required.

English 489 Advanced Poetry Writing Workshop 3. Offered in Spring Only. Prerequisite: ENG 389. An advanced workshop in creative writing for the students with demonstrated understanding and accomplishment in the techniques of writing poetry. This course is restricted to juniors and seniors. Departmental approval required.

English 490 Studies in Medieval Literature 3. Offered in Fall Only. Topics (in rotation) in medieval English and continental literature, such as Arthurian legend and literature; women in medieval society and literature; the self in the late Middle Ages. Focus on special areas of interest, with attention to cultural and historical backgrounds and contemporary scholarship. Some texts in Middle English, some in translation; no prior knowledge of Middle English needed.
ENTOMOLOGY

ENT 201  Insects and People 3. Introduction to the fascinating world of insects and how they interact with people. Survey of insect history, diversity, structure and function, and behavior. Examples of harmful and beneficial insects in a variety of human activities concluding with some profound impacts insects have had on history, society and culture.

ENT 203  An Introduction to the Honey Bee and Beekeeping 3. Offered in Fall Only. Introduction to honey bee biology and a fundamental understanding of beekeeping management including crop pollination by bees. Examination of the relationships between honey bees and humans from prehistoric through modern times and the behavior and social system of one of the animal world's most complex and highly organized non-human societies.

ENT 305  Introduction to Forensic Entomology 3. Offered in Spring Only. This course provides a broad overview of forensic entomology—a specialized field of entomology employed in medicolegal investigations. Forensic entomology relies on knowledge of insect ecology, biology, taxonomy, physiology, and development to elucidate the circumstances surrounding death. The role of arthropods associated with decomposed human remains is one of several valued disciplines in forensic sciences. Understanding the general principles of forensic entomology and their application will be the focus of this course.

ENT 410  Advanced Beekeeping 3. Offered in Spring Only. Prerequisite: ENT 203. Hands-on course in honey bee management including bee pollination of selected crops based on an understanding of bee biology, bee behavior, bee pathology, and bee botany. Credit not allowed for both ENT 401 and ENT 501.

ENT 425  General Entomology 3. Offered in Fall and Summer. Prerequisite: BIO 181 or BIO 140 or BIO 150. Explores the science of entomology by focusing on the basic principles of systematics, morphology, physiology, development, behavior, ecology, and control of insects. Field trips provide opportunities to collect insects and study their adaptations to a wide variety of natural environments.

ENT 450  Challenges in Plant Resource Protection 3. Offered in Spring Only. Prerequisite: CS 414 or ENT 425 or CP 315. This course provides applied training to students in the scientific and regulatory aspects of plant protection using real-world studies, scenarios, and addressing important contemporary issues for safeguarding American agriculture. Students will gain hands-on problem solving abilities regarding the diagnosis, containment, and mitigation of introduced plant pests and pathogens.

ENT 460  Fundamentals of (Pest) Risk Analysis 1. This course provides students with a historical perspective as well as real-time exposure to working professionals involved in the development of risk analysis documents for plant protection. The course uses real world scenarios and addresses contemporary issues facing scientists and regulators tasked with safeguarding American agriculture. Students will gain hands-on problem solving abilities regarding the identification and mitigation of plant pathogens, insects, and noxious weeds that can be introduced into the USA through international trade in agricultural commodities.

ENT 470  Advanced Turfgrass Pest Management 2. Offered in Spring Only. Prerequisite: C- or better in CS 200. Characteristics and ecology of turfgrass weed, insect, and disease pests; identification and diagnosis of turfgrass pests; strategies for managing pests including cultural, mechanical, biological, and chemical methods; development of integrated pest management programs, characteristics and modes of action for herbicides, insecticides, fungicides, and plant growth
regulators; behavior and fate of pesticides in soil; and the development and management of pesticide resistant pest populations.

ENT 490 Critical Issues in Plant Protection 1. This course is of particular interest to students majoring in plant biosecurity and regulatory science; however, it is open to all students. The course will feature subject-matter experts in the area of regulatory plant science that will deliver one hour lectures on emerging and critical topics in regulatory plant protection.

ENT 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

ENT 493 Special Problems in Entomology 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

ENT 495 Special Topics in Entomology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

EOE 101 Introduction to Occupational Education 1. Offered in Fall Only. Orientation to occupational teacher education curricula. Overview of philosophy, objectives and scope of occupational education programs in the public schools; multi-cultural and individual differences of students. Orientation to microcomputers and their potential uses by occupational education teachers.


EOE 298 Special Topics in Occupational Education 1-3. Offered in Fall Spring Summer. Individual or group study of particular areas of education at the freshman and sophomore levels.

EOE 444 Administration of Marketing Education 3. Offered in Fall Only. Prerequisite: EOE 241 and admission to teacher education candidacy. The theory and skills necessary to plan, administer, and evaluate effective programs in Marketing Education classroom. Student teachers spend ten weeks full-time in a public school: observing, teaching, and participating in the total school program.

EOE 457 Student Teaching in Technology Education 1-8. Offered in Spring Only. Prerequisite: Admission to professional semester. Corequisite: EOE 452 and EOE 495. Skills and techniques involved in teaching technology education through practice in a public school setting.

ES 100 Introduction to Environmental Sciences 3. Environmental Science majors only. Permission of instructor. Interrelationships between human populations and the natural environment. Human population trends, agriculture, air and water pollution, biological diversity, forest and land use, energy and mineral resources, and toxic substances. Consideration of related economic factors, laws, politics, political behavior, and ethical questions.

ES 200 Climate Change and Sustainability 3. Offered in Spring Only. This course explores the relationships between humans and the environment with interdisciplinary content. Focus is on past impacts of climate change on human activities and future prospects. Course content is based on lectures with students also responsible for developing and presenting seminars. Student may incur extra expenses with projects for this course.

ES 295 Special Topics in Environmental Science 1-3. Offered in Fall and Spring. Provides instruction on rapidly emerging curriculum. Also provides courses on an experimental basis before incorporation into the curriculum. See specific course offering for course details.

ES 300 Energy and Environment 3. Offered in Fall Only. This course explores relationships between humans, energy, and the environment with interdisciplinary context. Themes include environmental impacts of energy production, distribution and use with discussion of new technologies. Half of the course content is from subject lectures and half from self-selected student projects. Student projects emphasize analytical approaches to solving environmental problems, and enhance skills in writing, seminars, and team work. Student may incur extra expenses with projects for this course.

ES 400 Analysis of Environmental Issues 3. Offered in Spring Only. A capstone course for students in environmental sciences or related majors. The course teaches use of analytical approaches for solving environmental problems, and for communicating results. The course emphasizes development of student projects that lead to environmental decision-making, such as devising a resource management plan, developing a predictive model, prioritizing risk, identifying tipping points, designing new software or technologies, or predicting outcomes of environmental policies. Individual student projects fit within a team framework to simulate a work environment. Students enhance writing and seminar skills. Student may incur extra expenses with projects for this course.

ES 495 Special Topics in Environmental Science 1-6. Offered in Fall and Spring. This course provides instruction on rapidly emerging environmental issues not currently covered in the undergraduate curriculum. Also provides courses on an experimental basis. See specific course offering for course detail.

ES 496 Environmental Science Internship 1-3. Offered in Fall Spring Summer. Students can earn 1-3 credits for completing internships in the public or private sectors. Emphasis is placed on gaining work experience needed to explore and plan careers in the environmental field. Students must prepare an internship proposal. Students must provide own transportation for internship. Students are required to purchase internship liability insurance. Contact university insurance & risk management for details an acquiring the insurance and the current charge.

ES 497 Professional Development in Environmental Science 1-3. Offered in Fall Spring Summer. The course provides 1-3 credits for professional development in environmental sciences.
required. The student must produce a final report, seminar, or product that can be evaluated. Typically, the work for 1-3 credits of ES 498 research will be completed in one semester.

ES 499 Thesis in Environmental Science 3. Offered in Fall Spring Summer. ES 499 thesis provides academic credit for students who participate in original, inquiry-based learning and discovery in environmental sciences. Students present the thesis to a community of peers and experts for evaluation. ES 499 thesis requires a thesis proposal signed by the student, ES faculty advisor, a thesis host, and a supporting faculty member.

ENVIRONMENTAL TECHNOLOGY

ET 105 Introduction to Environmental Regulations 1. Offered in Spring Only. ET 105 is a 1 hour lecture/discussion class, required of all environmental technology majors. The course reviews all the major federal and state regulations and laws addressing, water air and soil pollution; solid, toxic and hazardous waste, occupational safety/health and environmental management systems. For ET majors only.

ET 201 Environmental Technology Laboratory I 1. Offered in Fall Only. Use of field and laboratory instrumentation for monitoring water quality and quantity. Management, analysis, interpretation, and oral and written reporting of complex environmental data sets. Hands-on, real-world experience in water quality monitoring and maintenance. Required field trips may extend beyond class time.

ET 202 Environmental Technology Laboratory II 1. Offered in Spring Only. Use of field and laboratory instrumentation for monitoring plants, soils, and natural systems. Management, analysis, interpretation, and oral and written reporting of complex environmental datasets. Hands-on, real-world experience in plant and soil quality monitoring and maintenance. Required field trips may extend beyond class time.

ET 203 Pollution Prevention 1. Prerequisite: ES 100. This course studies the prevention of the pollution of air, water, and terrestrial ecosystems. State of the art technological solutions are discussed. The social, economic, legal and ethical dimensions of pollution prevention are integrated into the scientific and technological challenges facing developed and developing economies.

ET 252 Introduction to Spatial Technologies 3. Offered in Spring Only. Introduction to types of spatial information technologies and their uses in environmental assessments. Topics include: map reading, geographic positioning systems, geographic information systems, and remote sensing. This course will provide a basic overview of these technologies through lectures, and will afford an exposure to their uses through a series of structured laboratory exercises.

ET 301 Environmental Technology Laboratory III 1. Offered in Fall Only. Assessment of and response to environmental hazards caused by hazardous materials releases. Regulatory requirements associated with hazardous materials releases. Utilization of chemical protective clothing and respiratory protection. Students passing the class receive Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) certification. Required field trips may extend beyond lab time.

ET 302 Environmental Technology Laboratory IV 1. Offered in Spring Only. Use of field and laboratory instrumentation for monitoring outdoor and indoor air quality. Management, analysis, interpretation, and oral and written reporting of complex environmental data sets. Hands-on, real-world experience in air quality monitoring and maintenance. Required field trips may extend beyond class time.

ET 303 Laboratory Safety Systems and Management 1. Offered in Fall Only. Theory and practice of regulation, management, and auditing of laboratory safety. Laboratory field trips may extend beyond class time.

ET 310 Environmental Monitoring and Analysis 3. Offered in Spring Only. Prerequisites: CH 220 or CH 221/222. Monitoring and analysis of chemical, biological, and radiation impacts to the environment. Theory of chemical, physical, biological, and ecological monitoring. Planning and conducting environmental sampling and monitoring programs. Management, analysis, and quality assurance and control. Risk assessment in environmental technology. Laboratory practice and safety.

ET 320 Fundamentals of Air Pollution 4. Offered in Spring Only. Prerequisite: (MA 121, MA 131, or MA 141) and (PY 131 or PY 201 or PY 205 or PY 211). Air pollution sources, and the influence of natural and anthropogenic processes on the atmosphere. Roles of local, state and federal governments in air pollution control and importance of the Clean Air Act and it amendments. Techniques for measurement of atmosphere pollutant concentrations and determination of local and regional air quality. Required field trips may extend beyond class time.

ET 330 Environmental Technology Practicum 3. Offered in Summer. Preparation for practicum, including resume writing, interviewing skills, cover letters, and practicum search techniques and resources. Professional practice as an environmental technologist. Written and oral communications of the practicum experience.

ET 401 Environmental Technology Laboratory V 1. Offered in Fall Only. Scientific and legal definitions of brownfield and EPA Superfund sites. Physical, chemical, and biological methods for remediating contaminated sites. Impacts of hazardous waste management on public and private sector organizations. Field trips to public and private brownfield and Superfund remediation sites to examine real-world applications of principles. Required field trips may extend beyond class time.

ET 410 Toxic Substances and Society 3. Offered in Spring Only. Interdisciplinary evaluation of past, present and future effects of toxic substances in the environment. Addresses various dimensions of toxic substances; special emphasis on ways to minimize adverse effects in contemporary and future societies.


ET 455 Adaptive Management and Governance 3. Offered in Fall Only. Prerequisite: (PS 320 or ARE 309 or PS 336). Some environmental and natural resource problems are more difficult to resolve than others. The purpose of this course is to understand the factors that condition intractable or “wicked” environmental and natural resources conflicts. These factors include narrow conceptions of science, rigid bureaucratic structures and narrow policy targets. We
also explore some of the alternatives for addressing intractable environmental and natural resource problems—incorporating adaptive management and governance.

**ET 460 Practice of Environmental Technology** 3. Prerequisite: ET 310. Preparation and presentation of comprehensive environmental assessments and analyses. Critical roles of quality control and assurance. The ISO 14000 environmental management standard of the American National Standards Institute (ANSI). Preparation for certification as an environmental auditor by ANSI and registration as an Environmental Professional by the National Register of Environmental Professionals. Optional training and exams for Environmental Auditors Registration Association and American National Standards Institute/Register Accreditation Board. Written Examination available.

**ET 470 Environmental Forensics** 3. Offered in Fall Only. Prerequisite: ET 252, ET 301, ET 310. Use of site assessment methodologies and state of the art technologies from analytical chemistry, molecular biology, biogeochemistry, and GIS to solve environmental cases of "Who done it?" with regards to soil/sediment, water, and air contamination. Two field trips which may extend beyond class time are required.

**ET 490 Senior Seminar in Environmental Technology** 1. Offered in Spring Only. Weekly departmental and university seminars and group discussions to enrich and broaden student perspectives on the practice and development of environmental technology. Oral and written reporting of seminars topics.

**FOREIGN LANGUAGE**

**FL 215 Discovering France** 3. Offered in Spring Only. A wide-ranging exploration of the French experience—from the glories of the past to the uncertainties of the future. Examination of social, political, economic, and cultural issues, with guest speakers offering complementary perspectives. Special emphasis on the role of France and the French cultural heritage in today's rapidly changing world. Course taught in English.

**FL 216 Art and Society in France** 3. Offered in Fall Only. An overview of the visual arts in France, defined broadly, and their relationship to French society and culture: painting, architecture, photography, cinema, book production, gardens, fashion, food, television, popular culture, and mass media, including the Internet. The principal themes of the course are how France's cultural heritage is embodied in its rich tradition of visual expression and how artists' visual expressions have either served to represent, glorify, or critique the nation.

**FL 219 Studies in Great Works of Non-Western Literature** 3. Readings, in English translation, or non-Western literary masterpieces from the beginnings of literacy in the Middle East, Asia, and Africa to the modern period, including excerpts from texts such as the Upanishads, the Ramayana, the Sandhiata, Gilgamesh, A Thousand and One Nights, and the Quran and such authors as Confucius, Oe Kenzaburo, Omar Khayyam, Rumi, and Amos Oz.

**FL 220 Studies in Great Works of Western Literature** 3. Offered in Fall Spring Summer. Readings, in English translation, of Western literary masterpieces, from the beginnings of literacy in the Middle East and Europe towards the present, including such authors as Homer, Sophocles, Virgil, Ovid, Augustine, Dante, Machiavelli, Shakespeare, Cervantes, Moliere, Voltaire, Goethe, Austen, Flaubert, Dickinson, Tolstoy, Kafka, and Woolf. Credit will not be given for both ENG/FL 220 and either ENG/FL 221 or ENG/FL 222.

**FL 221 Literature of the Western World I** 3. Offered in Fall Only. Readings from English translations of Biblical, Classical, Medieval, and Early Renaissance literature, including works by such authors as Homer, Plato, Virgil, Ovid, St. Paul, St. Augustine, Marie de France, and Dante.

**FL 222 Literature of the Western World II** 3. Offered in Spring Only. Readings from English translations of Renaissance, Neo-Classical, Romantic, and Early Modern literature, emphasizing the cultures of continental Europe from the Renaissance to 1900; and including such authors as Petrarch, Erasmus, Rabelais, Machiavelli, Shakespeare, Moliere, Voltaire, Rousseau, Goethe, Flaubert, Tolstoy, Achebe, Soyinka, Calvino, Walcott and Naipaul. Topics will vary from semester to semester. May be repeated for credit with new topic.

**FL 223 Contemporary World Literature I** 3. Offered in Fall Only. Prerequisite: ENG 112. Twentieth-century literature of some of the following cultures: Russian, Eastern European, Western European, Latin American, Canadian, Australian.

**FL 224 Contemporary World Literature II** 3. Offered in Spring Only. This course probes the modern period, including such authors as Shakespeare, Goethe, Balzac, and Flaubert, Kafka, Proust, Lessing and Gordimer, Borges and Marquez, Neruda, Achebe, Soyinka, Calvino, Walcott and Naipaul. Topics will vary from semester to semester. May be repeated for credit with new topic.

**FL 225 Special Topics in Foreign Languages and/or Literatures 1-3. Offered in Fall Spring Summer. A special projects course on topics to be determined as needed in the departmental program.**

**FL 298 Independent Study in Foreign Language or Literature 1-6. Offered in Fall Spring Summer. Individualized study in a foreign language or literature. Topic, mode of study and credit hours to be determined in consultation with the faculty member supervising work.**

**FL 392 Major World Author 3. Offered in Fall and Spring. Intensive study in English, of the writings of one (or two) author(s) from outside the English and American traditions. Sample subjects: Homer, Virgil and Ovid, Lady Murasaki, Marie de France and Christine de Pizan, Dante, Cervantes, Goethe, Balzac and Flaubert, Kafka, Proust, Lessing and Gordimer, Borges and Marquez, Neruda, Achebe, Soyinka, Calvino, Walcott and Naipaul. Topics will vary from semester to semester. May be repeated for credit with new topic.**

**FL 393 Studies in Literary Genre 3. Offered in Fall and Spring. Concentrated treatment of one literary genre, such as the epic, the lyric, the drama, satire, romance, autobiography, the essay, the novel, or the short story. Treatment of materials from several national or ethnic cultures and several periods. All readings in English. Course may be taken three times for credit. Course may be taken 3 times in different genres.**

**FL 394 Studies in World Literature 3. Offered in Fall and Spring. Prerequisite: ENG 111 and 112 or 113. Study of a subject in world literature: for example, African literature, Asian literature, Hispanic literature, East European literature, Comedy, the Epic, the Lyric, Autobiography, the Faust legend, or Metamorphosis. Subjects vary according to availability of faculty. Readings in English translation.**
FL 395 Study Abroad Programs 1-3. Specific category of courses involving language and/or culture taught in foreign countries through the Department Study Abroad Program.

FL 406 Modernism 3. Offered in Fall Only. International Modernist movement in literature, from its nineteenth-century origins to its culmination in the early twentieth century. Definitions of modernity, as embodied in a variety of genres. Placement of Modernist texts within a variety of cultures that produced them.

FL 407 Postmodernism 3. Offered in Spring Only. Literary expressions of Postmodernism, from its origins in the Modernist movement through its culmination in the later decades of the twentieth century. Definitions of postmodernity, as embodied in a variety of genres. Placement of Postmodernist texts within a variety of cultures that have produced them.

FL 424 Linguistics for ESL Professionals 3. Offered in Fall Only. Study of the diachronic nature of language and the phonological, morphological, syntactic, and semantic features of English in relation to other world language groups. Application of linguistic principles to the ESL classroom. Analysis of English speech and writing patterns of non-native speakers. Examination of the ways children, adolescents, and adults learn a second language.


FL 439 Perspectives on English as a New Language 3. Offered in Fall Only. Examination of the complexity of multiculturalism in American society and the challenges faced by immigrant families in adapting to U.S. institutions. Emphasis on understanding historical, legal, cultural and pedagogical issues with respect to learning English as a new language (ENL).

FL 440 Internship in Teaching English as a Second Language 3. Offered in Summer. Skills and techniques required in teaching ESL in a public school setting. 15 hours of classroom observation and 30 hours in direct instruction. Demonstration of competencies essential for teaching ESL.

FL 495 Special Topics in Foreign Languages and Literatures 3. A concentrated study of a special period, author or genre to be determined as needed in the departmental program.

FL 497 Senior Seminar in World Literature 3. Offered in Spring Only. Rotating topics in world literature, including treatment of materials from more than one culture and including consideration of the subject's theoretical or methodological framework. Readings in English (original languages encouraged but not required).

FL 498 Independent Study in Foreign Language or Literature 1-6. Offered in Fall Spring Summer. Individualized study of a foreign language or literature. Topic, mode of study, and credit hours to be determined in consultation with the faculty member supervising work.

FL 101 Beginning Arabic 101 3. Offered in Fall Only. Beginning Arabic is for students who have had no prior experience with the language. It is the first in a series of courses which develop reading and writing skills in Modern Standard Arabic with active speaking and listening skills in both formal Arabic and the Egyptian dialect. Authentic materials from the Arabic media will be used in addition to text-related video and audio materials. An introduction to Arab culture will be integrated throughout the semester. This course is designed for true beginners who have had no previous experience with the Arabic language, either written or spoken. Credit will be allowed for either FLA 101 or FLA 111, but not for both.

FL 102 Beginning Arabic 102 3. Offered in Spring Only. Prerequisite: FLA 101 or 111. This course is the second in a series which develops reading and writing skills in Modern Standard Arabic with active speaking and listening skills in both formal Arabic and the Egyptian dialect. Authentic materials from the Arabic media will be used in addition to text-related video and audio materials. An introduction to Arab culture will be integrated throughout the semester. Credit will be allowed for either FLA 102 or FLA 112, but not for both.

FLA 111 Advanced Beginning Arabic 111 3. Offered in Fall Only. Advanced Beginning Arabic 111 is a beginning course of language study for students who have some knowledge of an Arabic dialect, but have not yet learned to read or write in Arabic. This is the first in a series of courses which develops strong reading, writing, listening and speaking skills in Modern Standard Arabic. In addition to the standard course texts, authentic materials from the Arabic media will be used as well as text-related video and audio materials. FLA 111 and FLA 112 can meet university foreign language requirements instead of FLA 101 and FLA 102. Credit will be allowed for either FLA 111 or FLA 101, but not for both.

FLA 112 Advanced Beginning Arabic 112 3. Offered in Spring Only. Prerequisite: FLA 111 or FLA 101. Continuation of Advanced Beginning Arabic 111. This course further develops strong reading, writing, listening and speaking skills in Modern Standard Arabic for those who have previous knowledge of an Arabic dialect. In addition to the standard course texts, authentic materials from the Arabic media will be used as well as text-related video and audio materials. FLA 111 and FLA 112 can meet university foreign language requirements instead of FLA 101 and FLA 102. Credit will be allowed for either FLA 112 or FLA 102, but not for both.

FLA 201 Intermediate Arabic I 3. Offered in Fall Only. Prerequisite: FLA 102 or FLA 112. Intermediate Arabic I is the third in a series of courses which develop reading and writing skills in Modern Standard Arabic with active speaking and listening skills in both formal Arabic and the Egyptian dialect. An increased emphasis is placed on the acquisition of vocabulary and grammatical tools necessary to undertake more in-depth readings and discussions of news articles from the Arab media. Authentic materials from the Arab media will be used in addition to text-related video and audio materials.

FLA 202 Intermediate Arabic II 3. Prerequisite: FLA 201. Intermediate Arabic II is the fourth in a series of courses which develop reading and writing skills in Modern Standard Arabic with active speaking and listening skills in both formal Arabic and the Egyptian dialect. A continued emphasis is placed on the acquisition of vocabulary and grammatical tools necessary to undertake more in-depth readings and discussions of news articles from the Arab media. Authentic materials from the Arab media will be used in addition to text-related video and audio materials.
FLA 301 Advanced Intermediate Arabic 1 3. Offered in Fall Only. Advanced Intermediate Arabic 1 is the fifth in a series of courses which develop whole language skills in Modern Standard Arabic with active speaking and listening skills in the Egyptian dialect. Upon completion of this course the student will have the tools necessary to understand and produce all the basic structures of Modern Standard Arabic. Arabic film and media will be used in class. The student will also be introduced to selected short stories from modern Arabic literature.


FLC 102 Elementary Chinese II 3. Offered in Spring Only. Prerequisite: FLC 101. Continuation of basic skills. Emphasis on speaking and listening with some reading, writing and Chinese culture.


FLC 201 Intermediate Chinese I 3. Offered in Fall Only. Prerequisite: FLC 102. Continuation of basic skills. Greater emphasis on reading, writing and Chinese cultural traditions.

FLC 202 Intermediate Chinese II 3. Offered in Spring Only. Prerequisite: FLC 201. Continuation of basic skills. Focus on reading, writing, Chinese cultural traditions and patterns of behavior.

FLC 301 Intermediate Chinese III 3. Offered in Fall Only. Prerequisite: FLC 202. Last of the foundation courses in Chinese. Continued practice in speaking and understanding Chinese with new emphasis on writing and on the reading of cultural and literary texts.


FLF 102 Elementary French II 3. Offered in Fall, Spring, Summer. Prerequisite: FLF 101. Continuation of FLF 101 with intensive practice in spoken French. Readings in French culture and civilization.

FLF 201 Intermediate French I 3. Offered in Fall Spring Summer. For non-native speakers of French. Intensive introduction to critical writing and reading in academic contexts. Exploration of writing processes and academic literacy skills: interpreting assignments; comprehending, analyzing, and evaluating college-level texts; inventing, drafting, and revising; seeking, providing, and responding to constructive feedback; collaborating effectively under varied learning models. Extensive writing practice and individualized coaching. Attention to grammar and conventions of standard written English. Intended as preparation for FLE 101. Only for non-native speakers of French. Requires C- or better. Credit for FLF 101 is not allowed if student has prior credit for FLE 101.

FLF 202 Intermediate French II 3. Offered in Fall Spring Summer. Prerequisite: FLF 201. Continuation of FLF 201 with intensive practice in spoken French. Readings in French culture and civilization.

FLF 105 Intensive Elementary French 6. An intensive course aimed at developing a balanced foundation in listening, speaking, reading and writing French. Equivalent to FLF 101 plus FLF 102.

FLF 110 Accelerated Elementary French 3. Offered in Fall Spring Summer. Content of FLF 101 and 102, at an accelerated pace, for students with previous study of French (1-2 years in high school) who placed into the course based on results of the NC State French Placement Test. Includes a refresher of 101 material before covering 102 material. Development of skills in listening, speaking, reading, writing and understanding Francophone cultures. Significant amount of work outside of class. Fulfills the FL 102 requirement.

FLF 101 Elementary French I 3. Offered in Fall Spring Summer. First in a four-course sequence to develop language skills. Oral and written practice in classroom and language laboratory. Readings in French culture and civilization.

FLE 100 Introduction to Academic Writing 4. Offered in Fall and Spring. For non-native speakers of English. Intensive introduction to critical writing and reading in academic contexts. Exploration of writing processes and academic literacy skills: interpreting assignments; comprehending, analyzing, and evaluating college-level texts; inventing, drafting, and revising; seeking, providing, and responding to constructive feedback; collaborating effectively under varied learning models. Extensive writing practice and individualized coaching. Attention to grammar and conventions of standard written English. Intended as preparation for FLE 101. Only for non-native speakers of English. Requires C- or better. Credit for FLE 100 is not allowed if student has prior credit for FLE 101.

FLE 101 Academic Writing and Research 4. Offered in Fall and Spring. Prerequisite: Grade of C- or better in FLE 100 or placement via ESL testing guidelines. For non-native speakers of English intensive instruction in academic writing and research. Basic principles of rhetoric and strategies for academic inquiry and argument. Instruction and practice in critical reading, including the generative and responsible use of print and electronic sources for academic research, adapted for non-native speakers. Exploration of literate practices across a range of academic domains, laying the foundation for further writing development in college. Continued attention to grammar and conventions of standard written English. Satisfies freshman English requirements. Successful completion of FLE 101 requires a C- or better. Credit for FLE 101 is not allowed if the student has already fulfilled the first-year writing requirement.

FLE 201 Oral Communication in English for International Students 3. Offered in Fall and Spring. Oral communication in English; active and interactive speaking skills; listening comprehension and reading. Specific tasks in spoken English such as communicating information, making inquiries, requests and complaints. Individual and group work in the form of oral reports, role play, presentations, etc. Listening to lectures and note taking skills.

FLE 202 Written Communication in English for International Students 3. Offered in Fall and Spring. Written communication skills for graduate students; integrated writing tasks focusing on writing, reading, grammar and comprehension, specifically geared to the needs of research students and teaching assistants. Reading, critical analysis and synthesis of written material such as journal articles, research reports, etc.

FLE 301 Intermediate Chinese I 3. Prerequisite: FLC 301. Placement Test. Includes a refresher of 101 material before covering 102 material. Development of skills in Modern Standard Chinese with active speaking and listening skills in the Egyptian dialect. Upon completion of this course the student will have the tools necessary to understand and produce all the basic structures of Modern Standard Arabic. Arabic film and media will be used in class. The student will also be introduced to selected short stories from modern Arabic literature.
to develop skills of speaking, listening, reading and writing. Readings and discussions of French culture, civilization and literature.

FLF 202 Intermediate French III. Offered in Fall Spring Summer. Prerequisite: FLF 201. Last of four sequential language courses. Increased emphasis on reading and writing. Readings in the literature, culture, and civilization of France and the Francophone world.

FLF 212 French: Language, Culture, and Technology. Offered in Fall Only. Prerequisite: FLF 102 and FLF 110. A study of the language structures and vocabulary necessary for an intermediate level of communication in French together with cultural and technological issues of our global society, in the context of the French-speaking world and the European Union. Students are responsible for providing their own transportation for required field trip. Fulfills the FLF 201 requirement.

FLF 301 Survey of French Literature from the Middle Ages through the Enlightenment. Offered in Fall Only. Prerequisite: An advanced language skills course (FLF 308, 310, 315) or FLF 202 with permission of instructor. Reading and discussion of representative works with attention to literary analysis as well as to historical and cultural background.

FLF 302 Survey of French Literature from Romanticism to the Contemporary Period. Offered in Spring Only. Prerequisite: An advanced language skills course (FLF 308, 310, 315) or FLF 202 with Consent of Instructor. Reading and discussion of representative works with attention to literary analysis as well as to historical and cultural background.


FLF 307 Business French. Offered in Fall Only. Prerequisite: FLF 202. Business French vocabulary and concepts with emphasis on cultural differences and their importance in the new global village business world.

FLF 308 Advanced Conversation: Contemporary French Cultures. Offered in Spring Only. Prerequisite: FLF 202. Conversation and reading emphasizing idiomatic and practical usage with attention to contemporary civilization and cultures of the French speaking world. Emphasis on social structures, political features, events, world views and modes of communication.


FLF 310 Advanced Written Communication. Offered in Fall Only. Prerequisite: FLF 202. An in-depth study of French written communication at the advanced level, including the more advanced aspects of the French grammar with extensive writing practice serving a variety of practical communicative needs.

FLF 315 French Civilization and Culture. Offered in Spring Only. Prerequisite: FLF 202. French civilization and culture from its origins to the modern period. Reading and discussion of the social, cultural, economic and political structures of France, including its geography, history, music, art and national consciousness.

FLF 318 The Heritage of French Cinema. Offered in Spring Only. Prerequisite: 3 hrs. in French at 300 level. Survey of the major contributions of French cinema from its origins to the present. Attention to film as an artistic medium and to the cinematic representation of French history and culture. Reading, discussion, and viewing of films including Un Chien Andalou, La Passion de Jeanne d'Arc, Le Retour de Martin Guerre, La Marseillaise, Les 400 Coups, and Diva.

FLF 321 French Cultures and contexts. Offered in Spring Only. Prerequisite: FLF 202. An approach to important periods in the history of French culture through the reading of texts by several important writers. Films, slides, painting, music, and the Internet will be included to put the readings in a cultural context.

FLF 398 Independent Study. Offered in Fall and Spring. Individualized study in French language, culture, or literature. Topic, mode of study, and credit hours to be determined in consultation with faculty member supervising work. Course may be taken a maximum of two times provided the topic is sufficiently different.

FLF 401 French For Graduate Students. Basic French grammar, with special attention to characteristics of formal expository style, and illustrative readings. Study of extracts from scholarly publications in students’ areas of research. Prepares students to take the graduate foreign language certification exam.

FLF 411 Approaches to French Translation. Prerequisite: at least two French (FLF) 300 level courses. Intensive practice of translating into and from French a variety of texts selected from the areas of business, law, technology and science, as well as literature and the arts. Focus on Documentation, Research and Translation techniques and ethics.

FLF 414 Studies in French Prose. Offered in Fall and Spring. Prerequisite: 3 hrs in French at 300 level with 3 hrs in literature. Major developments in the French essay, letter, novel and other prose forms from the Renaissance to 1900. Readings from such authors as Montaigne, Servève, Lafayette, Rousseau, Sand, Balzac, Stendhal, Flaubert.

FLF 425 Literature, Cinema and Culture of the Francophone World. Offered in Spring Only. A study of a number of literary texts and films from across the spectrum of the Francophone world - West Africa, the Maghreb, and the Caribbean. Through these texts and films we will study the diversity of the French colonial empire as well as the different historical, political and cultural effects of colonialism and postcolonialism. Films, videos, internet sites will be used. Course taught in French.

FLF 492 Seminar in French Studies. Offered in Spring Only. Prerequisite: Junior standing and 6 hrs in French literature. A small-group study of a topic in literature resulting in either a substantial essay or series of essays by each student. Topics vary each semester.

FLG 101 Elementary German I. Offered in Fall Spring Summer. The first in a four-course sequence to develop the language skills of listening, speaking, reading, and writing. Emphasis on the acquisition
of everyday German and cultural awareness. Active class participation, practice in the language lab and computer lab, and written assignments.

**FLG 102 Elementary German II** 3. Offered in Fall Summer. Prerequisite: FLG 101. Second in a four-course sequence to develop the language skills of listening, speaking, reading, and writing. Emphasis on the acquisition of everyday German and cultural awareness. Active class participation, practice in the language lab and computer lab, and written assignments.

**FLG 201 Intermediate German I** 3. Offered in Fall Summer. Prerequisite: FLG 102. The third of four consecutive courses in German. Intensive conversational practice to develop proficiency in speaking and listening, advanced reading and writing skills by learning complex grammatical structures and through the use of authentic texts. Acquisition of cultural knowledge about the German-speaking countries.

**FLG 202 Intermediate German II** 3. Offered in Fall and Spring. Prerequisite: FLG 201. Last of four consecutive courses in German. Continued conversational practice to develop proficiency in speaking and listening. Development of advanced writing skills by refining grammatical structures and style through assignments, and of advanced reading skills through the use of cultural and literary texts from the German-speaking countries.

**FLG 212 German Language, Culture, Science, and Technology** 3. Offered in Fall Only. Prerequisite: FLG 102. The third consecutive courses in German, with a special focus on the language of technology and the topics of science, technology, and society in the German-speaking countries. Intensive conversational practice to develop proficiency in speaking and listening, advanced reading and writing skills by learning complex grammatical structures and through the use of authentic texts. Acquisition of general cultural knowledge and of selected issues of science and technology in the German-speaking countries. Fulfills the FLG 201 requirement.

**FLG 301 Advanced German** 3. Prerequisite: FLG 202 or a score of 688 on the NC State placement test. Review and consolidation of aspects of German grammar and development of writing skills. Listening and speaking practice through group activities and oral reports. Class discussions on topics from the cultures of Germany, Austria, and Switzerland, such as film, history, and the fine arts. FLG 301 and 302 can be taken in random order.

**FLG 302 German Oral and Written Expression** 3. Prerequisite: FLG 202 or a score of 688 on the NC State placement test. Review and practice of spoken and written German using authentic texts and materials from contemporary Germany (short stories, films, and online media). Review of German grammar through conversation, writing, and vocabulary building exercises. Oral reports by students. FLG 301 and 302 can be taken in random order.

**FLG 307 Business German** 3. Offered in Fall Only. Prerequisite: FLG 202. Business German vocabulary and terminology. Readings and discussions on current business topics. Special consideration to intercultural communication relative to international business operations. *Techniques in translation applied to materials of various fields and professions. Emphasis on written translation.*

**FLG 310 Advanced German Syntax and Composition** 3. Prerequisite: FLG 202. Advanced aspects of German syntax and writing styles. Assignments include paraphrasing and summarizing authentic German texts and writing compositions. *Techniques in translation applied to materials of various fields and professions. Emphasis on written translation.*

**FLG 311 Introduction to German Translation** 3. Offered in Fall Only. Prerequisite: FLG 202. Introduction to theory, methods, and techniques in translation applied to materials of various fields and professions. Emphasis on written translation.

**FLG 315 Germanic Civilization and Culture** 3. Prerequisite: FLG 202. Culture and civilization of the German-speaking countries. Analysis of the social, economic and political structures of Germany, Austria, and Switzerland. Lectures, reports, conversation. Taught in German.

**FLG 318 New German Cinema** 3. Offered in Spring Only. Prerequisite: FLG 202. Survey of the major contributions to the "New German Cinema" (1970's to 1990's). Attention to film as an artistic medium and to the cinematic representation of German history and culture. Reading, discussion, and viewing of films including films by Schloendorff (Der Blaue Engel), Fassbinder (Die Ehe der Maria Braun), von Trotta (Rosa Luxemburg), Herzog (Stroszek), and Wenders (Der Himmel ueber Berlin).

**FLG 320 Introduction to German Literature** 3. Offered in Fall Only. Prerequisite: FLG 202. An introduction to reading and analyzing German, Austrian, and Swiss literary texts in their cultural and historical contexts. Discussion of various genres (short story, novel, drama, poetry) formal aspects, literary periods, and a variety of critical approaches. Lectures and much discussion. Oral and written assignments, exam.

**FLG 323 Twentieth Century German Literature** 3. Prerequisite: FLG 202. Twentieth century literature from German-speaking countries. Readings of Mann, Kafka, Rilke, Hesse, Dururrenmat, Frisch, Grass, and a variety of poets.

**FLG 325 German Lyric Poetry** 3. Offered in Spring Only. Prerequisite: FLG 202. A historical and interpretative study of the German lyric from the fifteenth into the twentieth century with special attention to the poet's choice of theme, the ways in which that theme is treated, and the relevance of the poem to the human experience.

**FLG 390 German Studies Topics** 3. Prerequisite: FLG 202. Presentation of material not available in regular course offerings, or offering of new courses on a trial basis. Course may be offered through videoconferencing with other UNC campuses as an offering of the German Studies Consortium. Content determined by faculty member in consultation with the department's German section coordinator. May be repeated.

**FLG 398 Independent Study in German** 1-6. Offered in Fall Spring Summer. Prerequisite: FLG 202. Individualized study in German language, culture, or literature. Topic, mode of study, and credit hours to be determined in consultation with the faculty member supervising work. Departmental approval required.

**FLG 401 German For Graduate Students** 3. Offered in Fall Only. Basic German grammar, with special attention to characteristics of formal expository style, and illustrative readings. Study of extracts from scholarly publications in students’ areas of research. Prepares students to take the graduate foreign language certification exam.

**FLG 407 Business German II** 3. Prerequisite: FLG 307. Second course in the two-course series on Business German. Topics cover project planning, international marketing, trade fair presentation, financial issues, work place issues, logistics, including all forms of oral and written communication in these areas. Brief lectures, much discussion, oral presentations, written assignments, exam. Course can be used as preparation for certification in the internationally recognized "Zertifikat Deutsch fur den Beruf" (certificate "German for Professionals"). Certification is voluntary, for a fee, and separate from the course.
FLG 420 Current Issues in German-Language Media 3. Offered in Fall Only. Prerequisite: One FLG 300-level course and one from this list: FLG 300, 315, 316, 318, 323, 390. Focus on major cultural achievements in Germany, Austria, and Switzerland, including literature, film, art, and music. Topics will vary. Examples are: "Kafka and Modernism", "German/Austrian/Swiss Literature and Film-Adaptations", "German-LanguageOpera", "German Art and Society in the 20th Century", or "The Faust Theme in Literature, Art, and Music".

FLG 430 Cultural Artifacts in the German-Speaking Countries 3. Offered in Fall Only. Prerequisite: REL (FLH) 102. Continuation of REL (FLH) 101 with increased emphasis upon reading selected prose passages. Discussion, oral presentations, and either a substantial essay or a series of essays. Topics vary each semester.

FLG 492 Senior Seminar in German Studies 3. Offered in Spring Only. Prerequisite: Two 300-Level German. Survey of the long "Green" tradition in German-speaking countries as reflected in the arts, literature, and in scientific discoveries that have made Germany, Austria, and Switzerland leaders in development of alternative environmental technologies. Discussion in German of issues such as Romantic nature poetry, industrialization, Nazi attitudes towards nature, deforestation, the Green Party, air and water pollution, waste management, energy production, climate change, transportation systems, green architecture, sustainability, and the latest environmental technologies. Practice and assessment through class debates, group work, writing tasks, student presentations, and a portfolio.

FLG 499 Internship in Germany, Austria, or German-Speaking Switzerland 1-6. Prerequisite: Two courses at the FLG 300 level. Professional internship in a company or organization in Germany, Austria, or German-speaking Switzerland, with German as the main language of daily operations. Contract between the student, department, and company or organization about content, scope, and requirements. 1-6 credits for an approved internship. Essay describing and evaluating the internship experience in the context of student's professional development. Students are responsible for their own travel and living expenses. Departmental approval required.

FLH 202 Intermediate Biblical Hebrew II 3. Offered in Full and Spring. Prerequisite: REL (FLH) 201. Exclusive attention devoted to reading and interpreting selected prose and poetic passages in the Hebrew Bible.


FLJ 202 Intermediate Japanese II 3. Prerequisite: FLJ 201. Corequisite: FLJ 204. Continuation of the learning of the basic skills. Emphasis on reading and writing as well as on spoken Japanese and on cultural patterns of behavior.

FLJ 203 Intermediate Japanese Conversation I. Offered in Fall and Spring. Prerequisite: FLJ 102, Corequisite: FLJ 201, FLJ 202 or FLJ 301. Practice in spoken Japanese through use of the language in a variety of situations. Increase vocabulary and develop fluency and ease in the structural patterns of the language. May be repeated for a maximum of three credit hours.


FLJ 301 Intermediate Japanese III I 3. Offered in Fall Only. Prerequisite: FLJ 202. Continued study of Japanese language. Primary emphasis on spoken Japanese, but attention also given to reading, writing and culture.

FLJ 302 Intermediate Japanese IV 3. Offered in Spring Only. Prerequisite: FLJ 301. Continued training in the foundations of Japanese language. Primary emphasis on spoken Japanese, with increased attention to reading and writing.

FLJ 342 Classical Japanese Literature in Translation 3. Offered in Spring Only. A survey of literature in Japan from earliest recorded times through the sixteenth century. Examples from major eras and genres (folktales, poetry, philosophy, fictional narrative, theater, etc.) will be considered, with attention to historical and cultural contexts, as well as to contemporary scholarship and approaches toward traditional literature. Examples from literature outside Japan will be included for comparative purposes. No prior knowledge of Japanese required: Readings and discussions in English.

FLJ 345 Modern Japanese Literature in Translation 3. Offered in Spring Only. A survey in literature in Japan from the Meiji Era through World War Two. Examples from major periods and genres (novels, poetry, philosophy, drama, miscellaneous narrative, etc.) will be considered, with attention to historical and cultural contexts, as well as to contemporary scholarship and approaches toward the literature. Examples from literature outside Japan will be included for comparative purposes. No prior knowledge of Japanese required: Readings and discussions in English.

FLJ 351 Contemporary Culture in Japan 3. Offered in Spring Only. Introduction to basic aspects of cultural practices in Japanese society, including education, work life, family relationships, everyday religious practices, aesthetic traditions, national identity, and gender. Students will develop an understanding of the interrelationships between language and culture.

FLJ 401 Advanced Japanese I 3. Offered in Fall Only. Prerequisite: FLJ 302. Continued training in the foundations of Japanese language, with emphasis on complex verb forms. Increased attention to reading and writing.

FLJ 402 Advanced Japanese II 3. Offered in Spring Only. Prerequisite: FLJ 401. Elaboration on grammatical forms learned in the previous courses with applications in reading and writing, combined with more sophisticated vocabulary and idioms and attention to development of natural reading skills.

FLM 378 Women & Film 3. Offered in Spring Only. This course will introduce students to the rich international history of women's participation in the motion picture industry. Course includes readings, screenings, discussions, and a final examination.

FLM 450 Professional Internship in Film Studies 3. Offered in Fall and Spring. Prerequisite: completed 9 hours of Film Studies coursework: 150 hours of professional work over the course of a semester. Students may undertake any work relevant to the field of Film Studies, but they are required to complete at least one professional project indicating that they have developed a specific skill in film programming, exhibition, production, research, or promotion. A paper is due at the end of the semester, outlining the significance of the professional experience in relation to some aspect of film history, theory, criticism, distribution, or production. Students must provide their own transportation. Restricted to FLM majors. FLM 450 may only be taken once for credit towards the major requirements.

FLM 459 Seminar in Film Studies 3. Offered in Spring Only. Prerequisite: ENG 282, ENG 384 and Junior or Senior standing. Advanced critical approaches to focused film topics involving film genres, directories styles, or trends within a national cinema. This seminar-style course will include screenings, readings, regular discussions, and a substantive final research paper. Topics will vary from semester to semester. Junior or senior standing or permission of instructor required.

FLN 101 Elementary Hindi-Urdu I 1. Offered in Fall Only. Corequisite: FLN 103. Introduction to standard Hindi-Urdu. Emphasis on speaking and listening, and on reading and writing in the Hindi writing system (Devanagari). Readings in South Asian culture and civilization. Offered jointly in teleconferencing format with HIND 101 at the University of North Carolina-Chapel Hill.

FLN 102 Elementary Hindi-Urdu II 3. Offered in Spring Only. Prerequisite: FLN 101. Corequisite: FLN 104. Continuation of FLN 101. Emphasis on oral communication and reading and writing in the Hindi writing system (Devanagari). Further readings in South Asian culture and civilization. Offered jointly in teleconferencing format with HIND 102 at the University of North Carolina-Chapel Hill.

FLN 103 Elementary Hindi-Urdu I Conversation 1. Offered in Fall Only. Corequisite: FLN 101. Required conversational practice for
FLN 101. Special attention to individual pronunciation and intonation. Introduction of formal and informal speech. Use of audiovisual materials.


FLN 201 Intermediate Hindi-Urdu I 3. Offered in Fall Only. Prerequisite: FLN 102, Corequisite: FLN 203. Continuation of basic language skills. Introduction of Urdu writing system (Nastaliq) through Hindi writing system (Devanagari). Introduction to grammatical divergence of Hindi and Urdu. Readings in South Asian culture and civilization. Offered jointly in teleconferencing format with HIND 103 at the University of North Carolina-Chapel Hill.

FLN 202 Intermediate Hindi-Urdu II 3. Offered in Spring Only. Prerequisite: FLN 201, Corequisite: FLN 204. Continuation of FLN 201. Further practice of both Urdu (Nastaliq) and Hindi (Devanagari) writing systems. Further distinction of spoken and literary Urdu and Hindi. Further readings in South Asian culture and civilization. Offered jointly in teleconferencing format with HIND 103 at the University of North Carolina-Chapel Hill.

FLN 203 Intermediate Hindi-Urdu I Conversation 1. Offered in Fall Only. Prerequisite: FLN 102, Corequisite: FLN 201. Required conversational practice for FLN 201. Advancement of speaking skills through role playing, interviews, debates. Further Hindi and Urdu non-verbal communication. Use of audiovisual materials, including responses to commercial television and movies.


FLN 208 Intermediate Hindi Conversation 3. Offered in Fall Only. Prerequisite: FLN 201. Intensive practice in speaking and understanding Hindi through role playing, debates, interviews, and use of audio-visual materials.

FLN 300 Advanced Hindi: Readings in Literature I 3. Offered in Fall Only. Prerequisite: FLN 202. Reading and discussion of representative works with attention to literary analysis as well as to historical and cultural background. Taught through interactive TeleVideo.

FLN 302 Advanced Hindi: Readings in Literature II 3. Offered in Spring Only. Prerequisite: FLN 301. Reading and discussion of representative works with attention to literary analysis as well as to historical and cultural background. Taught through interactive TeleVideo.

FLN 308 Advanced Hindi Conversation 3. Offered in Spring Only. Prerequisite: FLN 208. Conversation and reading emphasizing idiomatic and practical usage with attention to contemporary civilization and cultures of the Hindi speaking world. Emphasis on social structures, political features, events, world views and modes of communication.

FLN 401 Hindi Literature and South Asian Cultural Contexts 3. Offered in Fall Only. Selected topics in Hindi literature and/or South Asian literature in Hindi, such as drama in modern South Asia, the twentieth-century novel, literature and the nation, narratives of pain and resistance, gender and social reform. Readings and discussion in Hindi, with emphasis on the examination of formal literary characteristics and the interconnections of texts and relevant South Asian cultural contexts. Topics will be rotated so that students can take this course for credit up to three times.

FOREIGN LANGUAGE - PORTUGUESE

FLP 101 Elementary Portuguese I 3. Introduction to the fundamentals of Brazilian Portuguese: pronunciation, comprehension, and spoken syntax and grammar.

FLP 102 Elementary Portuguese II 3. Prerequisite: FLP 101. Continuation of the essentials of Brazilian Portuguese. Further stress on pronunciation and comprehension and introduction of reading and writing skills.

FLP 201 Intermediate Portuguese I 3. Offered in Fall Only. Prerequisite: FLP 102 or placement in course. The third level of Portuguese with special attention to speaking, reading, writing and developing a cultural awareness of the cultural heritage of the Portuguese-speaking peoples of Portugal, Brazil and Portuguese-speaking Africa.

FOREIGN LANGUAGE - RUSSIAN

FLR 101 Elementary Russian I 3. Offered in Fall Only. First in a four-course sequence to develop language skills in Russian. Oral and written practice in the classroom and language laboratory and attention to Russian cultural heritage.

FLR 102 Elementary Russian II 3. Offered in Spring Only. Prerequisite: FLR 101. Emphasis on acquisition of basic oral skills, with complementary reading and writing exercises and attention to Russian cultural heritage.

FLR 201 Intermediate Russian I 3. Offered in Fall Only. Prerequisite: FLR 102. Basic Russian language skills continued. More emphasis given to writing and essential conversational practice. Intermediate level readings in Russian literature and culture. Class and laboratory practice; written assignments.


FLR 303 Russian Literature in Translation: The Nineteenth Century 3. Offered in Spring Only. A study of selected plays, short stories and novels of the great Russian writers of the nineteenth century: Pushkin, Lermontov, Gogol, Goncharov, Turgeniev, Dostoevsky, Saltykov-Shchedrin, Leskov, Tolstoy and Chekhov. Examinations of peculiarly Russian as well as the universal aspects of this literature. All readings, lectures and discussions in English.

FLR 304 Russian Literature in Translation: The Twentieth Century 3. A study of selected poems, plays, short stories and novels by major Russian writers of the twentieth century, such as Chekhov, Gorky, Blok, Mayakovsky, Esenin, Zamyatin, Olesha, Bulgakov,
Babel, Pilnyak, Pasternak, Solzhenitsyn, Evtushenko, and Voznesensky. All readings, lectures and discussions in English.


FLS 295 Intermediate Special Topics in Spanish 3. Offered in Fall Spring Summer. Prerequisite: FLS 201. Special Topics in language and cultures of the Spanish speaking world for students at the intermediate (200) level. Includes courses taught in Spanish study abroad programs. Course may be taken up to three times.

FLS 319 Children's and Adolescent's Literature in Spain and Latin America 3. Prerequisite: FLS 310 or FLS 311. Traditional and contemporary children's and adolescent's literature written originally in Spanish. Critical examination of picture books, folktales, poetry, theater and novels from a literary/artistic point of view and for their value in cultural development.

FLS 331 Spanish Oral and Written Expression I 3. Prerequisite: FLS 202. Development of speaking and writing skills at the Intermediate Mid to Intermediate High levels of the American Council on the Teaching of Foreign Languages proficiency scale, as well as listening/viewing and reading skills. Focus on sentence and paragraph-length discourse, narration and description in present, past, and future time frames within a variety of topics and contexts, and communication skills such as circumlocution. Course readings, video and discussion content center upon cultural aspects of the Spanish speaking world.

FLS 332 Spanish Oral and Written Expression II 3. Offered in Fall and Spring. Prerequisite: FLS 331. Development of speaking and writing skills at the Intermediate High levels of the American Council on the Teaching of Foreign Languages proficiency scale, as well as listening/viewing and reading skills. Focus on sentence and paragraph-length discourse, narration and detailed description in present, past, and future time frames within a variety of topics and contexts, and communication skills such as circumlocution. Course readings, video and discussion content center upon aspects of the Spanish speaking world.

FLS 333 The Sounds of Spanish 3. Prerequisite: FLS 202. A study of the pronunciation and phonological system of Spanish, with the goals of improving student pronunciation and analyzing native Spanish pronunciation. Extensive practice in phonetic transcription and pronunciation, as well as phonetic/phonological dialect variation.


FLS 337 Spanish for Tourism in the Hispanic World 3. Prerequisite: FLS 202. Exploration of the tourism industry in the Spanish speaking world from cultural-historical, geographic, and linguistic perspectives. Course can lead to Tourism Certificate in Spanish from the Chamber of Commerce and Industry of Spain.

FLS 340 Introduction to Hispanic Literatures and Cultures 3. Prerequisite: FLS 331, Corequisite: FLS 332. Exploration of what literature is; what it means to read literature; and why one might be interested in analyzing literature. Introduction to literary terminology, as well as literary genres and movements in the Spanish language. Examination of social-cultural-historical contexts of Spain and Latin America, particularly matters of race, class, gender, and political ideas as they relate to literatures of the Spanish speaking world. Interpretation and analysis of literary texts, cultural institutions, and objects of national, mass, and popular cultures.

FLS 341 Literature and Culture of Spain I 3. Prerequisite: FLS 332; Corequisite: FLS 340. Survey of literary and cultural contexts of medieval and early modern Spain (12th to 17th centuries). Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Spanish society during this time.
Includes courses taught in Spanish study abroad programs. Course may give voice to value systems, traditions, and beliefs.

**FLS 342 Literature and Culture of Spain II** 3. Prerequisite: FLS 332; Corequisite: 340. Survey of literary and cultural contexts of 18th and 19th century Spain. Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Spanish society during this time period. Emphasis on the ways in which literature and other cultural artifacts give voice to value systems, traditions, and beliefs.

**FLS 343 Literature and Culture of Spain III** 3. Prerequisite: FLS 332; Corequisite: 340. Survey of literary and cultural contexts of 20th and 21st century Spain. Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Spanish society during this time period. Emphasis on the ways in which literature and other cultural artifacts give voice to value systems, traditions, and beliefs.

**FLS 344 Literature and Culture of Latin America I** 3. Prerequisite: FLS 332; Corequisite: 340. Survey of literary and cultural contexts of Latin America from the pre-conquest, colonial and early-independence periods (15th to mid 19th centuries). Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Latin American society during this time period. Emphasis on the ways in which literature and other cultural artifacts give voice to value systems, traditions, and beliefs.

**FLS 345 Literature and Culture of Latin America II** 3. Prerequisite: FLS 332; Corequisite: 340. Survey of literary and cultural contexts of Latin America from the mid 19th to the mid 20th centuries. Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Latin American society during this time period. Emphasis on the ways in which literature and other cultural artifacts give voice to value systems, traditions, and beliefs.

**FLS 346 Literature and Culture of Latin America III** 3. Prerequisite: FLS 332; Corequisite: 340. Survey of literary and cultural contexts of Latin America since 1960. Examination of literary genres in connection with concurrent cultural and historical events. Exploration of literature as a reflection of the experiences and events meaningful to Latin American society during this time period. Emphasis on the ways in which literature and other cultural artifacts give voice to value systems, traditions, and beliefs.

**FLS 360 Hispanic Cinema** 3. Prerequisite: FLS 331 and Corequisite FLS 332. Survey of the major contributions of Hispanic cinema from its origins to the present. Analysis of film as an artistic medium and as the cinematic representation of Hispanic histories and cultures. Reading, discussions, and viewing of films by representative directors.

**FLS 395 Special Topics in Spanish** 3. Offered in Fall Spring Summer. Prerequisite: FLS 202. Special Topics in language and cultures of the Spanish speaking world for students at the 300 level. Includes courses taught in Spanish study abroad programs. Course may be taken up to three times.

**FLS 400 Methods and Techniques in Spanish Translation and Interpretation** 3. Prerequisite: 12 credits of 300 level Spanish. Study and practical application of theory, methods and techniques of translation based on materials relevant to various fields and professions.

**FLS 401 Spanish For Graduate Students** 3. Offered in Fall and Spring. Basic Spanish grammar, with special attention to characteristics of formal expository style, and illustrative readings. Study of extracts from scholarly publications in students' areas of research. Prepares students to take the graduate foreign language certification exam.

**FLS 402 Introduction to Spanish Linguistics** 3. Prerequisite: 12 credits of 300 level Spanish. Introduction to fundamental terminology and concepts in the study of linguistics. Overview of the Spanish phonetics and phonology, morphology, syntax, semantics, pragmatics, sociolinguistics and historical linguistics.

**FLS 403 Hispanic Prose Fiction** 3. Prerequisite: 12 credits of 300 level Spanish. Nineteenth- and twentieth-century prose and fiction of Spain and Latin America, including Galdos, Realism, the Boom, testimonial literature.

**FLS 404 Hispanic Drama** 3. Prerequisite: 12 credits of 300 level Spanish. Selected topics in Spanish of Latin-American drama from the Golden Age to the present.

**FLS 405 Spanish-English Comparative Grammar** 3. Offered in Spring Only. Prerequisite: 12 credits of 300 level Spanish. Analysis of the linguistic and grammatical structure (phonology, morphology, syntax, and discourse) of English and Spanish in order to develop a deeper understanding of how both linguistic systems function in similar and different ways.

**FLS 411 Topics in the Culture of Spain** 3. Prerequisite: 12 credits of 300-level Spanish. Exploration of particular themes related to the culture of Spain, with culture broadly defined as history, social and political aspects of society, as well as human and artistic expression including use of language, literary production, performance, print, and electronic media. Themes in this course expand upon those introduced in the 300 level of the Spanish curriculum. Class discussion and assignments require greater depth and sophistication than introduction to literature and culture courses of the 300 level.

**FLS 412 Topics in the Culture of Latin America and the Caribbean** 3. Prerequisite: 12 credits of 300-level Spanish. Exploration of particular themes related to the culture of Latin America and the Caribbean, with culture broadly defined as history, social and political aspects of society, as well as human and artistic expression including use of language, literary production, performance, print, and electronic media. Themes in this course expand upon those introduced in the 300 level of the Spanish curriculum. Class discussion and assignments require greater depth and sophistication than introduction to literature and culture courses of the 300 level.

**FLS 413 Spain and the Americas in Transatlantic Perspective** 3. Prerequisite: 12 credits of 300-level Spanish. Exploration of key moments of communication, exchange and conflict between the different parts of the Spanish speaking world, from the point of contact between imperial Spain and the indigenous civilizations of the "New World". Examination of the commonalities and distinctions of the quest for independence, modernity and democracy. Analysis of immigration across national frontiers in the present day Hispanic World and greater American continent.

**FLS 492 Seminar in Hispanic Studies** 3. Offered in Spring Only. Prerequisite: 12 credits of 300 level Spanish. Advanced seminar on a specific area of Hispanic studies (topics vary), leading to a major term paper and/or a series of essays by the student.

**FLS 495 Advanced Special Topics in Spanish** 3. Offered in Fall Spring Summer. Prerequisite: 12 credits of 300-level Spanish. Advanced special topics in language and cultures of the Spanish
speaking world for students at the 400 level. Includes courses taught in Spanish study abroad programs. Course may be taken up to three times.

FEED MILL

FM 425 Feed Manufacturing Technology 3. Offered in Spring Only. Prerequisite: PO(ANS) 415 or ANS 230 or ANS 225. Feed mill management, feed ingredient purchasing, inventory, storage, and quality evaluation, computerized feed formulation, feeding programs for poultry and swine, feed mill design, equipment, maintenance, operation, safety, state and federal regulations pertaining to feed manufacture.

FM 460 Feed Mill Operations and Leadership 2. Prerequisite: PO(ANS) 425. Principles and current practices of modern feed mill operations. Topics include managing employees, team building, safety, budgets, regulations, and key performance indicators.

FM 480 Feed Quality Assurance & Formulation 2. Offered in Spring Only. Prerequisite: PO(ANS) 425. Introduction to the principles of ingredient and feed quality assurance and how to develop a comprehensive quality assurance program. The course will include the development of approved suppliers, ingredient specifications, feed manufacturing procedures, and formulation based on dynamic ingredient matrices.

FM 490 Feed Science Seminar 1. Offered in Fall Only. Exploration of topics related with current and future potential to influence the feed industry. Guest lectures from feed industry leaders and university representatives will include: vertically integrated and commercial feed production, current research topics, government regulations, trade organizations, and quality assurance.

FM 494 Feed Mill Learning Experience 1. Prerequisite: PO(ANS) 425. Hands-on laboratory teaching students how to safely operate feed mill equipment and manufacture feed using a computer system.

FORESTRY

FOR 110 Introduction to Forestry 2. Offered in Fall Only. Overview of the history and policies of forestry, the basis of forest management, the impact of forestry on nature and society, and the opportunities of a career in forestry.

FOR 150 Professional Development I: Critical Thinking in Natural Resources 1. Offered in Spring Only. Techniques of critical thinking applied to a broad range of natural resource and forestry issues.

FOR 172 Forest System Mapping and Mensuration 1.2. Offered in Fall Only. Concepts and application of basic forest and land resource measurement techniques used in forestry and related fields. Measuring distances and areas; orienteering; basic air photo and topographic map interpretation; introduction to GPS; measuring tree characteristics; introduction to forest sampling. Application of spreadsheets and word processing to analyze and summarize resource characteristics. Field trip required.

FOR 202 Wood Anatomy and Properties 3. Offered in Fall Only. Formation, anatomy and properties of wood. Structural features of softwoods and hardwoods and the relationships among anatomy, physiology, physical and mechanical properties. Variability, naturally occurring defects, and wood deterioration are discussed and related to wood utilization. Techniques on hand lens and microscopic identification of wood.

FOR 204 Silviculture 2. Offered in Summer. Silvical characteristics and growth requirements of forest trees; dynamics of stand growth, species-site relationships, site productivity, forest pest interactions, hydrology and nutrient cycling in forest ecosystems; emphasis on understanding and applying ecological principles to the production of multiple benefits at the forest community level.

FOR 220 Urban and Community Forestry 3. Offered in Fall Only. Introduction to the interdisciplinary study of urban forestry and greenspaces. Study of urban forest history, distribution and ownership patterns, urban ecology and ecosystems, benefits and uses of urban forests, vegetation establishment and maintenance, urban planning and policy, community interactions, urban forestry implementation.

FOR 221 Conservation of Natural Resources 3. Offered in Fall Spring Summer. Importance of natural resources and their role in human environment. Physical, biological and ecological principles underlying sustainability of natural resources with attention to consequences of human impacts while meeting society needs.

FOR 248 Forest History, Technology and Society 3. Offered in Fall and Spring. Examining forest resource use and issues throughout history. Tracing developments and concepts that created the context for today's issues concerning global forest resources. Examining how wood resource availability shaped civilization's development, and examining consequences on forest resources of civilization's scientific, social, and technological progress.

FOR 250 Professional Development II: Communications in Natural Resources 1. Offered in Spring Only. Development of written and oral communication skills for forestry and natural resource management. Discussion topics include interactive communication, writing to a target audience, common pitfalls in technical writing, various kinds of technical writing, poster and oral presentations, reviewing and revising writing, and responding to questions in a professional manner.

FOR 252 Introduction to Forest Science 3. Offered in Spring Only. Integration of biological principles into studies of tree growth, reproduction, establishment, survival, and disturbance. Discussions of regional silviculture and of effects of humans on forest ecosystems. Instruction in forest sampling and tree identification. Many laboratories meet outdoors. Not open to Forest Management majors.

FOR 260 Forest Ecology 3. Offered in Spring Only. Introduction to forest ecosystems, their structure, and the processes that regulate them including: radiation, temperature, water, and biogeochemistry; productivity; plant populations; structure and function of forest communities; succession; wind and fire; and human influences.

FOR 261 Forest Communities 2. Offered in Summer. Prerequisite: FOR 339 or PB 220 or PB 403. Study of the species composition, distribution, site requirements, and succession of the principal forest communities of southeastern North America. Identification of important member plant species. Field trips to typical examples.

FOR 264 Forest Wildlife I. Offered in Summer. Diversity of fauna that inhabits forest communities in the Piedmont of North Carolina. Inventory terrestrial and aquatic habitats and identify various vertebrate and invertebrate species. Insect collection initiated. The life histories of representative species presented.
FOR 265 Fire Management 1. Offered in Summer. Effects of wildfire and ecosystem fire on forest ecosystem components and processes; fire behavior and the ecosystem and meteorologic factors that affect it; silvicultural uses of fire; organization, equipment, and tactics for wildfire suppression; fire suppression exercises on the North Carolina Division of Forest Resources' Forest Fire Simulator.

FOR 273 Forest System Mapping and Mensuration II 3. Offered in Summer. Prerequisite: FOR 172. Procedures and Instruments for measuring various tree and stand characteristics. Determination of stem volume and taper. Planning and implementation of forest resource samples to provide population estimates using fixed-radius and variable-radius sampling. Detailed coverage of land measurements and mapping of boundary surveys. Use of aerial photography, topographic maps, and GPS to aid in resource assessment. Incorporation of inventory data into a GIS. Basic statistical concepts applied to resource measurements. Taught off-campus at Hill Forest.

FOR 280 Evolution of Forest machinery and Systems 3. Offered in Fall Only. Introduction to forest resources operations and machinery. Historical account of the evolution of mechanized forest operations: harvesting, inwood transport, processing, hauling, site preparation, planting, forest land maintenance, nursery and seed orchard machines. Discussion of current and future machines for forest harvest and regeneration.

FOR 291 Independent Study in Forestry 1-6. Offered in Fall Spring Summer. Detailed investigation of forestry topics of interest to undergraduates under faculty direction on a tutorial basis. Credit and content determined by faculty member in consultation with Undergraduate Program Director or Department Head.

FOR 295 Special Topics in Forestry 1-6. Offered in Fall Spring Summer. Study of forestry topics not covered in existing courses at the introductory level. Development of a new course on a trial basis.

FOR 303 Silvics and Forest Tree Physiology 3. Offered in Fall Only. Prerequisite: CH 101 and (CH 201/202 or PY 211). Ecological and physiological processes influencing establishment, growth, and development of forest stands with particular emphasis on forest types of Southeastern United States; influence of resource availability on forest stand productivity; physical and biochemical processes associated with tree function, including water relations, mineral nutrition, transport and translocation, photosynthesis, respiration; internal and environmental factors regulating tree growth and development.

FOR 304 Theory of Silviculture 4. Offered in Spring Only. Prerequisite: FOR 260 or BO 360. Ecological processes affecting the establishment and growth of forest stands with particular emphasis on forest types of the Southeastern United States. Forest stand productivity, how productivity is influenced by site, stand, climatic factors, and the application of site specific prescriptions to establish and manipulate the composition, growth, and health of forest stands.

FOR 318 Forest Pathology 3. Offered in Spring Only. Prerequisite: PB 290. Major diseases of forest trees and deterioration of wood products emphasizing principles of plant pathology; diagnosis; nature, physiology, ecology, and dissemination of disease-causing agents; mechanisms of pathogenesis; epidemiology and environmental influences; principles and practices of control.

FOR 319 Forest Economics 3. Offered in Fall Only. Prerequisite: ARE 201 or EC 205. Economic approaches for evaluating the production and costs of forest management, timber harvesting activities, and non-timber forest products. Estimating the financial returns of long-term investments in timber or other forest resources, including discounted cash flow analysis and capital budgeting techniques. Property taxes and income tax treatment of timber and their effects on investment returns. Demand estimation and timber supply analyses.

FOR 320 North Carolina Forests 3. Offered in Fall and Spring. An introduction and overview of forests in North Carolina with emphasis on the importance of forests in the 21st century. Topics include: history and distribution of forests, soils-sit relationships, forestry practices, non-conventional management objectives. Two required Saturday field trips.

FOR 334 Operations Research Applications in Natural Resources 1. Offered in Fall Only. Introduction to the application and use of management science in forestry and natural resources. The course will introduce decision and information theory and mathematical programming techniques including linear, non-linear and integer programming concepts. The emphasis is on problem formulation and solution using computer programs. Half semester course.

FOR 339 Dendrology 4. Identification and elementary silvics of woody plants of eastern North America with studies of their classification, characteristics, and habitats. Consideration of trees from northern and western North America and the Caribbean region. Field identification with trips to forest communities.

FOR 350 Professional Development III: Ethical Dilemmas in Natural Resource Management 1. Offered in Spring Only. Study of ethical issues confronting natural resource management professionals, including: biodiversity conservation, private property rights, traditional religion and ecological values, community rights, environmental racism, hunting and animal rights, business ethics, and the purpose and content of professional codes of ethics.

FOR 353 Air Photo Interpretation and Photogrammetry 3. Offered in Fall Only. Prerequisite: MA 114. Theory, principles, and techniques of utilizing air photos for inventory and management of renewable resources, photogrammetric and engineering applications, hydrologic and terrain analysis, and land use/cover mapping. Introduction to remote sensing and use of color infrared, thermal, Skylab, and Lands at imagery in resource mapping.

FOR 374 Forest Measurement, Modeling, and Inventory 3. Offered in Fall Only. Prerequisite: MA 121, MA 114, FOR 273, ST 311. Mathematical functions required for quantifying the yield of timber and non-timber products. Procedures for planning, conducting, and analyzing forest inventories. Use of mathematical models to estimate growth and yield of forest stands and non-timber products for management decisions.

FOR 402 Forest Entomology 3. Offered in Spring Only. Fundamentals of morphology, classification, biology, ecology and control of insects attacking trees, with emphasis on silvicultural practices.

FOR 404 Forest Wildlife Management 3. Offered in Fall Only. Prerequisite: 9 hrs Biological Sciences. Relationships between forest and wildlife management and the effects of silvicultural systems on wildlife. Species-habitat requirements, forest wildlife management techniques, and forest-wildlife policies and economics.

FOR 405 Forest Management 4. Offered in Fall Only. Prerequisite: FOR 304, FOR 319, FOR 374. Fundamental principles and analytical techniques necessary in the planning, management and optimization of forest operations. Formulation of objectives and constraints, yield forecasting, forest regulation, procurement and marketing, inventory methods, and management plan preparation. Written and oral reporting.
FOR 406 Forest Inventory, Analysis and Planning 4. Offered in Spring Only. Prerequisite: FOR 405, FOR 460. Independent project in designing and implementing a multi-resource survey; analyze stand conditions; forecast growth, yield and revenue of timber and forest products; use linear programming to prepare a long-term management plan subject to economic, social, and ecological constraints; assess economic and environmental impacts of potential actions; and report results orally and in writing.

FOR 411 Forest Tree Genetics and Biology 3. Offered in Spring Only. Genetics as it is applied in forest management for both conifers and hardwoods. The variation, evolution and genetics of forest trees. Methods for selection, breeding, seed production, and vegetative propagation. Exotics, wood properties, and tree improvement as a forest management tool.

FOR 414 World Forestry 3. Offered in Spring Only. Management of global forest resources; distribution and trends in forest cover; role of forests in economic development; international production and trade of forest products; current policy issues, including tropical deforestation, certification, and carbon sequestration; social forestry and non-timber forest products; international institutions and aid for conservation and development; identification and evaluation of sources of current information on global forestry issues.

FOR 415 World Forestry Study Tour 1. Offered in Spring Only. Corequisite: FOR 414. Field trip to Mexico and/or Central America for seven days over spring break. Examine tropical forestry issues through field visits to timber concessions, plantations, nurseries, wood products firms, protected areas, and agroforestry projects; meetings with representatives of forest research institutes, government agencies, timber industry, cooperatives, and environmental organizations; and interaction with local people. Fee for field trip determined annually. Offered during spring break, as soon as field trip to Mexico and/or Central America.

FOR 420 Watershed and Wetlands Hydrology 4. Offered in Fall Only. Prerequisite: SSC 200, BO 360. Principles of hydrologic science; classification and assessment of watersheds and stream networks; hydrologic, erosion, and water quality processes in natural and managed watersheds; wetlands hydrology; hydrologic measurements and data analysis; applications of hydrology and water quality management for forest agriculture, and urban ecosystems; watershed restoration. Emphasis field study of watersheds and hydrologic measurements. Two weekend field trips are required. Credit will not be given for both FOR(NR)420 and FOR(NR)520.

FOR 422 Consulting Forestry 3. Offered in Fall Only. Forest land acquisition and ownership: ownership, appraisal, legal considerations, financial management and planning. Producing forest resources: timber, wildlife, recreation, farm products, water, minerals, specialty products, and development. Marketing forest resources: timber, recreation, farm leases, minerals, specialty products, and developed property. Forest resources consulting: forms of organization, pricing of services, consultant client relationships (Law of Agency), professional ethics and continuing education.

FOR 423 Forest Machinery and Systems 3. Offered in Fall Only. Applications of engineering principles to problems in forest operations: power sources; testing; rating and capabilities of forest machinery; power requirements and utilization efficiencies; effects of vehicle design parameters on stability, safety, and operation under load; traction devices and vehicle mechanics.


FOR 434 Forest Operations and Analysis 3. Offered in Spring Only. Prerequisite: MA 114, MA 121, ST 311 and FOR 319. Management science and operational techniques in forestry. Logging road layout and construction, and machine systems; harvesting machine optimization and selection. Harvesting, production and forest planning. Decision and inventory theory, and other techniques for solving problems typically encountered in forest operations management. Required overnight weekend field trip.

FOR 444 Wood Procurement Management 3. Offered in Spring Only. Prerequisite: FOR 374 and FOR 319. Market structure and behavior for wood product raw materials. Evaluation of alternative procurement strategies and introduction to the legal and business principles important in the wood products trade. Practice in appraising multi-product tracts and in predicting future raw material availability. Includes visits to a range of manufacturing facilities and procurement organizations. Required all-day field trips held one week prior to the start of the semester.

FOR 450 Professional Development IV: Leadership 1. Offered in Spring Only. Concepts and applications of leadership principles with emphasis on leadership challenges and opportunities for professionals in natural resources management. Assessment and development of leadership skills.

FOR 485 Natural Resources Advocacy 3. Offered in Fall and Spring. Prerequisite: ENG 333: JR or SR level with at least 10 hrs. of Biology. Analysis of natural resources problems as they affect management agencies and user groups. Emphasis on professional attitudes, policies, and communication skills needed for management of sensitive natural resource issues. Guest professionals sharing their perspectives on dealing effectively with natural resource clientele groups. Student discussions, team projects, technical presentations citing popular articles on natural resources subjects.

FOR 490 Senior Seminar in Forestry 1. Offered in Fall and Spring. Attend departmental or university seminar with group discussions weekly to enrich and broaden student perspectives. Oral or written summaries of these seminars.

FOR 491 Special Topics in Forestry and Related Natural Resources 1-4. Offered in Fall and Spring. Independent (or group) study or research of a forestry or related natural resources topic with a faculty supervisor of the student's choice. Also courses offered on a trial basis.

FOOD SCIENCE

FS 201 Introduction to Food Science 3. Offered in Fall and Spring. Science and practice of providing a wholesome, nutritious, economical and readily available supply of basic and processed foodstuffs. Chemical nature of foods, nutritional requirements, health-related dietary considerations, microorganisms, foodborne illnesses, preservation and processing, food additives, food labeling, food safety and the consumer.

FS 231 Principles of Food and Bioprocess Engineering 4. Offered in Spring Only. Prerequisite: FY 211. Engineering concepts and their applications to the food and bioprocessing industries. Mass and energy balances and principles related to fluid flow, heat transfer, refrigeration and freezing, psychrometrics, and selected unit operations found in these industries.
FS 290 Careers in Food and Bioprocessing Sciences 1. Offered in Fall Only. Careers and opportunities related to food and bioprocessing industries and regulatory agencies. Development of professional enhancement skills. Resume preparation, interviewing techniques, leadership development, oral and written communication, and team building. Benefits of undergraduate research, internships, and graduate education.

FS 295 Special Topics in Food Science 1-4. Offered in Fall Spring Summer. Offerings of new or experimental courses in Food Science at the early undergraduate level.

FS 301 Introduction to Human Nutrition 3. Offered in Fall Spring Summer. Functions, dietary sources and deficiencies of essential nutrients in humans; a balanced diet; role of nutrients in heart disease, cancer, hypertension, osteoporosis; weight control and eating disorders; vegetarianism; food safety; dietary supplements; government regulation of food supply; food quackery. Food science majors may use as a free elective only.

FS 322 Muscle Foods and Eggs 3. Offered in Fall Only. Prerequisite: ZO 160, BIO 181 or BIO 183. Processing and preserving fresh poultry, red meats, seafood, and eggs. Ante- and post-mortem events as they affect quality, yield, and compositional characteristics of muscle foods. Principles and procedures involved in the production of processedmeat items.

FS 324 Milk and Dairy Products 3. Offered in Fall and Spring. Prerequisite: ZO 160, BIO 181 or BIO 183. Introduction to the manufacture of dairy products. Dairy processing procedures from the farm, through the dairy plant, and to the consumer are studied. The course consists of 15 learning modules, three exams, and a project.

FS 330 Science of Food Preparation 3. Offered in Spring Only. Prerequisite: FS 201 and CH 101. Basic elements of culinary practices are taught in conjunction with the scientific basis for how flavor, texture, and appearance of foods are created or maintained during food preparation.

FS 350 Introduction to HACCP 3. Offered in Fall and Spring. Introductory course on the Hazard Analysis and Critical Control Points System (HACCP) which is designed to decrease hazards in foods. An International HACCP Alliance approved curriculum which covers prerequisite programs. A step by step approach for developing and implementing a HACCP plan for USDA regulated food processing plants. Offered only as a world wide web course through the Office of Instructional Telecommunications.

FS 351 Sanitation Standard Operating Procedures in Food Safety Control 3. Offered in Fall and Spring. This course is one of a series of six courses that are part of North Carolina State University's Food Safety Certification program. "Sanitation Standard Operating Procedures (SSOPs) in Food Safety Control" addresses current federal regulatory requirements for seafood, meat, and poultry processing operations. The course also addresses the international dimensions of sanitary standards in import/export of food. The course is designed to provide the student with the background necessary to develop, implement and maintain a sanitation plan based on sanitation standard operating procedures (SSOPs).

FS 352 Introduction to Microbiological Food Safety Hazards 3. Offered in Fall and Spring. For non-science students. The course is designed to provide an introduction to the more prominent microbial foodborne safety hazards and their control. Lessons are provided on specific pathogens, their pathogenesis and transmission and the scientific basis for specific control options. In addition, the course provides up-to-date information on current "hot-topics" in food microbiology, including food safety regulations and emerging food safety issues. Course is offered to non-science majors. Students may not receive credit for both FS 352 and FS 405.

FS 353 Good Manufacturing Practices 3. Offered in Fall and Spring. Food Safety sanitation in the United States is primarily regulated by FDA under their "Good Manufacturing Practices (GMP)." This course will introduce the student to the GMP and consider how and why they were developed. Students will become familiar with the issues of compliance and consider the regulations in light of international laws and current practices. The student should have some familiarity with food processing and safety.

FS 354 Food Sanitation 3. Offered in Fall and Spring. Prerequisite: FS/ANS/PO 350 or equivalent HACCP industry experience: Discussion of hygienic practices, requirements for sanitation programs, and modern sanitation practices in food processing facilities. At the end of this course, students will have the knowledge to develop and maintain a sanitation program.

FS 400 Principles of Human Nutrition 3. Offered in Fall Spring Summer. Prerequisite: CH 220 or 221; ZO 160, or BIO 181/183. Overview of fields of Nutritional Sciences; functions of nutrients in the human body; sources and properties of nutrients; relationships of food industry practices to nutrition. Credit will not be given for both NTR (FS)400 and NTR 500.

FS 402 Chemistry of Food and Bioprocessed Materials 4. Offered in Fall Only. Prerequisite: CH 220 or 221. The course focuses on the properties of biological molecules (e.g., proteins, enzymes lipids, carbohydrates and pigments) found in foods and pharmaceuticals. Basic elements of molecules, such as structure and reactive groups, are presented in regard to how they affect the properties of foods and pharmaceuticals. Reactions such as Maillard browning and lipid oxidation are discussed regarding mechanisms, products and controlling processes. Laboratory experiments emphasize basic concepts discussed in lecture and provide a practical working knowledge of select analytical equipment.

FS 403 Analytical Techniques in Food & Bioprocessing Science 4. Offered in Spring Only. Prerequisite: FS 402. Principles, methods and techniques for quantitative physical and chemical analyses of food, nutraceutical, and pharmaceutical products. Results of analyses evaluated in terms of quality standards and governing regulations.

FS 405 Food Microbiology 3. Offered in Fall Only. Prerequisite: MB 351. Microorganisms of importance in foods and their metabolic activities. Source of microbial contamination during food production, processing and storage. Microbial spoilage; foods as vectors of human pathogens. Physical and chemical destruction of microorganisms in foods and the kinetics involved. Conversions of raw foods by microorganisms into food products. Microbiological standards for regulatory and trade purposes. Credit will not be given for both FS/MB 405 and FS/MB 505.

FS 406 Food Microbiology Lab 1. Offered in Fall Only. Prerequisite: MB 351 and Corequisite: FS 405 or FS 505. Laboratory experience to complement FS/MB 405. Skills in detecting and quantitating microorganisms and their toxins in foods. Application of colony and direct microscopic counts, most probable numbers, enzyme immunoassays, nucleic acid probes and computer modeling are used to understand the numbers and types of microorganisms or microbial end products in foods. Laboratory safety and oral and written reports are emphasized.

FS 407 Risk Analysis and Hazard Analysis in Food Safety 3. Offered in Fall and Spring. Prerequisite: FS/ANS/PS 350 or equivalent HACCP industry experience. In-depth focus on the application of the first HACCP principle, Hazard Analysis, on the identification of food safety hazards, as well as the emerging importance of risk assessment. Distance Education Only.

FS 421 Food Preservation 3. Offered in Fall Only. Prerequisite: MB 351 and FS 231. Food preservation methods. Emphasis on thermal, freezing, drying and fermentation processes and corresponding physical, chemical and organoleptic changes to products. Application of preservation schemes to the development of an overall processing operation.

FS 426 Industrial Microbiology & Biomanufacturing Laboratory 3. Offered in Fall and Spring. Prerequisite: MB 351 and FS 231 or MB/BEC 420. This course is an introduction to current food manufacturing practice (CGMP) as applied to the growth of microbial cells in bioreactors. Hands-on experience is obtained in the operation and control of 30 liter bioreactors to study agitation, oxygen transfer, cleaning, sterilization, media preparation and the growth of recombinant E. coli for protein production. Credit will not be awarded in both BBS 426 and BBS/FS 526. This is an eight week course.

FS 453 Food Laws and Regulations 3. Federal and state laws and regulations, and case law history affecting food production, processing, packaging, marketing, and distribution of food and food products. History of food law, enactment of laws and regulations, legal research, and regulatory agencies. Credit will not be given for both FS 453 and FS 553.

FS 462 Postharvest Physiology 3. Offered in Spring Only. Prerequisite: PB 421. Preharvest and postharvest factors that affect market quality of horticultural commodities with an emphasis on technologies to preserve postharvest quality and extend storage life of fruits, vegetables and ornamentals.

FS 475 Problems and Design in Food and Bioprocessing Science 3. Offered in Spring Only. Prerequisite: FS 231, FS 402, FS 405 or RAE/BBS 425. Team approach to problem solving and product/process design and development. Ingredient functionality; formulation, sensory, processing, packaging, sensory evaluation, regulatory issues, hazard analysis, critical control points (HACCP), nutritional labeling and other pertinent scientific, technical, marketing and financial aspects. Oral and written presentations are required.

FS 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by the student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

FS 493 Special Problems in Food Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by the student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

FS 495 Special Topics in Food Science 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering new courses on a trial basis.

FTM 170 Textile Design Orientation 1. Orientation course designed to present the breadth and scope of the Textile Design profession together with future opportunities in this field.

FTM 217 The Textile Industry 3. Prerequisite: TT 105. Study of the structure and organization of the integrated textile complex and its strategic functions. Critical stages involved in the manufacture of textile and apparel products. Fundamental aspects of cost management and finance as related to the integrated Textile Complex. One Saturday attendance during the semester is required.

FTM 219 Fashion Product Analysis 3. Concepts and practices for the production and evaluation of fashion goods, beginning with selection of fabric and other raw materials and extending through quality analysis of the final product. Provide techniques for production of a variety of garment applications, as well as methods for evaluation.

FTM 220 Principles of Retailing and Supply Chain Management in Textiles 3. Offered in Fall Spring Summer. Prerequisite: FTM 217. Introduction to theories and principles in fashion and textiles retailing and supply chain management including: the framework of textile retailing, textile retail strategies, textile supply chains and investigation of the strategic planning process. Emphasis placed on conducting an environmental scan, identifying and targeting the consumer, analyzing the trade area, site selection and textile product merchandise planning.

FTM 271 Computer-Aided Textile Design 3. Prerequisite: DF 101 or ADN 111. Introduction to the operation of design software for woven, knitted and printed textiles. Adobe Photoshop, Pointcaren' and Monarch programs will be taught. Peripheral equipment essential to the design process will be included. Field trips to areatextile design centers. Credit not allowed for students enrolled in TT curriculum with the exception of the dual degree in the Bachelor of Art and Design and BS in Textile Technology.

FTM 282 Introduction to Textile Brand Management and Marketing 3. An introduction to the essential elements of brand management and marketing with specific reference to the marketing of textile and apparel goods with the integrated textile complex (from fiber to retail). The course covers both the principles and practice of marketing, in general, and provides an introduction of major concepts of brand management and marketing with a focus on branding activities used in major textile and apparel firms within the integrated textile supply chain.

FTM 310 Entrepreneurship & New Product Development in Textiles 3. Offered in Fall and Spring. Academic dimensions of the entrepreneurship body of knowledge. Integration of new product development (NPD) process and entrepreneurship in textiles. Critical thinking skills for the textile entrepreneurial mindset. Teams exercise entrepreneurial skills to develop innovative textile products. Write a business plan to take the textile product to market. Multidisciplinary and experiential learning environment is cultivated through in-class activities and online collaboration.

FTM 315 Fashion Product Design 3. Prerequisite: FTM 217 and FTM 219. Concepts and practices for the design and development of fashion apparel items, beginning with selection of fabric and other raw materials and extending through flat pattern development, pattern engineering, and generation of final garments. Provide techniques for development of styled patterns, which address issues of body measurements, body shape, comfort and fit.

FTM 317 Computer-Aided Design for Apparel 3. Corequisite: FTM 315. Introduction to the operation of industry design software for
apparel & other sewn products. Euphoria and/or Artworks visual design programs, Gerber AccuMark or Lectra pattern design programs, and other programs used by the industry to create, market and/or visualize products will be taught. Peripheral equipment essential to the design process will be included.

FTM 318 Fashion Development Processes 3. Prerequisite: FTM 317. The principles of apparel manufacturing including computerization of the design; marker making and production areas; spreading and cutting technology; apparel assembly systems; production systems evaluations; fusing and pressing; production capacity; and quality evaluations.

FTM 320 Retail Merchandising in Fashion and Textiles 3. Offered in Fall Only; Prerequisite: FTM 220. An in-depth study of textile product merchandising and its functions, focusing on a comprehensive approach to textile product merchandising that links manufacturing and retailing to the consumer through the merchandising process. Textile merchandising as a process is studied in newly restructured consumer-centric businesses and textile product strategy needed for employees to function successfully in today's global, integrated world of merchandising.

FTM 352 Dress, Style, Change 3. Interdisciplinary course focusing on historical and cultural principles of style as related to dress and fashion. Examination of fashion and stylistic trends in cycles of dress.

FTM 380 Management and Control of Textile and Apparel Systems 3. Prerequisite: TT 252. Management approaches, practices and basic economic considerations in the development, production and distribution of industrial and consumer textile and apparel products.

FTM 382 Intermediate Textile Brand Management and Marketing 3. Prerequisite: FTM 282 and EC 201. This course builds on the introduction of the basic concepts introduced in TAM 282 by providing an in-depth examination of the major theories and concepts associated with brand management and brand marketing. Included is the identification and analysis of major strategic tools used for brand management and marketing activities by firms across the integrated textile complex. Students will be assigned practical application projects that require utilization of academic knowledge with industry application.

FTM 384 Visual Merchandising Principles and Management 3. Prerequisite: Junior standing or higher. FTM 217. Corequisite: FTM 382. Study and application of techniques in the effective display of merchandise, from fiber to finished product. The focus of the course placed on the integration of textile and apparel product characteristics, target market characteristics and the latest merchandising technology and concepts.

FTM 385 Fashion and the Consumer 3. Prerequisite: FTM 217, FTM 282. This course focuses on consumer decision process for textile products, including the study of environmental, individual, psychological and marketing influences on behavior of consumers in the textile consumption process. Further examination will include influences on the process, including fashion theories, the mass media, demographics and psychographics, and societal trends. Current development and research in the textile consumer decision process are reviewed.

FTM 387 Textile Brand Communications & Promotions 3. Offered in Fall and Spring. Prerequisite: FTM 382. Examines the utilization of textile brand marketing communication and promotion tools to build, maintain or expand a brand's value in the textile complex marketplace. Includes examination of principles and theories for Integrated Brand Marketing (IBMC) and how these strategies and tactics are used within the textile complex advance brand positioning.

Knowledge of IBMC will be demonstrated via case studies, examination and textile industry-related application projects. FTM Majors Only.

FTM 400 Major Fashion Designers 3. Study of fashion designers from the early 1900s to the present. Emphasis will be placed on historical and cultural events that may have influenced the work of fashion designers during the time and trends that have emerged. Of specific interest will be major historical and current fashion designers that have had an international influence on US fashion merchandise. An additional focus of the course will be on the career path of major fashion designers. A study of haute couture and pret-a-porter will be conducted to provide insight into special management issues.


FTM 415 Fashion Product Development 3. Prerequisite: FTM 318. Fashion product development for specific target markets. Line production using various methods of generating patterns for mass-produced apparel with emphasis on "flat pattern" design techniques. Relationship of body configuration to pattern shape, specifications to garment size and fit, standards for judging fit, distinctions between ease and style fullness, and design analysis procedures are included.

FTM 416 The Fashion Industry 3. Planning and sourcing of fashion apparel products to meet the needs of the consumer. Emphasis is placed on the role of the merchandiser and merchandising function together with the measures of performance required by the fashion businesses. The interactions of the merchandiser with the functions of marketing, design, development and sourcing during pre-production are studied with respect to successful sourcing. Sourcing is studied from the requirements of compliance, product quality, cost, and manufacturing capability.

FTM 420 Retail Buying in Fashion and Textiles 3. Offered in Spring Only; Prerequisite: FTM 320. Overview and analysis of the components of buying and selling products at he retail level. Management of profit factors to improve performance in textile merchandising driven organizations. Analysis of the practices, procedures and systems that track textile merchandising decisions and aid in meeting profit goals. The course consists of an integrated framework that applies merchandising theory and mathematical processes to textile retail problems.

FTM 431 Quality Management and Control In Textile Manufacturing 3. Prerequisite: TT 221, TT 252, TT 331, and ST 361 or BUS 350. Principles of quality and process management and control in textile/apparel manufacturing with emphases in quality management systems, quality costs, statistical control chart procedures, process capability, acceptance sampling, and optimal process and product design and improvement methods.

FTM 460 Textile Market Research 3. Offered in Fall and Spring. Prerequisite: FTM 382 and ST 361. Data from textile and apparel industry trends are utilized to examine the role of textile research in managerial decision-making within the textile and apparel industry, and
allow students to develop basic skills in the market research process (problem identification to final reporting). Topics included are problem formulation, research design, data collection (instruments and sampling), and data analysis techniques (qualitative and quantitative).

FTM 480 Operations Management Decisions for Textiles 3. Prerequisite: FTM 380, ACC 210, ST 361, (MA 131 and 132 or MA 141). Quantitative techniques for decision making and management in the textile complex. Applications include vendor selection, plant location, retail inventory management, forecasting demand, project management, and logistics planning. Techniques covered include simulation, PERT/CPM, mathematical modeling.

FTM 481 Product Costing in the Textile and Apparel Industry 3. Capstone course covering cost issues in yarn manufacturing, fabric formation, finishing, apparel production and retail operations. Traditional and activity-based costing systems will be addressed. Relevance of costing to managerial decisions as well as cost reduction strategies will be emphasized.

FTM 482 Advanced Textile Brand Management and Marketing 3. Prerequisite: FTM 382. An applied textile marketing course that integrates textile product development, brand management, and global marketing. This course provides an overview of the global textile and apparel industries, their distribution channels and markets—-with positioning the US textile, apparel, and retail industries in the global competitive environment. The course includes diverse textile end uses, including apparel, nonwovens, home textiles, transportation textiles and medical textiles. Development and implementation strategies of launching textile products in the global marketplace are analyzed.

FTM 483 Global Trade & Sourcing 3. Prerequisite: FTM 282 and EC 201 or ABE 201 or EC 205. This course provides students with an understanding and appreciation of the global textile and apparel market. Included is the explanation and guidance in understanding the uniqueness of textile and apparel regulations in global trade. Students will learn global sourcing strategies and the identification and analysis of major strategic decisions used in global sourcing, as impacted by global trade dynamics. Students will be assigned practical application projects that require utilization of academic knowledge with industry application.

FTM 484 Management Decision Making for the Textile Firm 3. Prerequisite: FTM 380 and EC 201 or ABE 201 or EC 205. Economic, institutional and environmental settings within which management decisions are made, including in-depth analyses of specific issues and problem areas affecting the textile industry. Special emphasis on strategic management and topics of current interest and significance.

FTM 485 Textile Computer Integrated Enterprise 3. Prerequisite: FTM 380. Survey of information technology in textile and apparel industries. Topics discussed include: computer aided design (CAD); computer aided manufacturing (CAM); computer aided engineering (CAE); material handling systems; automation and robotics; logistics and warehousing systems; retail product tracking, and Internet resources.

FTM 486 Supply Chain Management in the Textile Industry 3. Prerequisite: FTM 380. Study of the operations necessary to produce and distribute a product, starting with the procurement of the raw material used in making the goods and ending with the delivery of the finished product. Topics covered include approaches to solving problems in manufacturing, sourcing, transportation logistics, and retail operations within the Integrated Textile Complex. Credit cannot be given for both TAM486 and MT386.


FTM 490 Development Projects in Textile and Apparel Management 1-3. Directed research in Textile and Apparel Management through experimental, theoretical and literature studies in textile and apparel-related problems. Courses may be taken twice provided projects are different subject matter.

FTM 491 Special Topics in Textile and Apparel Management 1-3. Special topics related to textile and apparel management.

FTM 494 International Industrial Internship in Textile Management 3. Professional level work experience in textile management abroad, relating academic training, international textile management and technology to industrial practice under professional guidance. Grading based on written report and oral presentation.

FTM 497 Senior Fashion Collection Studio 6. Offered in Spring Only. Prerequisite: FTM 318. Advanced fashion product design. Design and production of a "collection" using various methods of generating patterns for garments, such as flat patterns, draping, and CAD techniques. Relationships of body configuration and fabrication to garment design. Emphasis on ideation, creativity, communication, theme development, fit, quality, and exhibition of a fashion collection. Work culminates in a Fashion show or Static exhibition format.

FTM 499 Textile Senior Project 4. This is a project based course to be taken in the last semester of the Senior year. In this capstone course the students work in cross-functional teams to research and solve applied problems in textile related fields. The results of the projects will be presented formally at the end of the semester. Course should be taken in the last semester of the Senior year. It cannot be substituted by other project courses.

FW 221 Conservation of Natural Resources 3. Offered in Full Spring Summer. Importance of natural resources and their role in human environment. Physical, biological and ecological principles underlying sustainability of natural resources with attention to consequences of human impacts while meeting society needs.

FW 311 Piedmont Wildlife Ecology and Management 3. Offered in Summer. This 3-week course will involve relationships of wildlife and habitat, the use of GIS and GPS, use of new technology (PET tags, radio telemetry), and field identification of habitats and animals. This course is taught off-campus at Hill Forest. It is a 3 week residential camps with side trips and overnight trips. Class meets all day for 3 weeks. Additional charge for room and board. Students must provide their own transportation to Hill Forest. Junior standing in one of the following: FOM, NRE, SFW, SFF, SZO, ESC.

FW 312 Fisheries Techniques and Management 1. Offered in Summer. Corequisite: FW 311 and FW 313. Field exercises in aquatic environments emphasizing assessment of habitat, fish, invertebrates, plants, and ecological relationships to form the basis of describing and solving management dilemmas. Taught off-campus at Hill Forest. 5 day residential camp. Local travel required to various aquatic ecosystems. Additional charges for room and board.

FW 313 Mountain Wildlife Ecology and Management 1. Offered in Summer. Corequisite: FW 311 and FW 312. Visit different mountain communities along an elevation gradient from 2,000 to 6,000 feet and observe changes in plant and animal communities. Discuss wildlife and fisheries management issues, interact with agency personnel responsible for managing mountain fisheries and wildlife. One-week
FW 314 Coastal Ecology and Management 1. Offered in Summer. Prerequisite: BIO 181. Hands-on study of the fishery and wildlife resources associated with North Carolina coastal plain habitats. These habitats will include estuarine, ocean, longleaf pine savanna, pocosin, and Carolina bays. Common techniques and concepts used in terrestrial, marine, and estuarine ecology and management will be taught. Field identification of habitats, animals, and plants. Use of multiple sampling gear including bottom trawl, beam trawl, beach seine, gill nets, and coverboards. Use of water quality measurement equipment. This course meets all day for 1 week off-campus at CMAST in Morehead City, NC. Additional charge for room and board and boat rental. Students must provide their own transportation to CMAST.

FW 353 Wildlife Management 3. Offered in Fall Only. Prerequisite: BIO 181 or ZO 150. Historical development of Wildlife Management from anecdotal and observational practices to modern scientific approaches used around the world. Principles of population analysis, management, protection and conservation of animals, particularly those of conservation, aesthetic, sport or food values in urban, rural and wilderness areas. Ethics of hunting and trapping. Contradictory objectives challenging modern wildlife managers.

FW 353 Wildlife Management 3. Offered in Fall Only. Prerequisite: BIO 181 or ZO 150. Historical development of Wildlife Management from anecdotal and observational practices to modern scientific approaches used around the world. Principles of population analysis, management, protection and conservation of animals, particularly those of conservation, aesthetic, sport or food values in urban, rural and wilderness areas. Ethics of hunting and trapping. Contradictory objectives challenging modern wildlife managers.

FW 403 Urban Wildlife Management 3. Offered in Fall Only. Issues facing wildlife in urbanizing landscapes and the general courses of action to minimize the negative effects of urbanization on native wildlife. Large-scale planning and zoning for roads, developments and open space; meso-scale planning and landscaping of new neighborhoods and other developments; and small-scale landscaping for backyard habitats. Coexistence between wildlife and humans in urban environments and management of wildlife damage to human property.

FW 404 Forest Wildlife Management 3. Offered in Fall Only. Prerequisite: 9 hrs. Biological Sciences. Relationships between forest and wildlife management and the effects of silvicultural systems on wildlife. Species-habitat requirements, forest wildlife management techniques, and forest-wildlife policies and economics.

FW 411 Human Dimensions of Wildlife and Fisheries 3. Offered in Spring Only. Study of human interactions with wildlife and fisheries, including principles important for understanding and addressing wildlife management and conservation challenges. Discussions of wildlife at the urban fringe, human attitudes towards hunting and fishing, and the public trust approach to wildlife management are included.

FW 420 Introduction to Fisheries Science 3. Offered in Spring Only. Prerequisite: BIO 181 or ZO 150, BIO 260 or PB 360. Role of fish in aquatic ecosystems, fish biology, fish ecology, fisheries management and conservation. Emphasis on aquatic ecosystems and food webs, life history and ecology of important sport and commercial fishes, population and community dynamics, and theory and practice of fisheries management and conservation. Case studies from freshwater, estuarine and marine systems.

FW 430 Fisheries and Wildlife Administration 3. Offered in Spring Only. Prerequisite: PS 201, PS 202; FW/BIO 420, FW/BIO 353. Describes and compares the administrative structures and programs of federal and state fish and wildlife agencies and develops an understanding of the basis on which these agencies function. Evaluates the interrelationships that fisheries-wildlife professionals, special interest groups, public agencies and legislative bodies play in resource management programs.


FW 465 African Ecology and Conservation 4. Offered in Summer. Prerequisite: One 200-level or higher course in ES, ET FOR, FW, NR, PB, PRT, or ZO. This course provides an international perspective on desert ecology, the African savannah ecosystem, African wildlife ecology and management. In addition, the management of a large national park of international importance, conservation of predators and their conflict with humans, and international tourism are discussed. Various sampling techniques are practiced during field work. A combination of lectures, field lectures, field work, field excursions, data analyses and home work form an integral part of the course.

FW 485 Natural Resources Advocacy 3. Offered in Fall and Spring. Prerequisite: ENG 333. Junior standing or Senior standing with at least 10 hours of biology. Analysis of natural resources problems as they affect management agencies and user groups. Emphasis on professional attitudes, policies, and communication skills needed for management of sensitive natural resource issues. Guest professionals sharing their perspectives on dealing effectively with natural resource clientele groups. Student discussions, team projects, technical presentations citing popular articles on natural resources subjects.

FW 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

FW 493 Special Problems in Fisheries and Wildlife Sciences 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved.

FW 495 Special Topics in Fisheries and Wildlife Science 1-3. Offered in Fall and Spring. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.
GC 101  Engineering Graphics I 3. Offered in Fall and Spring.  Graphical representation and solution of 2D and 3D spatial problems.  Emphasis on development of logical and analytical approaches to problem solution. Conventional methods of graphically describing size and shape to represent basic mechanical elements. Includes practical engineering drawing applications.

GC 120  Foundations of Graphics 3. Offered in Fall Spring Summer. Introductory course providing orientation to language of graphics for students majoring in any field. Designed to help develop ability to use CAD within the context of a concurrent design process to understand how everyday objects are designed, analyzed and created. Emphasis placed on decision-making processes involved with creating geometry and development of modeling strategies that incorporate intentions of designer.

GC 210  Introductory Engineering Graphics for Industrial Engineering 3. Offered in Fall and Spring. Prerequisite: E 115. Introduction to the graphical representation and solution of 2D and 3D spatial problems. Conventional methods using computer-based tools to graphically describe 2D and 3D objects relevant to the field of IE. Overview of the fundamentals and applications of computer graphics and computer-aided design. Includes practical IE drawing applications.

GC 211  Introductory Engineering Graphics for Mechanical and Aerospace Engineers 3. Offered in Fall and Spring. Prerequisite: E 115. Graphical representation and solution of 2D and 3D spatial problems relevant to the field of mechanical and aerospace engineering using sketching and computer-based tools. Computer-aided design in the engineering design and manufacturing process. Practical mechanical and aerospace engineering drawing applications. Credit can be given for only one of the following: GC 101, GC 120, or GC 211.

GC 250  Architectural Graphic Communications 3. Offered in Fall and Spring. Prerequisite: GC 120 or GC 210 or GC 211. Architectural Graphic Communications is an advanced graphic course designed to expand on the concepts covered in the introductory courses (GC 120, GC 210, GC 211). The emphasis is on strengthening architectural sketching and CAD drawing skills and showing how specific construction processes and materials selected for an architectural design affect commercial and residential production architectural drawings. Topics include perspective drawing, shadow projection, texturization, rendered plans, elevations and other related topics.

GC 320  3D Spatial Relations 3. Offered in Fall and Spring. Prerequisite: GC 101 or GC 120 or GC/IE 210. Analysis and solution of three-dimensional space problems utilizing graphical principles of orthogonal projection techniques. Application of studies of lines; surfaces; solids; surface intersections; surface development; vectors; and civil, mechanical, and geographical structures.

GC 330  Basic Technical Animation 3. Offered in Fall Only. Prerequisite: GC 120 or GC 210 or GC 211. Create technical animations to communicate scientific and technical information to a variety of audiences and environments. Includes performing basic skills in image processing including cropping, transformations, color manipulation and color enhancement. Students will apply basic concepts of constructing 3-D objects, spaces, and environments. Create technical animations which apply environmental attributes including surface study, texture, color, lighting models, photo-realism, and raytracing.

GC 340  Concepts of Website Development 3. Offered in Spring Only. An introduction to the essential elements of web site development for students in Technology Education and Graphic Communications. Content focuses on planning and executing web site for educational effectiveness, user interfaces, site testing, and maintenance. Course provides instruction in software appropriate for creating a website.

GC 350  Applied CAD/D and Geometric Controls 3. Offered in Fall Spring Summer. Prerequisite: GC 120 or GC/IE 210 or GC 211. Techniques for producing mid-level computer models of individual parts and assemblies of parts. Application of conventional tolerancing and geometric tolerancing and dimensioning. Investigation of design for manufacture and CAD/CAM (Computer-AidedDesign/Computer-Aided Manufacture) processes. Conventions and standards for technical drawing documentation.


GC 420  Visual Thinking 3. Offered in Fall and Spring. Develop visual thinking skills through a series of exercises using various visual media. Integrates and stresses drawing and construction activities essential to visual thinking. Emphasis on direct observation (seeing), mental imagery and sketching that is based upon three-dimensional space. Develops students' visual and drawing skills and provides for their application toward solving open-ended spatial problems. Intended for the scientific and technically oriented student.

GC 450  Advanced Graphics Usage with CAD 3. Offered in Fall and Spring. Prerequisite: GC 350 or GC 250. Advanced applications of 3-dimensional solid modeling tools in technical and engineering environments. Theory and application of manufacturing databases developed with 3-D modeling tools. Development and management of 3-D geometry using modeling software. Emphasis on application of 3-D modeling technology.

GC 496  Special Topics in Graphic Communications 1-4. Offered in Fall Spring Summer. Topical study in areas of current interest and need to students and/or needs of curricula served by Graphic Communications.

GC 498  Independent Study in Graphic Communications 1-4. Offered in Fall Spring Summer. Prerequisite: GC 120 or GC 210 or GC 211. Independent study in areas of current interests and needs of students in the field of Graphic Communications and the visual sciences.

GD 102  Graphic and Industrial Design Fundamentals 6. Offered in Spring Only. Prerequisite: DF 101, Design Majors. Introductory studio in fundamental two-dimensional and three-dimensional concepts of graphic and industrial design. Basic design principles and invention of visual and spatial form within contexts relevant to design of communication and products.

GD 200  Graphic Design Theory and Practice 3. Offered in Spring Only. An examination of theories and critical perspectives shaping graphic practice. The course includes a discussion of contemporary
design strategy in business and the role of visual communication in the information age.

GD 201 Graphic Design Studio I 6. Prerequisite: DF 101, DF 102, Corequisite: GD 217 and GD 217L. Principles and language of graphic design. Analysis, organization, invention of two-dimensional form for the purpose of communicating information, concepts, emotions. Varied means of graphic representation are explored.

GD 202 Graphic Design Studio II 6. Prerequisite: GD 201, GD 217, Corequisite: GD 310, GD 310L, GD 317, GD 317L. Methods and processes of graphic design problem solving. Student exercises define communication problems; evaluate analytical, synthetic, and intuitive approaches to problem solving; develop critical thinking, oral presentation, and writing skills. Emphasis on the appropriateness of form to a given context.

GD 210 Imaging for Graphic Design I 3. Offered in Fall Only. Prerequisite: DF 102. Introduction to the technical and formal issues of photography and photomechanical processes as they relate to visual communication; terminology; photographic history within the context of graphic design.

GD 217 Typography I 3. Prerequisite: DF 101, DF 102, Design Majors, Approved minor. Typography as a medium of visual communication. Student exercises focus on type as image and the relationship between visual and verbal language; the expressive characteristics of letter forms and text explored. Terminology, typographic history, technical issues related to typography.

GD 292 Special Topics in Graphic Design 1-3. Topics of current interest in Graphic Design. Normally used to develop new courses.

GD 301 Graphic Design Studio III 6. Offered in Spring Only. Prerequisite: GD 202, GD 310, GD 317, Graphic Design Majors, Corequisite: GD 410, GD 417. Students apply theoretical information related to semiotics and communication theory through demonstration projects. Projects center on tailoring communication to audiences and acknowledging the role of context in the interpretation of form.

GD 310 Imaging for Graphic Design II 3. Prerequisite: GD 210. Intermediate photography and introduction to digital imaging as they relate to visual communication design; simple serial imaging; using movement and point of view; discussion of examples from photography and graphic design history.

GD 317 Typography II 3. Prerequisite: GD 217. Exploration of design using text type and typographic technology. Student exercises explore congruency between visual and verbal hierarchies, expressive use of typographic form, format/informational organization problems, and technical details of typographic specification and computer layout.

GD 342 History of Graphic Design 3. Offered in Spring Only. Events, ideas, movements, designs and individuals that have historical significance and influence on contemporary graphic design and the graphic design profession. Concentration on graphic design of the last 100 years.

GD 400 Advanced Graphic Design Studio 6. Offered in Fall Spring Summer. Prerequisite: GD 301, GD 417, GD 342, Graphic Design Majors. Advanced visual communication problems integrating typographic, photographic, and historical concepts in graphic design studio projects. Projects reflect applications with specific audiences, contexts, and production criteria.

GD 410 Imaging for Graphic Design III 3. Offered in Fall Only. Prerequisite: GD 310, GD 310L. Advanced photography and digital imaging; introduction to multi-media and narrative as they relate to visual communication design; discussion of authorship and images in culture and the communication environment.

GD 417 Typography III 3. Offered in Fall Only. Prerequisite: GD 202, GD 317, Design Majors. Systematic approaches to structuring typographic form according to information hierarchies, user needs, and visual expression. Application to the organization of tables, charts, books, magazines, and corporate identities.

GD 490 Graphic Design International Studio 6. Offered in Summer. Define visual communication design problems and develop design solutions in an international setting. Studio projects related to design, culture, and traditional and contemporary visual communication. Directed studios in history and culture, and in artifact making. Additional travel and trip costs are required beyond registration fees, as well as appropriate immunizations.

GD 492 Special Topics in Graphic Design 1-3. Offered in Fall Spring Summer. Topics of current interest in Graphic Design. Normally used to develop new courses.

GD 494 Internship in Graphic Design 3. Offered in Fall Spring Summer. Supervised field experience in graphic design offices and organizations.

GD 495 Independent Study in Graphic Design 1-3. Offered in Fall Spring Summer. Special projects in graphic design developed under the direction of a faculty member on a tutorial basis.

GEO 200 Principles of Geography 3. Offered in Spring Only. Basic ideas in the field of geography. The scope of geography as an academic field explored. Emphasis placed on mastery of geographic tools, e.g., maps, globes, and media materials and sources. Regional study of contemporary world.

GEO 220 Cultural Geography 3. Offered in Fall and Spring. Investigates the world's past and present cultural diversity by studying spatial patterns of population, language, religion, material and non-material culture, technology and livelihoods, communities and settlements and political organization and interaction.

GIS 410 Introduction to Geographic Information Systems 3. Offered in Fall and Spring. Overview of the operations and functions of computerized spatial display and map analysis processes (Geographic Information Systems), production of effective computer-generated maps and spatial displays, concepts for spatial modeling. Extensive independent learning and computer experiences including on-line virtual laboratory sessions. Credit will not be given for both GIS 410 and GIS 510.

GN 301 Genetics in Human Affairs 3. Offered in Fall Spring Summer. Appreciation and understanding of genetics in everyday life. Genetic perspective on normal human development, birth defects, birth
control, cancer, organ transplants, intelligence, mental illness, and radiation and chemical exposure and issues raised by applications of recently developed genetic techniques such as in vitro fertilization, genetic engineering and perinatal monitoring.

**GN 311 Principles of Genetics** 4. Prerequisite: BIO 183 or ZO 160. Basic concepts and principles of prokaryotic and eukaryotic genetics. Mendelian inheritance, polygenic inheritance, linkage and mapping, chromosome aberrations, population genetics, evolution, DNA structure and replication, gene expression, mutation, gene regulation, extranuclear inheritance, bacterial and viral genetics, and recombinant DNA technology.

**GN 312 Elementary Genetics Laboratory 1. Offered in Fall and Spring. Corequisite: GN 311.** Genetic experiments and demonstrations using a variety of bacterial, plant and animal organisms. Mendelian inheritance, linkage analysis, population genetics, cytogenetics, biochemical genetics, DNA isolation, electrophoresis, and Southern blotting.

**GN 413 Advanced Genetics 3. Offered in Fall and Spring. Prerequisite: GN 311.** Biological macromolecules and their interactions. Chromatin and chromosome structure. Bacteria, viruses, plants, animals and fungi as genetic systems. Transcription, RNA processing, genetic code, translation, DNA replication and the cell cycle. RFLP mapping. DNA and forensics. Molecular genetics of disease. Genetic transformation and cloning of plants and animals. Recombinant DNA methodology. Students cannot receive credit for both GN 413 and GN 513.

**GN 414 Genes and Development 3. Offered in Spring Only. Prerequisite: GN 311.** Genes and genetic pathways that control development in animals; overview of early, pivotal experiments in embryology and genetics; use of molecular biology, genomics and bioinformatics to study genes and development; concentration on four model systems; presentation and discussion of major issues in developmental biology.

**GN 415 Genome Science 3. Prerequisite: GN 311.** Complementation of modern genomics approaches with classical and molecular genetics; goals of major genome projects in animals, plants, humans, and microorganisms; genomic science opportunities at NCSU and in the Research Triangle; presentation and discussion of current literature; and preparation for careers in genomics-related fields.

**GN 421 Molecular Genetics 3. Offered in Fall and Spring. Prerequisite: GN 311.** Biological macromolecules and their interactions. Chromatin and chromosome structure. Bacteria, viruses, plants, animals and fungi as genetic systems. Transcription, RNA processing, genetic code, translation, DNA replication and the cell cycle. RFLP mapping. DNA and forensics. Molecular genetics of disease. Genetic transformation and cloning of plants and animals. Recombinant DNA methodology. Students cannot receive credit for both GN 413 and GN 513.

**GN 423 Population, Quantitative and Evolutionary Genetics 3. Offered in Spring Only. Prerequisite: GN 311 and (MA 131 or MA 141).** This course is an introduction to population, quantitative and evolutionary genetics. This course will acquaint students with basic population genetics and models. The course will cover genetic variation; measures of genetic variation; basic and advanced topics of selection; ecological genetics; inbreeding; genetic drift and effective population size; mutation; neutral theory and coalescence; gene flow and population structure; linkage disequilibrium and recombination; quantitative genetics; heritability; quantitative trait loci; molecular population genetics and evolution.

**GN 425 Advanced Genetics Laboratory 2. Offered in Spring Only. Prerequisite: GN 412. Corequisite: GN 413 or GN 421.** This is a challenging advanced genetics laboratory designed to provide research and communication training and in-depth understanding of modern genetics through hands-on activities. Students will participate in a semester-long supervised research project in contemporary genetics using a model genetic organism and state-of-the-art techniques. The project will be directly related to research in the coordinating faculty member’s laboratory. The project will require literature review, hypothesis development, experimental design and execution, data analysis and presentation of results in written and oral form.

**GN 434 Genes and Development 3. Offered in Spring Only. Prerequisite: C- or better in GN 421.** Genes and genetic pathways that control development in animals; overview of early, pivotal experiments in embryology and genetics; use of molecular biology, genomics and bioinformatics to study genes and development; concentration on four model systems; presentation and discussion of major issues in developmental biology.

**GN 451 Genome Science 3. Prerequisite: C- or better in GN 423.** Complementation of modern genomics approaches with classical and molecular genetics; goals of major genome projects in animals, plants, humans, and microorganisms; genomic science opportunities at NCSU and in the Research Triangle; presentation and discussion of current literature; and preparation for careers in genomics-related fields.

**GN 490 Genetics Colloquium 1. Offered in Spring Only. Prerequisite: GN 421.** This course will involve critical study of research in genetics. Students will evaluate primary research publication on prepared topics assigned by instructor, with emphasis on review of recent and current research.

**GN 492 External Learning Experience 1-6. Offered in Fall and Spring.** A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

**GN 493 Special Problems in Genetics 1-6. Offered in Fall and Spring.** A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Arrangements must be initiated by student and approved by a faculty adviser and the departmental teaching coordinator.

**GN 495 Special Topics in Genetics 1-3. Offered in Fall Spring.** Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

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**GLOBAL PUBLIC HEALTH**

**GPH 201 Fundamentals of Global Public Health 3. Offered in Fall Only.** Introduction to Public Health, providing a population-based perspective on disease and injury causation and prevention. Environmental, social, behavioral, and biological determinants of health and disease. Access to health services from a global perspective. Selected tools of disease control and health promotion and problems related to health-care delivery to society as a whole and to vulnerable populations.
**GREEK**

**GRK 101 Elementary Greek I** 3. Offered in Fall Only. Introduction to Classical Greek. Greek alphabet, basic grammar and syntax. Readings based on Greek mythology, philosophy, and literature.

**GRK 102 Elementary Greek II** 3. Offered in Spring Only. Prerequisite: GRK 101. A second course in Classical Greek, continuing and expanding the work of GRK 101, and completing the study of grammar. Readings from major authors including Herodotus, Thucydides, and Xenophon.

**GRK 201 Intermediate Greek I** 3. Offered in Fall Only. Prerequisite: GRK 102. Introduction to Greek prose. Emphasis upon improvement of reading skill through vocabulary acquisition and study of complex grammar. Introduction to Attic dialect through reading Plato, and Koine Greek through reading the New Testament. Examination of the importance of these works to Western literature and culture.


**GRK 310 Classical Mythology** 3. Offered in Fall Only. Greek and Roman mythology through the writings and art of the Classical period. Discussion of creation stories, the major gods and heroines, the underworld and afterlife. Intellectual religious and educational role of myth and of the most important theories of interpretation and classification. All readings and discussion in English.

**GRK 320 Greek Tragedy in Translation** 3. Offered in Spring Only. Tragedies of Aeschylus, Sophocles and Euripides in translation. Oral-traditional literature, formulaic myth composition and the Indo-European origins of the American folk hero. Readings include Iliad, Gilgamesh, Sanskrit Puranas and Beowulf; films such as Stagecoach and Superman.

**GRK 330 Medical Terminology** 2. Offered in Spring Only. Study of the formation of medical terms from their Greek and Latin roots designed both to build vocabulary and to teach the uses of a medical dictionary.

**GRK 371 The Origins of American Mythology** 3. Offered in Spring Only. Oral-traditional literature, formulaic myth composition and the Indo-European origins of the American folk hero. Readings include Iliad, Gilgamesh, Sanskrit Puranas and Beowulf; films such as Stagecoach and Superman.

**GLOBAL TRAINING UNIT**

**GTI 401 US Culture and Education Colloquium** 3. Overview of US Culture, Higher Education in America, and Student Success Skills for degree or non-degree international students. Guest faculty lectures, media presentations, field trips, and required readings form basis for discussion groups, assignments, and capstone paper (reflection on issues discussed in class, personal development, and required community involvement). Includes break-out discussion groups, field trips, personal projects and research. Students may have additional travel cost associated with field trips. Enrollment limited to first year international students, participants in NC Global Training Initiative Certificate Programs, or by permission of the instructor.

**HISTORY OF ART**

**HA 201 History of Art From Ancient Greece Through the Renaissance** 3. Offered in Fall Only. Art from Ancient Greece and Rome through Italian Renaissance. Major art forms of painting, sculpture, and architecture.

**HA 202 History of Art From the Renaissance Through the 20th Century** 3. Offered in Spring Only. Art from the Northern Renaissance in Europe through the 20th century in Europe and America: painting, sculpture and architecture recent mixed media techniques such as collage, and trottage.


**HA 298 Special Topics in Art History** 3. Offered in Fall Spring Summer. Special topics in art history with emphasis on chronological periods such as 20th-century art of the Italian Renaissance or on fields of art such as paintings, sculpture, photography, or architecture.

**HA 310 History of Art and Photography** 3. History of and the interaction between art and photography from the invention of photography to the present.

**HA 320 American Decorative Arts** 3. History of American Art (painting, sculpture, and architecture) from Colonial Period through 20th century.

**HA 395 History of Art: Study Abroad** 3. Offered in Fall Spring Summer. Topical History of Art courses taught in NC State Study Abroad programs. (Current listings available in History Department, Study Abroad Office and CHASS Dean's Office.)

**HA 401 19th Century European Art** 3. Offered in Fall Only. Prerequisite: HA 201 or HA 202. Major stylistic movements of 19th century European art and the theoretical basis for their development. Covers Neo Classicism, Romanticism, Realism and Impressionism, and Post Impressionism.

**HA 404 Italian Renaissance Masters** 3. Prerequisite: 3 hrs. of HA. Selected problems in the development of Italian Renaissance art including painting sculpture and architecture, 1300-1550: including the pioneers Giotto and Duccio; founders of the early Renaissance: Masaccio, Donatello, and Brunelleschi; great masters of the High Renaissance: Michelangelo, Raphael and Leonardo da Vinci. Works of art analyzed in terms of style, subject matter and historical context.

**HA 498 Independent Study in History of Art** 1-6. Offered in Fall and Spring. Prerequisite: 3 hours History of Art. Directed independent study of topics in the History of Art.
HISTORY

HI 205 Western Civilization Since 1400 3. Offered in Fall and Spring. A survey of Western Civilization from the Renaissance to the present.

HI 207 Ancient World to 180 A.D 3. Offered in Fall and Spring. The ancient cultures of the Middle East, Greece and Rome, including Mesopotamian, Egyptian, Hebrew, Phoenician, Greek and Roman societies and cultures.

HI 208 The Middle Ages 3. Offered in Fall and Spring. Medieval civilization as it emerged from the declining Roman Empire through its apogee in the 13th century. The transition from the classical to the medieval world, the impact of the Germanic influx, the Islamic influence, the Crusades, and the political, economic, and social institutions of the High Middle Ages.

HI 209 Europe, Renaissance to Waterloo, 1300-1815 3. Offered in Fall and Spring. Transition from the medieval to modern Europe; decline of medieval institutions, Renaissance, Reformation and Counter-Reformation, rise of Absolutism, English 17th-century revolution, French Revolution and Napoleonic era.

HI 210 Modern Europe 1815-Present 3. Offered in Fall and Spring. Survey of the history of European societies and political systems from 1815 to the present.

HI 215 Latin America to 1826 3. Offered in Fall and Spring. The origins and development of social, political, economic and religious institutions from pre-conquest times to the achievement of independence. The ancient American cultures; Spain and Portugal before 1492; conquest and settlement, Spanish rule in theory and practice, economic life, the Church, land and labor; the African contribution; the Portuguese in Brazil; the independence movements.

HI 216 Latin America Since 1826 3. Offered in Fall and Spring. Social, political, economic, and intellectual life in the 19th and 20th centuries in Central and South America. The social structure of the new nations; 19th century liberalism; the force of tradition; relations with Europe and the United States; economic change; caudillo rule; 20th century upheavals; revolutions; political conflict.

HI 221 British History to 1688 3. History of the British peoples from earliest times to the Glorious Revolution. Social, political, constitutional developments; relationship between history and literature; synthesis of British cultures.

HI 222 History of British Cultures and Societies From 1688 3. British people from Glorious Revolution to the present. Social, political, constitutional development; history and literature; growth and decline of British empire; spread of British culture.

HI 232 The World from 1200 to 1750 3. Offered in Fall and Spring. Introductory survey of three major civilizations before 1750, associated with Islam, with Christianity, and with China. The course examines the ways that people structure community identities, from the local to the civilization; the importance of interregional connections, established particularly through trade; and the ongoing impact of these connections on community identities.

HI 233 The World Since 1750 3. Offered in Fall Spring Summer. This course surveys the making of the world from 1750 to the present.

Topics include: the Industrial Revolution, the development of the Nation-States, the rise of European, American and Japanese Empires, WWI, inter-war reconfigurations of colonial empires, anti-colonial nationalist movements, the Great Depression, the Cold War, struggles for political and economic independence among newly independent nations, the US-dominated neo-liberal order from the 1980s to the present, and contemporary global conflicts over ethnicity, religion, resources, disease, and the environment.

HI 251 Early American History 3. Offered in Fall and Spring. Themes in early American history: colonial clash and mix of culture; generation of an American consciousness; federalism and democracy in national politics; expansion and immigration; racial and sectional division.

HI 252 Modern American History 3. Offered in Fall and Spring. Themes in modern American history: impact of war on American foreign and domestic policy; the repercussions of industrialization and economic modernization; continuity and change in American institutions and values; problem solving in pluralistic society.

HI 263 Asian Civilizations to 1800 3. Offered in Fall Only. Introductory survey of the great civilizations of Asia; particular attention to India, China and Japan. Emphasis on comparative study of Asian religions, political systems, art, and literature.

HI 264 Modern Asia: 1800 to Present 3. Offered in Spring Only. Introductory survey of 19th and 20th century Asia, with attention to Japan, Southeast Asia, India and China. Emphasis on cultural and political crises of the 19th century and revolutionary transformations of the 20th century.

HI 270 Modern Middle East 3. Offered in Fall Only. Social and political change in the Middle East in the nineteenth and twentieth centuries. Decline of the Ottoman empire, the rise of nationalism, the waxing and waning of European imperialism in the region, and the creation of modern states and societies and their ideological and economic underpinnings.

HI 275 Introduction to History of South and East Africa 3. Offered in Fall Spring Summer. The African kingdoms (Lunda, Buganda, and Zulu); the European encroachment; the origins of colonialism and the character of colonial societies and economies, South African apartheid; African protest, nationalism and independence.

HI 276 Introduction to History of West Africa 3. Offered in Fall and Spring. The history of Western Africa. Forest civilizations and the slave trade, trade and the expansion of Islam, colonialism in West Africa; African nationalism and the achievement of independence; and postcolonial West Africa.

HI 295 First-Year Seminar in History 3. Topical introductory history course in the CHASS First-Year Seminar offerings. (Current listings available in the CHASS Dean's office and in the History Department).

HI 298 Special Topics in History 3. Offered in Fall Spring Summer. Presentation of material normally not available in regular history course offerings, or offering of new introductory courses on a trial basis. Students cannot receive credit for multiple sections of HI 298 unless the topics are different.

HI 300 Sophomore Seminar in History 3. Offered in Fall and Spring. Introduction to the process of researching and writing history. Techniques for locating and interpreting primary sources. The craft of

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historical writing. Analysis and criticism of the varieties of history. Basic computer literacy; basic computing terms, electronic mail, online searching of the NCSU Libraries, use of the Internet, and word processing.

HI 320 Religion in American History 3. Offered in Fall Only. Prerequisite: 3 hours of History or Sophomore standing. Representative people, movements and thought in the major religions within the context of American society and culture.

HI 321 Ancient and Medieval Science 3. Prerequisite: 3 hours of History or Sophomore standing. Selected topics in the history of pre-modern science are studied for both their intrinsic interest and to gain perspective on the nature of modern science. Examples are taken from pre-history, Mesopotamia, Egypt, Greece, Rome, Islam, and the medieval Christian West, with the possibility of comparisons to other cultures.


HI 335 The World at War 3. Offered in Spring Only. Prerequisite: 3 hours of History. Comparative history of the experience of war over time and place. Topics include the interactions between war and society; effects on combatants and non-combatants, especially women and children; and the role of technology.

HI 341 Technology in History 3. Offered in Spring Only. Prerequisite: 3 hours of History or Sophomore standing. The role of technology in society from earliest times to the present. Major achievements in technology and an examination of the nature of invention, innovation and adaptation of technologies and their impact on Western Civilization.

HI 350 American Military History 3. Offered in Fall and Spring. Prerequisite: 3 hours of History or Sophomore standing. American military experience and its relationship to other historical developments. Use of military force in terms of strategy and tactics and as an element in the nation's diplomatic, political, social, economic and intellectual life.

HI 351 U.S. Naval History 3. Offered in Spring Only. Prerequisite: 3 hours of History or Sophomore standing. The role of the U.S. Navy in American history. Sea power, national defense and foreign policy. The impact of technology on naval warfare and the historical evolution of missions of the U.S. Navy.

HI 364 History of North Carolina 3. Prerequisite: 3 hours of History or Sophomore standing. History of North Carolina from early European exploration to the present. Features of North Carolina society which made this state similar to and different from other southern states and the nation as a whole.

HI 365 The American West 3. Prerequisite: 3 hours of History or Sophomore standing. A history of the American Frontier with emphasis on the trans-Mississippi West. Cycles of exploration, conquest, and exploitation of this region. Influence of the frontier in the development of the United States.

HI 366 Native American History 3. An introductory interpretation of the varied historical experiences of many nations native to North America from the first migrations of peoples into the continent until the present, including the variety and diversity of Indian cultures and experiences; native resistance to colonialism, expansion, and U.S. federal policies; and the survival and continuity of native cultures and peoples through more than four centuries of contact, conquest, and change.

HI 370 Modern Egypt 3. Offered in Spring and Summer. Prerequisite: 3 hours of History or Sophomore standing. Political history of Modern Egypt, 1805-present. The general framework traces events from the foundation of the modern state under Muhammad 'Ali to the current period of Hosni Mubarak. The focus will be on understanding the creation of modern Egypt by looking at examples of various cultural productions (film, architecture, music, and literature) over the course of the past two centuries.

HI 371 Modern Japan, 1850 to Present 3. Offered in Spring Only. Prerequisite: 3 hours of History or Sophomore standing. Survey of Japan's emergence as a modern nation and world power. Topics include nation-state formation; modernization and its dislocations; democratization and authoritarianism; imperialism, international politics, and war; postwar reforms; changing gender relations; popular culture; and social problems.

HI 372 African-American History Through the Civil War, 1619-1865 3. Prerequisite: 3 hours of History or Sophomore standing. African background and continuity of the particular role, experience and influence of African Americans in the United States through the Civil War.

HI 373 African-American History Since 1865 3. Prerequisite: 3 hours of History or Sophomore standing. The history of African-Americans from the Reconstruction era through the Civil Rights movement of the 1950s and 1960s to the present.

HI 380 History of Nonprofits, Philanthropy, and Social Change 3. Offered in Fall Only. Prerequisite: 3 hours of History or Sophomore standing. Historical development of nonprofits and philanthropy in the United States from the colonial period to the present— including origins of charity and philanthropy as concepts for social change and social justice, rise of benevolent societies, creation of philanthropic foundations and advocacy organizations, and relationships between modern nonprofits, the state, and the private sector.

HI 395 History: Study Abroad 1-3. Prerequisite: 3 hours of History or Sophomore standing. Topical History courses taught in NCSU Study Abroad programs. (Current listings available in Study Abroad Office, CHASS Dean's Office and History Department).

HI 400 Civilization of the Ancient Near East 3. Prerequisite: 3 hours of History. The civilization of Mesopotamia and Egypt from earliest times to the fall of Babylon in 539 B.C. Credit for both HI 400 and HI 500 is not allowed.

HI 402 Early Christianity to the Time of Eusebius 3. Offered in Spring Only. Prerequisite: One of: REL 312, REL 317, or HI 207. Growth and diffusion of early Christianity from the end of the first century up to the time of Eusebius and the conversion of Constantine (early fourth century); Christianity in its Greco-Roman environment; Roman policy towards Christianity; heterodox Christian movements; anti-hetereous writings; orthodox institutions of authority.

HI 403 Ancient Greek Civilization 3. Prerequisite: 3 hours of History. The history of the Hellenes from the Minoan civilization through Alexander's legacy, with readings in Herodotus and Thucydides.
HI 404 Rome to 337 A.D. 3. The development of ancient Rome from its origins in Italy, through the rise of an Empire, embracing the entire Mediterranean World and Western Europe, to Constantantine, Christianity and the foundation of Constantinople. Examines critically the political achievement of a people who rose from an obscure Italian city to a world empire, with emphasis on the analysis of primary sources. Credit will not be given for both HI 404 and HI 504.

HI 405 History and Archaeology of the Roman Empire 3. Analysis of Rome's rule over the Mediterranean World in the first four centuries A.D. through the use of literary and archeologic sources. Special emphasis on imperial army and frontier security. Credit will not be given for both HI 405 and HI 505.

HI 406 From Roman Empire to Middle Ages 3. Late Antiquity and the early Middle Ages. The transition from classical civilization to the basis of modern civilizations; the fall of Rome, the Germanic kingdoms, Byzantium, the establishment of Christianity, the birth and growth of Islam. Credit will not be given for both HI 406 and HI 506.

HI 407 Islamic History to 1798 3. Credit will not be given for both HI 407 and HI 507. The history of the Islamic Near East to 1798. Topics include the East Mediterranean before Islam, Muhammad and the development of Islam, sources of Muslim civilization, Islamic law, science, philosophy, art and architecture, Islam in Spain, India, Asia and Africa, the Crusades, the Ottomans, Islam and Europe.

HI 408 Islam in the Modern World 3. Prerequisite: 3 hours of History or Religious Studies. Evolution of modern Islam from 17th century to the present. Primary emphasis on North Africa, the Middle East and South Asia. Pre-modern Islamicate empires, reform and revival. Historical origins of current issues in the Islamic world.

HI 409 The High Middle Ages 3. Medieval culture from 10th through 13th centuries: revival of the Roman Empire, monastic and papal reform, rise of universities, evolution of representative bodies, the Gothic style, troubadour and goliardic poetry, scholasticism, and revival of Roman law. Credit will not be given for both HI 409 and HI 509.

HI 410 Italian Renaissance 3. Renaissance humanism, an educational ideal and an awareness of man as the sole creator in the historical world, is examined in its relationship to the Italian republics and princesdoms of the 14th through the 16th century. Credit will not be given for both HI 410 and HI 510.

HI 411 The Protestant and Catholic Reformation of the 16th Century 3. The conditions and criticisms which led to reform and the nature of the institutional and theological changes affected by the various churches and sects. Special attention to Luther and Calvin. Credit will not be given for both HI 411 and HI 511.

HI 412 The Sexes and Society in Early-Modern Europe 3. Examination of changes in gender relations; ideas about the sexes, femininity, and masculinity; the roles of women and men in political, religious, economic, scientific, and family life in Europe between the late Middle Ages and the French Revolution. Credit for HI 412 and HI 512 is not allowed.

HI 414 France in the Old Regime 3. France from the sixteenth century to the Revolution, development of renaissance and absolutist state, social and economic change, religious reform and Enlightenment, origins and beginnings of the revolution. Credit will not be given for both HI 414 and HI 514.

HI 415 The French Revolution 3. Broadly based analysis of France's first revolutionary era; the enlightenment and its impact, the causes and character of the Revolution in France; impact of these events in France and Europe. Credit will not be given for both HI 415 and HI 515.

HI 418 Fascist Italy and Nazi Germany 3. Offered in Fall Only. Fascism as a theoretical concept, rise of fascism in Italy and Germany; seizure of power by Mussolini and Hitler; organization of the economy, churches, military, women, youth, and culture under the dictatorships. Students will not receive credit for both HI 418 and HI 518.

HI 419 Modern European Imperialism 2. Historical background of European overseas expansion; its impact on the economics, politics and culture of both Europe and the colonized world; the significance of imperialism and anti-colonial nationalism in shaping the modern world. Credit will not be given for both HI 419 and HI 519.

HI 420 European Diplomatic History 3. Offered in Spring and Summer. Prerequisite: 3 hours of History. Survey of major events in European international relations, including the Congress of Vienna in 1815, the unification of Germany, World War I and II, the origins of the Cold War, European unification, and the crisis of the Soviet bloc. Credit will not be given for both HI 420 and HI 520.

HI 421 European Intellectual History: The Eighteenth Century 3. Historical examination of some of the major figures of the European Enlightenment, beginning with Locke and ending with Kant. Credit will not be given for both HI 421 and HI 521.

HI 422 European Intellectual History: The 19th Century 3. Historical examination of some of the major figures of European thought during the 19th century, beginning with the enthusiasm of the period of the French Revolution and ending with the disillusionment of the fin de siecle. Credit will not be given for both HI 422 and HI 522.

HI 423 Women in European Enlightenment 3. Offered in Spring Only. Prerequisite: 3 hours of History, Junior standing. Historical examination of construction of female 'nature', resources available to women writers and intellectuals, and constraints on women's education, writing and publication during the Enlightenment period.

HI 425 Tudor and Stuart England 3. British history from the Reformation through the Civil War. Emphasis on key developments in social, political and economic life: The development of a new concept of kingship, the growing independence of Parliament, the search for religious uniformity and the changing status of the aristocracy and gentry. Credit will not be given for both HI 425 and HI 525.

HI 429 20th Century Britain 3. Prerequisite: 3 hours of History. British political, social and economic history since 1914, with reference to the effects of two world wars, the growth of the Welfare State, Britain's decline as a power, and its search for a new role in the world.

HI 430 Modern France 3. French history from the downfall of Napoleon I to the present, with a short introductory survey of the Old Regime and the French Revolution. Cultural, social and economic developments and political trends. Credit will not be given for both HI 430 and HI 530.

HI 431 Germany: Luther to Bismarck 1500-1871 3. Germany from the Reformation to the completion of national unification in 1871. Emphasizes the impact of socioeconomic changes on politics and culture. Credit will not be given for both HI 431 and HI 531.

HI 432 History of Germany Since 1871 3. Prerequisite: 3 hours of History. German history from the unification of 1871 to the present, concentrating on problems of nationalism and political and social reform. Credit will not be given for both HI 432 and HI 532.
HI 435 Europe Since 1945 3. Offered in Fall Only. Survey of European politics, society, and culture from 1945 to the present day focusing equally on Eastern and Western Europe. Begins with the Cold War division of the continent and gives special attention to the years immediately following the end of the Second World War, to the revolts of 1968, to the fall of Communism in 1989-1991, and to the Wars of Yugoslav Succession, 1991-1999.

HI 438 The Russian Empire to 1917 3. Prerequisite: 3 hours of History. Russian Empire to the Revolution of 1917. Kievan Rus and the Mongol conquest, seldom, territorial expansion, cultural insularity of the Great Russian state in Moscow, Westernization, reform, and great power status in 18th and 19th centuries, peoples of the multi-national empire, cultural, educated society, and revolutionary opposition, industrialization, rapid urbanization, war, and revolution.

HI 439 History of the Soviet Union And After 3. Soviet state and society from the 1917 Revolution, including the post-Soviet situation. Political disarray and resistance to the Bolshevist regime, 1917-21; industrialization, urbanization, and application of coercive techniques of rule; popular reconciliation with Party state and great power status during World War II and after; fate of non-Russian nationalities; de-stalinization, stagnation, and the failed attempt at Party renewal after 1985. Credit will not be given both for HI 439 and HI 539.

HI 440 American Environmental History 3. Offered in Fall Only. Prerequisite: 3 hours of History. Interactions between humans and their environments in America; environmental focus on themes in American history such as colonial settlement, industrialization, progressivism, the New Deal, the 1960s.

HI 441 Colonial and Revolutionary U.S. 3. Origins of the English colonies in America to the American Revolution. European background to colonization, merging of different cultures, effects of mercantile doctrine, causes of revolution. Credit will not be given for both HI 441 and HI 541.

HI 442 Creating the Constitution : Origins and Development 3. Offered in Spring Only. Prerequisite: 3 hours of History. Analysis of state and federal constitutions developed in the United States after 1776. Theories behind a federal constitution; the Philadelphia Convention of 1787; the ratification debate; and the bill of rights.

HI 443 U.S. Constitutional History to 1883 3. This course examines the origins and development of the U. S. Constitution from the Articles of Confederation to 1883. The course specifically looks at the federal Convention of 1787, the national bank debate and early constitutional interpretation; the constitution and its interaction with politics, economics, and society; the powers of Congress-taxation, contracts, commerce and war. The course also examines sovereignty, slavery and civil rights. It ends with an analysis of the Civil War Amendments and the transformation in American constitutionalism. Credit for both HI 443 and HI 543 is not allowed.

HI 444 U.S. Constitutional History Since 1870 3. Offered in Spring Only. Examines the transformation of American Constitutional thought after the Civil War; the triumph of nationalism and the evolution of a new federal theory; the rise and fall of federal protections of civil rights in the late 19th-century and the Civil Rights Revolution in the 20th century. Explores key concepts as civil liberties, judicial activism and judicial restraint; procedural and substantive due process, liberty of contracts and entrepreneurial liberty, Japanese internment, privacy, women and gender issues; explores free speech, religious freedom, civil liberties. Credit for both HI 444 and HI 544 is not allowed.

HI 445 Early American Frontier 3. Examines the social, political, and cultural development of the eastern American frontiers between the early seventeenth and mid-nineteenth centuries. Addresses the relationships between settlers and environments, settlers and Native Americans. Explores the structure and life of pioneer families, the development of new institutions, the role of governments in regulating settlements, and the evolution of the "frontier myth." Credit cannot be given for both HI 445 and HI 545.

HI 446 Civil War and Reconstruction 3. Examination of sectional polarization of the 1850's, impact of the war on both northern and southern societies, and trauma of reconstructing the Union. Credit will not be given for both HI 446 and HI 546.

HI 447 History of American Women to 1900 3. Prerequisite: 3 hours of History. The historical experience of women in America from the colonial period to 1890. Women's work, education, legal and political status, religious experience, and sex roles: age, class, race, sexual preference, and region as significant variables in women's experience.

HI 448 American Women in the Twentieth Century 3. Women's historical experience in America, 1890-1990. Changes in women's work, education, legal and political status, and sex roles, age, class, race, sexual preference and region as significant variables in women's experience. Credit will not be given for both HI 448 and HI 548.

HI 449 U.S. Labor to 1900 3. History of work, workers, and working-class organizations and politics in colonial and nineteenth-century America. Credit will not be given for both HI 449 and HI 549.

HI 450 U.S. Labor Since 1900 3. History of work, workers, and working-class organizations and politics in twentieth-century America. Credit will not be given for both HI 450 and HI 550.

HI 451 The Vietnam War 3. Offered in Spring Only. Prerequisite: 3 hours of History. Analysis of U.S. involvement in Vietnam, including an introduction to Vietnamese history, why the United States intervened in Vietnam, the various forms U.S. intervention took, which Americans went to Vietnam and what they expected there, the consequences of U.S. involvement for Americans and Vietnamese, the effort to end American participation in the war, and the war's legacy. Credit for both HI 451 and HI 551 is not allowed.

HI 452 Recent America 3. Examination of contemporary opinions and historical interpretations of major problems in American life since 1939, including World War II, its social and economic consequences; Korea and the Cold War, big business and labor; civil rights and feminist movements; countercultures, Vietnam and Watergate. Credit will not be given both for HI 452 and HI 552.

HI 453 United States-Latin American Relations Since 1823 3. Analysis of periods, issues, and events in U.S.-Latin American relations since 1823: Monroe Doctrine, Manifest Destiny, Mexican and Spanish-American Wars, Dollar Diplomacy, Good Neighbor Policy, anti-Communist crusade since 1945, Alliance for Progress, U.S. responses to revolution. Historical perspective on contemporary inter-American problems on drugs, environment, debt crisis, and human rights abuses. Credit will not be given both for HI 453 and HI 553.

HI 454 History of U.S. Foreign Relations, 1900-Present 3. America's emergence as a world power; American diplomatic history since 1900; the expansion of American economic and cultural relations; the evolution of the American foreign policy bureaucracy; and the historical forces and personalities that have shaped American relations with other nations. Credit for both HI 454 and HI 554 will not be allowed.
HI 455 History of the Civil Rights Movement. The black revolution; important leaders of the movement; successes and failures in the fight for desegregation, the vote, and economic opportunity: impact of Civil Rights movement on the United States. Credit will not be given both for HI 455 and HI 555.

HI 456 Early American Thought. Prerequisite: 3 hours of History. American intellectual history to 1865. Influence of reformation, enlightenment, scientific revolution, capitalism and romanticism on social and political order. Credit will not be given for both HI 456 and HI 556.

HI 457 Twentieth-Century U.S. Intellectual History. American intellectuals and their views on 20th-century topics such as politics, culture, race and gender in historical context. Credit for both HI 457 and HI 557 is not allowed.

HI 458 Modern American Historical Biography. Credit will not be given for both HI 458 and HI 558. American history in the 20th century through the medium of historical biography. Credit will not be given for both HI 458 and HI 558.

HI 459 The Early American Republic. Examines the social, political, and cultural development of the Early Republic, the period in American history roughly from the Revolutionary War through the Administration of John Quincy Adams. Employs the life of Thomas Jefferson-the quintessential American, as the foundation for delving into the historical problems, interpreting primary sources, and analyzing secondary sources. encourages graduate students to analyze the ways in which historiographic debates complicate our understanding of the Early American Republic. Credit will not be given for both HI 459 and HI 559.

HI 460 Civilization of the Old South. The distinctive features of the Old South as part of the regional development of United States history. Consideration of colonial factors in the making of the South, development of the plantation system and slavery, Southern social order, intellectual and cultural life, economic development, and rise of Southern nationalism. Credit will not be given for both HI 460 and HI 561.

HI 461 Social History of the New South. Offered in Fall Only. Prerequisite: 3 hours of History. Analysis of the change and continuity in the American South from the end of the Civil War through the present. Credit will not be awarded both for HI 461 and HI 562.

HI 462 Oil and Crisis in the Gulf. Prerequisite: 3 hours of History or Sophomore standing. Historical roots and development of the Persian Gulf region from the late nineteenth century until the present with an emphasis on the social, economic, cultural and political transformations following the discovery of oil, and subsequent events such as the Arab Oil embargo of 1973, the Iranian Revolution, the Iran-Iraq war, and the two Gulf wars.

HI 463 History of the Palestinian-Israeli Conflict. Prerequisite: 3 hours of History or Sophomore standing. Historical roots and development of the Palestinian-Israeli conflict from the late nineteenth century until the present through the study of the history and historiography of Zionism, Palestinian nationalism, creation of the state of Israel, establishment of settlements, conflicts and peace negotiations, as well as a study of the impact of this conflict on both Israeli and Palestinian societies, economies and cultures.

HI 464 Modern Mexico. Prerequisite: 3 hours of History. Major developments in Mexican national life since 1821. The 19th century: the era of Santa Anna, the war with the United States, the Reform, the French intervention, and the dictatorship of Porfirio Diaz. The 19th century to the present, the political, social and economic institutions and problems of Mexico. Credit will not be given both for HI 464 and HI 564.

HI 465 Latin American Revolutions in the Twentieth Century. Comparative analysis of causes, participants, process, and outcome of revolutions in Mexico, Bolivia, Cuba, and Central America. Credit for both HI 465 and HI 565 will not be given.

HI 470 Seminar: Teaching World History. Offered in Spring Only. Prerequisite: 3 hours of History. Introduction to historiography and themes of world history; designed for, but not restricted to, LTH students planning to teach world history.

HI 471 Revolutionary China. China 1900 to present. Examination of political, cultural, and socio-economic revolutionary phases of China's 20th-century transformation from traditional empire to communism. Particular attention to post-1949 problems of nation-building. Credit will not be given for both HI 471 and HI 571.

HI 472 Japan's Empire in Asia, 1868-1945. Offered in Fall Only. Prerequisite: 3 hours of History. Junior standing. An advanced survey of Japanese relations with Asia in the nineteenth and twentieth centuries. Structures and ideologies of imperialism and colonialism; modernization, nationalism and social change; migration and mobility; resistance and collaboration; and legacies of empire. Credit will not be given for both HI 472 and HI 572.

HI 473 History of the Republic of South Africa. Offered in Fall and Spring. Prerequisite: 3 hours of History. Evolution of the Republic of South Africa's society, with emphasis on the interaction of diverse peoples and cultures. Particular attention is given to the period since 1870. Credit will not be given for both HI 473 and HI 573.

HI 474 Modern India. Offered in Fall Only. Prerequisite: 3 hours of History. The history of the Indian sub-continent, from the 16th century to the present. Focus on political, economic and cultural change under the Mughal Empire and the British Raj: the problems of independent India, Pakistan and Bangladesh.

HI 475 History of the Republic of South Africa. Offered in Fall and Spring. Prerequisite: 3 hours of History. Evolution of the Republic of South Africa's society, with emphasis on the interaction of diverse peoples and cultures. Particular attention is given to the period since 1870. Credit will not be given for both HI 475 and HI 575.

HI 476 Leadership in Modern Africa. Prerequisite: 3 hours of History. Recent sub-Saharan African political history (excluding South Africa). Overview of concepts, vocabulary, historical trends. Detailed examination of specific African countries as case studies, such as Ghana, Nigeria, Zimbabwe, Tanzania.

HI 477 Women in the Middle East. Offered in Spring Only. Prerequisite: 3 hours of History. The varied forces influencing lives of women in Middle East from beginning of Islam to present.

HI 478 Islam and Christianity in Sub-Saharan Africa. Offered in Spring Only. Prerequisite: 3 hours of History. Expansion and interaction of Islam and Christianity in sub-Saharan Africa in the nineteenth and twentieth centuries, and their influence and impact on the economy, politics, and society. Topics include missionary activity, resistance to imperial authority, the role of the churches, and the influence of religion on leadership, education, nationalism, and post-colonialism.

HI 479 Africa (sub-Saharan) in the Twentieth Century. Offered in Spring Only. Prerequisite: 3 hours of History. Developments in sub-Saharan Africa during the colonial period, from the end of the nineteenth century to the advent of decolonization in the early 1960s. Interplay of political, social, economic and cultural factors in the experiences of African peoples during this period. Credit will not be given for both HI 479 and 579.
HI 480 Scientific Revolution: 1300-1700 3. Factors behind dramatic scientific changes of the seventeenth century. Role of mathematics and experiment. Interaction of the new science with trends in philosophy, religion, alchemy, magic, medicine, and with institutional, educational, political, economic and technological factors. Credit will not be given for both HI 480 and HI 580.

HI 481 History of the Life Sciences 3. The major ideas, methods, institutions, and individuals that have contributed to the biological sciences from Renaissance to modern times. The connections between the life sciences and other aspects of culture, including the physical sciences, religious belief, medical practice, and agriculture. Credit will not be given for both HI 481 and HI 581.

HI 482 Darwinism in Science and Society 3. Offered in Spring Only. Scientific development of Darwinism and its reception by the scientific community and the general public. Social impact of theories of evolution as reflected in Social Darwinism, eugenics, sociobiology, and relationship of sciences to ethics and religion. Credit will not be given for both HI 482 and HI 582.

HI 483 Science and Religion in European History 3. Offered in Spring Only. Prerequisite: 3 hours of History, Junior standing. The historical conflict between science and religion; crisis of religion, science as a new cultural authority; political and institutional landscape of science and religion in Europe. Credit will not be given for both HI 483 and HI 583.

HI 484 Science in European Culture 3. Offered in Fall Only. Prerequisite: 3 hours of History, Junior standing. Relationship between science and culture in European history; evaluation of ‘two cultures’ thesis; scientific instruments, universal expos, science and literature. Credit will not be given for both HI 484 and HI 584.

HI 485 History of American Technology 3. Offered in Spring Only. Prerequisite: 3 hours of History. Technology in American history; the ideological, social, economic, and institutional contexts of technological change from the 1760’s to the present. Impacts of new technological systems.

HI 491 Seminar in History 3. Offered in Fall and Spring. Prerequisite: 3 hours of History, Junior standing. Detailed investigation of selected topics in history. Consult Department of History for specific topics.

HI 495 Honors Research in History I 2. Offered in Fall and Spring. Preparation of the honors thesis. Topics and procedures to be determined by the student and the supervising faculty member.

HI 496 Honors Research in History II 4. Offered in Fall and Spring. Prerequisite: HI 495. Senior in History Honors Program. Completion of the honors thesis. Topics and procedures to be determined by the student and the supervising faculty member.

HI 498 Independent Study in History 1-6. Prerequisite: 3 hours of History. Extensive readings on predetermined topics focused around a central theme. Permission of the department is required.

HONORS

HON 101 Honors Colloquium I 1. Offered in Fall Only. Introduction to Honors at NC State University for University Honors Program students. Development of Honors Plan of Study and discussion of issues of concern in higher education and relationship between education, personal development, and community involvement. Require permission of the University Honors Program.

HON 102 Honors Colloquium II 1. Offered in Spring Only. Prerequisite: HON 101, UHP student. Introduction to Honors at NC State University for University Honors Program students. Development of plan for honors research project and proposal for study abroad experience. Further reflection on purpose of higher education in addressing the issues and opportunities of our time. Require permission of the University Honors Program.

HON 201 Inquiry, Discovery, and the Arts 3. Offered in Fall and Spring. A study of works of art that treat the theme of inquiry and discovery—its risks, its creativeness, its ambiguities and complexities, and its moral dilemmas. Selected works from several media-theatre, music, visual arts, and film. Analysis of each work in terms of its historical context and internal structure as well as its treatment of the nature of inquiry and discovery.

HON 202 Inquiry, Discovery, and Literature 3. Offered in Fall and Spring. A study of works of literature that treats the themes of inquiry and discovery—its risks, its creativeness, its ambiguities and complexities, and its moral dilemmas—through selected works from literature and other media, including theater, music, visual arts, and film. Analysis of each work in terms of its historical context and internal structure as well as its treatment of the nature of inquiry and discovery.

HON 290 Honors Special Topics - History 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in History, interdisciplinary in character and often team-taught.

HON 291 Honors Special Topics-Mathematics 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in mathematics, interdisciplinary in character and often team-taught.

HON 292 Honors Special Topics-Natural Sciences 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in the natural sciences, interdisciplinary in character and often team-taught.

HON 293 Honors Special Topics-Literature 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in history or literature, interdisciplinary in character, and often team-taught.

HON 294 Honors Special Topics-Philosophy or Religion 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in philosophy, religion, or arts, interdisciplinary in character, and often team-taught.

HON 295 Honors Special Topics-Social Science 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in the social sciences, interdisciplinary in character, and often team-taught.

HON 296 Honors Special Topics-Science, Technology, Society-H&S Perspective 3. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in Science, Technology and Society (humanistic perspective) interdisciplinary in character and often team-taught.
HON 297 Honors Special Topics - Science, Technology, Society - Natural Sciences. Offered in Fall and Spring. Seminar for University Honors Program students. Repeatable if content varies. GER requirements in Science, Technology and Society (natural science perspective) interdisciplinary in character and often team-taught.

HON 298 Honors Research/Independent Study 1-3. Offered in Fall Spring Summer. Research/independent Study for University Honors Program students. Repeatable if content varies. Research or independent study under supervision of faculty members. Project approval by the Honors Program Advisory Committee necessary prior to registration. Permission of the University Honors Program required.

HON 299 Honors Special Topics - Visual and Performing Arts. Offered in Fall and Spring. Seminar for University Honors Program students, repeatable if content varies, meeting GER requirements in Visual and Performing Arts, interdisciplinary in character and often team-taught.

HON 300 The Creative Process in Science: Realities, Comparisons, and Culture Perceptions. Offered in Fall and Spring. What is creativity in the context of the sciences? How does the creative process in science differ from and how is it similar to the creative process in other fields? This interdisciplinary perspective helps students to develop an understanding of scientific creativity through readings in history and philosophy of science, in the psychology of creativity, in original scientific papers, in biography and in memoirs. Student will analyze representations of scientific creativity in films and literature, conduct interviews with scientists, artists, musicians, and humanists, and analyze the social and institutional context of creativity.

HON 312 Music and the Science of Sound. Offered in Fall Only. This course investigates music using the science of sound, from the earliest experiments on vibrating strings to digital recording and MP3s, and the parallel development of music and scientific thought in western cultures. Concepts will be explained in simple mathematical and non-mathematical terms and developed in an historical perspective. Students will build instruments based upon what they have learned in the course. This course is suitable for both science and non-science students. University Honors Program student or permission of the UHP.

HON 341 Time Travel. Offered in Spring Only. A study of contemporary metaphysics organized around the topic of time travel. David Lewis, perhaps the foremost contemporary metaphysician, argues that time travel is possible. His argument is based on ingenious positions about three central topics of metaphysics, personal-identity, causation, and free will. Students will consider each of these topics in some detail, always with an eye to their implications for time travel.

HON 342 Issues in Contemporary Religion. Offered in Spring Only. An examination of major issues in contemporary religious thought, with particular attention to how theologians have reshaped traditional theological concepts in response to 20th-21st century challenges. After considering the academic study of religion and addressing the methodological issues of the nature of religious language and the task of theology, the course will examine the impact of recent historical and cultural developments on the formulation of theological proposals and the role religion plays in shaping societal attitudes and mores.

HON 343 Philosophical Ethics. Offered in Fall Only. An introduction to some of the main concepts and theories in the field of ethics. This course explores answers to the most basic questions of ethics: How can we tell right from wrong and good from bad? What is it to be a good person? What does "making the world a better place" amount to? The course will examine how philosophers have answered these questions in the past and consider how their answers might be relevant to contemporary ethical dilemmas. University Honor Program Students or permission of UHP.

HON 351 American Ideals in Global Perspective. Offered in Fall Only. This course will examine core American ideals, how they evolved, what differentiates them from competing ideologies, and the extent to which they are transferable to countries with very different cultures, histories, and levels of economic development. It will also critically enquire about the extent to which the United States has been achieving its ideals and how successful it has been in promoting these values globally.

HON 361 Eco-Realism: Human Nature, Politics, and Ecological Constraints. Offered in Fall Only. This course explores the relationship between information technology and society, probing complex issues such as information overload, the digital divide, information ethics, indeterminate authority, and the open access movement. As we explore specific information technologies, students will also have the opportunity to develop greater expertise in locating, evaluating, and using information. University Honors Program student or permission of the UHP.

HON 371 Environmental Science and Technology. Offered in Spring Only. This seminar explores deeply advanced topics in contemporary environmental science and considers and evaluates the potential solutions to the challenges they pose. The seminar is based on readings from multiple perspectives of these real-world challenges with an emphasis on those occurring in North Carolina. The seminar is interdisciplinary, so political, economic, and ethical aspects are addressed. University Honors Program student or permission of the UHP.

HON 391 Music and Social Life. Offered in Spring Only. At NC State and in the Triangle people are actively engaged in music-making, dancing, devotional practices, and a multitude of other kinds of artful performance. Students in this class think about the relationship between music and other aspects of social life by doing field research to answer questions about creativity, listening, performance, and the ways music and dance shape social life, values, and ideas about difference. Students consider modes of research about music and learn techniques for doing ethnographic research. Must be a University Honors Program student or have permission of the UHP.

HON 395 Honors Cooperative Education. Offered in Fall and Spring. Experimental work in government or industry for Honors Program students with two semesters completed in Honors. Typically students work 40 hrs/week with salary. Work supervisor, faculty adviser and Honors Program Director must sign HON 395 Honors Cooperative Ed contract. NC State cooperative Education requires paper work; student must pay fee rate for a 0-5 credit hour course. No other courses permitted along with HON 395. Student report of the independent project is required.

HON 397 Honors Extension and Engagement. Offered in Fall Spring Summer. Opportunity for significant hands-on involvement in extension and engagement research/project as mentored by NC County
Extension employees often in cooperation with community employers/executives, local and government officials, and county citizens. Approved plan of work required with significant independent research/project including a reflective journal, a final paper and presentation at the NC State Undergraduate Research Symposium or a venue appropriate to the discipline. Students must provide their own transportation.

HON 398 Honors Special Topics 1-6. Offered in Fall Spring Summer. A seminar or other learning experience within an academic framework that may be on- or off-campus. Enables the development of new HON courses outside the GER list.

HON 496 Honors Capstone Seminar 3. Offered in Fall and Spring. Honors Seminars open to Juniors and Seniors in all disciplinary Honors Programs, and others with permission of the University Honors Program. Repeatable if content differs. A series of seminars with differing subjects, interdisciplinary in character and sometimes team-taught, allowing advanced students to explore topics from a multidisciplinary perspective and to apply their knowledge to issues and problems in the present world. Permission of the University Honors Program.

HON 498 Honors Research/Creative Project 1 3. Offered in Fall Spring Summer. Opportunity for hands-on faculty mentored research/creative project. Course may be stand-alone project completed in one semester/summer, or serve as part of a two semester project that is completed at the end of Honors Research/Creative Project 2 (HON 499). Approved plan of work required with significant independent research/creative project culminating with final paper and presentation at the NC State Undergraduate Research Symposium or other venues appropriate to the discipline. Research within or outside the student's discipline may fulfill experience.

HON 499 Honors Research/Creative Project 2 3. Offered in Fall Spring Summer. Opportunity for hands-on faculty mentored research/creative project. Course may be stand-alone project completed in one semester/summer, or serve as part of a two semester project that is completed at the end of Honors Research/Creative Project 1 (HON 498) or approved disciplinary research experience. Approved plan of work required with significant independent research/creative project culminating with final paper and presentation at the NC State Undergraduate Research Symposium or other venues appropriate to the discipline. Research within or outside the student's discipline may fulfill experience.

HORTICULTURE SCIENCE

HS 100 Home Horticulture 3. Offered in Fall and Spring. Introduction and review of home horticulture as it relates to the horticultural enthusiast. A general understanding of plant growth, structure, and development; house plant selection and care, selecting trees, shrubs, and flowers for the home landscape, and other related topics.

HS 201 Principles of Horticulture 3. Offered in Fall and Spring. Principles of plant growth and development relating to production and utilization of fruit, vegetable, floricultural, and ornamental crops. Historical, economic, and global importance of horticultural crops and services.

HS 203 Home Planet Propagation 3. Offered in Spring Only. Not for Horticultural Science Majors (SH, THG, THL). Substitution of HS 203 for HS 301 are not allowed. An introduction to the basic principles of sexual and asexual plant propagation, including seeds, cuttings, layering, Grafting, and Division.

HS 211 Ornamental Plants 1 3. Offered in Fall Only. Prerequisite: BIO 181. Identification, distribution, growth, characteristics, adaptation, and usage of ornamental plants. Emphasizes bedding plants, trees, and gymnosperms.

HS 212 Ornamental Plants II 3. Offered in Spring Only. Prerequisite: BIO 181. Identification, distribution, growth, characteristics, adaptation, and usage of ornamental plants. Emphasizes shrubs, ground covers, vines, bulbs, and interior landscape plants.

HS 215 Basic Agricultural Genetics 3. Offered in Fall Only. Prerequisite: ZO 160 or BIO 183. Basic principles of inheritance in plants and animals of agricultural significance. Transmission genetics and its effects on the usefulness of plants and animals. Basic principles of plant and animal improvement.

HS 250 Home Landscape Design 3. Offered in Summer. Home landscape design is a 3-credit hour course for non-landscape design majors. Students will be introduced to the various issues associated with landscape design at the residential level. Through a series of Power Point lectures, on-line discussions, and small projects/exercises, students will gain an understanding of landscape graphics. Skills in design, and develop landscape plans and other forms of landscape graphics. Students will use all of their learned skills to develop a design for a given site using provided design software.

HS 252 Landscape Graphic Communication 3. Offered in Spring Only. Visualization of the entire design process, from conception to presentation drawings. A complete graphic vocabulary (concepts, techniques, and drawing styles) will be covered, providing the designer with an effective means of communicating design ideas, to her/himself, other professionals, clients, and the public.

HS 290 Perspectives in Horticultural Science 1. Offered in Fall Only. Introduction and orientation to programs in horticultural science. Discussion of current status of horticulture, extension and research. Emphasis on undergraduate program management, internships, graduate education, and career planning. Guest lectures, career opportunities and qualifications for employment in horticulture and related fields.

HS 301 Plant Propagation 4. Offered in Fall Only. Prerequisite: BIO 181 or BO 200. Theoretical basis and techniques for successful asexual and sexual propagation of seed plants and ferns. Influence of heredity, phytopathological infection, and environmental conditions on success and quality of propagules. Recent developments and innovations in propagation techniques and methodologies.

HS 302 Gardening with Herbaceous Perennials 3. Offered in Spring Only. Prerequisite: BIO 183 or BO 200. Examination of the use of herbaceous perennials in the home garden and commercial landscapes. Topics include: general plant characteristics, culture and management, garden attributes, design usage, horticultural history, propagation, use of exotic (nonnative) species in the garden, heirloom roses and ornamental grasses.

HS 342 Landscape Horticulture 3. Offered in Fall and Spring. Introduction to comprehensive process for small scale landscape projects. Includes garden history, social and environmental analysis, creative problem solving process and the practice of oral, written and graphic communication.

HS 357 Site Design and Construction Materials 4. Offered in Fall and Spring. Prerequisite: Landscape Horticulture (11HORTTHL) students, HS 252 and HS 342. Site design of small scale landscape
design projects including: understanding two-dimensional and three-dimensional representation of landform, landform manipulation, surveying and measuring, base map development, site analysis, grading and drainage plans, small circulation systems (pedestrian and vehicular), pavement, functional role of plants, designing site structures (steps, ramps, walls, and fences), documenting and analyzing user information, and special population site requirements. Exploration of appropriate construction materials and their properties occurs concurrently with the above topics. Field trips will be required.

HS 371 Interior Plantscapes 3. Offered in Spring Only. Prerequisite: BIO 181 or BO 200, second semester Sophomore standing. Identification, selection, installation, utilization, and maintenance of plants commonly used in commercial interior settings.

HS 400 Residential Landscaping 6. Offered in Fall and Spring. Prerequisite: HS 211, 212, 342, LAR 430. Corequisite: LAR 457. Equips students with the necessary skills to create functional, aesthetic, and humanistic designs for residential and other small scale projects. Aspects of problem identification, project organization, design, execution, and evaluation. Required field trip with fee.

HS 401 Landscape Construction Studio 6. Offered in Spring Only. Prerequisite: THL Majors, HS 357, 400. Small scale landscape design with a concentrated focus on detail design and construction documentation. Development of skills in designing, drawing, and building landscape features. Opportunities for hands-on experiences.

HS 411 Nursery Management 3. Offered in Fall Only. Prerequisite: BIO 181, SSC 200, Junior standing. Principles and practices of production, management, and marketing of field-grown and container-grown nursery plants. One of three scheduled weekend field trips required at students' expense.

HS 416 Principles of Ornamental Planting Design 4. Offered in Fall and Spring. Prerequisite: Landscape Horticulture (11HORTTHL) concentration, HS 400. Developing and cultivating a design process for creating meaningful and compelling ornamental planting designs through the study and practice of spatial articulation (form, enclosure, permeability), physical properties of plants (line, form, texture, color), client/site analysis and program development, visual journaling, garden narrative, presentation skills, utilizing principles of visual composition, design communication, and understanding and resolving technical and horticultural issues in contemporary planting design.

HS 421 Physiology and Culture of Temperate-Zone Tree Fruits 3. Offered in Fall Only. Prerequisite: BIO 181 or BO 200. Physiology and culture of the major temperate-zone tree fruit and nut crops of the United States. Fundamental principles underlying woody plant growth as applied to the culture of specific tree-fruit crops with emphasis on crops of commercial importance to North Carolina.

HS 422 Small Fruit Production 3. Prerequisite: BIO 181, SSC 200. HS 201. Importance and economic value of blackberries, blueberries, cranberries, grapes, raspberries, strawberries and minor small fruit crops in the agricultural economy of the USA and the world. Cultural requirements of these crops and manipulation of their known morphological and physiological traits for successful production. Six all afternoon field trips are required.

HS 431 Vegetable Production 4. Offered in Fall Only. Prerequisite: BIO 181, SSC 200. Principles and practices of production and marketing of seventeen vegetable crops grown in the U.S. Additional topics include pest management, seed technology, food safety, sustainable agriculture, use of genetically engineered crops, and consumer issues.

HS 432 Introduction to Permaculture 3. Offered in Fall and Spring. Permaculture means "permanent culture," or "permanent agriculture") and "is the conscious design and maintenance of cultivated ecosystems that have the diversity, stability, and resilience of a natural ecosystem." (Bill Mollison) This course will explore, through lectures, discussions, field trips, and required projects, a design/thinking methodology that seeks to profit for our physical needs, food, water, shelter, energy, etc., while doing so in an environmentally friendly, sustainable manner. The Saturday field trips and the weekend mountain trip are all optional.

HS 440 Greenhouse Management 3. Offered in Fall Only. Prerequisite: SSC 200 and HS 201. Perspective of greenhouse systems management. Selection of greenhouse site, construction, heating, cooling and production systems. Emphasis on greenhouse operations, cost accounting and analysis. Other topics; root substrates, sanitation, water, fertilization, chemical growth regulation, temperature, light and marketing. Hands-on experience in greenhouse operations plus trips to commercial greenhouses and markets.

HS 442 Production of Floricultural Crops 3. Offered in Spring Only. Prerequisite: SSC 200, HS 201. Production of floricultural crops. Emphasis on environmental manipulation and scheduling of crop growth and development for targeted market periods. Specific flowering crops as models to demonstrate potted flowering plant, cut flower, and bedding plant production systems. Hands-on crop production experience plus field trips to commercial floriculture production and marketing facilities.

HS 451 Plant Nutrition 3. Offered in Spring Only. Prerequisite: SSC 200. An understanding of the basic mineral nutrient requirements, nutritional monitoring procedures, and fertilizer application methods in horticultural production systems including those for fruits, field vegetables, fruits and vegetables under plasticulture, nursery crops, landscapes, greenhouse flowers and vegetables, interior plantscapes, hydroponics, and organic farming.

HS 462 Postharvest Physiology 3. Offered in Spring Only. Prerequisite: PB 421. Preharvest and postharvest factors that affect market quality of horticultural commodities with an emphasis on technologies to preserve postharvest quality and extend storage life of fruits, vegetables and ornamentals.


HS 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

HS 493 Special Problems in Horticultural Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

HS 495 Special Topics in Horticultural Science 1-6. Offered in Fall Spring Summer. Independent study under faculty supervision of
Introduction to the fundamentals of product development and design with emphasis on analytical and intuitive approaches to problem solving, technical skills, manufacturing and structural considerations in design of simple products/systems.

**ID 201 Basic Industrial Design Studio I** 6. Offered in Fall Only. Prerequisite: Design Majors, DF 102, Corequisite: ID 255, ID 318. Introduction to the theories, methods, and language of industrial design; elementary problems in form and function; transitional implications of hand-crafted and mass-produced objects, in various materials.

**ID 202 Basic Industrial Design Studio II** 6. Offered in Spring Only. Prerequisite: Design Majors, ID 201, Corequisite: ID 256, ID 418, ID 418L. Introduction to the fundamentals of product development and design with emphasis on analytical and intuitive approaches to problem solving, technical skills, manufacturing and structural considerations in design of simple products/systems.

**ID 215 Introduction to digital Techniques** 3. Offered in Fall Only. Introduction to the computer as a design tool for generating and manipulation of two-dimensional raster and vector imagery; techniques in two-dimensional concept rendering; desktop publishing applications for design and production of presentation documentation; and visual editors for creating and managing web sites.


**ID 256 Contemporary Manufacturing Processes II** 3. Offered in Spring Only. Second course in mass production processes and their influences on design. Emphasis on material search and process selection in relation to form, function, human factors, finishes, and joining methods. Plastics and rubber and their specific manufacturing processes utilized in mass production.

**ID 262 Professional Practice in Industrial Design** 3. Offered in Spring Only. Issues and situations encountered in a design practice. Topics include patents, trademarks, contracts, basic marketing skills within corporations and in free-lance design.

**ID 292 Special Topics in Industrial Design** 1-3. Offered in Fall Spring Summer. Topics of current interest in Industrial Design. Normally used to develop new courses.

**ID 300 Intermediate Industrial Design Digital Studio Series** 6. Offered in Fall Spring Summer. Prerequisite: Design Majors, ID 202, ID 315, Corequisite: ID 415. Individual and team-oriented design experiences that expand upon and combine intellectual and manual skills required for the practice of industrial design. Emphasis on identifying and solving design problems through manipulation of design theory, application of human factors, product safety awareness, universal design principles, ecological/environmental concerns, appropriate combination of materials and manufacturing techniques, and presentation of concepts. Extensive integration of computertechnology, including 3-D digital modeling, rapid prototyping, interactive virtual product visualization, and world wide web-based presentation.

**ID 315 Digital Product Modeling** 3. Offered in Spring Only. Prerequisite: Design Majors, ID 215. Progression of digital experiences that expand upon and combine the intellectual and conceptual skills required for 3-dimensional design visualization. Emphasis on solving design problems through development and manipulation of 3-dimensional form within the virtual environment.

**ID 318 Ideation I** 3. The ideation process of conceiving, developing and recording ideas two-dimensionally. These techniques defined and practiced as an extension of understanding the human idea motor process.

**ID 400 Advanced Industrial Design Studio Series** 6. Offered in Fall Spring Summer. Prerequisite: Industrial Design Majors, ID 300. A series of advanced studio experiences that expands upon and combines intellectual and manual skills required for the practice of industrial design. Emphasis on identifying and solving design problems through manipulation of design theory, application of human factors, product safety awareness, appropriate combination of materials and manufacturing techniques, and presentation of concepts.

**ID 415 Advanced Digital Product Modeling** 3. Offered in Fall and Summer. Prerequisite: Design Majors, ID 215, ID 315. Advanced concepts for planning and executing efficient workflow practices for manufacturable product surfaces. Emphasis on theory and application.
of three-dimensional surface modeling tools, accurate development of wire frame geometry, rapid prototyping and animation techniques. Introduction of animations to aid with dynamic visual analysis of digital product design concepts.

ID 418 Ideation II 3. Offered in Spring Only. This is an advanced course which expands the ideation process with greater emphasis directed toward the creative development and recording of conceptual design phase.

ID 445 Human-Centered Design 3. Offered in Fall Only. Introduction to the spectrum of human physical and cognitive capabilities as they relate to user interaction with designed products and environments.

ID 490 Industrial Design International Studio 6. Offered in Fall Spring Summer. Define industrial design problems and develop design solutions in an international setting. Studio projects related to design, culture, and traditional and contemporary limited and mass produced products. Focus on artifact making through directed studies.

ID 492 Special Topics in Industrial Design 1-3. Offered in Fall Spring Summer. Topics of current interest in Industrial Design. Normally used to develop new courses.

ID 494 Internship in Industrial Design 1-6. Offered in Fall Spring Summer. Supervised field experience in product design offices, galleries, museums and other related organizations. Maximum of 6 credit hours.

ID 495 Independent Study in Industrial Design 1-3. Offered in Fall and Spring. Special projects in industrial design developed under the direction of a faculty member on a tutorial basis. Maximum 6 credit hours - May be repeated.

INTERDISCIPLINARY STUDIES


IDS 201 Environmental Ethics 3. Offered in Fall and Spring. Interdisciplinary consideration of ways in which field of study coupled with personal/cultural values contribute towards either solving or compounding environmental problems; provides framework for process of making ethical decisions.

IDS 211 Eating through American History 3. Examination of cultural and scientific forces that have shaped our relationship with food. Science and politics of dietary recommendations. Influence, over time, of economic, social and political conditions on food preparation, preference and nutritional knowledge. Role of religion, family, tradition and personal experience in shaping eating attitudes and behaviors. Roles played only by women in American food culture.

IDS 220 Coastal and Ocean Frontiers 3. Offered in Fall Only. Interdisciplinary approach to current issues, scientific concepts, management strategies and future trends concerning the coasts and the oceans. Required weekend field trip.

IDS 260 Changing Paradigms of Leadership, Learning, and Service 4. Offered in Fall and Spring. Interdisciplinary examination of leadership, learning, and service-and their inter-relatedness-in light of the evolving scientific worldview of western civilization. Service-learning enhanced seminar supports students in connecting course material and community-based experiences to their personal lives and their roles as citizens. Peer-led reflection sessions, seminars with guests, field-trips, and other enhancement opportunities during required weekly two-hour learning lab; service hours scheduled by students. Serves as training course for students interested in leadership roles in service-learning and civic engagement at NCSU.

IDS 295 Special Topics in Interdisciplinary Studies 1-99. Offered in Fall Spring Summer. Detailed investigation of an interdisciplinary topic. Topic and mode of study to be determined by faculty member and/or teach team.

IDS 303 Humans and the Environment 3. Interactions among human populations in the biophysical system and the environment. Emphasis on current issues, ecological principles and their relationships to basic biophysical processes; considers food, population dynamics, public land and common resources, renewable natural resources, pollution, water resources, energy and non-renewable resources.

IDS 305 Peace in the Global Village 3. Offered in Fall Only. Examination of peace in multidisciplinary terms- anthropological, psychological, political, philosophical, environmental and religious; consideration of human propensity for cooperation as well as aggressiveness; dialogue-lectures, case studies, workshops and round table presentations on past and present human groupings that succeeded in attaining peace; possibilities for peace in the future.

IDS 401 The Contemporary City: Problems and Prospects 3. Offered in Spring Only. Interdisciplinary examination of the social and physical characteristics of the contemporary city and problems which cities face. Topics include urban design, social relationships, education, transportation, crime and violence, and urban psychology. Alternative solutions to various urban problems examined.


IDS 415 Peruvian Amazon Ecology and Ethnology 2. Offered in Summer. A field/lecture course, located on the Amazon, near Iquitos, Peru, is presented by a team of scientists and specialists in ornithology, ecology, entomology, and anthropology. Coursework is divided into pre-trip readings, onsite field experiences and lectures; and post-trip reflection and application. This course is designed for, but not restricted to precollege teachers and informal educator, e.g., in museums and parks, as a general introduction to tropical systems. Additional travel and trip costs are required beyond registration fees as well as appropriate immunization.

IDS 490 Interdisciplinary Methods and Issues 3. Offered in Fall and Spring. Capstone seminar for students in the IDS self-design major. Intensive study of student's area of concentration, leading to a major research paper.

IDS 495 Special Topics in Interdisciplinary Studies 1-99. Offered in Fall and Spring. Examination of selected topics of an interdisciplinary nature.
IDS 496 Topics in Film and Interdisciplinary Studies 3. Detailed examination of film within interdisciplinary contexts. Specific topics will vary from semester to semester.

IDS 498 Independent Study in Interdisciplinary Studies 1-99. Offered in Fall and Spring. Independent investigation and discussion of a selected topic of an interdisciplinary nature.

INTERNATIONAL STUDIES

IS 393 International Affairs Seminar 3. Offered in Fall Only. An interdisciplinary study of various aspects of globalization, with an emphasis on the interaction between local communities and global forces and how the two shape each other at the level of human rights, ethnic relations, states, human migrations, the environment, cultures and languages, and health.

IS 491 Senior Seminar in International Studies 3. Offered in Spring Only. Prerequisite: IS 393. An intensive study of selected international issues, global dimensions and implications, leading to a major research paper.

INDUSTRIAL AND SYSTEMS ENGINEERING

ISE 110 Computer-Based Modeling for Engineers 3. Offered in Fall and Spring. Prerequisite: E 115, Corequisite: MA 141. Introductory course in computer-based modeling and programming using Visual Basic for Applications. Emphasis on algorithm development and engineering problem solving. Methodical development of VBA within applications like Microsoft Excel and Access from specifications; documentation; style; control structures; classes and methods; data types and data abstraction; object-oriented programming and design; graphical user interface design. Projects: design problems from electrical, industrial, textile, and financial systems. Functional relationships will be given and programs will be designed and developed from a list of specifications.

ISE 210 Introductory Engineering Graphics for Industrial Engineering 3. Offered in Fall and Spring. Prerequisite: E 115. Introduction to the graphical representation and solution of 2D and 3D spatial problems. Conventional methods using computer-based tools to graphically describe 2D and 3D objects relevant to the field of IE. Overview of the fundamentals and applications of computer graphics and computer-aided design. Includes practical IE drawing applications.

ISE 216 Manufacturing Engineering Practicum 3. Offered in Fall and Spring. Prerequisite: C or better in ISE 110, Corequisite: ISE/GC 210. Hands-on experimention for students to learn the capabilities and limitations of basic manufacturing processes. Relationships between product design, quality, manufacturing planning, computer simulation, material handling systems, time and motion studies, and ergonomics.


ISE 316 Manufacturing Engineering I - Processes 3. Offered in Fall and Spring. Prerequisite: MSE 200; ISE 216; ISE/GC 210. Analytical study and design of manufacturing engineering with emphasis on mfg. and processes. Addresses the interaction of design, materials, and processing. Laboratory instruction and hands-on experience in metrology, machining, process planning, economic justification, and current mfg. methodologies.


ISE 331 Furniture Manufacturing Processes I 3. Prerequisite: ISE 330. Furniture manufacturing technology emphasizing mass production equipment capabilities and capacities. Relationship of product characteristics to machine selection and process planning activities. Introduction to computer-controlled machining and integrated manufacturing systems.

ISE 351 Manufacturing Engineering 3. Prerequisite: MSE 200 and ISE 210. Analytical study and design of manufacturing engineering and processes. Emphasis on the interaction of design, materials, and processing, on the techniques of metrology, machining, process planning, computer-aided process control, economic justification, and state-of-the-art manufacturing technologies.

ISE 352 Work Analysis and Design 3. Offered in Fall and Spring. Prerequisite: C- or better in ST 371; C or better in ISE 110. Work methods and production processes to improve operator effectiveness and reduce production costs. Techniques studied include operation analysis, motion study, value engineering, predetermined time systems, time study and line balancing.

ISE 361 Deterministic Models in Industrial Engineering 3. Offered in Fall and Spring. Prerequisite: (MA 303 or MA 341 or MA 405) and C or better in ISE 110. Introduction to mathematical modeling, analysis techniques, and solution procedures applicable to decision-making problems in a deterministic environment. Linear programming models and algorithms and associated computer codes are emphasized.

ISE 401 Stochastic Models in Industrial Engineering 3. Offered in Fall and Spring. Prerequisite: (MA 303 or MA 341 or MA 405) and C or better in ST 371 and C or better in ISE 110. Introduction to mathematical modeling, analysis, and solution procedures applicable to uncertain (stochastic) production systems. Methodologies covered include probability theory and stochastic processes. Applications relate to design and analysis of problems, capacity planning, inventory control, waiting lines, and system reliability and maintainability.

ISE 408 Control of Production and Service Systems 3. Offered in Fall and Spring. Prerequisite: ISE 361; C- or better in ST 371. Planning and control of production and service systems. Production organization flow and inventory control methods: Systems approach.

ISE 416 Manufacturing Engineering II - Automation 3. Offered in Fall and Spring. Prerequisite: ISE 316. Integration of design and mfg. through computer aided/automated process planning, concurrent engineering, and rapid prototyping. Fixed and programmable automation in mfg. and service. Autonomous mfg. systems such as...
computer numerical control (CNC), industrial robotics, automated inspection, electronics manufacturing and assembly.

**ISE 417 Manufacturing Engineering III - Computer Integrated Manufacturing** 3. Offered in Fall and Spring. Prerequisite: ISE 316 or ISE 331; C or better in ISE 110. Principles, economic justification, implementation, and performance evaluation of Computer Integrated Mfg. (CIM) systems. Fundamentals of group technology and cellular mfg. systems. Automation of information flow supporting the manufacturing operations using transaction processing via database technology. Real-time control of CIM systems including data acquisition, process control, and programmable logic controllers.

**ISE 430 Furniture Manufacturing Processes II** 3. Prerequisite: ISE 331; C or better in ISE 110. A survey of furniture manufacturing technology. Emphasis is on operations, production rates, and the integration of many types of equipment into a manufacturing system.

**ISE 431 Furniture Manufacturing Facilities Design** 3. Prerequisite: ISE 430. A survey of furniture manufacturing technology. Emphasis is on operations, production rates, and the integration of many types of equipment into a manufacturing system.

**ISE 441 Introduction to Simulation** 3. Offered in Fall and Spring. Prerequisite: MA 242, ST 372; C or better in ISE 110. Discrete-event stochastic simulation for the modeling and analysis of systems. Programming of simulation models in a simulation language. Input data analysis, variance reduction techniques, validation and verification, and analysis of simulation output. Random number generators and random variate generation.


**ISE 452 Ergonomics** 3. Offered in Fall and Spring. Prerequisite: CE 214; Corequisite: ISE 352. Worker - machine environment systems, design and evaluation; applications to consumer products tools, equipment and the workplace. Consideration of anatomical, physiological and psychological capabilities and limitations as related to systems design and human performance. Use of anthropometric data in design of display and control systems. Effects of environmental stress upon work performance, safety, and health.

**ISE 453 Production System Design** 3. Offered in Fall and Spring. Prerequisite: ISE 401. Principles and practice in design of facilities and logistics networks. Integration of supply chain design, capacity planning, facility layout, material handling, and storage and warehousing issues into overall production system design. Emphasis on economic justification of alternative designs and use of computer software to aid design process. Group projects.

**ISE 495 Project Work in Industrial Engineering** 1-6. Offered in Fall and Spring. Special investigations, study or research related to the field of industrial engineering. In a given semester several students and/or student groups may be working in widely divergent areas under the direction of several members of the faculty.

**ISE 498 Senior Design Project** 3. Offered in Fall and Spring. Prerequisite: ISE 311, ISE 408, ISE 441, ISE 453. Individual or group design projects requiring problem definition and analysis, synthesis, specification and presentation of a designed solution. Students work under faculty supervision either on actual industrial engineering problems posed by local industrial, service and governmental organization or on emerging research issues.

**LANDSCAPE ARCHITECTURE**

**LAR 102 Landscape Architecture Design Fundamentals Studio** 6. Offered in Spring Only. Introductory design studio for students in the department of Landscape Architecture. Emphasis on increasing awareness, understanding, and appreciation of the context in which we fit our human-made objects, i.e. the environment. Examination of the specific nature of places, human manipulation of natural and human-made elements, and the consequences of such manipulation. Field trips may be included with a maximum pass through charge totaling $25.00.

**LAR 200 Landscape Architecture Introductory Studio** 6. Offered in Fall Only. Prerequisite: Design Majors, LAR 102. Small scale landscape architectural design. Site observation exercises and visits, physical design projects, reading and discussion. Basic skills in landscape architecture, discerning the environmental issues in design, understanding design process, drawing and verbally communicating issues, and idea conceptualization and realization.

**LAR 210 Digital Drawing for Landscape Architecture** 3. Offered in Spring and Summer. Digital modeling and computer aided design in landscape architecture. Integration of digital data in visualization of past, existing and future designs.

**LAR 211 Digital Design Media for Landscape Architecture** 3. Offered in Fall and Summer. Principles and practices related to the use of digital applications in landscape architectural design. Includes two-dimensional raster imaging, vector graphics, photo simulation, and three-dimensional modeling.

**LAR 221 Introduction to Environment and Behavior for Designers** 3. Offered in Fall Only. Integration of behavioral and environmental systems related to design. Exploration of humane, ecologically sound design alternatives.

**LAR 222 Perception and Behavior for Designers** 3. Offered in Spring Only. Perceptual systems, linkages among them, and linkages between them and language and culture as these affect the design process.

**LAR 292 Special Topics in Landscape Architecture** 1-3. Offered in Fall Spring Summer. Topics of current interest in Landscape Architecture. Normally used to develop new courses.

**LAR 400 Landscape Architecture Studio** 6. Offered in Fall and Spring. Prerequisite: DF 102. Projects cover small scale design, urban landscapes, community design, and environmental management. Design process stressed, including attention to project organization, design synthesis and realization.

**LAR 421 Environmental Cognition for Designers** 3. Offered in Fall Only. Basic cognitive theory as a framework for exploration of cognitive imagery; images of self; and developmental images of home, school, neighborhood, and city.

**LAR 423 Concepts of Space** 3. The role of space and its representation in design is considered against an overview of concepts of space drawn from psychology, anthropology, mathematics, art history, and philosophy.
LAT 101 Elementary Latin I 3. Offered in Fall Only. Beginning course in Classical Latin, emphasizing elementary grammatical form and basic syntax. Readings based on brief selections from Roman authors, including Cicero and Catullus.

LAT 102 Elementary Latin II 3. Offered in Spring Only. Continuation of Latin 101. Completion of the study of elementary grammar. Readings from a variety of Latin authors, including texts on mythological themes.

LAT 201 Intermediate Latin I 3. Offered in Fall Only. Prerequisite: LAT 102. Introduction to Latin prose and poetry. Emphasis on increased reading skill. Review of grammar fundamentals and exposure to new and more complex syntax. Examination of cultural significance of readings.


LAT 310 Classical Mythology 3. Offered in Fall Only. Greek and Roman mythology through the writings and art of the Classical period. Discussion of creation stories, the major gods and heroes, the underworld and afterlife. Intellectual religious and educational role of myth and of the most important theories of interpretation and classification. All readings and discussion in English.


LOG 335 Symbolic Logic 3. Prerequisite: LOG 201 or MA 225. Introduction to modern symbolic logic; the concept of proof, mathematical induction, recursion and the relationship between formal and informal theories (examples: group theory, Peano arithmetic). The Gödel Theorems and the mathematical study of logic.

LOG 435 Advanced Logic & Metamathematics 3. Offered in Spring Only. Prerequisite: LOG 335. Advanced topics in logic and metamathematics: proof procedures, first-order theories, soundness and completeness theorems, recursive functions, the formalization of arithmetic, the Gödel Incompleteness Theorems. Emphasis on mathematical study of logic and mathematics. Students cannot receive credit for both LOG 435 and LOG 535.

LOG 437 Model Theoretic Semantics 3. Offered in Spring Only. One of the following courses: MA/LOG 335, LOG 435, MA 403, MA 407, MA 408, MA 410, MA/CSC 416, MA 421, MA 425, MA 426, CSC 333, CSC 411, CSC 417. This course is an introduction to the fundamental concepts and methods of model-theoretic semantics and its applications in logic, foundations of mathematics, philosophy, and computer science. Credit will not be given for both LOG 437 and LOG 537.

LOG 498 Special Topics in Logic 1-6. Offered in Fall Spring Summer. Prerequisite: One of the following: (MA/LOG 335, LOG 435, LOG 437, MA 403, MA 407, MA 408, MA 410, MA/CSC 416, MA 421, MA 425, MA 426, CSC 333, CSC 411, or CSC 417). Detailed investigation of selected topics in logic. Topics determined in consultation with head of the department. Course may be used for individualized study. Students cannot receive credit for both LOG 498 and LOG 598 unless the topic is different.
LEADERSHIP PUBLIC SECTOR

LPS 200 Introduction to Public Leadership 3. Offered in Fall Only. This introductory course is designed for students who are interested in exploring public sector leadership. It starts with acquainting how to conduct adequate academic research for studying leadership. Covering fundamental concepts and assumptions of leadership, it will focus on necessary skills and approaches for good public and non-profit sector leadership. The course will also address contemporary e-government practices and the role of information technology in the public sector.

LPS 201 The Humanitarian Response to Conflict 3. Offered in Fall Only. LPS 201 offers up an introduction to the ideals and paradigms of humanitarian intervention, with a special emphasis on military responses to humanitarian crises. This course explores the history, animating ideals and contemporary paradigms of humanitarian action and related military interventions. Throughout history and ever increasingly in the present, there is an intersection between military and humanitarian operations in conflict zones.

LPS 400 Advanced Military Leadership Theory 3. Offered in Fall Only. Advanced Military Leadership Theory (AMLT) is a challenging course that will study, practice, and apply the fundamentals of leadership, values and ethics, personal development, decision-making, influencing and motivating others and team tactics in problem solving and mission accomplishment. Especially military officers enrolled in the LPS program will gain immediate benefit from the leadership self-assessments and new leadership strategies.

LPS 425 Leadership in the Public & Nonprofit Sectors Capstone 3. Offered in Spring Only. Prerequisite: LPS Majors need to have passed LPS 200. Leadership is a critical topic in public, nonprofit, and business administration. Leadership is what we expect of U.S. presidents, association directors, and CEOs, as well as of mid-level and frontline supervisors. Clearly, leaders are awarded the accolades when the organization succeeds and given the blame for its failures. But organizations succeed not just because of the top leader's actions; a positive leadership climate that pervades the organization helps it to learn, adapt, and perform at a high level. Only LPS major students must complete LPS 200 Introduction to Public Leadership course prior to enrolling in LPS 425.

MANAGEMENT

M 100 Professionalism, Diversity, and Academic Success in Management 1. Offered in Fall and Spring. Introduction to expectations and opportunities in the College of Management. Overview of curricula, academic requirements, and career opportunities in business administration, accounting, and economics. Discussion of expectations for academics and career success including professionalism, diversity, and inclusiveness. Overview resources and support services.

M 110 Microcomputer Applications for Management 2. Offered in Fall Spring Summer. Use of computers in management. Developing facility with using word processing, spreadsheet, and presentation software for solving management problems. Preparation for use of software tools in subsequent management courses. Substitutes for passing required test of proficiency with software applications. Credit for this course not allowed toward degrees in the College of Management.

MATHEMATICS

MA 100 Precalculus by Self Study 3. Directed self study of precalculus topics to prepare students for a Mathematics Level II C Achievement Test in order to qualify for placement into the appropriate calculus course at NC STATE. Enrollment is limited to students who have not received credit for a calculus course or higher at NC State.

MA 101 Intermediate Algebra 4. Offered in Fall Spring Summer. Preparation for MA 103, MA 105, MA 107, MA 111, and MA 114. Reviews main topics from high school Algebra I and Algebra II emphasizing functions and problem solving. Other concepts and skills covered include algebraic operations, factoring, linear equations, graphs, exponents, radicals, complex numbers, quadratic equations, radical equations, inequalities, systems of equations, compound inequalities, absolute value in equations and inequalities. MA 101 may not be counted as credit toward meeting graduation. Credit for MA 101 is not allowed if student has prior credit in any other mathematical course.

MA 103 Topics in Contemporary Mathematics 3. Offered in Spring Only. Prerequisite: MA 101 or equivalent completed in high school. Primarily for students in Humanities and Social Sciences. Illustrations of contemporary uses of mathematics, varying from semester to semester, frequently including sets and logic, counting procedures, probability, modular arithmetic, and game theory.

MA 105 Mathematics of Finance 3. Offered in Fall Spring Summer. Prerequisite: MA 101 or equivalent completed in high school. Simple and compound interest, annuities and their application to amortization and sinking fund problems, installment buying, calculation of premiums of life annuities and life insurance.

MA 107 Precalculus I 3. Offered in Fall Spring Summer. Prerequisite: C- or better in MA 101, or a 450 or better on the SAT Subject Test in Mathematics Level 2 or the NCSU Math Skills Test. Algebra and basic trigonometry; polynomial, rational, exponential, logarithmic and trigonometric functions and their graphs. Credit for MA 107 does not count toward graduation for students in Engineering, PAMS, Design, Bio and Ag Engineering (Science Program), Bio Sci (all options), Math Edu, Sci Edu, Textiles, College of Management, and B.S. degrees in CHASS. Credit is not allowed for both MA 107 and MA 111.

MA 108 Precalculus II 3. Offered in Fall Spring Summer. Prerequisite: C- or better in MA 107. Algebra, analytic geometry and trigonometry; inequalities, conic sections, complex numbers, sequences and series, solving triangles, polar coordinates, and applications. Credit for MA 108 does not count toward graduation for students in Engineering, PAMS, Design, Bio and Ag Engineering (Science Program), Bio Sci (all options), Math Edu, Sci Edu, Textiles, College of Management, and B.S. degrees in CHASS. Credit is not allowed for both MA 108 and MA 111. Also, MA 108 should not be counted toward the GER mathematical sciences.

MA 111 Precalculus Algebra and Trigonometry 3. Prerequisite: C- or better in MA 101, or 480 or better on the SAT Subject Test in Mathematics Level 2 or the NCSU Math Skills Test. Real numbers, functions and their graphs (special attention to polynomial, rational, exponential, logarithmic, and trigonometric functions), analytic trigonometry. Credit in MA 111 does not count toward graduation for students in Engr., Physical & Math. Sci., Design, Biological & Ag. Engr. (Science Program), Biological Sci.(all options),Math. Edu., Forestry, & Textiles. Credit is not allowed for both MA 111 and either MA 107 or MA 108.
MA 114 Introduction to Finite Mathematics with Applications 3. Offered in Fall Spring Summer. Prerequisite: MA 101 or equivalent completed in high school. Elementary matrix algebra including arithmetic operations, inverses, and systems of equations; introduction to linear programming including simplex method; sets and counting techniques, elementary probability including conditional probability; Markov chains; applications in the behavioral, managerial and biological sciences. Computer use for completion of assignments.

MA 116 Introduction to Scientific Programming (Math) 3. Offered in Fall and Spring. Computer-based mathematical problem solving and simulation techniques using MATLAB. Emphasizes scientific programming constructs that utilize good practices in code development, including documentation and style. Covers user-defined functions, data abstractions, data visualization and appropriate use of pre-defined functions. Applications are from science and engineering. MA or AMA majors or permission of instructor.

MA 121 Elements of Calculus 3. Offered in Fall Spring Summer. Prerequisite: MA 107 or 111 with a C- or better, or 480 on the SAT Subject Test in Mathematics Level 2 or the NCSU Math Skills Test, or 2 or better on an AP Calculus exam. For students who require only a single semester of calculus. Emphasis on concepts and applications of calculus, along with basic skills. Algebra review, functions, graphs, limits, derivatives, integrals, logarithmic and exponential functions, functions of several variables, applications in management, applications in biological and social sciences. Credit is not allowed in more than one of MA 121, 131, 141. MA 121 may not be substituted for MA 131 or MA 141 as a curricular requirement.

MA 131 Calculus for Life and Management Sciences A 3. Offered in Fall Spring Summer. Prerequisite: C- or better in MA 107 or MA 111, or 520 or better on the SAT Subject Test in Mathematics Level 2 or the NCSU Math Skills Test, or 2 or better on an AP Calculus exam. First order finite difference models, derivatives - limits, power rule, graphing, and optimization; exponential and logarithmic functions - growth and decay models; integrals - computation, area, total change; applications in life, management, and social sciences. Credit not allowed for more than one of MA 121, 131, 141.

MA 132 Computational Mathematics for Life and Management Sciences 1. Offered in Spring Only. Prerequisite: C or better in MA 121 or MA 131. Computational aspects of calculus for the life and management sciences; use of spreadsheets and a computer algebra system; applications to data models, differential equation models, and optimization.

MA 141 Calculus I 4. Offered in Fall Spring Summer. Prerequisite: MA 111 or MA 108 with grade of C- or better, or 550 or better on the SAT Subject Test in Mathematics Level 2 or the NCSU Math Skills Test, or 2 or better on an AP Calculus exam. First of three semesters in a calculus sequence for science and engineering majors. Functions, graphs, limits, derivatives, rules of differentiation, definite integrals, fundamental theorem of calculus, applications of derivatives and integrals. Use of computation tools. Credit is not allowed for more than one of MA 141, 131, 121.

MA 205 Elements of Matrix Computations 3. Prerequisite: C- in MA 121, 131, or 141. Complex numbers and Euler's formula. Vectors in 2-D and 3-D, lines, planes, vector products and determinants. Vectors in n-D, matrices and matrix products. Algebraic systems, row operations, inverse matrices and LU factors. Least squares, undetermined systems and null and column spaces. Applications to linear systems of differential equations and/or to visualization and image filters. Emphasis is on by-hand computations, but it is to include applications and computing tools. Students cannot receive credit for more than one of MA 205, MA 305, or MA 405.

MA 225 Foundations of Advanced Mathematics 3. Offered in Fall and Spring. Prerequisite: MA 241. Introduction to mathematical proof with focus on properties of the real number system. Elementary symbolic logic, mathematical induction, algebra of sets, relations, functions, countability. Algebraic and completeness properties of the reals.

MA 231 Calculus for Life and Management Sciences B 3. Offered in Fall Spring Summer. Prerequisite: MA 131. Differential equations - population growth, flow processes, finance and investment models, systems; functions of several variables - partial derivatives, optimization, least squares, multiple integrals; Lagrange multiplier method - chain rule, gradient; Taylor polynomials and series; numerical methods. MA 121 is not an accepted prerequisite for MA 231.

MA 241 Calculus II 4. Offered in Fall Spring Summer. Prerequisite: MA 141 with grade of C- or better or AP Calculus credit. Second of three semesters in a calculus sequence for science and engineering majors. Techniques and applications of integration, elementary differential equations, sequences, series, power series, and Taylor's Theorem. Use of computational tools.

MA 242 Calculus III 4. Offered in Fall Spring Summer. Prerequisite: MA 241 with grade of C- or better or AP Calculus credit, or Higher Level IB credit. Third of three semesters in a calculus sequence for science and engineering majors. Vectors, vector algebra, and vector functions. Functions of several variables, partial derivatives, gradients, directional derivatives, maxima and minima. Multiple integration. Line and surface integrals, Green's Theorem, Divergence Theorems, Stokes' Theorem, and applications. Use of computational tools.

MA 293 Special Topics in Mathematics 1-6. Offered in Fall Spring Summer. Freshman-sophomore level experimental course offerings or directed individual study.


MA 303 Linear Analysis 3. Offered in Fall and Spring. Prerequisite: MA 241. Linear difference equations of first and second order, compound interest and amortization. Matrices and systems of linear equations, eigenvalues, eigenvectors, systems of difference and differential equations, transform methods, population problems. Credit not allowed if credit has been obtained for MA 301, 341 or 405.

MA 305 Elementary Linear Algebra 3. Offered in Fall Spring Summer. Prerequisite: MA 241 (with corequisite MA 242) or MA 231 and MA 132, Corequisite: MA 242 (with prerequisite MA 241). An elementary introduction to the essentials of linear algebra. Matrices and systems of linear equations, determinants, euclidean spaces as vector spaces, linear transformations of euclidean spaces, elementary treatment of eigenvalues and eigenvectors, applications to numerical solutions of equations and computer graphics. Credit is not allowed for both MA 305 and MA 405.


MA 325 Introduction to Applied Mathematics 3. Offered in Spring Only. Prerequisite: MA 231 or MA 242. Introduces students with multivariable calculus to five different areas of applied
MA 335 Symbolic Logic 3. Prerequisite: LOG 201 or MA 225. Introduction to modern symbolic logic; the concept of proof, mathematical induction, recursion and the relationship between formal and informal theories (examples: group theory, Peano arithmetic). The Godel Theorems and the mathematical study of logic.


MA 351 Introduction to Discrete Mathematical Models 3. Offered in Fall and Spring. Prerequisite: MA 224, 225, 231 or 241. Basic concepts of discrete mathematics, including graph theory, Markov chains, game theory, with emphasis on applications; problems and models from areas such as traffic flow, genetics, population growth, economics, and ecosystem analysis.

MA 401 Applied Differential Equations II 3. Offered in Fall Spring Summer. Prerequisite: MA 341 or 301. Wave, heat and Laplace equations. Solutions by separation of variables and expansion in Fourier Series or other appropriate orthogonal sets. Sturm-Liouville problems. Introduction to methods for solving some classical partial differential equations. Use of power series as a tool in solving ordinary differential equations. Credit for both MA 401 and MA 501 will not be given.

MA 402 Computational Mathematics: Models, Methods and Analysis 3. Offered in Fall Only. Prerequisite: Programming proficiency (Matlab, C++, Java, Fortran, or other language) and PY 2**. Corequisite: MA 341. Introduction to high performance computing and numerical modeling. Matrix models and boundary value problems with an emphasis on heat and mass transfer. Assessments of all approximations in the computational engineering and science analysis.

MA 403 Introduction to Modern Algebra 3. Offered in Fall Spring Summer. Prerequisite: MA 225. Sets and mappings, equivalence relations, rings, integral domains, ordered integral domains, ring of integers. Other topics selected from fields, polynomial rings, real and complex numbers, groups, permutation groups, ideals, and quotient rings. Credit is not allowed for both MA 403 and MA 407.

MA 405 Introduction to Linear Algebra and Matrices 3. Offered in Fall Spring Summer. Prerequisite: MA 241. Corequisite: MA 242. Linear equations operations with matrices, row echelon form, determinants, vector spaces, linear independence, bases, dimension, orthogonality, eigenvalues, reduction of matrices to diagonal forms, applications to differential equations and quadratic forms. Credit is not allowed for both MA 305 and MA 405.

MA 407 Introduction to Modern Algebra for Mathematics Majors 3. Prerequisite: MA 225 and MA 403. Elementary number theory, equivalence relations, groups, homomorphisms, cosets, Cayley's Theorem, symmetric groups, rings, polynomial rings, quotient fields, principal ideal domains, Euclidean domains. Credit is not allowed for both MA 403 and MA 407.

MA 408 Foundations of Euclidean Geometry 3. Offered in Fall and Spring. Corequisite: MA 403 or MA 407. An examination of Euclidean geometry from a modern perspective. The axiomatic approach with alternative possibilities explored using models.

MA 410 Theory of Numbers 3. Offered in Spring Only. Arithmetic properties of integers. Congruences, arithmetic functions, diophantine equations. Other topics chosen from quadratic residues, the quadratic reciprocity Law of Gauss, primitive roots, and algebraic number fields.

MA 412 Long-Term Actuarial Models 3. Offered in Fall Only. Prerequisite: MA 241 or MA 231. Corequisite: MA 421, BUS(ST) 350, ST 301, ST 305, ST 311, ST 361, ST 370, ST 371, ST 380 or equivalent. Long-term probability models for risk management systems. Theory and applications of compound interest, probability distributions of failure time random variables, present value models of future contingent cash flows, applications to insurance, health care, credit risk, environmental risk, consumer behavior and warranties.

MA 413 Short-Term Actuarial Models 3. Offered in Spring Only. Prerequisite: MA 241 or MA 231, and one of MA 421, ST 301, ST 305, ST 370, ST 371, ST 380, ST 421. Short-term probability models for risk management systems. Frequency distributions, loss distributions, the individual risk model, stochastic process models of solvency requirements, applications to insurance and business decisions.

MA 416 Introduction to Combinatorics 3. Offered in Spring Only. Prerequisite: MA 225 or CSC 226. Basic principles of counting: addition and multiplication principles, generating functions, recursive methods, inclusion-exclusion, pigeonhole principle; basic concepts of graph theory: graphs, digraphs, connectedness, trees; additional topics from Polla theory of counting, Ramsey theory; combinatorial optimization - matching and covering, minimum spanning trees, minimum distance, maximum flow; sieves; mobius inversion; partitions; Gaussian numbers and q-analogues; bijections and involutions; partially ordered sets.

MA 421 Introduction to Probability 3. Offered in Fall Spring Summer. Prerequisite: MA 242. Axioms of probability, conditional probability and independence, basic combinatorics, discrete and continuous random variables, joint densities and mass functions, expectation, central, limit theorem, simple stochastic processes.

MA 425 Mathematical Analysis I 3. Offered in Fall and Spring. Prerequisite: MA 225 (MA 407 desirable). Real number system, functions and limits, topology on the real line, continuity, differential and integral calculus for functions of one variable. Infinite series, uniform convergence. Credit is not allowed for both MA 425 and MA 511.

MA 426 Mathematical Analysis II 3. Offered in Spring Only. Prerequisite: MA 425 and 405. Calculus of several variables, topology in n-dimensions, limits, continuity, differentiability, implicit functions, integration. Credit is not allowed for both MA 426 and MA 511.

MA 427 Introduction to Numerical Analysis I 3. Offered in Fall Only. Prerequisite: MA 341 or 301 and programming language efficiency. Theory and practice of computational procedures including approximation of functions by interpolating polynomials, numerical differentiation and integration, and solution of ordinary differential equations including both initial value and boundary value problems. Computer applications and techniques.

MA 428 Introduction to Numerical Analysis II 3. Offered in Fall and Spring. Prerequisite: MA 405 or MA 305 and programming language proficiency. Computational procedures including direct and
undergraduate degree.

MA 430 Mathematical Models in the Physical Sciences 3. Offered in Fall Only. Prerequisite: MA 341 or 301, and MA 405. Application of mathematical techniques to topics in the physical sciences. Problems from such areas as conservative and dissipative dynamics, calculus of variations, control theory, and crystallography.

MA 432 Mathematical Models in Life and Social Sciences 3. Offered in Spring Only. Prerequisite: MA 301 or 341, 305 or 405, programming language proficiency, Corequisite: MA 421 or ST 371. Topics from differential and difference equations, probability, and matrix algebra applied to formulation and analysis of mathematical models in biological and social science (e.g., population growth).

MA 433 History of Mathematics 3. Offered in Fall and Spring. Development of mathematical thought and evolution of mathematical ideas examined in a historical setting. Biographical and historical content supplemented and reinforced by study of techniques and procedures used in earlier eras.

MA 437 Applications of Algebra 3. Offered in Spring Only. Prerequisite: MA 403 or 407, MA 405. Error correcting codes, cryptography, crystallography, enumeration techniques, exact solutions of linear equations, and block designs.

MA 440 Game Theory 3. Offered in Fall Only. Prerequisite: MA 231 or MA 242. Game Theory as a language for modeling situations involving conflict and cooperation in the social, behavioral, economic, and biological sciences. Backward induction; dominated strategies; Nash equilibria; games with incomplete information; repeated games; evolutionary dynamics.

MA 444 Problem Solving Strategies for Competitions 1. Offered in Fall Only. Analyze the most common problem-solving techniques and illustrate their use by interesting examples from past Putnam and Virginia Tech math competitions. Problem solving methods are divided into groups and taught by professors of the math department. After the lecture, students practice writing the solutions for the assignment and have informal discussions in the next class.

MA 491 Reading in Honors Mathematics 1-6. Offered in Fall and Spring. A reading (independent study) course available as an elective for students participating in the mathematics honors program.

MA 493 Special Topics in Mathematics 1-6. Offered in Fall and Spring. Directed individual study or experimental course offerings.

MA 494 Major Paper in Math 1. Offered in Fall and Spring. Corequisite: MA class at the 400-level or above. Introduces students to one or more forms of writing used in scientific and research environments. Students are required to take a companion math course at the 400-level or above, and adapt writing assignment(s) to the topics in the companion course. Instruction covers all phases of the writing process (planning, drafting, revising, and critique and other people's work). Emphasis is placed on organizing the needs of a variety of readers; concise, clear expression.

MA 499 Independent Research in Mathematics 1-6. Offered in Fall Spring Summer. Study and research in mathematics. Topics for theoretical, modeling or computational investigation. Consent of Department Head. Honors Program should enroll in MA 491H. At most 6 hours total of MA 499 and 491H credit can be applied towards an undergraduate degree.

MAE 206 Engineering Statics 3. Offered in Fall Spring Summer. Prerequisite: MAE 201 or MAE 204 and either ST 212 or ST 214. Statics of particles and systems; equilibrium of particles and systems; centroids and centroids of systems of particles; application of moments and principles of equilibrium to structures; properties and methods of analysis of trusses and frames.

MAE 208 Engineering Dynamics 3. Offered in Fall Spring Summer. Prerequisite: MAE 202. Kinematics and dynamics of particles and systems; Newton's laws of motion; kinematic and kinetic properties of particles and systems; motion relative to rotating coordinate systems.


MAE 301 Engineering Thermodynamics I 3. Offered in Fall Spring Summer. Prerequisite: MA 242, PY 208 or 202. Introduction to the concept of energy and the laws governing the transfers and transformations of energy. Emphasis on thermodynamic properties and the First and Second Law analysis of systems and control volumes. Integration of these concepts into the analysis of basic power cycles is introduced.

MAE 302 Engineering Thermodynamics II 3. Offered in Fall Spring Summer. Prerequisite: CSC 112 or CSC 114, C or better in MAE 301. Continuation of Engineering Thermodynamics I with emphasis on the analysis of power and refrigeration cycles and the application of basic principles to engineering problems with systems involving mixtures of ideal gases, psychrometrics, nonideal gases, chemical reactions, combustion, chemical equilibrium cycle analysis, and one-dimensional compressible flow.

MAE 304 Manufacturing Laboratory 1. Offered in Fall and Spring. Prerequisite: Sophomore standing in ME, C or better in MAE 206, GC 211. This laboratory course teaches several modern-manufacturing processes. Interaction between manufacturing and design is emphasized. Students learn techniques in operating manual and numerically controlled manufacturing machines. Students learn about other metallic and nonmetallic manufacturing processes. Safe operation of equipment is taught and students are expected to perform the labs in a safe manner. Students will not become certified machinists or CNC operators.

MAE 305 Mechanical Engineering Laboratory I 1. Offered in Fall and Summer. Prerequisite: C- or better in MAE 208 or CE 215. Theory and practice of measurement and experimental data collection. Laboratory evaluation and demonstration of components of the generalized measurement system and their effects on the final result. Applications of basic methods of data analysis as well as basic instrumentation for sensing, conditioning and displaying experimental qualities. (Instruction and practice in technical report writing.).

MAE 306 Mechanical Engineering Laboratory II 1. Offered in Spring and Summer. Prerequisite: MAE 305, Corequisite: MAE 310. Continuation of MAE 305 into specific types of measurements. Students evaluate and compare different types of instrumentation for measuring the same physical quantity on the basis of cost, time.


MAE 401 Continuation of Engineering Thermodynamics I with emphasis on the analysis of power and refrigeration cycles and the application of basic principles to engineering problems with systems involving mixtures of ideal gases, psychrometrics, nonideal gases, chemical reactions, combustion, chemical equilibrium cycle analysis, and one-dimensional compressible flow.
required, accuracy, etc. (Oral and written presentation of technical material).

MAE 308 Fluid Mechanics. 3. Offered in Fall Spring Summer. Prerequisite: MA 242, C- or better in MAE 208 or CE 215. Corequisite: (MA 341 or MA 301) and (MAE 301 or MSE 301). Development of the basic equations of fluid mechanics in general and specialized form. Application to a variety of topics including fluid statics; inviscid, incompressible fluid flow; design of fluid dynamic system.

MAE 310 Heat Transfer Fundamentals. 3. Offered in Fall Spring Summer. Prerequisite: (MA 341 or MA 301), C- or better in MAE 301. Corequisite: MA 308. Analysis of steady state and transient one and multidimensional heat conduction employing both analytical methods and numerical techniques. Integration of principles and concepts of thermodynamics and fluid mechanics to the development of practical convective heat transfer relations relevant to mechanical engineers. Heat transfer by the mechanism of radiation heat transfer.

MAE 314 Solid Mechanics. 3. Prerequisite: MA 242, C- or better in (MAE 206 or CE 214). Corequisite: MSE 200 or MSE 201, or BME 203, or BAE 315. Concepts and theories of internal force, stress, strain, and strength of structural elements under static and dynamic loading conditions. Constitutive behavior for linear elastic structures. Deflection and stress analysis procedures for bars, beams, and shafts. Introduction to matrix analysis of structures.

MAE 315 Dynamics of Machines. 3. Offered in Fall Spring Summer. Prerequisite: MA 341, C- or better in MAE 208 or CE 215. Application of dynamics to the analysis and design of machine and mechanical components. Motions resulting from applied loads, and the forces required to produce specific motions. Introduction to mechanical vibration, free and forced response of discrete and continuous systems.

MAE 316 Strength of Mechanical Components. 3. Offered in Fall Spring Summer. Prerequisite: MAE, AE, or NE Majors, C- or better in MAE 314 or CE 313. Analysis and design of mechanical components based on deflection, material, static strength and fatigue requirements. Typical components include beams, shafts, pressure vessels and bolted and welded joints. Classical and modern analysis and design techniques. Computer analysis using the finite element method. Material and manufacturing considerations in design.

MAE 355 Aerodynamics I. 3. Offered in Fall Only. Prerequisite: MAE 261 and (MA 341 or MA 301). Fundamentals of perfect fluid theory with applications to incompressible flows over airfoils, wings, and flight vehicle configurations.

MAE 356 Aerodynamics II. 3. Offered in Spring Only. Prerequisite: MAE 355, C- or better in MAE 301. Concepts of thermodynamics, compressible fluid flow, and shock waves with application to computing the aerodynamic characteristics of airfoils, wings and flight configurations at high speed.

MAE 357 Experimental Aerodynamics I. 1. Offered in Fall Only. Prerequisite: MAE 261, (MA 341 or MA 301). Corequisite: MAE 355. Subsonic wind tunnel, instrumentation, data acquisition techniques, technical report preparation. Experiments involve pressure and force/moment measurements of various aerospace vehicle components with supplemental flow visualization.

MAE 358 Experimental Aerodynamics II. 1. Offered in Spring Only. Prerequisite: MAE 357. Corequisite: MAE 356. Advanced stability and control experiments in the subsonic wind tunnel and external compressible flow experiments in the supersonic wind tunnel.

MAE 435 Principles of Automatic Control 3. Offered in Fall Spring Summer. Prerequisite: (MA 341 or MA 301) and MA 315. Study of linear feedback control systems using transfer functions. Transient and steady state responses. Stability and dynamic analyses using time response and frequency response techniques. Compensation methods. Classical control theory techniques for determination and modification of the dynamic response of a system. Synthesis and design applications to typical mechanical engineering control systems. Introduction to modern control theory.

MAE 442 Automotive Engineering 3. Prerequisite: MAE 302, MAE 308, MAE 315, MAE 316. Fundamental aspects of automotive engineering. Examines various automotive systems (engine, brakes, etc.) as well as their interactions in such areas as safety and performance. Current practices and development for the future.


MAE 453 Introduction to Space Flight 3. Offered in Spring Only. Prerequisite: MA 341 or MA 301), CSC 112, C- or better in PY 205. Fundamental aspects of space flight including launch vehicle performance and design, spacecraft characteristics, two-body orbital mechanics, earth satellites, interplanetary trajectories, atmospheric entry, and atmospheric heating.

MAE 455 Boundary Layer Theory 3. Offered in Fall Only. Prerequisite: MAE 355. Introduction to the Navier-Stokes Equations and boundary layer approximations for incompressible flow. Calculation techniques for laminar and turbulent boundary layer parameters which affect lift, drag, and heat transfer on aerospace vehicles. Discussions of compressible flows.

MAE 456 Computational Methods in Aerodynamics 3. Offered in Fall Only. Prerequisite: MAE 356, Corequisite: MAE 455. Introduction to computational methods for solving exact fluid equations. Emphasis on development of the fundamentals of finite difference methods and their application to viscous and inviscid flows.

MAE 461 Dynamics & Controls 3. Offered in Fall Only. Prerequisite: (MA 341 or MA 301), and C- or better in (MAE 208 or CE 215). Dynamics and linear feedback control of aerospace and mechanical systems. Concepts from linear system theory, kinematics, particle dynamics, first- and second-order systems, system dynamics, vibrations, and computational techniques. Feedback control by root-locus, Nyquist, Bode plots, servo-mechanisms, gain and phase margin, and compensation. Control system design emphasized.

MAE 462 Flight Vehicle Stability and Control 3. Offered in Spring Only. Prerequisite: MAE 261 and (MAE 461 or MAE 435). Longitudinal, directional and lateral static stability and control of aerospace vehicles. Linearized dynamic analysis of the motion of a six degree-of-freedom flight vehicle in response to control inputs and disturbance through use of the transfer function concept. Control of static and dynamic behavior by vehicle design (stability derivatives) and/or flight control systems.

MAE 466 Experimental Aerodynamics III 3. Offered in Fall Only. Prerequisite: MAE 358. Corequisite: MAE 435, MAE 475. Laboratory experiments in internal compressible flow and boundary layers in conjunction with MAE 455 and MAE 475. Topics include nozzle flows, constant area duct flows, component/overall performance of a gas turbine, and boundary layer analysis.

MAE 469 Controls Laboratory 1. Offered in Fall Only. Prerequisite: (MAE 306 or MAE 261). Corequisite: (MAE 461 or MAE 435). Laboratory experiments demonstrate the essential features of classical and modern control theory for single-input and single-output systems.

MAE 472 Aerospace Structures II 3. Offered in Spring Only. Prerequisite: MAE 371. A continuation of MAE 371; deflection of structures, indeterminate structures, minimum weight design fatigue analysis and use of matrix methods in structural analysis. Selection of materials for aircraft construction based on mechanical, physical, and chemical properties.

MAE 473 Aerospace Vehicle Structures II Lab 1. Offered in Spring Only. Prerequisite: MAE 371, Corequisite: MAE 472. Demonstration and application of the concepts that have been presented in MAE 371 and MAE 472. Fabrication techniques and the design and construction of a structural component will be emphasized.

MAE 475 Propulsion 3. Offered in Fall Only. Prerequisite: MAE 356. C- or better in MAE 301. One-dimensional, internal, compressible flow including: isentropic flow, normal shocks, flow with friction and simple heat addition. Applications to air-breathing aircraft propulsion systems. Performance, analysis and design of components and overall performance of air-breathing engines.

MAE 476 Rocket Propulsion 3. Offered in Fall Only. Prerequisite: MAE 356 or MAE 302. Study of chemical rockets. This includes nozzle theory, flight performance, thermochemical calculations, and component and system analysis and design.

MAE 478 Aerospace Vehicle Design I 3. Offered in Fall Only. Prerequisite: Senior standing, Aerospace Engineering Majors, MAE 356, 472, 462. A synthesis of previously acquired theoretical and empirical knowledge and application to the design of practical aerospace vehicle systems.

MAE 479 Aerospace Vehicle Design II 4. Offered in Spring Only. Prerequisite: MAE 478. Designs are refined and the vehicles constructed and instrumented by the students. A flight test program is designed and carried out in cooperation with MAE 525 students. A continuation of MAE 478.

MAE 495 Special Topics in Mechanical and Aerospace Engineering 1-3. Offered as needed to present new or special MAE subject matter.

MAE 496 Undergraduate project Work in Mechanical and Aerospace Engineering 1-6. Offered in Fall Spring Summer. Prerequisite: Completion of all required MAE-300 level courses, Corequisite: MAE 415 or MAE 478. Individual or small group project in engineering, comprising the design of an equipment or system stemming from a mutual student-faculty interest; a substantial final report (project) containing calculations, drawings and specifications must be produced. Alternatively, individual or small group undergraduate research evolving from a mutual student-faculty interest; a conference or scientific journal paper must be submitted for publication. Departmental approval required.
MB 101 Introduction to Microbiology and Biochemistry Laboratory Practices 3. Offered in Spring Only. Curricular bridge between high school and college for high school and transitional students. A “hands on” introduction to fundamentals in Microbiology and Biochemistry. Bacterial isolation, identification and growth using aspetic technique, microscopy, and metabolic analysis. Experiments with DNA isolation and analysis, protein isolation, and purification, and enzyme kinetics. Lectures and readings on background, theory and applications of these techniques. Field trips to university and industry research laboratories. This course is part of the Summer College in Biotechnology and Life Sciences (SCIBLS) as well as other pre-college, transitional and early-college programs and is offered as 4 week intensive course. Applicants should have completed high school courses in biology and chemistry. Students must have completed no more than 30 credit hours. Departmental approval is required for current NCSU students.

MB 103 Introductory Topics in Microbiology 1. Offered in Spring Only. Introduction to scope and objectives of university education. Emphasis on microbiology. Career opportunities, computers, university resources.

MB 180 Introduction to Applied Bioprocessing 3. Offered in Summer. Curricular bridge between high school and college for high school and transitional students. Fundamental cell biology concepts pertaining to biomanufacturing. Students gain an understanding of the basic principles of microbiology, culture preparation, physiology, and genetics of microbial cell cultures. Team-based decisions, collaborations and consideration of multiple perspectives are emphasized. Practical experience in laboratory and culture techniques used in biomanufacturing. Transportation will be provided for field trips. This course is part of the Summer College in Biotechnology and Life Sciences (SCIBLS), as well as other pre-college, transitional and early-college programs. Suitable for students with less than 30 credit hours.

MB 200 Microbiology and World Affairs 3. An integrated and comprehensive study of the microbial world and its influence on global events and human affairs.

MB 210 Phage Hunters 3. Offered in Fall Only. This course offers first-year students an opportunity for mentored research. Students will apply the scientific method to make novel discoveries. Students will isolate and characterize naturally-occurring bacteriophage (viruses that infect bacteria, but not humans) from the environment. They will present their data to each other, and the genome of one phage will be sequenced. Students have the option to continue in a second semester to annotate that genome, culminating in a submission to genbank and a poster presentation. Students in the course are part of the National Genome Research Initiative funded by The Howard Hughes Medical Institute. Student should have had a high school biology course before taking this course.

MB 211 Phage Genomics 2. Offered in Spring Only. Prerequisite: BIT/MB 210. This course offers first-year students an opportunity for mentored research. Student will apply the scientific method to make novel discoveries. Students will build on the work they began in BIT/MB 210. The novel phage isolated in the previous semester will undergo genome sequencing over winter break, and in this course students will learn to analyze and annotate the genome sequence. This semester will culminate in a submission to genbank and a poster presentation. Students in the course are part of the national genome research initiative funded by the Howard Hughes Medical Institute.

MB 320 Fundamentals of Microbial Cell Culture 2. Offered in Fall Spring Semester. Prerequisite: BIO 183. This is a half-semester course. This introductory module addresses fundamental cell biology concepts and enables students to gain an understanding of the basic principles of microbiology, culture preparation, physiology and genetics of microbial cell cultures. The lab portion of the course provides students with practical experience in basic laboratory and culture techniques. Students who have completed MB 352 may not take this course for credit.

MB 325 Fundamentals of Microbial Cell Biotransformations 2. Prerequisite: BEC(MB) 320 or MB 352. This is a half-semester course. Basic microbial cell culture theory and practice: cell physiology, mass balances, and metabolic control as seen in a dynamic bioreactor culture. The biological understanding, mathematical models, and engineering products that enable a bioreactor process to be scalable, consistent, and robust. The lab portion of the course provides students with hands-on experience in culture techniques using bioreactors. Students who have completed BIT(CHE) 463 may not take this course for credit.

MB 351 General Microbiology 3. Offered in Fall Spring Summer. Prerequisite: One Biology course (BIO 181, BIO 183, ZO 150 or ZO 160) and one Organic Chemistry course (CH 221 or CH 220). Rigorous introduction to basic principles of microbiology for students in biological and agricultural sciences and for all students planning to take further courses in microbiology.

MB 352 General Microbiology Laboratory 1. Offered in Fall Spring Summer. Corequisite: MB 351. Laboratory experience in general microbiology. Aseptic technique, isolation and identification of bacteria, staining and microscopy. Enumeration of bacteria and viruses.

MB 405 Food Microbiology 3. Offered in Fall Only. Prerequisite: MB 351. Microorganisms of importance in foods and their metabolic activities. Source of microbial contamination during food production, processing and storage. Microbial spoilage; foods as vectors of human pathogens. Physical and chemical destruction of microorganisms in foods and the kinetics involved. Conversions of raw foods by microorganisms into food products. Microbiological standards for regulatory and trade purposes. Cedit will not be given for both FS/MB 405 and FS/MB 505.

MB 406 Food Microbiology Lab 1. Offered in Fall Only. Prerequisite: MB 351 and Corequisite: FS 405 or FS 505. Laboratory experience to complement FS/MB 405. Skills in detecting and quantitating microorganisms and their toxins in foods. Application of colony and direct microscopic counts, most probable numbers, enzyme immunoassays, nucleic acid probes and computer modeling are used to understand the numbers and types of microorganisms or microbial end products in foods. Laboratory safety and oral and written reports are emphasized.

MB 411 Medical Microbiology 3. Offered in Fall Only. Prerequisite: MB 351. Comprehensive study of microbial pathogenesis and mammalian host resistance. Diagnosis, prevention, and therapy of common human diseases of microbial origin.

MB 412 Medical Microbiology Laboratory 1. Offered in Fall Only. Laboratory experience to complement MB 411. Techniques of detection, growth and identification of bacteria and viruses relevant in clinical microbiology laboratories. Good laboratory practices (GLP) and safety stressed.

MB 414 Microbial Metabolic Regulation 3. Offered in Fall Only. Prerequisite: MB 351, BCH 451. An integrative perspective on bacterial physiology and metabolism through an analysis of metabolic regulatory functions.
MB 420 Fundamentals of Microbial Cell Biotransformations 2. Offered in Fall and Spring. Prerequisite: MB 352 OR Corequisite of BEC(MB) 320. This is a half-semester course. Basic microbial cell culture theory and practice: cell physiology, mass balances, and metabolic control as seen in a dynamic bioreactor process to be scalable, consistent, and robust. The lab portion of the course provides students with hands-on experience in culture techniques using bioreactors. Students who have completed BIT (CHE) 463 may not take BEC (MB) 420 for credit.

MB 441 Immunology 3. Offered in Fall Only. Prerequisite: MB 351. Introduction to principles of molecular immunology. Overview of immune system development and function, and discussions of ongoing scientific research regarding immune regulation.

MB 451 Microbial Diversity 3. Offered in Spring Only. Prerequisite: MB 411/412 and either GN 311 or BCH 451. Molecular, biochemical, and evolutionary diversity of the microbial world, including Bacteria, Archaea, and Eukaryotes. Evolutionary perspective on microbial relationships, molecular methods of study and classical and modern biotechnological methods utilizing this genetic diversity to explore the microbial world and use the resulting insight to meet the needs of our own species.

MB 452 Microbial Diversity Lab 2. Offered in Spring Only. This lab course is project-oriented. Students perform a series of classical enrichments and isolations, starting from environmental samples collected by the students themselves. Some of these isolations serve as the starting materials for a series of modern molecular biology experiments, in which students purify DNA, amplify ribosomal DNA by PCR, and have a portion of this gene sequenced. This sequence information is the starting point for the term project, a detailed molecular phylogenetic analysis of the isolated organisms. Students will be required to provide their own transportation during non-scheduled class time for local field sample collection.

MB 455 Microbial Biotechnology 3. Prerequisite: MB 351 and GN 311. Introduction to industrial microbiology with focus on biotechnology including developments employing recombinant nucleic acid and monoclonal antibody techniques. Bioremediation, industrial enzymes, transgenic plants, biopesticides, medical diagnostics, recombinant vaccines production of important secondary metabolites, and other topics. Field trips to local biotechnology companies.

MB 461 Introduction to Molecular Virology 3. Offered in Spring Only. Prerequisite: MB 351, MB 411. Introduction to principles of molecular virology. Overview of classification and nomenclature, virus structure, interaction of viruses with cells, organisms (immunology, pathology), and populations (epidemiology). Detailed case studies from major groups of viruses: picornaviruses, togaviruses, orthomyxoviruses, retroviruses, polyomaviruses, and herpesviruses.

MB 480 Current Issues in Microbiology 1. Offered in Fall and Spring. Prerequisite: SMB majors or minors, Senior standing, and MB 351. Library research on current topics in all areas of microbiology. Presentation of research results orally and in the form of a major term paper.

MB 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

MB 493 Special Problems in Microbiology 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences

MB 495 Special Topics in Microbiology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.


MEA 101 Geology 1: Physical 3. Offered in Fall Spring Summer. Systematic consideration of processes operating on and below the earth's surface and the resulting features of landscape, earth structures, and earth materials. Occurrences and utilization of the earth's physical resources.

MEA 110 Geology 1 Laboratory 1. Offered in Fall Spring Summer. Corequisite: MEA 101. Scientific methodology applied to the study of common rock-forming minerals, common rocks, topographic maps, geologic structures and geological maps. Field trips.

MEA 120 The Dinosaurian World 3. Evolution and ecology of dinosaurs related to broader features of Earth history, including plate tectonics, paleoclimatology, mass extinction and the long-term effects of natural selection.

MEA 121 The Dinosaurian World Lab 1. Offered in Fall Only. Corequisite: MEA 120. Companion to lecture course on "The Dinosaurian World." Adaptive significance of osteological characteristics, ecological correlates of body weight and physical environmental variables, and concepts relating to natural selection, fitness, biodiversity and changes in the planetary environment on various time scales. Discussion, specimen demonstrations and problem solving.

MEA 130 Introduction to Weather and Climate 3. Offered in Fall and Spring. Explores the structure, physical causes, and climatology of weather systems including the jet streams, mid-latitude cyclones, hurricanes, thunderstorms, and tornadoes. Clouds and precipitation, air pollution, climate modification, optical effects (rainbows, halos) and weather instruments. Weather systems and forecasting techniques are illustrated through daily weather map discussions.

MEA 135 Introduction to Weather and Climate Laboratory 1. Offered in Fall and Spring. Corequisite: MEA 130. Experiments include effects of air pressure change on temperature and density (gas law); measurement of atmospheric moisture; formation of clouds and hail; effects of variable solar heating. Graphical display and interpretation of data; weather instruments and observations; weather map analysis; forecasting principles.
ME 140 Natural Hazards and Global Change 3. The science of natural hazards and global change: the impact on human civilization of events in the lithosphere, atmosphere, biosphere, and hydrosphere (e.g., earthquakes, hurricanes, red tides, and floods), and the impact of humans on the global environment (e.g., global warming).

ME 150 Environmental Issues in Water Resources 4. Offered in Fall Only. The science of current environmental concerns, particularly those related to water resources. Major topics include weather and climate, natural resource cycles, resource depletion and contamination, societal impacts. Scientific aspects of environmental issues. Required field trips.

ME 200 Introduction to Oceanography 3. Offered in Fall and Spring. The ocean as a part of our environment including interactions between atmosphere and ocean, ocean circulation, physical and chemical properties of sea water, marine geology and marine biology.

ME 202 Geology II: Historical 3. Offered in Spring Only. Prerequisite: ME 101. Corequisite: Recommended that ME 211 be taken concurrently. The second semester of the basic introductory sequence in geology. Utilization of the principles of geology to reconstruct and understand the earth's history. Geologic events that cause modification of the earth's crust, emphasizing North America. History of life and the environmental significance of changes in animal and plant life through geologic time.

ME 210 Oceanography Lab 1. Offered in Fall and Spring. Corequisite: ME 200. Complements the lecture course in Oceanography. Numerous demonstrations and resource materials visualize basic oceanographic concepts such as geological processes occurring in the marine realm, the chemical properties of seawater, oceanic circulation, tides and waves, as well as processes affecting the biology of the oceans.


ME 213 Fundamentals of Meteorology 2. Offered in Fall Only. Corequisite: MA 141. Introduction to the discipline of and opportunities in meteorology, atmospheric vertical structure, motion, and pressure systems, jet streams; global circulation; air masses and fronts; mid-latitude cyclone structure and evolution.

ME 214 Fundamentals of Meteorology II 2. Offered in Spring Only. Prerequisite: ME 213. Introduction to moisture variables, adiabatic processes, thermodynamic diagrams, stability, clouds and precipitation, thunderstorms, tornadoes, and hurricanes, air pollution, global climate change, ozone hole.

ME 220 Marine Biology 3. Offered in Spring Only. Prerequisite: ME 200 or BIO 181. Introduction to marine plants and animals, their adaptations to life in the sea and ecological interactions in selected marine environments (e.g. coral reefs, deep sea, salt marshes). Interactions of man with the sea: food from the seas, biology of diving. Optional trip.

ME 250 Introduction to Coastal Environments 3. Prerequisite: ME 200/210 or MEA 101/110. A global survey of coastal habitats, the processes that shape these dynamic environments, and the physicochemical controls that regulate their indigenous biological communities.

ME 251 Introduction to Coastal Environments Laboratory 1. Corequisite: MEA 250. Complements the lecture course Introduction to Coastal Environments (MEA 250). Experiments involving the physical, chemical and biological processes that shape a variety of coastal environments.

ME 268 Marine Paleontology 4. Offered in Fall Only. Prerequisite: BIO 181, MEA 102. Evolution of marine life traced through geologic time, accenting the functional significance of adaptations and the history of marine ecosystems. Required field trips.

ME 300 Environmental Geology 4. Prerequisite: MEA 101 or MEA 150 or MEA 140 or SSC 200. Geologic aspects of the environment. Effects of humans upon or interactions with geologic processes. Geologic considerations in land use planning, waste disposal, water resources, and natural resources. A field and lab oriented course with combined lecture/laboratory. Inquiry-based learning approach to study the basic processes of environmental geology and develop research skills. Required field trips.

ME 311 The Global Atmosphere 3. Offered in Fall Only. Physical basis for weather and climate. Regional and global climate change; earth-sun relationships; solar energy incident to and modified by the atmosphere; terrestrial radiation; transports of heat and water vapor; surface and global energy balance; general circulation of the atmosphere; climate classification.


ME 313 Weather Measurements and Analysis I 1. Offered in Fall Only. A laboratory course supplementing material in MEA 311. Solar and terrestrial radiation; atmospheric attenuation; surface energy balance; general circulation of heat and water vapor; climate classification.

ME 314 Weather Measurements and Analysis II 1. Offered in Spring Only. A laboratory course supplementing material in MEA 312. Meteorological data fields and their mathematical expression; objective analysis; measurement and calculation of moisture variables: moist and dry adiabatic processes; static stability; effects of radiation and vertical motion; vertical cross sections.

ME 320 Fundamentals of Air Pollution 4. Offered in Spring Only. Prerequisite: MA 121 or MA 131 or MA 141, CH 201, or any MEA course. Analysis of atmospheric pollution sources, the influence of natural and anthropogenic processes on the atmosphere. Roles of local, state and federal governments in air pollution control and importance of the Clean Air Act and its amendments. Techniques for measurement of atmospheric pollutant concentrations and determination of local and regional air quality. Required field trips may extend beyond class time.

ME 322 Earth System Chemistry 3. Offered in Spring Only. Prerequisite: CH 201, Corequisite: BIO 181 or any MEA course. Chemistry of the earth with an emphasis on the interactions of the biosphere, geosphere and atmosphere. The origin and chemical evolution of the solar system, chemical cycles in the environment, and the impact of man on biogeochemical processes.

ME 369 Terrestrial Paleontology 4. Offered in Spring Only. Prerequisite: BIO 181 or MEA 202 or MEA 120. Evolution of terrestrial life traced through geologic time, accenting the functional significance of adaptations and the history of terrestrial ecosystems. Required field trips.


ME A 410 Introduction to Mineralogy and Petrology 4. Offered in Fall Only. Prerequisite: MEA 101, CH 101/102. Introduction to the fundamentals of mineralogy, optical mineralogy, and igneous and metamorphic petrology. Description and identification of minerals, using physical properties and geological associations. Optical properties of non-opaque rock-forming minerals, emphasizing petrographic thin sections. Introduction to igneous and metamorphic environments and rocks. Description and classification of common crystalline rocks. Required overnight field trips; additional expenses required.

ME A 411 Marine Sediment Transport 3. Offered in Fall Only. Prerequisite: MEA 101 or MEA 200, MA 241, PY 201 or PY 205. Quantitative study of sediment transport in the marine environment including an introduction to fluid mechanics and sediment transport theory. Discussion of the processes and products of sediment transport in specific marine environments from estuaries to the deep sea and interpretation of sediment transport processes from sedimentary structures. Credit not allowed for both MEA 411 and MEA 562.

ME A 412 Atmospheric Physics 3. Offered in Spring Only. Prerequisite: MA 242, PY 206. Physical and analytical descriptions of atmospheric aerosols, clouds/foogs, and precipitation processes; size distribution and sources of atmospheric aerosols; impact of aerosols on visibility and climate; microstructure of warm and cold clouds and their interaction with solar and terrestrial radiation; collision-coalescence and ice phase mechanisms of precipitation formation; atmospheric electricity; planned and inadvertent weather modification; weather radar; atmospheric optics.

ME A 415 Geology of Economic Mineral Deposits 3. Offered in Spring Only. Prerequisite: MEA 410, MEA 440 and 450 recommended. The nature, geologic setting and geographic distribution of economic mineral deposits. Topics include both metallic and industrial minerals and the various geologic processes that work to produce them. Laboratory work with economic mineral suites from famous mining districts of the world. Two to three weekend field trips required.

ME A 417 Geology of Fossil Fuel Deposits 3. Prerequisite: MEA 410 or MEA 450. MEA 431, PY 211 or PY 205. Introduction to applications of geological and geophysical principles in the exploration, evaluation and exploitation of the earth's fossil energy resources.

ME A 421 Atmospheric Dynamics I 3. Offered in Fall Only. Prerequisite: MA 242, PY 208, MEA 312, MEA 314. Meteorological applications of fluid kinematics: divergence, vorticity, deformation, advection, mass continuity and vertical motion. Atmospheric dynamics: the equation of motion on a rotating earth; component equations in Cartesian, polar-spherical and pressure coordinates. Scale analysis and simplifications. Cases of horizontal flow: geostrophic and gradient wind, ageostrophy and acceleration; thermal wind and vorticity.

ME A 422 Atmospheric Dynamics II 3. Offered in Spring Only. Prerequisite: MEA 421. Vorticity and potential vorticity equations; dynamics of synoptic-scale motions; quasi-geostrophic theory; atmospheric waves including shallow water, internal gravity, inertia-gravity, and Rossby waves; finite difference methods; numerical weather prediction; atmospheric instabilities including static, Kelvin-Helmholtz, inertial, symmetric, barotropic, and baroclinic instabilities.

ME A 425 Introduction to Atmospheric Chemistry 3. Offered in Fall Spring Summer. Prerequisite: MA 141, CH 201, (PY 205, PY 211 or MEA 320). The course covers history, regulations, sources, physics, and chemistry of major air pollutants and factors affecting their transport and fate. Emphasis is placed on atmospheric chemistry and physics underlying five major air pollutant problems including urban outdoor air pollution, indoor air pollution, acid deposition, stratospheric ozone reduction, and global climate change. Credit will not be allowed for MEA 425 and MEA 525.

ME A 430 Scientific Concepts and Global Problems 3. Offered in Fall and Spring. Major problems facing human population caused by conflict between its growth, its consumption and the earth's finite environment. Focus on scientific concepts and dynamics governing these problems, their interrelationships, their causes, and their consequences. Participatory learning through group discussions and student-initiated research.

ME A 433 Forensic Geology 4. Offered in Spring Only. Prerequisite: MEA 101. Application of geology to crime investigation, ranging from violent crime to fraud and liability in property management. Role of a geologist as expert witness. Application of analytical techniques, e.g., petrographic microscopy, trace-element analysis, remote sensing, digital mapping, and image analysis. Tour of the SBI lab and a certified gemology lab. Identification of art fraud by pigment analysis and a corresponding tour of the NC Museum of Art.

ME A 435 Engineering Geology 3. Offered in Spring Only. Prerequisite: MEA 101 and Junior standing in Colleges of Agriculture and Life Sciences, Engineering, Natural Resources, Physical and Mathematical Sciences or Textiles. Application of both geology and geotechnical engineering to engineering projects. Illustrations of relevant materials properties and techniques utilized in describing subsurface conditions.

ME A 440 Igneous and Metamorphic Petrology 4. Offered in Spring Only. Prerequisite: MEA 410. The study of rocks formed by the crystallization of magmas (igneous) and by the recrystallization of existing rocks (metamorphic), with emphasis on whole-rock and mineral compositions, classification, petrography, hand-sample and thin-section identification, and the rock origins in terms of magma genesis and emplacement and tectonics. Field trips are required.

ME A 443 Weather Analysis and Forecasting I 4. Offered in Fall Only. Prerequisite: MEA 421. Analysis and forecasting of mid-latitude weather systems with emphasis on simplified models and methods. Barotropic model, Rossby waves; baroclinic structure, upper-level wave evolution, forecasting; surface cyclone evolution, Sutcliffe-Petterssen model. Numerical computation methods; numerical weather prediction and operational models, subjective and objective analysis of meteorological fields.
ME 444 Weather Analysis and Forecasting II. Offered in Spring Only. Prerequisite: MEA 443. Analysis and forecasting of mid-latitude weather systems with emphasis on simplified models and methods. Barotropic model, Rossby waves, baroclinic structure, upper-level wave evolution, forecasting; surface cyclone evolution, Sutcliffe-Petterssen model. Numerical computation methods, numerical weather prediction and operational models, subjective and objective analysis of meteorological fields.

ME 449 Principles of Biological Oceanography. Offered in Fall Only. Biological productivity and trophic relationships in plankton, nektont and benthos; community ecology of selected habitats (estuaries, intertidal zones, coral reefs, deep sea); and adaptation of organisms to the marine environment. Credit is not allowed for both MEA/BIO 449 and MEA/BIO 549.

ME 450 Introductory Sedimentary Petrology/Stratigraphy 4. Offered in Spring Only. Prerequisite: MEA 410. Properties, classification, geologic occurrences, and origin of minerals and rocks formed by physical, chemical, and biological processes at and near the earth's surface. Principles of division of stratified terrains into natural units, correlation of strata, interpretation of depositional environments and facies. Required field trips.

ME 451 Structural Geology 4. Offered in Fall Only. Prerequisite: MEA 410. Basic principles of geometric, kinematic and dynamic analysis as applied to fractures, shear zones, folds, and fabrics of deformed rock bodies. Considers both brittle and ductile realms of the crust from microscale to regional tectonics. Required overnight field trips.

ME 454 Marine Physical-Biological Interactions 3. Offered in Spring Only. Prerequisite: MEA 460 and MEA/GO 449. Space-time relationships between physics and biology; influence of Reynolds Number on aquatic life style; aspects of physical and biological mathematical modeling; influence of biology on physical phenomena; influence of static physical/chemical properties on biology; influence of dynamic physical phenomena (turbulence, waves and advection) on biology within the water column and its boundaries. Credit is not allowed for both MEA454 and 554.

ME 455 Micrometeorology 3. Offered in Fall Only. Prerequisite: MEA 422 or MAE 308. Energy budget near the earth's surface; soil temperatures and heat transfer; air temperature, humidity, and wind distribution in the planetary boundary layer; fundamentals of viscous flows and turbulence; semiempirical theories of turbulence; exchanges of momentum, heat and moisture in the atmospheric surface layer; air modification due to changes in surface properties; agricultural and forest micrometeorology.

ME 459 Field Investigation of Coastal Processes 5. Prerequisite: MEA 250 and MEA 251. Coastal zone processes and dynamics with emphasis on the forcing factors that regulate changing coastal landforms, the ecology and physicochemical character of coastal ocean water-masses, seabed morphologies, landscape academins, etc. Field observations and field exercises will be emphasized at and near the freshwater coastal wetlands, estuaries, barrier island, tidal inlets, continental shelves and shelf-margin habitats. Additional fees required.

ME 460 Principles of Physical Oceanography 3. Offered in Fall Only. Prerequisite: MA 242, Corequisite: PY 203 or PY 208. Introduction to principles and practices of physical oceanography. Equation of state of seawater; energy transfer to the ocean by thermal, radiative and mechanical processes; the heat budget; oceanic density distribution; oceanic boundary conditions; conservation equation; air-sea interaction; global fluxes and general description of major ocean currents. Credit is not allowed for both MEA 460 and MEA 540.

ME 461 Undergraduate Cruise Experience 1. Offered in Fall and Spring. Corequisite: MEA 200 or MEA 220. Broad exposure to planning and execution of oceanographic research operations, including demonstration of techniques and equipment regularly used aboard ships and familiarization with acquisition and processing of oceanographic data via preparation for and participation in a demonstration cruise under the guidance of NCSU oceanography faculty members.

ME 462 Observational Methods and Data Analysis in Marine Physics 3. Prerequisite: MEA 460. Practical experience in the observational techniques used by physical oceanographers. Basic instrumentation described, emphasizing principles rather than detailed descriptions. Both direct and indirect techniques used to define the three-dimensional circulation of the ocean as a function of time.

ME 463 Fluid Physics 3. Offered in Fall Only. Prerequisite: MA 341 and PY 208. A derivation of the basic equations governing fluid motion in a rotating coordinate system. Equations include conservation of mass or the continuity equation, momentum equations, thermodynamic energy equation, inviscid and viscous equations, and vorticity and vorticity dynamics.


ME 465 Geologic Field Camp 4. Offered in Summer. Prerequisite: MEA 440, MEA 450, MEA 451. Introduction to field instruments and techniques used in geological sciences. Geologic field mapping in areas ranging from undeformed sedimentary rocks to complexly deformed crystalline rocks. May include field techniques specific to engineering geology, geophysics, hydrogeology, and paleontology. Preparation of maps and reports. Four-week course taught off-campus, typically out-of-state. Additional fees required.

ME 466 Marine Meteorology 3. Offered in Spring Only. Prerequisite: MEA 422 or MEA 460. Basic equation and concepts. Review of ocean and atmospheric circulations. Ocean mixed layer, air-sea interaction and coastal ocean and meteorological processes, marine boundary layer and cloud processes.

ME 468 Invertebrate Paleontology and Biostratigraphy 4. Offered in Fall Only. Prerequisite: MEA 102 and MEA 111, or ZO 402. Study of fossil invertebrates and their applications to problems and concepts of paleoecology, correlation of strata, evolution and broader concepts of earth history. Required field trips.

ME 469 Ecology of coastal Resources 3. Offered in Spring Only. Prerequisite: MEA 250, MEA 220. Anthropogenic impacts on estuarine and coastal marine ecosystems. Survey of basic biological, physical, chemical and geological mechanisms underlying habitat-specific functioning, followed by discussion, in-class presentation, and critique of real and hypothetical case studies involving anthropogenic impacts.

ME 470 Introduction to Geophysics 3. Prerequisite: PY 208 or 212. Structure of the earth, a dynamic and evolving entity, as inferred from seismology, gravity, magnetism and heat flow. Geodynamic processes responsible for continental drift, plate tectonic theory, regional geophysics of selected areas.

ME 471 Exploration and Engineering Geophysics 3. Prerequisite: PY 208. Geophysical methods applied to exploring the earth's shallow sub-surface. Principles of gravity, magnetic, electrical,
and seismic exploration surveys. Planning, conducting, and interpreting geophysical surveys.

MEA 473 Principles of Chemical Oceanography 3. Offered in Fall Only. Prerequisite: CH 201. Chemical processes controlling the composition of oceans, including discussions of chemical equilibria, biological cycling of nutrients and use of chemical tracers in marine environment; consideration of origin and chemical history of oceans. Credits not allowed for both MEA 473 and MEA 573.

MEA 479 Air Quality 3. Offered in Spring Only. Prerequisite: CE 373, CE 382; or CHE 311 (CHE Majors); or MEA 421 (MEA Majors). Corequisite: ST 370; ST 380 (MEA Majors). Introduction to: risk assessment, health effects, and regulation of air pollutants; air pollution statistics; estimation of emissions; air quality meteorology; dispersion modeling for non-reactive pollutants; chemistry and models for tropospheric ozone formation; aqueous-phase chemistry, including the "acid rain" problem; integrated assessment of air quality problems; and the fundamentals and practical aspects of commonly used air quality models. Credit is allowed only for one of CE/MEA 479 or CE/MEA 579.

MEA 481 Principles of Geomorphology 3. Prerequisite: MEA 101 and MEA 110. Landforms and the processes responsible for their origin. Emphasis on the geologic principles involved in interpreting the origin and evolution of various landforms, and discussion of North American geomorphic process.

MEA 485 Introduction to Hydrogeology 3. Prerequisite: MEA 101, MA 242, CH 201, and PY 201, PY 205, or PY 211. Basic science of groundwater flow in geological media. Saturated and unsaturated flow, Darcy's equation, heterogeneity and anisotropy, flow nets, storage properties of geological materials, effective stress, equations for steady and unsteady flow, recharge, groundwater exchange with surface water, groundwater flow to pumping wells, estimation of hydraulic properties of aquifers, contaminant plumes and chemical transport in groundwater.

MEA 491 Seminar on Selected Geologic Topics 2. Offered in Fall Only. Study and discussion of selected topics from the geological literature. Preparation of a major library research paper.

MEA 493 Special Topics in MEAS 1-6. Offered in Fall and Spring. Directed individual study or experimental course offering.

MEA 495 Senior Seminar in the Marine Sciences 1. Offered in Fall Only. Discussions of selected topics from the marine literature. Marine scientists from the public and private sectors introduce students to career options. Strategies for finding jobs and graduate programs are presented.

MEA 498 Internship in MEAS 1-6. Offered in Fall Spring Summer. Awards academic credit for learning that occurs during internships. Requires daily journal and written summary report. Successful completion of the course based on review of summary report by an MEAS faculty, who shall be identified by the student prior to the internship. Transportation expenses may be incurred. MEAS majors only.

MIE 201 Introduction to Business Processes 3. Cross-functional treatment of major activities of business, such as product design, distribution, production, and marketing. Description of specific tasks, via lectures and case studies, in support of major business activities. Interactions among various functional areas of business.

MIE 235 Topics in Leadership Seminar 3. Introduction to leadership, self-awareness, interpersonal needs, attitudes, cognitive style, values, ethics and values. Listening, communicating, interviewing, self-efficacy, empowerment, time and stress management, solving problems creatively, motivation, giving feedback and developing others. Team building and group dynamics. A history of leadership research, leadership concepts, characteristics, and principles.

MIE 300 Business Career Planning 2. Integration of work values, career interests, and skills and corporate environments and career fields related to business management. Development of proactive plans and skills to enhance marketability for placement into professional career paths in business. Minimal fee assessed to cover cost of career tests administered during course.

MIE 305 Legal and Regulatory Environment 3. Introduction to contract, tort and agency law, the judicial system, common law, statutory law, and constitutional law. Review and discussion of the major legal and regulatory issues affecting business including ethics, fiduciary duty, white collar crime, dispute resolution, intellectual property, international, and product safety laws.

MIE 306 Managing Ethics in Organizations 3. Offered in Fall and Spring. Prerequisite: MIE 201 or BUS 201. Management practices to define, communicate, and implement ethical conduct in business organizations. Normative and applied analysis of current ethical dilemmas of corporations in free markets, techniques for effective management of corporate social responsibility, and formulation and implementation of ethics management programs. College of Management majors only.

MIE 310 Introduction to Entrepreneurship 3. Prerequisite: MIE 201 or BUS 201. Introduction to planning, formation, and management of entrepreneurial ventures. Fundamental business concepts and managerial skills applied to entrepreneurial ventures. Course projects support experiential learning of critical skills. Some individual off-campus travel is required.

MIE 330 Human Resource Management 3. Prerequisite: MIE 201, Sophomore standing: College of Management Majors must have passed Software Applications Proficiency Requirement. The systematic principles for managing the human resource component of organizations. Topics include: environmental influences on planning, recruitment, and selection; managing workforce diversity; developing effectiveness and enhancing productivity, compensation, benefits, and security; and strengthening employee-management relations.

MIE 335 Organizational Behavior 3. Survey of contemporary managerial applications for managing people in modern organizations. Topics include: motivation, group dynamics, team development, ethics, communications, organizational politics, leadership, power, organizational development, organizational design and structure. Current managerial issues include total quality management and technology management.

MIE 410 Business Opportunity Analysis 3. Prerequisite: MIE 310. Issues and management processes related to the identification of new business opportunities with emphasis on commercializing new technologies. Students will analyze and develop individual plans for commercialization of a new technology or other innovation. New venture formation is the primary focus, but the processes and skills students develop are relevant to new product introductions by existing firms.
MIE 411 Managing the Growth Venture 3. Prerequisite: MIE 310. Managing the growth venture with emphasis on entrepreneurial planning in the dynamic context of rapidly growing ventures and the development of managerial skills necessary for successful leadership in high growth ventures. Fundamental concepts, issues and skills are taught through an integrated combination of readings, lectures, discussions, cases analyses, and applied project with a local venture. Students need to provide their own transportation to off-campus sites.

MIE 412 Finance and Accounting for Entrepreneurs 3. Prerequisite: MIE 310. Financial planning for new ventures including financial reporting conventions and projection of critical financial amounts for new ventures. Introduction to fundamental accounting and financial concepts applied in the context of entrepreneurial ventures. Topics include projection of revenues, expenses, capital expenditures, cash flows, and balance sheet amounts; and the creation of pro-forma financial statements. Individual student projects integrate financial projections and pro-forma financial statements with the preparation of a complete business plan. Some individual off-campus travel is required.

MIE 413 New Venture Planning 3. Prerequisite: MIE 410. Developing the business plan for a new venture and the entrepreneurial process of executing the first phases of new venture creation. Topics include idea conception, entrepreneurship, business planning, market research, entrepreneurial opportunities and strategies. Emphasis is placed on high growth business opportunities. The final deliverable is a complete business plan for a high growth venture and formal presentation of the plan to mock investors. Some individual off-campus travel is required.

MIE 416 The Legal Dynamics of Entrepreneurship 3. Prerequisite: MIE 310. Overview of important legal and regulatory issues facing entrepreneurs and start-up entities including legal structure of the organization, intellectual property protection, human resource requirements, product liability, and risk management.

MIE 418 Social Entrepreneurship Practicum 3. Corequisite: MIE 413. Application of entrepreneurship skills and knowledge to plan a social entrepreneurial venture envisioned by the student. This course is a capstone course for the Minor in Entrepreneurship and the Concentration in Entrepreneurship. The deliverables include an evaluation of the venture and a formal presentation including a summary of work completed and the implications of the work for each student's project. Students need to provide their own transportation to off-campus sites.

MIE 419 Entrepreneurship Practicum 3. Corequisite: MIE 413. Application of entrepreneurship skills and knowledge to plan an entrepreneurial venture envisioned by the student. This course is the capstone course for the Minor in Entrepreneurship. The final deliverable includes an evaluation of the project and a formal presentation that includes a summary of the work completed and the implications of that work each student's project. Some individual off-campus travel is required.


MIE 432 Industrial Relations 3. Prerequisite: EC 201, MIE 330. The role of collective bargaining in the labor market. Determinants of the pattern of union membership today and its growth rate. The objectives and tactics of both labor and management within public policy guidelines. Analysis of the impact of unions on job security, productivity, and compensation.


MIE 435 Leadership and Management 3. Prerequisite: MIE 330. Development of leadership and management skills for organizational settings. Self-awareness: interpersonal needs, attitudes toward change; cognitive styles, ethics and values; listening; communicating; interviewing; time and stress management; creativity and managing creativity. Team building and group dynamics. Leadership and followership: theory and case studies (Churchill, Antigone; Henry V; Machiavelli); the use of power and authority; women and leadership in leadership; leadership and leadership embodiment of leadership traits; effective traits and characteristics of great leaders.


MIE 438 Staffing 3. Prerequisite: MIE 330. Staffing of contemporary organizations including strategic and environmental influences on: HR planning, job analysis, measurement, recruitment, assessment and selection, decision making, employment, and termination. Considerable emphasis on employment and labor recruitment, assessment and selection, decision making, employment, and termination. Considerable emphasis on employment and labor legislation.

MIE 480 Business Policy and Strategy 3. Prerequisite: BUS/MIE 305, BUS 320, BUS/CSC 340 or ACC 340, BUS 360, BUS 370, MIE 330, and (BUS/ST 350 or ST 302 or ST 361 or ST 370 or ST 372). Comprehensive analysis of business issues from the point of view of the general manager. It involves the integration of perspectives from marketing, finance, and other functional areas of management. Uses case study analyses or simulation and written/oral reports to develop decision making skills.

MIE 495 Special Topics in MIE 1-6. Presentation of material normally not available in regular course offerings, or offering of new courses on a trial basis.

MIE 498 Independent Study in MIE 6. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction on a tutorial basis. Credits and content determined by faculty member in consultation with Department Head.
MILITARY SCIENCE

MS 101 Introduction to Leadership and Values I. Offered in Fall Only. This course introduces students to fundamental components of service as an officer in the United State Army. Initial lessons form building blocks of progressive lessons in values, fitness, leadership and officeriness. Classroom instruction includes "life skills" including physical and mental fitness, communication theory, and interpersonal relationships. Upon completion, students will be prepared to receive more complex leadership instruction.

MS 102 Basic Military Leadership. Offered in Fall and Spring. Familiarizes students with the fundamentals of map reading, land navigation techniques, small unit tactics and leadership, personal goal setting, Army Leadership and values, ethical decision making as well as Army basics.

MS 106 Map Reading. Offered in Spring Only. Basic map reading techniques: determination of present location through the use of intersection and resection procedures; information for outdoor activities, ranging from competitive orienteering to occasional backpacking.

MS 201 Intermediate Leadership Theory I. Offered in Fall Only. Instruction is oriented on communication and leadership theory using practical exercise to apply communications and leadership concepts. Critical "life skills" and their relevance to success in the Army are stressed. Upon completion of this course, students will understand fundamental principles of leadership, and be prepared to intensity practical application in subsequent coursework.

MS 202 Intermediate Leadership Theory II. Offered in Spring Only. Prerequisite: MS 101. This course focuses on the purpose, roles, and obligations of commissioned officers. Coursework will include origins of Army institutional values and practical application in decision making and leadership. Upon completion of this course, students will possess and understanding of leadership and officeriness, demonstrate the ability to apply these skills, and be prepared for the Advanced Military Science Program.

MS 295 Special Topics in Military Leadership. Offered in Fall Only. Prerequisite: MS 101. The role of military justice, the Uniform Code of Military Justice (UCMJ) and the procedures for accomplishing certain legal actions. Ethics and professionalism of the officer corps. Also included are counseling techniques and continued preparation for the transition from cadet to commissioned officer. Emphasis on student interaction and small group exercise practical application.

MS 495 Special Topics in Military Science. Offered in Fall Spring. Prerequisite: Departmental approval required. Offered in Fall Spring Summer. Prerequisite: Departmental approval required-advanced course students only.

MATERIALS SCIENCE AND ENGINEERING

MSE 200 Mechanical Properties of Structural Materials. Offered in Fall Spring Summer. Prerequisite: CH 101. An introduction to the atomic and grain structure of structural materials emphasizing the mechanical properties. Effects of mechanical and heat treatments on structure and properties. Fatigue and creep of materials, fracture toughness, mechanical and non-destructive evaluation, effects of environment. Design considerations, characteristics of metals, ceramics, polymers and composites. Not for Materials majors.

MSE 201 Structure and Properties of Engineering Materials. Offered in Fall Spring Summer. Prerequisite: CH 101. Introduction to the fundamental physical principles governing the structure and constitution of metallic and nonmetallic materials and the relationships among these principles and the mechanical, physical and chemical properties of engineering materials.

MSE 203 Introduction to the Materials Science of Biomaterials. Offered in Fall Only. Prerequisite: C- or better in CH 101, CH 102 and PY 205. This course introduces fundamental physical principles governing the structure, processing, properties and performance of metallic, ceramic and polymeric materials. Relationships are developed defining how mechanical, physical and chemical properties are controlled by microstructure and chemistry. Material failure modes are developed with an emphasis on biocompatibility and the applications/performance of materials in the human body. Basic aspects of material biocompatibility are presented, leading into studies of the current and future applications of biomaterials.

MSE 230 The Impact of Materials on Civilization. Offered in Spring Only. Exploration of the role of materials in the development of modern industrial civilizations by putting technology into a historical context and examining the advances made possible by innovations with materials starting with the Stone age. Basic concepts in materials science and engineering which focus on the relationship between processing, structure, properties and performance. Material classes covered include metals, ceramics, polymers, composites and semiconductors.


MSE 260 Mathematical Methods for Materials Engineers. Offered in Spring Only. Prerequisite: E 115, MA 141. Use of Excel spreadsheets to illustrate principles and application of mathematical and simulation methods that are central to materials science and
engineering. Data plotting, curve fitting, Taylor series, Fourier transforms, numerical integration and differentiation, finite element analysis, numerical solution of differential equations, atomistic and molecular modeling using Monte Carlo and other methods.

MSE 270 Materials Science and Engineering Seminar 1. Offered in Spring Only. Corequisite: MSE 201. This course surveys the field of materials science and engineering and introduces students to contemporary issues. Job and career opportunities at the BS and graduate degree levels are presented. Students are introduced to opportunities for laboratory assistant jobs in the MSE department, summer internships, co-ops and summer research experiences at NCSU and other institutions. Students will learn to prepare effective resumes, technical reports and oral presentations.

MSE 300 Structure of Materials at the Nanoscale 3. Offered in Fall Only. Prerequisite: C- or better in MSE 201. This course covers the structure of materials at the nanometer scale. Structure includes the periodic arrangements of atoms and ions in crystalline solids, the amorphous networks of atoms, ions, and molecules in glassy materials, and the molecular structure of polymeric and biological materials. The typical means of characterizing nanostructure are also reviewed. Finally, the course will introduce the structure of novel nanomaterials like nanotubes, buckyballs and self assembled monolayers.

MSE 301 Introduction to Thermodynamics of Materials 3. Offered in Fall Only. Prerequisite: MSE 201 or MSE 203; MSE majors must have a C- or better in MSE 201. Review of classical thermodynamics and thermodynamic relationships. Use of statistical methods of describe entropy and other thermodynamic properties. Description of vapor-, liquid-, and solid-phase equilibrium in unary and other multicomponent material systems. Treatment of ideal and nonideal solution behavior in inorganic alloys and organic polymers. Application of gas-phase reaction kinetics and identification of the criteria required for reaction equilibria.

MSE 320 Introduction to Defects in Solids 3. Offered in Fall Only. Prerequisite: C- or better in MSE 201. Classification of defects as point, line, surface or volume types. Geometrical and crystallographic aspects of defects. Defects in metallic, ionic and covalently bonded crystal structures. Physical, chemical, electronic and magnetic aspects of defects. Field quantities and forces associated with defects. Novel defects in nanostructured materials and semicrystalline materials.

MSE 335 Experimental Methods for Analysis of Material Properties 2. Offered in Fall Only. Prerequisite: C- or better in MSE 201. Principles and application of basic techniques for characterizing the properties of materials. Mechanical, thermal, electrical, optical and magnetic property measurements applied to metals, ceramics, polymers and semiconducting materials.

MSE 350 Mechanics of Materials 3. Prerequisite: MA 341. Covers fundamental topics in stress analysis and mechanics of materials including statics and structures, elasticity, plasticity, fracture, fatigue, testing methods, and engineering applications.

MSE 355 Electrical, Magnetic and Optical Properties of Materials 3. Offered in Spring Only. Prerequisite: PY 208 and MA 341. Fundamental treatment of the electronic properties of materials, including the electrical, magnetic and optical characteristics. The role of electrons, band structure, and Brillouin zones on the various classes of materials is discussed from the semiclassical and quantum mechanical viewpoints. Applications of these principles to specific technological devices is also covered.

MSE 360 Kinetic Processes in Materials 3. Offered in Spring Only. Prerequisite: MA 341 and MSE 301. Types, mechanisms, and kinetics of solid state phase transformations are covered with selected applications to all classes of materials. Mechanisms of diffusion and techniques for diffusion calculations are presented. The role of surface energy and strain in the evolution of structure during transformation is presented. Phenomena at different size scales (atomic, nano, micro) are described relative to the evolution of structure during transformation.

MSE 370 Microstructure of Inorganic Materials 3. Offered in Spring Only. Prerequisites: MSE 300, MSE 301, and MSE 320. Structure-property relationships in metallic and ceramic materials. Crystal structures of important metallic and ceramic elements, alloys, and compounds. Binary and ternary phase diagrams for notable systems will be presented. Microstructural features to be covered include grain size and distribution, multiphase microstructures, and defects. Examples of important metallic and ceramic systems for structural, electrical, optical and magnetic applications will be given.

MSE 380 Microstructure of Organic Materials 3. Offered in Fall Only. Prerequisite: CH 220 and MSE 300. Covers microstructure and properties of soft materials including polymer molecular weight distributions, amorphous polymers, semicrystalline polymers, copolymers, elastomers, rubber elasticity, strengthening mechanisms, creep, fracture and fatigue. Includes metals, ceramics, polymers and composites. Describes mechanical properties for nanostructured materials and biomaterials.

MSE 409 Nuclear Materials 3. Prerequisite: MSE 201. Properties and selection of materials for optimum design of nuclear steam systems. Implications of radiation damage to reactor materials and material problems in nuclear engineering. Overview of nuclear steam systems, crystal structure and defects, dislocation theory, mechanical properties, radiation damage, hardening and embrittlement due to radiation exposure and problems concerned with fission and fusion materials.

MSE 420 Mechanical Properties of Materials 3. Offered in Fall Only. Prerequisite: MSE 370 and MSE 380. Basic concepts for mechanical properties of materials, elasticity, plasticity, viscoelasticity, rubber elasticity, strengthening mechanisms, creep, fracture and fatigue. Includes metals, ceramics, polymers and composites. Describes mechanical properties for nanostructured materials and biomaterials.

MSE 423 Introduction to Materials Engineering Design 1. Offered in Fall Only. Materials selection in engineering design involving lecture, cooperative and problem-based learning techniques. Course stresses creative thinking, problem solving methodology, interdependence of design with analysis and evaluation, teamwork and sharpening of communication skills. Real industrial problems are introduced which are analyzed by student teams. This a half-semester course. The classroom lectures end at mid-semester. In the second half of the semester, student teams develop a proposal which is submitted to the industrial sponsors at the end of the semester. The proposal defines future work to be conducted under MSE 470.

MSE 440 Processing of Metallic Materials 3. Offered in Fall Only. Prerequisite: MSE 360 and MSE 370. Corequisite: MSE 420. Fundamental concepts of solidification and their application to foundry and welding practices; metal forming concepts applied to forging, rolling, extrusion, drawing, and sheet forming operations; machining mechanisms and methods; powder metallurgy; advanced processing methods including rapid solidification and mechanical alloying. Credit for both MSE 440 and MSE 540 is not allowed.

MSE 445 Ceramic Processing 3. Offered in Fall Only. Prerequisite: MSE 370. Ceramic processing of powders includes powder synthesis, characterization, mixing, and size reduction. Theoretical aspects include particle packing, particles in suspension, and some aspects of surface chemistry. Furnace methods include compaction, casting, and extrusion. Firing and sintering are examined. Credit for both MSE 445 and MSE 545 is not allowed.
MSE 455 Polymer Technology and Engineering 3. Offered in Spring Only. Prerequisite: MSE 380. This course will cover commercial polymers, polymer blends and miscibility, dynamic mechanical behavior, Boltzmann superposition principle, ultimate properties of polymers, polymer rheology and processing, recycling and design and selection of polymeric materials. Guest instructors from industry will give presentations on contemporary topics in polymer technology and engineering. Field trips are required.

MSE 456 Composite Materials 3. Offered in Spring Only. Prerequisite: MSE 420. The course covers the basic principles underlying properties of composite materials as related to the properties of individual constituents and their interactions. Polymer, metal and ceramic matrix composites are included. Property averaging and micromechanics of composites are covered at an introductory level. Emphasis is placed on design and processing of composite systems to yield desired combinations of properties. Credit for both MSE 456 and MSE 556 is not allowed.

MSE 460 Microelectronic Materials 3. Offered in Fall Only. Prerequisite: MSE 355. Processes and characterization techniques relevant to microelectronic materials science and technology. Boule growth, wafer preparation, oxidation, epitaxial growth, doping techniques, metallization, and device applications of elemental and compound semiconductors. Electrical, structural and chemical characterization of semiconductors is included as well as materials considerations relevant to device fabrication. Credit for both MSE 460 and MSE 560 is not allowed.

MSE 470 Materials Science and Engineering Senior Design Project 3. Offered in Spring Only. Prerequisite: MSE 423. Design project in materials science and engineering requiring problem definition and analysis, synthesis, and presentation of a designed solution. Students work in groups with a faculty advisor on problems submitted by local industrial sponsors or emerging research issues that represent the major specialty areas including ceramics, metals, polymers, or electronic materials.

MSE 480 Materials Forensics 3. Offered in Spring Only. Prerequisite: MSE 370 and MSE 380. Covers principles and prevention of the degradation of materials. The topics will include dissolution of polymer and ceramic materials, electrochemical corrosion, oxidation of metals and polymers, degradation of polymers, friction and wear, degradation of electrical device components, bio-deterioration of materials, and failure analysis. The general practice in failure analysis will be applied to a variety of case studies to illustrate important failure mechanisms.

MSE 490 Special Topics in Materials Engineering 1-4. Offered as needed for the development of new courses in materials engineering, including areas such as metals, ceramics, polymers, or microelectronic materials.

MSE 495 Materials Engineering Projects 1-6. Offered in Fall and Spring. Application of engineering principles to a specific materials engineering project by a student or small group of students under supervision of a faculty member. A written report required.

MT 105 Introduction to Medical Textiles 3. Offered in Fall Only. Corequisite: CH 101 and MA 131 or MA 141. Introduction to the structures and methods of production of polymers, fibers, yarns and fabrics used in medical applications. Survey of the performance requirements of current medical textiles and healthcare products used in health centers, as surgical implants and as consumer products. Overview of the structure, organization and integration of the medical textile, medical device and pharmaceutical industries within the healthcare sector. Credit not allowed if previous credit for TT 105.

MT 323 Introduction to Theory and Practice of Medical Fiber and Yarn Formation 3. Offered in Fall Only. Prerequisite: PY 211 or PY 205, PCC 203 or CH 221. Introduction to the manufacture of fibers and filament yarns used in medical textiles. It includes the flow behavior of polymeric materials as it relates to fiber formation. It also includes the application of fiber forming theories to synthetic and biopolymeric fibers used in medical textiles. The common methods of yarn manufacture are introduced.

MT 366 Biotextile Product Development 3. Offered in Fall Only. Prerequisite: MT 105 or PCC 105, MT 323, PCC 203 or CH 221, ZO 160, PY 205 or PY 211. Biotextile product development of surgical implants designed for the repair and replacement of tissues in cardiovascular, wound healing, orthopedic, dental and tissue engineering applications. Mechanical, physical, chemical, surface and biological properties including cell/bioretex interactions of fibers and fibrous structures will be reviewed. Biodegradable polymers, drug delivery systems, fiber reinforced composites, and strategies for surface modification and biorecognition will be reviewed in the light of material selection and structural design. Credit for TE 366 and TE 466 is not allowed.

MT 381 Medical Textile and the Regulatory Environment 3. Offered in Spring Only. The course will focus on the legal and regulatory environment as it impacts the design, manufacture, marketing and distribution of medical textiles and healthcare products. Fundamentals of legal theory, contract law, intellectual property, licensing, product liability and the Food and Drug Administration will be covered, providing the student with the ability to recognize and understand the legal issues involved with the medical textile supply chain.

MT 386 Medical Textiles Supply Network 3. Offered in Fall Only. Prerequisite: MT 105, TMS 210 or (TT 221 and TT 252), TAM 380, ZO 160. Study of the supply system for medical textiles and healthcare products among organizations and firms, including information requirements that are exchanged between producers, manufacturers, distributors, retailers, clinicians, institutional and individual users. Consideration of the market system, product pricing, channels to market, product lead times and the role of product managers. Modeling and simulation of supply networks will also be studied. Credit cannot be given for both MT 386 and TAM 486.

MT 432 Biotextiles Evaluation 3. Offered in Spring Only. Prerequisite: MT 323, ZO 160, Corequisite: MT 366 or TE 466. Evaluation of the performance of biotextiles and medical polymers in biological and microbiological environments, with an emphasis on in vitro and in vivo techniques for testing the biocompatibility and biostability of implantable biomedical products. Related issues will deal with quality assurance systems, inspection and sampling plans, ISO certification, good manufacturing practices, reference materials and organisms, and the use of accelerated tests and animal trials so as to meet regulatory requirements.

MT 435 Evaluation of Medical and Protective Textiles 3. Offered in Spring Only. Prerequisite: Senior standing, TMS 211, PY 211 or PY 205. Scientific principles and practices involved in the testing and qualification of the protection and comfort performance of medical and protective clothing.

MT 452 Formation, Structure and Assembly of Medical Textile Products 3. Offered in Fall Only. Prerequisite: MT 323, TMS 210 or (TT 221 and TT 252), PY 208 or PY 212. Braiding, weaving, knitting and nonwoven technologies in the design, patterning, formation and assembly of medical textiles and healthcare products. Specialized
laminating, finishing joining, cleaning and sterilizing techniques for conversion of textile structures into medical products. Structure/property relationships in terms of physical, chemical and biological performance of medical textiles and healthcare products.

MT 471 The Chemistry of Synthetic and Natural Bipolymers 3. Offered in Fall Only. Prerequisite: CH 220 or CH 221. Introduction to natural and synthetic biopolymers used for biomedical applications. Goals and challenges of biomaterials selection for biomedical engineering. Polymer concepts of polymerization and characterization. Sources/synthesis, chemical and physical properties and degradation mechanisms are described. Polymer classes include: polysaccharides, proteins, polyesters, polyurethanes, polyanhydrides and polyethers.

MT 482 Healthcare Product Management 3. Offered in Spring Only. Prerequisite: MA 231 or MA 241, ST 311 or ST 361, MT 386 or TAM 380. Overview and analysis of the entire health care complex, the markets, the needs, and especially the use of medical and biotextile products to meet these needs. Study of the product design, production, and distribution systems for medical textiles and biotextiles and other healthcare products. Covers roles of all organizations including designers, inventors, producers, buyers, consumers and users. Study of differences in regulatory systems, product testing, manufacturing quality control systems, and distribution and tracking systems.

MUS 100 Instrumental Music 1. Offered in Fall and Spring. The study and performance of instrumental music. Repertoire dependent upon instrument and level of interest and accomplishment.

MUS 103 Music Theory 3. Offered in Fall and Spring. Prerequisite: MUS 104. Through the examination of musical styles, as exemplified by various composers of the western music common practice period, the student will explore the fundamentals of music theory. Composition, analysis, and other practical skills will be used to enhance the study of traditional musical elements.

MUS 104 Aural Skills 1. Offered in Fall and Spring. Prerequisite: MUS 120 or Rudiments Placement Test. Co-requisite: MUS 104. This is the first course in a two-semester sequence which will lead to proficiency in sight singing, rhythmic skills, and conducting. Aural dictation of melodies, rhythms, and harmonies will be enhanced through computer-based software.

MUS 107 Class Piano 1. Offered in Fall and Spring. Development of technical and musical foundation for playing the piano. Exploration of repertoire in various keys, scale structures, harmonization of melodies using chord progressions, use of pedal. Materials supported with theory and aural examples. Section 001 for Music Minors and Honors students only. Section 002 for General Students and Honors students.

MUS 110 Choral Music 1. Offered in Fall and Spring. Study and performance of choral music by participation in Varsity Men's Glee Club (male chorus), Women's Choir, New Horizons Choir (mixed chorus), or Chamber Singers.

MUS 111 University Singers 1. Offered in Fall and Spring. Rehearsal and performance of choral literature. Includes instruction in individual vocal techniques, rehearsal protocols, and discussion of historical and musical significance of repertoire. May be repeated for credit. Possible charge for concert dress. Students may be asked to provide their own transportation to a local performance venue.

MUS 120 Rudiments of Music 3. Offered in Fall Only. Prerequisite: MA 231 or MA 241, ST 311 or ST 361, MT 386 or TAM 380. Upon instrument and level of interest and accomplishment.

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ensemble. May be repeated for credit. There is a band uniform charge; transportation to performances will be provided. Audition required. May be repeated up to 10 semesters.

MUS 133 British Brass Band 1. Offered in Spring Only. Rehearsal and performance of significant repertoire for British brass band, including individual practice techniques, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Possible charge for concert dress. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 134 Wind Ensemble 1. Offered in Fall and Spring. Rehearsal and performance of significant repertoire for wind ensemble, including individual practice techniques, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Possible charge for concert dress. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated for up to 10 semesters.

MUS 140 Jazz Improvisation 1. Offered in Fall and Spring. Study of basic and advanced techniques for jazz improvisation, including in-class performance and study of historical models. May be repeated for credit up to ten semesters. Audition required.

MUS 141 Jazz Combo 2 1. Offered in Fall and Spring. Rehearsal and performance of basic to advanced repertoire for small jazz ensemble, including individual practice techniques, improvisation, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 142 Jazz Ensemble 2 1. Offered in Fall and Spring. Rehearsal and performance of basic to advanced repertoire for jazz ensemble, including individual practice techniques, improvisation, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 143 Jazz Combo 1 1. Offered in Fall and Spring. Rehearsal and performance of advanced repertoire for small jazz ensemble, including individual practice techniques, improvisation, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 144 Jazz Ensemble 1 1. Offered in Fall and Spring. Rehearsal and performance of advanced repertoire for jazz ensemble, including individual practice techniques, improvisation, rehearsal protocols, discussion of historical and musical significance of repertoire, and public performances. May be repeated for credit. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 150 Vocal Techniques 1. Offered in Fall and Spring. Development and practice of vocal techniques suitable to solo and ensemble singing in a variety of musical styles, both historical and contemporary.

MUS 152 Pipes and Drums 1. Offered in Fall and Spring. Rehearsal and performance of music for bagpipes and drums, including individual practice techniques, traditional performance practices, and public performances. May be repeated for credit. Students may be asked to provide individual transportation to an off-campus local performance. Audition required. May be repeated up to 10 semesters.

MUS 180 Introduction to Musical Experiences 3. Offered in Fall and Spring. Examination of western musical materials, forms, styles and history through the primary musical experiences of composing, performing, and listening. Course designed for students with no formal musical training.

MUS 181 Exploring Music Theory 3. Offered in Fall and Spring. Exploring music theory provides the student insight into Basic theoretical elements of music from Western civilization, which are fundamental to analysis and creation of musical compositions. The course will cover tonality, rhythm, intervals, triads, composition of melodies, harmonic progressions, and lead sheets. This course will enrich the student who performs, sings, composes, and enjoys listening to music.

MUS 200 Understanding Music: Global Perspectives 3. Offered in Fall and Spring. Music as universal human phenomenon. Global approach to music's elements and concepts like melody, rhythm, and timbre; and how it functions in relationship to religious belief, observation, and experience; its role in the formation, expression, and contestation of social identity; and its expressive power in the exposition of narrative and drama.

MUS 201 Introduction to Music Literature I 3. Offered in Fall Only. Survey of Western art music from antiquity to end of eighteenth century. Includes examination of the art of music through discourses of philosophy (aesthetics) and anthropology (ethnomusicology). Core requirement for music minor. Requires the ability to read music notation.

MUS 202 Introduction to Music Literature II 3. Offered in Spring Only. Survey of Western art music from end of eighteenth century through end of twentieth century. Includes examination of contemporary popular genres and impact of media and technology on music production and consumption. Core requirement for music minor. REQUIRES ABILITY TO READ MUSIC NOTATION.


MUS 204 Aural Skills 2 1. Offered in Spring Only. Prerequisite: MUS 104 or Aural Skills 1 Placement Test.

MUS 205 Introduction to Music in Western Society 3. Offered in Spring and Summer. Introduction to the art of music in Western society, for the general student. Focuses on the western art music tradition, including stylistic periods from medieval to post-modern. Begins with the study of basic musical elements, formal principles and compositional techniques.

MUS 206 America's Music 3. Offered in Spring Only. Historical survey of music in the United States, including classical and popular, secular and religious, vocal and instrumental music genres and styles from the 18th to 21st centuries, studied in the context of relevant social and cultural issues.

MUS 207 Class Piano 2 1. Offered in Fall and Spring. Prerequisite: MUS 107. Development of technical and musical areas through study of solo and
ensemble repertoire; practical, theoretical and aural study of keys, scales and chord structures, harmonization and transposition of melodies. Section 001 for Music Minors and Hons. students only. Corequisite of MUS 203 and MUS 204 for students in the Music Minor, Performance Concentration. Section 002 for General Students and Hons. students.

**MUS 230 Introduction to African-American Music 3. Offered in Fall Only.** Comprehensive survey of African-American music in the United States from Colonial times to the, with emphasis on its unique features and contributions to American culture.

**MUS 260 History of Jazz 3.** History of jazz and the contributions of major artists. Emphasis of the various styles that have contributed to this American art form. Investigation of structural forms in the jazz idiom.

**MUS 300 Chamber Music Performance 1. Offered in Fall and Spring.** Performance of chamber music. Emphasis on chamber literature from the sixteenth through the twentieth centuries written for a wide variety of combinations ranging from string quartets to pieces written for specific instruments and voices.

**MUS 305 Music Composition 3. Prerequisite: MUS 103 or MUS 203.** Study and creation of musical works. Emphasis on writing original music and works imitative of conventional and contemporary musical styles.

**MUS 306 Music Composition with Computers 3. Offered in Fall Spring Summer.** Survey of the theory and history of computer music, compositional algorithms, digital synthesis techniques, composition of at least one computer music work -- a computer-assisted composition for traditional instruments, a piece for computer music on tape, a real-time piece, or a piece that combines tape and instrument(s).

**MUS 310 Music of the 17th and 18th Centuries 3. Offered in Spring Only.** Evolution of European music from 1600 to 1820, with emphasis on characteristics of Baroque and Classical form and style. Examination of major composers and representative works in light of social, political and cultural influences.

**MUS 315 Music of 19th Century Europe 3.** A survey of 19th century European music, including analysis of its texts, forms and composers, and its relations to other art forms of the period.

**MUS 320 Music of the Twentieth Century 3. Offered in Fall Only. Prerequisite: One 3-hour MUS class.** Study of Western Art Music from 1900 to present, emphasizing significant composers, repertoire, and compositional procedures and trends, including traditional, atonal, serial, aleatoric, electronic and computer music.

**MUS 330 Music Drama 3. Offered in Fall Only.** Survey of staged musical works spanning four centuries. Emphasis on large-scale dramatic works in the genres of opera, operetta, and musical theater. Designed for students with musical and/or theatrical experience.

**MUS 335 Choral Literature 3. Offered in Fall Only.** Survey of choral literature spanning five centuries. Emphasis on large-scale choral/orchestral masterworks in the genres of oratorio, passion, cantata, mass and requiem.

**MUS 350 World Music I: Music of Asia 3. Offered in Fall Only.** Examination of music from a variety of Asian traditions including India and Pakistan, Japan and Korea, Thailand and Indonesia. Emphasis on philosophical, social and religious contexts from which music emerges and in which it is experienced by native performers and listeners. No previous formal training in music is required.

**MUS 360 Women In Music 3. Offered in Spring Only.** The role of women in music as patrons, teachers, composers, and performers, placing them within the social, economic, and political framework to which they belong. Emphasis on Western Art Music and the role of women in popular music. No previous formal training in music is required.

**MUS 390 Applied Music 1. Offered in Fall and Spring.** Individual instruction in voice or instrumental performance. Includes development of technique basic to voice or instrument, as well as advancement of artistry, musicianship, and repertoire.

**MUS 493 Recital 2. Offered in Fall and Spring. Prerequisite: 4 Semesters of MUS 390 for Performance Concentration. MUS 493: Recital is the capstone for a student in the Music Minor performance concentration. Students receive weekly 45-minute individual instruction culminating in a public recital. Students also receive instruction in organizing the recital.

**MUS 495 Special Topics in Music 3. Offered in Fall and Spring.** Examination of selected topics in music.

**MUS 498 Independent Study in Music 1-3.** Directed independent study of selected topics for students with specialized interests in music and/or advanced musical ability. Credit and content determined by faculty member in consultation with Director of Music.

**NUCLEAR ENGINEERING**

**NE 201 Introduction to Nuclear Engineering 2. Offered in Fall Only. Prerequisite: MA 241, PY 205.** An introduction to the concepts, systems and application of nuclear processes. Topics include radioactivity, fission, fusion, reactor concepts, biological effects of radiation, nuclear propulsion, and radioactive waste disposal. Designed to give students a broad perspective of nuclear engineering and an introduction to fundamentals and applications of nuclear energy.

**NE 202 Radiation Sources, Interaction and Detection 4. Offered in Spring Only. Prerequisite: PY 208 and CSC 112.** Introduction to nuclear energy. Topics include radioactivity, radiation detection, interaction of radiation with matter, nuclear reactions, fission, fusion, nuclear reactors, radiation safety and protection, and laboratory measurement of nuclear radiation.

**NE 235 Nuclear Reactor Operations Training 2. Offered in Fall Only.** Principles of nuclear reactor operations. Lectures to cover basic nuclear engineering theory pertaining to fission reactor operations; laboratory sessions to provide hands on training with the PULSTAR nuclear reactor including facility pre-startup checks, approach to criticality, steady state operations, and measurement of various operating parameters. Qualified students may opt to enter training and study for the U.S. Nuclear Regulatory Commission exam to become federally licensed Nuclear Reactor Operators. Does not count towards NE graduation requirements.

**NE 301 Fundamentals of Nuclear Engineering 4. Offered in Fall Only. Prerequisite: MA 341, CSC 112. C- or better in NE 202.** Introductory course in nuclear engineering. Neutron physics, reactor operation, and reactor dynamics. Basic principles underlying the
design and operation of nuclear systems, facilities and applications. Laboratory sessions include neutron detection and measurement, reactor instrumentation, and radiometric measurements.

NE 400 Nuclear Reactor Energy Conversion 4. Offered in Spring Only. Prerequisite: MAE 301 and a C- or better in NE 301. Introduction to the concepts and principles of heat generation and removal in reactor systems. Power cycles, reactor heat sources, analytic and numerical solutions to conduction problems in reactor components and fuel elements, heat transfer in reactor fuel bundles and heat exchangers. Problem sets emphasize design principles. Heat transfer lab included. Credit will not be given for both NE 400 and NE 500.

NE 401 Reactor Analysis and Design 4. Offered in Spring Only. Prerequisite: C- or better in NE 301, Corequisite: MA 401. Elements of nuclear reactor theory for reactor core design and operation. Includes one-group neutron transport and multigroup diffusion models, analytical and numerical criticality search, and flux distribution and calculations for homogeneous and heterogeneous reactors, slowing down and thermalization models and transient isotopics. Laboratory observations and correlation of reactor measurements with theory.

NE 402 Reactor Engineering 4. Offered in Fall Only. Prerequisite: MAE 308 and either NE 400 or MAE 310. A course in thermal-hydraulic design and analysis of nuclear systems. Single and two-phase flow, boiling heat transfer, modeling of fluid systems. Design constraints imposed by thermal-hydraulic considerations are discussed. A thermal-hydraulics laboratory included. Credit will not be given for both NE 402 and NE 502.

NE 404 Radiation Safety and Shielding 3. Offered in Fall Only. Prerequisite: NE 301 with a grade of C- or better or NE 419. Radiation safety and environmental aspects of nuclear power generation. Radiation interaction, photon attenuation, shielding theory and design project, external and internal dose evaluation, reactor effluents and release of radioactivity into the environment, transportation and disposal of radioactive waste; and environmental impact of nuclear power plants.

NE 405 Reactor Systems 3. Offered in Fall Only. Prerequisite: NE 401, NE 402. Nuclear power plant systems: design criteria, design parameters, and economics. Topics covered include: PWR, BWR, core design, primary loops, auxiliary and emergency systems; containment, reactor control and protection systems, accident and transient behaviors.

NE 406 Nuclear Engineering Senior Design Preparation 1. Offered in Fall Only. Prerequisite: NE 401, Corequisite: NE 402. Preliminary design phase in nuclear engineering systems to prepare for the final design. Preliminary designs developed by teams with advice of faculty, with reports presented in oral and written form. Current and future systems emphasized, and use of computers encouraged.

NE 408 Nuclear Engineering Design Project 3. Offered in Spring Only. Prerequisite: NE 406. Projects in design of practical nuclear engineering systems. Preliminary designs developed by teams with advice by faculty as needed, with reports presented in oral and written form. Current and future systems emphasized, and use of computers encouraged.

NE 409 Nuclear Materials 3. Prerequisite: MSE 201. Properties and selection of materials for optimum design of nuclear steam systems. Implications of radiation damage to reactor materials and material problems in nuclear engineering. Overview of nuclear steam systems, crystal structure and defects, dislocation theory, mechanical properties, radiation damage, hardening and embrittlement due to radiation exposure and problems concerned with fission and fusion materials.

NE 412 Nuclear Fuel Cycles 3. Offered in Spring Only. Prerequisite: NE 401. Processing of nuclear fuel with descriptions of mining, milling, conversion, enrichment, fabrication, irradiation, reprocessing, and waste disposal. In-core and out-of-core nuclear fuel management design, including objectives, constraints, decisions and methodologies. Nuclear power plant and fuel cycle economics.

NE 418 Nuclear Power Plant Instrumentation 3. Offered in Fall Only. Prerequisite: ECE 221 or ECE 331. Instrumentation and supporting systems required for control and protection of a nuclear power plant. Radiation measurement, process measurement, and reactor operating principles used to develop instrumentation requirements and characteristics. Requirements and implementations of instrumentation, control and protection systems for pressurized and boiling water reactors. Design and implementation issues include power supplies, signal transmission, redundancy and diversity, response time, and reliability.

NE 419 Introduction to Nuclear Energy 3. Offered in Spring Only. Prerequisite: PY 202 or PY 208. Electrical power generation from nuclear fission, fundamental aspects of fission chain reaction, and reactor design. Reactor types, their static and dynamic characteristics and instrumentation. Reactor operation and safety. Nuclear fusion and fusion reactor development. Not open to majors in Nuclear Engineering.

NE 491 Special Topics in Nuclear Engineering 1-4. Detailed coverage of special topics.

NONPROFIT STUDIES

NPS 395 Special Topics in Nonprofit Studies 1-6. Offered as needed to present material not normally available in regular departmental course offerings or for offering of new courses on a trial basis.

NPS 490 Internship in Nonprofit Studies 4. Offered in Spring and Summer. Prerequisite: PS 203, COM 466. The 150-hour internship provides students with the opportunity to apply the knowledge, skills, and abilities gained through their coursework in the minor in Nonprofit Studies to a nonprofit organizational work setting. The course will include a bi-weekly, two-hour seminar that focuses on careers in the nonprofit sector and nonprofit employment strategies. Students will discuss and reflect upon the service-learning themes of the minor in Nonprofit Studies as they relate to their ongoing internship experiences. Departmental approval required.

NPS 498 Capstone Seminar in Nonprofit Studies 1. Offered in Fall and Spring. Prerequisite: PS 203, COM 466, Corequisite: NPS 490. This capstone seminar integrates the knowledge, skills, and abilities gained through coursework in the minor in Nonprofit Studies through class discussions and reflective writings where students draw upon previous service-learning experiences to reflect on challenges facing nonprofit leaders. Case studies and articles that focus on the themes of the minor are used to stimulate class discussions. Nonprofit leaders serve as discussants. In addition, students complete and submit a Nonprofit Studies portfolio, which documents successful achievement of program objectives. Departmental approval required.
NR 100 Introduction to Natural Resources 2. Offered in Fall Only. Orientation to natural resources management. Case study of a current natural resource management issue including biophysical, economic, social and political dimensions. Field experience with local natural resources issues. Career orientation and counseling. Open to Natural Resources, Forest Management and University Undesignated students only.

NR 300 Natural Resource Measurements 4. Offered in Spring Only. Prerequisite: (PB 360/365 or SSC 200) and (MA 231 or ST 311). Theory and practice of measuring, analyzing, and describing the characteristics of natural ecosystems. Surveying and mapping, inventory of vegetation, soils, wildlife habitat, and hydrology. Sampling, data analysis, and presentation of data. Use of geographic information systems to store, analyze, and present environmental data. Intensive instruction and practice in communication of technical information.

NR 301 Practicum for Professional Development I. Offered in Fall Only. Prerequisite: Junior standing, NR Majors, NR 100. Instruction in professional report writing and presentation, resume preparation and interview skills, professional ethics and practices, job search skills; review and critique of professional seminars and documents from NR 501 students; preparation for summer work experience.

NR 303 Humans and the Environment 3. Offered in Spring Only. Prerequisite: Junior standing, NR Majors. Study of human populations in the biophysical system and the environment. Emphasis on current issues, ecological principles and their relationships to basic biophysical processes; considers food, population dynamics, public land and common resources, renewable natural resources, pollution, water resources, energy and non-renewable resources.

NR 350 International Sustainable Resource Use 4. Offered in Summer. Study of sustainable use of natural resources in a global economy with consideration of consumption choices, sustainable production issues, conservation of various managed landscapes, and cross cultural perspectives. Specific topics vary somewhat by year and study location. Travel in North America in even years and to Sweden in odd years. Domestic or international travel overnight. Depending upon travel location, possible additional expense for passport, health certificate, insurance and domestic or international travel.

NR 360 Internship Experience 3. Offered in Fall Spring Summer. Prerequisite: NR 301. Internship experience with a natural resource agency or company. Most internships require working and living off-campus.


NR 401 Practicum for Professional Development II 1. Offered in Fall Only. Prerequisite: NR majors, NR 360. Preparation and presentation of journal on summer work experience, final report and oral presentation of summer work activities; instruction in presentation techniques; review and critique of seminars and documents; mentoring NR 301 students.

NR 406 Conservation of Biological Diversity 3. Offered in Spring Only. Population biology concepts fundamental to understanding the properties of the objects of conservation. Genetic diversity in agriculture, forestry, and animal breeding; the ethical and international policy issues in preservation and management.

NR 420 Watershed and Wetlands Hydrology 4. Offered in Fall Only. Prerequisite: SSC 200, BO 360. Principles of hydrologic science; classification and assessment of watersheds and stream networks; hydrologic, erosion, and water quality processes in natural and managed watersheds; wetlands hydrology; hydrologic measurements and data analysis; applications of hydrology and water quality management for forest agriculture, and urban ecosystems; watershed restoration. Emphasis field study of watersheds and hydrologic measurements. Two weekend field trips are required. Credit will not be given for both FOR(NR)420 and FOR(NR)520.

NR 421 Wetland Assessment, Delineation and Regulation 3. Offered in Spring Only. Prerequisite: SSC 200, BO 360, FOR 212 or BO 403 and FOR 420. Wetland definitions and systems of classification and functional assessment; methods for assessing ecological functions of wetlands; identification and delineation of jurisdictional wetlands in accordance with US Army Corps of Engineers procedures; application of federal and state regulatory programs. Five Saturday field trips are required. Credit will not be given for both NR 421 and NR 521.

NR 460 Renewable Natural Resource Management and Policy 3. Offered in Fall Only. The interaction of legal principles and governmental institutions in the development and implementation of natural resource policy and management. Legal principles, constitutional provisions and the location and organization of governmental programs. Examples from both historic and current case studies.

NR 484 Environmental Impact Assessment 4. Offered in Fall Only. Prerequisite: FOR 273 or NR 300 or ET 310. Impact assessment principles, practices, and their evolution. Lectures and field practicums concerning problems addressed by environmental assessment practitioners. Practical implications of current regulatory requirements, especially endangered species and wetlands.

NR 491 Special Topics in Forestry and Related Natural Resources 1-4. Offered in Fall and Spring. Independent (or group) study or research of a forestry or related natural resources topic with a faculty supervisor of the student's choice. Also courses offered on a trial basis.

NAVAL SCIENCE

NS 100 Naval Science Lab 0. Offered in Fall and Spring. Military drill, courtesies and honors, elements of unit leadership, physical fitness and professional development of the prospective Naval/Marine Corps Officer. Required for all Naval ROTC students.

NS 110 Introduction to Naval Science 2. Offered in Fall Only. Fundamental orientation to the Naval Service emphasizing the mission, organization, regulations, customs and traditions, broad warfare components of Navy and the major challenges facing today's Navy and Marine Officers.

NS 210 Leadership and Management 3. Offered in Fall Only. Assists students in acquiring knowledge and developing the cognitive processes necessary to make decisions in the practice of management. The student will learn the traditional foundations of management while
recent literature in the library and discussion of current topics in the fields of human and animal nutrition. Use of computer databases to conduct a literature search on the chosen topic. Preparation and presentation of a final oral report, including an abstract and effective visual aids.

NTR 400 Principles of Human Nutrition 3. Offered in Fall Spring Summer. Prerequisite: CH 220, CH 221; ZO 160 or BIO 181/183. Overview of fields of Nutritional Sciences; functions of nutrients in the human body; sources and properties of nutrients; relationships of food industry practices to nutrition. Credit will not be given for both NTR (FS)400 and NTR 500.

NTR 415 Comparative Nutrition 3. Offered in Fall Only. Prerequisite: CH 220 or both 221 and 223. Principles of nutrition, including the classification of nutrients and the nutrient requirements of and metabolism by different species for health, growth, maintenance and productive functions.

NTR 419 Human Nutrition and Chronic Disease 3. Offered in Spring Only. Prerequisite: Junior standing, ANS 230, or ANS/FS/NTR 301 or FS/NTR 400 or ANS/NTR/PO 415. Current concepts regarding, and physiological bases of the roles of nutrition in the prevention and treatment of acute and chronic disease states in humans with emphasis on the process of scientific discovery, reading of original research and transformation of research findings to public policy.

NTR 420 Community Nutrition 4. Offered in Fall Only. Prerequisite: NTR 301 and junior standing required. Junior standing required. This course exposes students to nutrition-related community programs, agencies, and activities. Through service-learning experiences, students will apply course material to teach nutrition in the community. Course topics will also cover behavior change models, educational pedagogies, and nutrition among diverse populations. Students are expected to provide their own transportation for the community service in the greater Raleigh area. Credit will not be given for both NTR 420 and NTR 520.

NTR 421 Life Cycle Nutrition 3. Offered in Spring Only. Prerequisite: NTR 301 and junior standing required. This course focuses on the physiologic changes and nutritional needs throughout the life cycle. Additionally, students will explore psychosocial and environmental influencers on food consumption and diet quality at each stage of life. Pregnancy and lactation, fetal development, infancy, early childhood, childhood, adolescence, young and middle adulthood, and geriatrics will be examined. Student will apply course content to real-world settings through individual and/or group service-learning projects. Credit will not be given for both NTR 421 and NTR 521.

NTR 490 Experience in Teaching, Research, or Service in Nutrition 3. Offered in Fall and Spring. This capstone course provides students with a supervised professional experience that involves both 90 hours of responsible participation in a teaching, research, or service setting and reflection on that experience through writing. Students must complete a plan-of-study contract to be signed by the course instructor and the student-identified preceptor prior to registration.

NTR 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

NTR 493 Special Problems in Nutrition 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated
PA 311 Public Policy Analysis and Evaluation 3. Offered in Fall Only. This course will be an introductory course for the study of policy analysis, i.e. the systematic study of political-issue problems and alternative policy choices. An individual semester-long project will be completed by each student that identifies a policy issue of interest to the student and various alternatives to implement or improve the policy. Students will measure outcomes of their alternative choices and choose a course of action based on anticipated outcomes.

PA 332 Human Resource Management in Public Sector 3. Offered in Spring Only. PA 332 is a fundamental, comprehensive course designed to provide a view of the major influence human resources management has in a productive public sector organization. Specifically, it examines the challenges of managing complex work systems in the political and institutional environments. Emphasis is given to the challenges facing the public sector in attracting and developing human assets in an environment of conflicting goals, stakeholder obligations and a highly aware electorate. With theoretical concepts established, the focus will shift to practical implementation tools to include recruitment, retention, compensation, and evaluation techniques.

PA 410 Public Administration for Police Supervisors 3. Introduces law enforcement supervisors to the subject of Public Administration as a field of intellectual inquiry and as a field of professional activity. Students will learn how important founding principles such as federalism, separation of powers, equity, and democratic accountability impact police organizations today. The more practical concerns of police administrators including budgeting and financial management, labor-management relations, and personnel law are also considered. Available only to distance education students enrolled in the AOMP.

PA 411 Managing Police Organizational Behavior 3. This course is designed to prepare police managers to develop more efficient and effective organizations. Particular attention is given to improving leadership and interpersonal communication skills through self assessment. Students will also study group dynamics, team building, and the importance of employee empowerment within a law enforcement context. Problem-solving tools and assessments utilized by police agencies to facilitate organizational change are also considered. Available only to distance education students enrolled in the AOMP.

PA 412 Management Skills & Practices for Police Supervision 3. The purpose of this course is to introduce law enforcement supervisors to management skills that can enhance their individual and organizational effectiveness. Students will learn collaborative leadership, conflict resolution, staff development, group problem solving, delegation and coaching. The skills taught in this class are considered theoretically (through reading assignments and lectures), experientially (through role plays, assessment center exercises, and management inventories), and analytically (through written analyses and class discussions). Available only to distance education students enrolled in the AOMP.

PA 420 State and Local Economic Development Policy 3. Offered in Spring Only. In many communities, both rural and urban, the most immediate policy problem confronting public leaders is how to improve the local economy. The purpose of this course is to introduce public leaders to the tasks and challenges in policy development for improving the economies of communities. This course introduces students to the strategies for attracting and retaining public and private investments in a local economy. An individual semester long project will be completed by each student that presents an original economic development strategy, program or project for a specific community (city/town or county).

PB 101 Perspectives on Botany 1. Offered in Fall Only. Orientation to modern botany, including discussions of historical background, relation to other sciences, the nature of modern subdisciplines, professionalism and ethics, local resources of personnel and facilities, educational opportunities, and career possibilities.

PB 200 Plant Life 4. Offered in Fall Spring Summer. An introduction to the structure, processes, and reproduction of higher plants, including the diversity of the plant kingdom and principles of inheritance, ecology, and evolution. Credit cannot be given for both BO 200 and BO 250.

PB 208 Agricultural Biotechnology: Issues and Implications 3. Offered in Spring and Summer. Trends and issues of agricultural biotechnology in today's society are addressed while covering the basic biological science behind the technology. Applications of and policy issues associated with plant, animal, and environmental biotechnology used in the agricultural industry are examined from an interdisciplinary approach.

PB 213 Plants and Civilization 3. Prerequisite: BIO 125, BIO 105 or PB 200. Economic social, political, religious, and medical roles of plants and plant products in human civilization. Foods, beverages, drugs, fibers, oils, latexes, religious symbols and elements.

PB 215 Medicinal Plants 3. Offered in Fall Only. Prerequisite: CH 101 and any one of the following courses: BIO 125,BIO 181, PB 200, ZO 150, ZO 160. Plants and their derived pharmaceuticals in Western medicine and in herbal medicine.

PB 220 Local Flora 3. Prerequisite: BIO 125 or PB 200. Structural terminology of vascular plants, field identification of plant species using popularized field guides, description of plant community types and their soil and topographic features.

PB 250 Plant Biology 4. Offered in Fall Only. An introduction for Life Science majors to the ecology, structure, function, processes, reproduction and evolution of higher plants. BIO 181 and BIO 183 or BIO 125; Students may not receive credit for both BO 200 and BO 250.

PB 277 Space Biology 3. Offered in Fall Only: Prerequisite: BIO 105 or BIO 140 or BIO 181 or BIO 183 or PB 200. Overview of the biology of plants, animals and humans in the space environment, including gravitational biology, aerospace medicine, search for extraterrestrial life, terraforming and life support.

PB 295 Special Topics in Botany 1-4. Offered in Fall Spring Summer. Trial offerings of new or experimental courses in Botany at the early undergraduate level.
PB 321 Introduction to Whole Plant Physiology 3. Offered in Spring Only. Prerequisite: BIO 183 or PB 200 or PB 250; CH 101/102 and CH 220 or CH 221. Physiology of higher plants with emphasis on whole plant aspects including structure-function relationships, water and solute movement, energy sources and needs, plant growth and development, and the impact of plant physiology findings on agriculture. Students cannot receive credit for both PB 321 and PB 421.

PB 330 Evolutionary Biology 3. Offered in Fall Only. Prerequisite: BIO 181, BIO 183. Principles and patterns of organic evolution. Topics will include the origin of life, patterns of genetic variation, adaptations, natural selection, and the formation of species, the relationship between micro and macroevolution, and the importance of evolution to humans and medicine.

PB 360 Ecology 4. Offered in Fall Spring Summer. Prerequisite: BIO 181. The science of ecology, including factors which control distribution and population dynamics of organisms, structure and function of biological communities, and energy flow and nutrient cycling in ecosystems; contrasts among the major biomes; and principles governing ecological responses to global climatic and other environmental changes.

PB 400 Plant Structure and Diversity 4. Offered in Spring Only. Prerequisite: BIO 181 or PB 200 or PB 250. Survey of the structure and diversity of plants. Emphasis on anatomy, including cells, tissue systems, and organs, morphology, evolutionary trends, adaptive strategies, and bases for assumed phylogenetic relationships of fossil as well as living forms. Two one-day weekend field trips.

PB 403 Systematic Botany 4. Offered in Fall Only. Prerequisite: PB 200, PB 250, BIO 183, Junior standing. The course introduces basic and contemporary systematic principles and methods as applied to vascular plants, with emphasis on flowering plants. It covers classification, identification, phylogenetics, and molecular approaches, and surveys important and common plant families representing major groups of vascular plants.

PB 405 Wetland Flora 3. Offered in Fall Only. Prerequisite: PB 200 or PB 250 or PB 403 or FOR 212. Plant morphological terminology and identifications of wetland plants; discussion of wetland flora, plant communities, functions and values of North Carolina wetland types; several one-day weekend field trips required.


PB 414 Cell Biology 3. Prerequisite: (BIO 183 or ZO 160) and CH 221. The chemical and physical bases of cellular structure and function with emphasis on methods and interpretations.

PB 421 Plant Physiology 3. Offered in Fall Only. Prerequisite: BIO 183 or ZO 160, or PB 200 and CH 220 or CH 221. Physiology of higher plants with emphasis on biochemical, cell biological and molecular aspects of how plants function. Unique aspects of regulation of plant metabolism including photosynthesis, respiration, nitrogen fixation, cell wall biosynthesis, growth and stress responses will be emphasized. The course is intended for students interested in postgraduate studies in plant biology. Students cannot receive credit for both PB 321 and PB 421.

PB 422 Plant Physiology Laboratory 1. Offered in Spring Only. Prerequisite: PB 421. Laboratory to accompany BO 421. Exercises are designed to study plant processes such as respiration, photosynthesis, tropisms, and secondary metabolite accumulation. Basic laboratory procedures in separation art., analytical techniques including electrophoresis, chromatography and spectroscopy and at least one library research project will be included. The course is intended for students interested in postgraduate studies in plant biology and in technical positions in plant biology research laboratories.

PB 445 Paleobotany 4. Prerequisite: BIO 181 or MEA 102. Morphologic, taxonomic, geologic and evolutionary relationships of fossil plants; emphasis on vascular plants; discussions of taphonomy, biogeography and palynology. Requires weekend field trips at student expense. Credit will not be allowed for both BO 445 and BO 545.

PB 476 Applied Bioinformatics 2. Offered in Fall Only. Prerequisite: BIT 410 or BCH 454 or GN 311. The haploid human genome occupies a total of just over 3 billion DNA base pairs. This information is not contained in books, but stored in electronic databases. Computational biology utilizes infer function by comparative analysis. This course is designed for life scientists from all fields to introduce them to the power of bioinformatics and enable them to access and utilize biological information in databases for their own research.

PB 480 Introduction to Plant Biotechnology 3. Offered in Fall and Spring. Prerequisite: BIT 410 or CS 211 or GN 311 or PB 421. Introduction to molecular techniques in the plant sciences, gene identification and isolation, plant tissue culture and transformation, and methods for working with single and multiple locus traits. Discussions of the role and potential of plant genetic engineering to solve problems facing agriculture.

PB 481 Plant Tissue Culture and Transformation 2. Offered in Fall Only. Prerequisite: BIT 360 or MB 409 or BCH 454 or ZO 480. Basic techniques in plant tissue culture and transformation. Empirical approaches to techniques in plant tissue culture, designing transgenes for expression in specific plant cell organelles and tissues, use of reporter genes to optimize transformation, and troubleshooting transformation. Laboratory sessions provide hands-on experience with plant tissue culture and transformation. Use of reporter genes, fluorescence microscopy and digital imaging. Half semester course, first part.

PB 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PB 493 SP Problems in BO 1-6. A learning experience within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PB 495 Special Topics in Botany 1-6. Offered in Fall Spring Summer. Prerequisite: 8 hrs. of Botany courses. Individualized study, under faculty supervision, of botanical topics in the student's area of interest and not covered in existing courses. Development of a new course on a trial basis.
PCC 101 Introduction to Polymer and Color Chemistry 2. Offered in Fall Only. Prerequisite: PCC 104. Introduction of topics related to Polymer and Color Chemistry, e.g. fiber and fiber forming polymers, polymerization methods, into to color assessment methods, various chemistry disciplines, molecular interactions, periodic table, acids, bases, solutions, into to and examples of textile coloration and textile finishing techniques.

PCC 104 Introduction to Polymer and Color Chemistry Lab 1. Offered in Fall Only. Prerequisite: PCC 101. An introduction to hands-on laboratory work for the study of basic polymer principles, dye synthesis, forensic analysis and coloration of fibers.

PCC 106 Polymer Chemistry and Environmental Sustainability 3. Offered in Fall Only. Prerequisite: CH 101; Corequisite: CH 221. Polymers are prevalent in almost every part of our lives. Many polymers are petroleum based and their raw material supply is limited. Using a theme of environmental impact, this course will review the origin and preparation of key industrial raw materials and how they are used in polymer synthesis. Properties of synthetic polymers will be introduced and concepts for establishing sustainable polymers will be discussed.

PCC 203 Introduction to Polymer Chemistry 3. Offered in Fall Spring Summer. Prerequisite: CH 101, TC 105 or TT 105. Organic reaction principles necessary to understand the preparation, properties and chemistry of polymers. Synthesis, applications and behavior of common classes of polymers with emphasis on those materials used in the textile industry. The chemistry and structure of natural and man-made fibers.

PCC 301 Technology of Dyeing and Finishing 3. Offered in Fall and Spring. Prerequisite: PCC 106 or PCC 203 or TE 200 and Corequisite: PCC 304. Basic principles and procedures for the preparation, dyeing, printing, and finishing of natural and man-made fibers. The chemical nature of dyes and fastness properties and the chemical nature of finishes used to impart specific end-use properties.

PCC 302 Technology of Textile Wet Processing 4. Offered in Fall Spring Summer. Prerequisite: TT 105 or PCC 105, TMS 211, CH 101, PY 211 or PY 205. Introduction to the science and technology used in textile wet processing. Topics include preparation, dyeing, printing and finishing of textiles, basics of color generation and measurement. Emphasis mainly on cotton, wool, nylon and polyester. Laboratory includes experiments in wet processing and a project on statistical analysis of fabric defects.

PCC 304 Technology of Dyeing & Finishing Laboratory 1. Offered in Fall and Spring. Prerequisite: PCC 106 or PCC 203 or TE 200 and Corequisite: PCC 301. Laboratory experience involving the preparation, dyeing, printing, and finishing of natural and man-made fibers.

PCC 350 Introduction to Color Science and Its Applications 2. Offered in Spring Only. Prerequisite: PCC 301 and either PY 208 or PY 212; Corequisite: PCC 354. Basic principles and applications of color science. Physical, physiological and psychophysical aspects of color, color perception, color specification, color measurement and color control.

PCC 354 Intro to Color Science Laboratory 1. Offered in Spring Only. Prerequisite: PCC 301 and either PY 208 or PY 212; Corequisite: PCC 350. An introduction to hands-on laboratory work for the color measurement and perception of colored materials.

PCC 401 Manufacturing and its Impact on Safety, the Environment, and Society 3. Offered in Fall Only. Relationship of society to safety and environmental aspects of manufactured products. Quantifying manufacturing risks. Protective methods, e.g. administrative, engineering, personal, treatment, pollution prevention. Social factors, e.g. political, regulatory, legal, consumer attitudes, public policy, perceptions. Understanding complex social issues, especially situations with conflicting goals. Critical comparison of options for risk reduction, and selecting reasonable (hopefully optimal) courses of action in complex and uncertain situations. Unsolved problems of industry and society (e.g. greenhouse effect). Relationships of ethics, laws and regulations to manufacturing.

PCC 402 Introduction to the Theory and Practice of Fiber Formation 3. Prerequisite: PCC 203, PY 206 or PY 212, MA 242, CH 201. Flow behavior of polymeric materials as related to the formation of fibers by melt, dry and wet extrusion. Elementary theories of drawing and heat setting. Application of fiber-forming theories to synthetic and cellulosic fibers.

PCC 403 Carpet Industry 3. Offered in Fall Only. Prerequisite: Senior standing PCC 301 or 302, TT 221, 241 and 251 or TMS 210 or TE 301 and 302. An overview of all aspects of carpet production and marketing including fiber properties and selection, yarn formation, carpet formation, dyeing and finishing, design, quality assurance and testing, marketing, and environmental issues. Instruction provided by industry professionals. May include a field trip.

PCC 407 Wet Processing Operations and Quality Control 3. Offered in Spring Only. Prerequisite: PCC 310, PCC 320, TMS 210, and CH 431 or TC 441. Pilot-scale batch and continuous wet processing. Selection and use of processes and quality control tests.


PCC 412 Textile Chemical Analysis 2. Offered in Spring Only. Prerequisite: PCC 301 and TE 303 or CH 331 or CH 431; Corequisite: PCC 414. Application of analytical techniques for analysis to fibers, textile chemicals and textile processes; atomic absorption, ultraviolet, visible, near-infrared and infrared spectrophotometer; chromatography; interfacial tension; calorimetric, gravimetric and complexometric analyses. Emphasis on interpretation of data and solving problems of analysis for quantitate and characterization purposes.

PCC 414 Textile Chemistry Analysis Lab 1. Offered in Spring Only. Prerequisite: PCC 301 and TE 303 or CH 331 or CH 431 and Corequisite: PCC 412. Laboratory course in the application of analytical techniques for analysis to fibers, textile chemicals and textile processes; atomic absorption, ultraviolet, visible, near-infrared and infrared spectrophotometry; chromatography; interfacial tension; calorimetric, gravimetric and complexometric analyses. Emphasis on interpretation of data solving problems of analysis for quantitave and characterization purposes.

PCC 420 Textile Dyeing and Printing 3. Offered in Spring Only. Prerequisite: PCC 301. Topics in coloration of textile fibers; chemical and physical mechanisms in textile dyeing and printing.

PCC 461 Chemistry of Polymeric Materials 3. Offered in Fall Only. Prerequisite: TE 200 and CH 220 or CH 223 and Corequisite: PCC 464. Properties unique to polymers are related to their high molecular weight, long and flexible chains, or polymers physics. The detailed molecular structures of polymer, polymer chemistry, are characterized and utilized to establish structure-property relations. An inside/outside approach connects their microstructures to their local conformational flexibilities, which impact their global responses, such as sizes and shapes and conformational entropies, to both their environments and the stresses placed upon them.

PCC 462 Characterization and Physical Properties of Polymers 3. Offered in Fall Only. Prerequisite: PCC 461. Properties unique to polymers are related to their high molecular weight, long and flexible chains, or polymers physics. The detailed molecular structures of polymer, polymer chemistry, are characterized and utilized to establish structure-property relations. An inside/outside approach connects their microstructures to their local conformational flexibilities, which impact their global responses, such as sizes and shapes and conformational entropies, to both their environments and the stresses placed upon them.

PCC 464 Chemistry of Polymeric Materials Laboratory 1. Offered in Fall Only. Prerequisite: TE 200 and CH 220 or CH 223 and Corequisite: PCC 461. Polymers are a critical component of most products used by society today. Understanding their formation and properties is key to development of the materials of tomorrow. This laboratory course is focused on preparation of the major synthetic polymers using step-growth and chain-growth polymerization techniques. The properties of the resultant polymers are studied.

PCC 466 Polymer Chemistry Laboratory 3. Prerequisite: TC 441 or CH 431. Senior standing. Synthesis and characterization of polymers; thermodynamics of rubber elasticity and gelation; spectroscopic, thermal and scattering techniques for polymer analysis. The processing of polymers into fibers and films.

PCC 467 The Chemistry of Synthetic and Natural Biopolymers 3. Offered in Fall Only. Prerequisite: CH 220 or CH 221. Introduction to natural and synthetic biopolymers used for biomedical applications. Goals and challenges of biomaterials selection for biomedical engineering. Polymer concepts of polymerization and characterization. Sources/synthesis, chemical and physical properties and degradation mechanisms are described. Polymer classes include: polysaccharides, proteins, polyesters, polyurethanes, polyamides and polyethers.

PCC 474 Forensic Chemistry Laboratory 3. Offered in Fall Only. Prerequisite: CH 220 or CH 223 and TMS 211. Forensic chemistry is the application of chemistry to the law. It is a key part of crime scene investigations. In this course, students work in teams and discover standard methods of crime scene processing, latent evidence processing and analysis of materials and chemicals germane to forensic trace evidence. Advanced analytical chemistry techniques will be learned and applied to solve a ‘crime’ with suspects. Students will attempt to solve the crime and will present their analytical evidence in a courtroom setting with cross-examination.

PCC 490 Undergraduate Research in Polymer and Color Chemistry 1-6. Offered in Fall Spring Summer. Prerequisite: PCC 301; PCC 464; CH 461; and TE 303, CH 331 or CH 431. Faculty-supervised individual research for undergraduates in PCC. Students must find an advisor from within the department with whom to work on a regular basis. Intended for PCC majors.

PCC 491 Seminar in Polymer and Color Chemistry 1. Offered in Fall Spring Summer. Familiarizes student with the principal sources of polymer and color chemistry literature and emphasizes importance of keeping abreast of developments in the field. Emphasizes fundamentals of technical writing. Arranged. Intended for PCC majors.

PCC 492 Special Topics in Polymer and Color Chemistry 3. Offered in Fall Spring Summer. Presentation of material not normally available in regular course offerings or offering of new courses on a trial basis. Credits and content determined by faculty member in consultation with the Department Head.

### PHYSICAL EDUCATION

PE 101 Fitness and Wellness 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced running activities as well as strength and endurance conditioning exercises.

PE 102 Fitness Walking 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced walking techniques and strength conditioning exercises.

PE 103 Water Aerobics 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues are also addressed. The components of fitness will be met through structured individually paced water aerobics classes that will take place in chest deep water. Muscular strength activities could take place in or out of water.

PE 104 Swim Conditioning 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. This course covers the mechanics of a variety of strokes, training methods, training principles, safety, with swim techniques that maximize fitness gains and minimize injuries.

PE 105 Aerobics and Body Conditioning 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced aerobic classes. Muscular strength activities could take place in or out of the aerobics room.

PE 106 Triathlon 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced swim, cycle and run training techniques. The student must provide bicycles and ANSI approved helmets.

PE 107 Run Conditioning 1. Offered in Fall Spring Summer. This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition.
composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through individually paced running activities on an indoor or outdoor track, and/or a cross-country route. Muscular strength activities will occur in a weight room or incorporated during running activities.

**PE 108 Water Step Aerobics 1. Offered in Fall Spring Summer.**
This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced step aerobics classes that will take place in chest deep water on an aquatic exercise step. Muscular strength activities could take place in or out of the water.

**PE 109 Step Aerobics 1. Offered in Fall Spring Summer.**
This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced step aerobics classes. Muscular strength activities could take place in or out of the aerobics room.

**PE 110 Adapted Physical Education 1. Offered in Fall Spring Summer.**
This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced aerobic, muscular strength and muscular endurance activities that meet the need of students with medical/physical limitations. For students with medical problems who are unable to take regular Physical Education classes. Repeatable up to two semesters.

**PE 111 Indoor Group Cycling 1. Offered in Fall Spring Summer.**
This course is designed to teach and apply the principles of lifetime physical fitness, utilizing the five major components of cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. A variety of health and wellness issues will be addressed. The components of fitness will be met through structured individually paced indoor group cycling classes. Muscular strength activities could take place in or out of the main classroom.

**PE 214 Beginning Swimming 1. Offered in Fall Spring Summer.**
Swimming strokes and deep water skills for the non-swimmer to survive in the water.

**PE 215 Advanced Beginning Swimming 1. Offered in Fall Spring Summer.**
Prerequisite: PE 214 or equivalent skill. Continuation of Basic Strokes acquired in Beginning Swimming, additional new strokes, and survival skills.

**PE 216 Soccer 1. Offered in Fall Spring Summer.**
Soccer with emphasis on skills development, playing strategies, and rules of the game.

**PE 217 Survival Swimming 1. Offered in Fall Only.**
Prerequisite: PE 214 or equivalent skill. This course will provide NCSU students with the opportunity to learn water survival skills and techniques that will enhance their chances of survival if stranded in the water. Skills include drownpfoofing, underwater swimming, survival swim strokes, jumping from a height, clothing inflation techniques, and swimming through a simulated oil/debris field. These survival skills and techniques will help promote physical fitness and a healthy lifestyle.

**PE 219 Gymnastics 1. Offered in Fall and Spring.**

**PE 221 Intermediate Swimming 1. Offered in Fall Spring Summer.**
Prerequisite: PE 214 or equivalent skill. This course is designed to provide instruction in five basic swim strokes- front crawl (freestyle), back crawl (backstroke), breaststroke, elementary backstroke and sidestroke. Additional emphasis will be placed on increased cardiovascular fitness along with skill development in treading water, underwater swims, turns and dives.

**PE 222 Lifeguard Training 1. Offered in Fall and Spring.**
This course is designed to provide entry-level lifeguard participants with the knowledge and skills prevent, recognize and respond to emergencies and to provide care for injuries and sudden illnesses until Emergency Medical Services (EMS) personnel arrive and take over. Optional fee assessed for certification.

**PE 223 Skin & Scuba Diving I 1. Offered in Fall and Spring.**
Topics include the use and care of scuba equipment, diving skills, problem solving, emergency procedures, basic rescue techniques, direct and indirect effects of pressure, medical contradictions, oxygen enriched are diving, and gas management. Optional fee assessed for open-water training field trip and certification. Students must provide their own transportation for fieldtrip(s).

**PE 224 Water Safety Instructor 1. Offered in Spring Only.**
Designed to provide students with the skills and knowledge necessary to qualify for an American Red Cross Water Safety Instructor's certification. Optional fee assessed for certification.

**PE 225 Scuba Leadership 2. Offered in Fall Only.**
Prerequisite: PE 227 or equivalent skill. This course will provide NCSU students with the opportunity to build upon the skills learned in PE 227 and progress towards proficiency as a scuba diving leader. This course will help promote physical fitness and skill development in scuba diving, as well as an understanding of the knowledge and skills of scuba diving leadership. Participation in scuba leadership provides interested students with the opportunity to seek clarification as a scuba diving leader. Fee is assessed for required fieldtrip(s). Students must provide their own transportation for fieldtrip(s).

**PE 226 Skin and Scuba Diving I 2. Offered in Fall Spring Summer.**
This course is designed for students with little or no experience, emphasizing safety and responsible skin and scuba diving techniques. Topics include the use and care of scuba equipment, diving skills, problem solving, emergency procedures, basic rescue techniques, direct and indirect effects of pressure, medical contradictions, oxygen enriched are diving, and gas management. Optional fee assessed for open-water training field trip and certification. Students must provide their own transportation for fieldtrip(s).

**PE 227 Skin & Scuba Diving II 2. Offered in Fall and Spring.**
Prerequisite: PE 226 or equivalent skills. This course will build on the knowledge and skills learned in Skin & Scuba Diving I with emphasis on diver rescue techniques. coursework will require a deeper understanding of dive planning, dive physiology, gas management, and diving first aid. Coursework will also require a higher skill level relating to propulsion techniques, navigation, equipment handling, buoyancy control, search & recovery techniques, and diving first aid than is required in Skin and Scuba Diving I. Optional fee assessed for open water training fieldtrip and certification. Students must provide their own transportation for fieldtrip(s).

**PE 228 Springboard Diving 1. Offered in Fall Spring Summer.**
Prerequisite: PE 215 or equivalent skills. Development of fundamental one-meter springboard diving.

**PE 230 Pilates/Core Training 1. Offered in Fall Spring Summer.**
This course will teach the fundamentals of Pilates which are to improve body awareness, increase breathing capacity and improve postural alignment through simultaneous stretching and strengthening movements. The goal of Pilates exercises is to achieve optimal functional fitness. The knowledge and training gained from Pilates will
not only benefit an individual in their daily activities, but also improve their performance in any physical activity they choose to participate in.

PE 231 Scientific Diving 3. Offered in Spring Only. Prerequisite: PE 227 or equivalent skill. This course covers the knowledge, skills, and diving experience necessary to plan and safely conduct scientific dives with regards to site selection, safety procedures, gas mix considerations, equipment requirements, data collection techniques, and dive team selection. These skills and techniques will help promote physical fitness and a healthy lifestyle. Successful completion of all phases of the course will qualify students for certification as a "scientific diver." This course meets American Academy of Underwater Sciences (AAUS) guidelines. Fee is assessed for required fieldtrip(s). Students must provide their own transportation for fieldtrip(s).

PE 232 Track & Field 1. Offered in Fall Only. Develops knowledge, skill and interest in track and field events.

PE 233 Clogging 1. Offered in Fall and Spring. An entry level dance course stressing the fundamentals of traditional and precision clogging. Emphasis on basic foot movements, combinations and individual freestyle.

PE 234 Country Dance 1. Offered in Fall and Spring. American Heritage dances, Texas two-step, and Western Square Dance.

PE 235 Beginning Karate 1. Offered in Fall and Spring. Introduction to traditional Japanese karate: kihon (basic punching, striking, blocking, and kicking techniques); kata (formal drills), yaku sukoku kumite (pre-arranged sparring); and demonstration of ji-ya-kumite (controlled free sparring). Karate uniform required.


PE 237 Weight Training 1. Offered in Fall Spring Summer. Provides essential knowledge of the Principles of Muscular Strength development and an opportunity to acquire skill in a variety of progressive resistance exercises.

PE 238 Wrestling 1. Offered in Fall and Spring. Wrestling skills, safety considerations, and conditioning factors necessary for moderate competition in a combative sport-beginning skills through more advanced techniques.

PE 239 Self Defense 1. Offered in Fall and Spring. Basic self defense skills and techniques. Skills covered include falls, kicks, punches, and escapes; plus psychology of physical and sexual assault. Physical contact between students and instructor.

PE 240 Social Dance 1. Offered in Fall Spring Summer. Basic steps and fundamentals of leading and following in the Fox Trot, Waltz, Cha-Cha, Shag, and one other current popular dance form.

PE 241 Social Dance II 1. Offered in Fall and Spring. This course will focus on training students to understand and perform more complex dances in an improvisational environment. Emphasis will be on learning advanced level dance steps and combinations that are more challenging or complex social dances not currently offered in the beginning level class. Dances taught will differ from semester to semester.

PE 242 Badminton 1. Offered in Fall Spring Summer. Skills development, strategies and rules of singles and doubles play.

PE 243 Bowling 1. Offered in Fall Spring Summer. Instruction in ball selection, grip, stance, approach, delivery, bowling etiquette, safety precautions, rules, scoring, terminology, and general theory of spare coverage. Additional fee assessed.

PE 244 Fencing 1. Offered in Fall and Spring. Development of offensive and defensive skills; emphasis on rules, courtesy, and strategy of bouting.


PE 246 Handball 1. Offered in Fall and Spring. Skills development, rules and strategies for singles, cut-throat, and doubles play of four wall handball.

PE 248 Squash 1. Offered in Fall and Spring. Skill development and strategies of play. Equipment selection, safety, history, and rules.

PE 249 Tennis I 1. Offered in Fall Spring Summer. Basic tennis skills on grips, footwork, ground strokes, service. Rules and basic strategy for singles play. Introduction to volleys, lobs, overheads, and doubles.

PE 250 Tennis II 1. Offered in Fall Spring Summer. Prerequisite: PE 249. Review basic tennis skills on grips, footwork, ground strokes, and service. Stroke production involved in more aggressive/offensive style of play: approach and volley, spin serve and kick serve. Emphasis on half-volleys, lobs, overheads, and supplemental shots. Active drills and point play situations for aggressive singles and doubles play.

PE 251 Target Archery 1. Offered in Fall Spring Summer. Shooting fundamentals, safety, selection, and care of equipment.

PE 252 Downhill Skiing 1. Offered in Spring Only. Skills and techniques in downhill skiing. Emphasis on safety control, and proper equipment selection. On slope instruction held at selected ski site during semester break. Four classroom sessions on campus prior to trip. Additional cost to student approximately $200.00.

PE 253 Orienteering 1. Offered in Fall and Spring. Navigating on foot from defined point to defined point, with use of map and compass in the shortest possible time.

PE 254 Beginning Equitation 1. Offered in Fall and Spring. Hunt seat equitation, care of horse and tack, and control skills at the walk, trot and canter. Meets off campus once a week. Additional fee assessed.

PE 255 Basic Canoeing 1. Offered in Fall and Spring. Instruction and experience in flatwater canoe skills; emphasizing paddling skills, safety, flat and moving water travel techniques and proper equipment selection. Plan and participate in one required weekend fieldtrip. Additional charge assessed for the fieldtrip. Refer to the online schedule of classes for the current charge.

PE 256 Racquetball 1. Offered in Fall Spring Summer. Skill development, strategies and rules of singles, doubles and cutthroat play.

PE 257 Backpacking 1. Offered in Fall and Spring. Designed for students with little or no backpacking experience. Safe and environmentally-sound camping practices. Equipment/clothing, first aid
and safety management agencies, land navigation, and trip planning. Plan and participate in one required weekend fieldtrip. Additional charge assessed for the fieldtrip. Refer to online schedule of classes for the current charge.

**PE 258 Basic Rock Climbing** 1. Offered in Fall Spring Summer. Instruction and direct experience for the beginning rock climber. Emphasis on safe rope systems for belaying and basic movement on rock.

**PE 259 Intermediate Rock Climbing** 1. Offered in Fall and Spring. Prerequisite: PE 258. Development of intermediate rock climbing skills and practices including: climbing safety, belaying techniques, anchor systems, partner and self-rescue, rappelling and ascending techniques, minimal impact climbing, and climbing hazards. Participate in one required weekend fieldtrip. Additional charge assessed for the fieldtrip. Refer to the online schedule of classes for the current charge.

**PE 260 Intermediate Equitation** 1. Offered in Fall and Spring. Advanced techniques, theories and performance in equitation. Additional fee assessed.

**PE 261 Basketball** 1. Offered in Fall and Spring. Offensive and defensive skills development and systems of team work. Coverage of strategies, history and rules of the sport.

**PE 262 Introduction to Whitewater Canoeing** 1. Offered in Fall and Spring. Prerequisite: PE 255. Intermediate swimming ability required. Instruction and direct experience in fundamental whitewater canoeing skills. Basic paddling strokes and maneuvers for use on whitewater, river safety, basic river rescue, equipment selection and care, and environmental ethics. Participate in one required weekend fieldtrip. Additional charge assessed for the fieldtrip. Refer to the online schedule of classes for the current charge.

**PE 263 Tap Dance** 1. Offered in Fall and Spring. Entry level dance course stressing fundamental movements of tap. Emphasis on foundation skill movements, rhythmic exercises, and the relationship of movement to music.

**PE 264 Ballet** 1. Offered in Fall and Spring. Beginning level ballet technique course. Fundamental ballet concepts and vocabulary introduced through barre and center exercises and combinations.

**PE 265 Softball** 1. Offered in Fall Spring Summer. Basic skills, rules, and strategies for playing softball.

**PE 266 Ultimate Frisbee** 1. Emphasis on skill development, aerobic fitness and spirit of competition. Includes flight dynamics, various throwing and catching techniques, offensive skills, defensive skills, equipment, strategies, and rules of the game.

**PE 267 Flag Football** 1. Offered in Fall and Spring. An introduction to the skills, history, rules and strategy of flag football.

**PE 268 Advanced Clogging** 1. Offered in Fall and Spring. Prerequisite: PE 233. Experience in advanced Appalachian clogging techniques.

**PE 269 Volleyball I** 1. Offered in Fall Spring Summer. Volleyball fundamentals: setting, passing, serving, spiking, court movement, and game strategy.

**PE 270 Volleyball II** 1. Offered in Fall and Spring. Prerequisite: PE 269. Advanced techniques, theories and strategies of volleyball.

**PE 271 Varsity Sports Military Conditioning** 1. Offered in Fall and Spring. This course is for student athletes on a team sponsored by the NCSU Department of Athletics or currently enrolled ROTC students. Coursework will require a high level of skill acquisition and mastery of the fitness skills required to perform training techniques and safe sport practice. The rules and terminology of each activity will also be addressed. Course not repeatable.

**PE 272 Jazz Dance** 1. Offered in Fall and Spring. Beginning level jazz dance technique course covering basic jazz skills in warm-up exercises, combinations, and compositions. Concentration on learning and performing combinations in jazz styles.

**PE 274 Modern Dance I** 1. Offered in Fall and Spring. Introduction of movement and dance concepts and techniques through theory and analysis, improvisation and composition, structured dance exercises combinations.

**PE 275 Modern Dance II** 1. Offered in Fall and Spring. Prerequisite: PE/DAN 274 (or permission of instructor). Continuation of Modern Dance I. Emphasis on design of body in space, movement qualities and musicality through structured technical exercises and combinations.

**PE 276 Whitewater Rafting** 1. Offered in Fall Spring Summer. Whitewater rafting skills and practices emphasizing safe river travel, minimal impact river camping techniques, and trip planning. Participate in one required weekend fieldtrip. Additional charge assessed for the fieldtrip. Refer to PackTracks for the current charge.

**PE 277 Mountain Biking** 1. Offered in Fall Spring Summer. Bike handling, minimal impact trail riding skills, safety, fitness, basic maintenance and repair, and equipment selection. Students must provide their own bike, helmet, protective equipment, and clothing.

**PE 278 Fly-Fishing** 1. Offered in Fall Only. Instruction and experience in basic fly-fishing skills. Emphasis on casting techniques, tackle selection, habitat evaluation, minimal impact travel, safety, fitness, equipment selection and trip planning. Basic swimming ability and field trip required. Transportation provided by the Physical Education Department. Charge required with a non-refundable deposit.

**PE 279 Yoga** 1. Offered in Fall and Spring. Yoga postures for all ages and levels. Breathing exercises, emphasis on physical yoga, utilizing a wide variety of postures: standing, sitting, forward bends, back bending, inverted, twisting, balances and relaxation.

**PE 280 Yoga II** 1. This course will build upon material introduced in Yoga I by emphasizing the physical practice of yoga at an intermediate level. Coursework will require a deeper level of understanding of a variety of yoga poses, as well as mastery of the fitness skills required to perform these poses and maintain a safe yoga practice. Breathing techniques and the philosophy of Hatha Yoga will also be addressed.

**PE 281 Introduction to Challenge Course Programming** 1. Offered in Fall and Spring. Participants are introduced to ropes and group initiative courses including a variety of adventure games, initiatives, love and high ropes course events. Safety, risk management issues and facilitation techniques are presented and discussed. Transportation is provided to and from the challenge course by the department. An additional charge is assessed for the course. Refer to the online schedule of classes for the current charge and field trip date(s).
PEC 208 Advanced Aerobics and Leadership 1. Offered in Fall and Spring. Prerequisites: PE 105 or PE 109. Safe and effective high-low impact aerobics program with emphasis on student choreography and leadership, development of individual exercise prescription, and related health topics.

PEC 283 Mountaineering 1. Offered in Spring Only. Prerequisite: PE 258, PE 257. Instruction and experience in alpine climbing skills emphasizing snow and ice travel, safety, land navigation, winter hazard evaluation, minimal impact camping skills, and equipment selection. Three full-day classroom sessions before the trip required. Plan and participate in a ten-day field trip over winter break. Additional charge assessed for the field trip with a non-refundable deposit. Refer to the online schedule of classes for the current charge.

PE 284 Sea Kayaking 1. Offered in Fall and Spring. Instruction and experience in basic sea kayaking skills. Emphasis on paddling techniques, open water travel, navigation, minimal impact camping, safety, fitness, equipment selection and trip planning. Plan and participate in one required field trip. Additional charge assessed for the field trip with a non-refundable deposit. Refer to the online schedule of classes for the current charge.

PE 295 Special Topics in Physical Education 1-3. Offered in Fall and Spring. Examination of selected topics in health, fitness, outdoor leadership, physical education, and sport.

PE 296 Independent Study in Physical Education 1-3. Offered in Fall Spring Summer. Independent study in Physical Education will vary according to the specialized topic of interest. Credit and content determined by instructor.

PHYSICAL EDUCATION - COACHING

PEC 201 Coaching Baseball/Softball 2. Offered in Spring Only. Theories, techniques, and strategies of coaching baseball/softball.

PEC 202 Coaching Basketball 2. Offered in Fall Only. Theories, techniques, and strategies of coaching basketball.

PEC 203 Coaching Football 2. Offered in Fall Only. Theories, techniques, and strategies of coaching football.

PEC 204 Coaching Golf 2. Offered in Spring Only. Theories, techniques, and strategies of coaching golf.

PEC 205 Coaching Soccer 2. Offered in Fall Only. Theories, techniques, and strategies of coaching soccer.

PEC 206 Coaching Swimming and Diving 2. Offered in Spring Only. Theories, techniques and strategies of coaching swimming and diving.

PEC 207 Coaching Tennis 2. Offered in Spring Only. Theories, techniques, and strategies of coaching tennis.

PEC 208 Coaching Track & Field/Cross-Country 2. Offered in Spring Only. Theories, techniques, and strategies of coaching track and field and cross-country.

PEC 209 Coaching Volleyball 2. Offered in Fall Only. Theories, techniques, and strategies of coaching volleyball.

PEC 211 Strength Training and Conditioning 2. Offered in Fall and Spring. Knowledge and skills necessary for designing and implementing strength and conditioning programs. This course does not constitute credit toward meeting the minimum university Physical Education requirements.

PEC 301 Coaching Practicum 1. Offered in Fall and Spring. A 30-hour practical coaching experience in a middle or high school setting. Specific placement will depend upon the various playing sessions for the sports involved. Students are required to purchase internship liability insurance to participate in the practicum. Contact University Insurance & Risk Management for details on acquiring the insurance and the current charge.

PEC 381 Athletic Training 3. Offered in Fall Spring Summer. Prerequisite: PEH 280 or PEH 281 or CPR/First aid Certification. Incidence, causes, prevention and treatment of sports-related injuries. Conditioning for sports, injury recognition and evaluation, taping techniques, first aid care, treatment and reconditioning.

PEC 477 Coaching Concepts 3. Offered in Fall Spring Summer. Practical and theoretical concepts essential to the preparation of coaches. This course does not constitute credit toward meeting Physical Education requirements.

PEC 478 Exercise Physiology and Sports Science 3. Offered in Fall Spring Summer. Basic principles of human anatomy, physiology, and biomechanics and their relationship to athletic coaching.

PEC 479 Sport Management 3. Offered in Fall Spring Summer. Planning, organizing, leading, and evaluating within a sport context; fundamentals of accounting, budgeting, economics, marketing, strategic planning, ethics, and their use in sport settings; techniques of personnel, facility, and sporting event management.

PHYSICAL EDUCATION - FITNESS

PEF 214 Methods of Group Exercise Instruction 2. Offered in Fall and Spring. Prerequisite: Any 100-level PE course. A core course in teaching methods and concepts of multi-training and condition in group exercise, equipment and current trends; participation in selected activities designed to promote fitness; planning programs for physical fitness for educational institutions and social agencies. Course does not constitute credit toward meeting Physical Education GER requirement.

PEF 303 Sports Science Practicum 1. Offered in Fall and Spring. A 30-hour practical sports science specialist experience in a fitness specific setting within the triangle area. Course does not constitute credit toward meeting the physical education requirement. Students are required to purchase internship liability insurance to participate in the practicum. Contact University Insurance & Risk Management for details on acquiring the insurance and the current charge.

PEF 480 Principles of Exercise Programming 2. Offered in Fall Only. Prerequisite: PEC 478. Fundamentals and scientific principles necessary to plan, design, implement, and evaluate individual exercise programs.
PEH 212 Alcohol, Drugs and Tobacco 2. Offered in Fall and Spring. Theories of drug use, pharmacology, tolerance, dependence, nicotine, alcohol usage, alcoholism, sedative-hypnotics, narcotics, amphetamines, cocaine, marijuana, hallucinogens, steroids and treatment. This course does not constitute credit toward meeting the Physical Education GER requirement.

PEH 213 Human Sexuality 2. Offered in Fall Spring Summer. Physiological and psychosocial aspects of human sexuality. Emphasis placed on health-related topics of birth control, pregnancy, childbirth, abortion and sexually-transmitted diseases. Concepts of gender acquisition, sexual values, and sexual morality discussed as related to the promotion of healthy lifestyles within contemporary American culture.

PEH 280 Responding to Emergencies 2. Offered in Fall Spring Summer. Information necessary to evaluate vital signs and bodily functions as related to emergency response; training to evaluate and react correctly to most emergency situations which might arise, and to perform temporary medical care and the follow-up action as indicated. Optional fee assessed for certification. Does not satisfy the physical education requirement.

PEH 281 First Responder 3. Offered in Fall Spring Summer. Knowledge and skills necessary to respond appropriately in an emergency. Advanced skills in first aid and CPR (adult, child, and infant, pocket masks and oxygen use) fulfills requirements for First Responder (depending on local protocol).

PEH 284 Women's Health Issues 2. Offered in Fall and Spring. This course will review health and wellness issues affecting women through their life span. It will explore medical concerns and prevention as well as social health issues that disproportionately affect women in contemporary society. Discussions of current critical topics in women's health will also take place. Minor courses.

PEH 285 Personal Health 2. Offered in Fall and Spring. Behavior change, wellness, stress management, cardiovascular diseases, alcohol and tobacco use, cancer, infectious diseases, arthritis, human sexual response, sexual assault, contraception, and sexually transmitted diseases. This course does not constitute credit toward meeting the Physical Education GER requirement.

PEH 286 Nutrition, Exercise and Weight Control 2. Offered in Fall and Spring. A nutrition, exercise and weight management program emphasizing the basics of proper nutrition and exercise. Emphasis on lifestyle changes and their relationship to appropriate weight management. Medical request.

PEH 287 Stress Management 2. Offered in Fall and Spring. Impact of stress upon the psychological and physiological function of the body. Exploration and interaction with stress management techniques. This course does not constitute credit toward meeting the Physical Education GER requirement.

PEH 335 Prevention of Sexual Assault and Violence 3. Offered in Fall and Spring. Historical and cultural perspective on rape, sexual assault, and relationship violence will be presented. The course prepares students to deliver a standard outreach program that includes statistics, definitions, risk reduction techniques, medical, legal, psychological, community and campus resources.

PEH 375 Health Planning and Programming 2. Offered in Fall and Spring. Prerequisite: PEH 285 Personal Health. This course is designed to assist students in developing a foundation in health programming. Students will learn the necessary skills to develop, implement, and evaluate health education programs.

PEH 377 Methods of Health Promotion 2. Offered in Fall and Spring. This course focuses on methods and techniques for delivering health-related content to diverse populations. Cooperative learning, critical thinking, peer educator training, and decision-making will be applied to various health dimensions.

PEH 493 Practicum in Health 1. Offered in Fall and Spring. Prerequisite: PEH 377 and 6 hours of electives from the Health Minor. This course focuses on applying program development, management, evaluation, and educational strategies and techniques within a health-related setting. Students are required to purchase internship liability insurance to participate in the practicum. Contact University Insurance & Risk Management for details on acquiring the insurance and the current charge.

PEO 214 Introduction to Adventure Education 3. Offered in Fall Only. History and philosophy, social psychology of adventure, theories of adventure, benefits, risk-taking behavior, current trends and issues, research and evaluation, and model programs. Field trip required. Students are responsible for their own transportation for field trip.


PEO 216 Backcountry Skills and Techniques 2. Offered in Spring Only. Skills for backcountry travel and camping. Techniques for planning, organizing and leading backcountry trips. Plan and participate in two required weekend field trips. Additional charge assessed for the field trips. Refer to the online schedule of classes for the current charge.

PEO 302 Practicum Experience in Outdoor Programs 1. Offered in Fall Spring Summer. Prerequisite: PEO 214, PEO 215, PEO 216, PEO 280. The practicum experience provides a short-term, supervised opportunity for students to participate in leading an outdoor activity course or program. The practicum is the integration of academic preparation with its application in a field setting. The student may be assigned to a Department of Physical Education outdoor activity course, program or to an approved non-University program in order to meet this requirement. The practicum student must be directly involved in the program for a minimum of 30 hours. Students are required to purchase internship liability insurance to participate in the practicum. Contact University Insurance & Risk Management for details on acquiring the insurance and the current charge.

PER 101 Elementary Persian 1. 3. Offered in Fall Only. Elementary Persian 101 is a beginning course for students who have little or no prior knowledge of the language. It is designed to give the students an
introduction to the phonology, morphology, and script of Persian which will develop, by the end of the semester, into outcome skills including the ability to read aloud and comprehend written texts from dictation, and carry on conversations at elementary levels. A textbook with grammar explanations in English is supplemented with tapes and videos of authentic language and culture used in situational communication.

PER 102 Elementary Persian II 3. Offered in Spring Only. Prerequisite: Elementary Persian 101 (PER 101) or instructor's permission. Elementary Persian 102 is the second-semester continuation of Persian 101. It continues and develops the students' familiarity with and command of the written and spoken forms of the language by actively involving them in communicative activities at the first-year level. A textbook with grammar explanations in English is supplemented with tapes and videos of authentic language and culture used in situational communication.

PER 201 Intermediate Persian I 3. Offered in Fall Only. Prerequisite: Elementary Persian 102, or instructor's permission. Persian 201 is the third semester (beginning of second-year) in Persian. It deepens the students' familiarity with the syntax of the literary language of Persia and expands their command of the spoken vernacular of Iran through exposure to more varied and sophisticated communicational contexts. An intermediate textbook with grammar explanations in English is supplemented with tapes and videos of authentic language and culture used in situational communication.

PER 202 Intermediate Persian II 3. Offered in Spring Only. Prerequisite: Elementary Persian (PER 201) or instructor's permission. Persian 202 is the fourth semester, which completes the intermediate level (second year) in Persian. It further deepens the students' familiarity with the syntax of the literary language of Persia and expands their command of the spoken vernacular of Iran through exposure to more varied and sophisticated communicational contexts. It deals principally with the acquisition of the conversation register of the language, which differs considerably from the formal written style. An intermediate textbook with grammar explanations in English is supplemented with tapes and videos of authentic language and culture used in situational communication.

PHI 205 Introduction to Philosophy 3. Offered in Fall and Spring. Introduction to selected problems of enduring philosophical importance, including such topics as the nature of morality, knowledge, human freedom, and the existence of God. Content varies with different sections.

PHI 214 Issues in Business Ethics 3. Offered in Fall and Spring. An analysis and evaluation of major issues in business ethics. Topics include the social responsibility of business; social justice and free enterprise; the rights and duties of employees, employers, manufacturers, and consumers; duties to the environment, the world's poor, future generations, and the victims of past injustices; the moral status of the corporation; and the ethics of advertising.

PHI 221 Contemporary Moral Issues 3. Offered in Fall and Spring. Philosophical analysis and theory applied to a broad range of contemporary moral issues, including euthanasia, suicide, capital punishment, abortion, war, famine relief, and environmental concerns.

PHI 250 Thinking Logically 3. Offered in Fall Spring Summer. Deductive arguments attempt to guarantee their conclusions. Inductive arguments attempt to make their conclusions more probable. Using a small number of simple, powerful logical techniques, this course teaches you how to find, analyze and evaluate deductive and inductive arguments, and thus how to avoid the most common errors in reasoning.

PHI 298 Special Topics in Philosophy 3. Selected studies in philosophy that do not appear regularly in the curriculum. Topics will be announced for each semester in which the course is offered.

PHI 300 Ancient Philosophy 3. Offered in Fall Only. Western philosophy of the ancient world, with special emphasis on Plato and Aristotle.

PHI 301 Early Modern Philosophy 3. Western philosophy of the 17th and 18th centuries, including such philosophers as Descartes, Hobbes, Leibniz, Locke, Berkeley, Hume, and Kant.

PHI 302 19th Century Philosophy 3. Offered in Fall Only. Western philosophy of the 19th century, including such philosophers as Kant, Hegel, Schopenhauer, Kierkegaard, Marx, and Nietzsche.

PHI 303 Medieval Philosophy 3. Offered in Spring Only. Philosophy of the Middle Ages. Authors to be studied may include Augustine, Anselm, Avicenna, Maimonides, Aquinas, and Scotus.

PHI 305 Philosophy of Religion 3. The existence and nature of God, including such topics as traditional proofs of God, skeptical challenges to religious belief, miracles, the problem of evil, faith and reason, and religious experience.

PHI 309 Contemporary Political Philosophy 3. Prerequisite: One PHI course. Current theories about basic concepts in political philosophy, such as liberty, equality, justice, natural rights, and democracy, with special attention to disputes concerning the nature of a just social order.

PHI 310 Existentialism 3. Philosophy of Existentialism, including such thinkers as Kierkegaard, Nietzsche, Dostoievsky, Sartre, Heidegger, and Camus.

PHI 312 Philosophy of Law 3. Offered in Fall Only. Fundamental legal issues such as what constitutes a law or legal system. Justifications of legal interference with individual liberty. Philosophical legal issues illustrated by specific legal cases.

PHI 313 Ethical Problems in the Law 3. Prerequisite: PHI 221, 275, or 375. Explores uses of the legal system, including such topics as the death penalty, plea bargaining, legalizing euthanasia, censorship, Good Samaritan laws, the insanity defense, civil disobedience, preferential treatment.

PHI 325 Bio-Medical Ethics 3. Offered in Fall and Spring. Interdisciplinary examination and appraisal of emerging ethical and social issues resulting from recent advances in the biological and medical sciences. Abortion, euthanasia, physician-assisted suicide, compromised infants, aids, reproductive technologies, and health care.
Focus on factual details and value questions, fact-value questions, fact-value interplay, and questions of impact assessment and policy formulation.

PHI 330 Metaphysics 3. Prerequisite: One PHI course.
Metaphysical problems: distinction between appearance and reality, nature of space and time, free will and determinism, mind and body, nature of identity.

PHI 331 Philosophy of Language 3. Prerequisite: One PHI course.
Introduction to traditional and modern accounts of the relations between language and reality, the nature of truth, problems of intentionality and propositional attitudes.

PHI 332 Philosophy of Psychology 3. Prerequisite: One PHI course or one PSY course. Problems and controversies that overlap the boundary between philosophy and psychology: the mind/body problem, behaviorism vs. cognitivism, the prospects for artificial intelligence, and language and the questions of innate knowledge.

PHI 333 Theory of Knowledge 3. Prerequisite: One PHI course.
Analysis of such central concepts as knowledge, belief, and truth, and the investigation of the principles by which claims to knowledge may be justified.

PHI 340 Philosophy of Science 3. Offered in Fall Spring Summer.
Nature of science highlighted by differences between science and pseudoscience, relationships between science and religion, and roles of purpose-directed (teleological) and causal explanation in physical, life and social sciences.

PHI 375 Ethics 3. Offered in Fall and Spring.
Examination of traditional questions of philosophical ethics: What are the principles of moral conduct? What sort of life is worthy of a human being? Includes both classic and contemporary literature.

PHI 376 History of Ethics 3. Offered in Fall and Spring.
Prerequisite: One PHI course. Topics in the history of ethics. Philosophers to be studied may include Plato, Aristotle, Aquinas, Butler, Hume, Kant, Sigmund and Nietzsche.

PHI 401 Kant's Critique of Pure Reason 3. Prerequisite: 6 credits in PHI.
A text-based critical study of Kant's Critique of Pure Reason. Focusing on such topics as perception, judgment, knowledge, space, time, substance, causation and reality. Students cannot receive credit for both PHI 401 and PHI 501.

PHI 415 Life Science Ethics 3. Offered in Spring Only.
Prerequisite: One PHI course. Recent work in normative evaluation of human actions affecting living things. Advanced readings in moral theory, comparative value assessment, and public policy. Students cannot receive credit for both PHI 415 and PHI 515.

PHI 420 Global Justice 3. Offered in Spring Only. Prerequisite: One PHI course.
The applications of the ideas of justice and right beyond and across the borders of individual nation states, attending to the facts of globalization and their consequences for political and economic justice and human rights. Topics: skepticism about global justice; transnational distributive justice, pollution, and poverty; national sovereignty, self-determination, and intervention; the ethics of war; international human rights; and global democracy. No one can receive credit for both PHI 420 and PHI 520.

PHI 422 Philosophical Issues in Environmental Ethics 3. Offered in Fall Only. Prerequisite: One PHI course.
Ethical questions about the environment; in particular, what obligations we have to the environment. Topics: animal rights, obligations to species and ecosystems, intrinsic vs. extrinsic value, and policy implications of moral judgments. Students cannot receive credit for both PHI 422 and PHI 522. Students who have received credit for PHI 322 cannot receive credit for either PHI 422 or PHI 522.

PHI 425 Introduction to Cognitive Science 3. Offered in Fall Only.
Prerequisite: One upper-level PHI, PSY, CSC or Linguistics course.
Philosophical foundations and empirical fundamentals of cognitive science, an interdisciplinary approach to human cognition. Topics include: the computational model of mind, mental representation, cognitive architecture, the acquisition and use of language. Students cannot receive credit for both PHI/PSY 425 and PHI/PSY 525.

PHI 440 The Scientific Method 3. Offered in Spring Only.
Prerequisite: One upper-level PHI course.
Detailed examination of core issues in the philosophy of science: the confirmation of scientific theories, falsification, projectability, the nature of scientific explanation, laws of nature, and causation. Students cannot receive credit for both PHI 440 and PHI 540.

PHI 445 Philosophy of Biology 3. Offered in Spring Only.
Prerequisite: One 300 level or higher course in Philosophy, Biology, Psychology or Anthropology. This course covers philosophical issues in the evolutionary study of human cognition: the role of adaptationism; the values of psychological vs. behavioral approaches; the phenotypic gambit; the evolution of morality and altruism; the nature of culture and the possibility of cultural evolution; innateness, genetic determinism and development; and case studies of evolutionary explanation of human behavior or psychology. Students cannot receive credit for both PHI 445 and PHI 545.

Prerequisite: One 300 level or higher course in Philosophy, Biology, Psychology or Anthropology. This course examines philosophical issues in the evolutionary study of human cognition: the nature of culture and the possibility of cultural evolution; innateness, genetic determinism and development; and case studies of evolutionary explanation of human behavior or psychology. Students cannot receive credit for both PHI 447 and PHI 547.

PHI 475 Ethical Theory 3. Offered in Spring Only. Prerequisite:
PHI 375 or PHI 376. An introduction to some central themes and issues in ethical theory. Topics in normative and meta-ethics such as consequentialism, deontology, virtue ethics, constructivism, realism, relativism, subjectivism, and expressivism. Readings primarily from contemporary literature.

PHI 494 Writing in Ethics 1.
Prerequisite: PHI 250, LOG 201 or 335 and one other PHI course. Corequisite: One of PHI 221, 273, 298, 306, 309, 310, 311, 313, 325, 375, 376, 420, 422, 475 or 498. A substantial paper in ethics, assigned by the instructor of the corequisite; enrollment subject to departmental approval; may be repeated for credit.

PHI 495 Writing in History of Philosophy 1. Offered in Fall and Spring.
Prerequisite: PHI 250, LOG 201 or 335 and one other PHI course. Corequisite: One of PHI 298, 300, 301, 302, 303, 310, 401 or 498. A substantial paper in history of philosophy, assigned by the instructor of the corequisite; enrollment subject to departmental approval; may be repeated for credit.

PHI 496 Writing in Contemporary Philosophy 1.
Prerequisite: PHI 250, LOG 201 or 335 and one other PHI course. Corequisite: One of PHI 298, 305, 306, 330, 331, 332, 333, 340, 425, 440, 445, 447 or 498. A substantial paper in contemporary philosophy, assigned by the instructor of the corequisite; enrollment subject to departmental approval; may be repeated for credit.
PHI 497 Writing in Logic, Representation and Reasoning 1. Offered in Fall and Spring. Prerequisite: LOG 201 or 335, and one other PHI course, not PHI 250. Corequisite: One of LOG 335, 435/535, 437, PHI 298, 330, 331, 332, 333, 340, 425/525, 440/540, 445/545, 447. A substantial paper in logic, representation and reasoning, assigned by the instructor of the corequisite. Enrollment subject to departmental approval; may be repeated for credit.

PHI 498 Special Topics in Philosophy 1-6. Prerequisite: Six credits in PHI courses. Detailed investigation of selected topics in philosophy. Topics determined by faculty members in consultation with head of the department. Course may be used for individualized study.

**PHYSICAL & MATHEMATICAL SCIENCES**

PMS 100 Perspectives on Learning 1. Offered in Fall Only. Undergraduates in College of Physical and Mathematical Sciences. The campus computing and information environment; levels of learning; recognition and application of good reasoning; academic and career resources and opportunities.

PMS 295 Special Topics in Physical and Mathematical Sciences 1-3. Offered in Fall Spring Summer. Special topics in physical and mathematical sciences at the early undergraduate level. Available as directed individual or group study.

PMS 498 Spec Topics in the Mathematical and Physical Sci 2 3. Special Topics for advanced undergraduates will be selected from the mathematical and physical sciences.

**POULTRY SCIENCE**

PO 201 Poultry Science and Production 4. Offered in Fall and Spring. Fundamental principles of broiler, turkey and egg production including poultry physiology, breeding, incubation, housing, nutrition, disease control, management and marketing.

PO 290 Poultry Seminar 1. Offered in Fall Only. Exploration of topics related with current and future potential to influence the poultry industry. Guest lectures from industry representatives will include: vertically integrated poultry production, primary brooders, marketing, animal health, veterinary medicine as it relates to poultry, allied equipment manufacturers, and management of poultry companies. Special emphasis on summer internships and career services.

PO 301 Evaluation of Live Poultry 2. Prerequisite: PO 201. Experience in evaluating live poultry for production and breeder stock potential. Emphasis on techniques and criteria used in selecting poultry for use in commercial production units.

PO 322 Muscle Foods and Eggs 3. Offered in Fall Only. Prerequisite: ZO 160, BIO 181 or BIO 183. Processing and preserving fresh poultry, red meats, seafood, and eggs. Ante- and post-mortem events as they affect quality, yield, and compositional characteristics of muscle foods. Principles and procedures involved in the production of processed meat items.

PO 350 Introduction to HACCP 3. Offered in Fall and Spring. Introductory course on the Hazard Analysis and Critical Control Points System (HACCP) which is designed to decrease hazards in foods. An International HACCP Alliance approved curriculum which covers prerequisite programs. A step by step approach for developing and implementing a HACCP plan for USDA regulated food processing plants. Offered only as a world wide web course through the Office of Instructional Telecommunications.

PO 351 Grading and Evaluation of Poultry Products 2. Offered in Fall Only. Prerequisite: PO 201. Principles of grading and evaluation of poultry products such as dressed broilers, turkeys, shell eggs, candled eggs and broken-out eggs according to USDA guidelines.

PO 405 Avian Physiology 4. Offered in Fall Only. Prerequisite: CH 220. Principles of avian physiology integrating physiological functions and anatomical structures of organs and organ systems. Practical problems associated with poultry production. The importance of maximizing growth and productivity via exploitation of environmental influences on physiological systems.

PO 410 Production and Management of Game Birds in Confinement 3. Management principles associated with the successful propagation and rearing of game birds, ornamental birds and waterfowl in confinement. Housing and pen requirements, nutrition, disease control and regulatory issues included.

PO 411 Agrosecurity 3. Offered in Spring Only. This course is designed to increase the awareness of the issues and vulnerabilities of the IS agricultural system, the importance of agriculture in the US economy, and the importance of protecting it from disease and/or attack. This course is organized to integrate and assimilate knowledge across multiple disciplines including agriculture, animal health, human health, infectious diseases, business, economics, and public policy. Students will identify and analyze the interactions between these disciplines in light of increasing population and concentrated agriculture's increased vulnerability to major disruptions in food production. Students will also analyze where potential links in the food chain are susceptible to disruptions by individuals (or natural disasters), the consequences of these disruptions, and how to minimize the associated risks by developing case studies and strategies for defending against specific threats. Students must have junior standing.

PO 415 Comparative Nutrition 3. Offered in Fall Only. Prerequisite: CH 220 or 221 and 223. Principles of nutrition, including the classification of nutrients and the nutrient requirements of and metabolism by different species for health, growth, maintenance and productive functions.

PO 421 Commercial Egg Production 2. Offered in Fall and Spring. Prerequisite: PO 201. Principles and current practices of commercial egg production.

PO 422 Incubation and Hatchery Management 2. Offered in Fall Only. Prerequisite: PO 201. Principles and current practices of hatching egg production, incubation, and hatchery management, beginning with the placement of broiler breeder chicks on the breeder farm and ending with the placement of chicks at the brooding facility.

PO 424 Poultry Meat Production 3. Offered in Spring Only. Prerequisite: PO 201. Principles and current practices of vertically integrated broiler and turkey production; encompassing management, nutrition, poultry health, environmental, and related areas.

PO 425 Feed Manufacturing Technology 3. Offered in Spring Only. Feed mill management, feed ingredient purchasing, inventory, storage, and quality evaluation, computerized feed formulation, feeding programs for poultry and swine, feed mill design, equipment,
maintenance, operation, safety, state and federal regulations pertaining to feed manufacture.

PO 430 Poultry Breeding 3. Offered in Spring Only. Prerequisite: PO 201. Application of reproductive and genetic principles to the reproduction of poultry breeding stocks.

PO 435 Poultry Incubation & Breeding 4. Offered in Spring Only. Prerequisite: PO 201. Principles and current practices of modern poultry incubation and breeding production systems. Students will be able to describe basic elements of breeding management and production practices, to apply those elements to specific scenarios, and to strengthen their ability to interpret and make critical judgements relative to the breeding of poultry, production of hatching eggs, and the subsequent incubation and hatching process.

PO 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PO 493 Special Problems in Poultry Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PO 495 Special Topics in Poultry Science 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

PP 318 Forest Pathology 3. Offered in Spring Only. Prerequisite: PB 200. Major diseases of forest trees and deterioration of wood products emphasizing principles of plant pathology; diagnosis; nature, physiology, ecology, and dissemination of disease-causing agents; mechanisms of pathogenesis; epidemiology and environmental influences; principles and practices of control.

PP 450 Challenges in Plant Resource Protection 3. Offered in Spring Only. Prerequisite: CS 414 or ENT 425 or PP 313. This course provides applied training to students in the scientific and regulatory aspects of plant protection using real-world studies, scenarios, and addressing important contemporary issues for safeguarding American agriculture. Students will gain hands-on problem solving abilities regarding the diagnosis, containment, and mitigation of introduced plant pests and pathogens.

PP 460 Fundamentals of (Pest) Risk Analysis 1. This course provides students with a historical perspective as well as real-time exposure to working professionals involved in the development of risk analysis documents for plant protection. The course uses real world scenarios and addresses contemporary issues facing scientists and regulators tasked with safeguarding American agriculture. Students will gain hands-on problem solving abilities regarding the identification and mitigation of plant pathogens, insects, and noxious weeds that can be introduced into the USA through international trade in agricultural commodities.

PP 470 Advanced Turfgrass Pest Management 2. Offered in Spring Only. Prerequisite: CS 290. Characteristics and ecology of turfgrass weed, insect, and disease pests; identification and diagnosis of turfgrass pests; strategies for managing pests including cultural, mechanical, biological, and chemical methods; development of integrated pestmanagement programs, characteristics and modes of action for herbicides, insecticides, fungicides, and plant growth regulators; behavior and fate of pesticides in soil; and the development and management of pesticide resistant pest populations.

PP 490 Critical Issues in Plant Protection 1. This course is of particular interest to students minoring in plant biosecurity and regulatory science; however, it is open to all students. The course will feature subject-matter experts in the area of regulatory plant science that will deliver one hour lectures on emerging and critical topics in regulatory plant protection.

PP 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PP 493 Special Problems in Plant Pathology 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

PP 495 Special Topics in Plant Pathology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials not normally available in regular course offerings or for offering of new courses on a trial basis.

PLANT PATHOLOGY

PP 150 Introduction to Plant Molecular Biology 3. Hands-on introduction to modern molecular biology techniques. Isolation of SNA from tobacco leaves, isolating a plant gene through polymerase chain reaction (PCR), cloning DNA fragments in plasmid vectors, bacterial transformation and plasmid DNA purification, restriction digestion and gel electrophoresis, gene transfer and expression of reporter genes in plant cell lines through a biolistic gene gun. Field trips, poster assignment and poster presentation are mandatory. This course is part of the Summer College in Biotechnology and Life Sciences (SCIBLS) and other pre-college, transitional and early-college programs. Students must have no more than 30 credit hours. Department approval required.

PP 222 Kingdom of Fungi 3. Offered in Fall and Spring. Prerequisite: Any 100-level course in Biology or 200-level course in Plant Biology. Influence and impact of fungi in our world. The role of fungi in history, ecology, medicine, human and plant diseases, industry, food and politics. Mushrooms, molds, mildews and symbiosis.

PP 315 Principles of Plant Pathology 4. Offered in Fall Only. Fundamental principles of plant pathology with emphasis on disease etiology, nature of pathogenesis, ecology of host/parasite interaction, epidemiology of plant diseases, current strategies and practices for integrated disease control.
PARKS, RECREATION, & TOURISM MANAGEMENT

PRK 102 Topics in Scholarship, Leadership, and Service II 0.
Offered in Spring Only. Prerequisite: PRK 101, restricted to Park Scholars. Interdisciplinary seminar with distinguished speakers and community leaders. A one-two day, off-campus trip will develop student leadership skills through examination of leadership challenges facing North Carolina. Volunteer work with an off-campus service agency will build awareness of community needs and how to address those needs. Students may need to use public transportation, which is free to NC State students with their id, to perform required public service. Restricted to Park Scholars.

PRK 202 Topics in Scholarship, Leadership and Service IV 0.
Offered in Spring Only. Prerequisite: PRK 201, restricted to Park Scholars. Interdisciplinary seminar includes speaker seminars and organizing Service Raleigh, a major spring service project. Planning begins for senior year enrichment activities. Students may need to use public transportation, which is free to NC State Students with their id, to perform required public service. Restricted to Park Scholars.

PRK 302 Topics in Scholarship, Leadership, and Service VI 0.
Offered in Spring Only. Prerequisite: PRK 301, restricted to Park Scholars. Interdisciplinary seminar to develop leadership skills through a Leadership Academy, attendance at various speaker seminars and dinners, and through continued community volunteerism. The Leadership Academy is a half-day workshop in February and builds on the skills from the fall Leadership Academy. Students may need to use public transportation, which is free to NC State Students with their id, to perform required public service. Restricted to Park Scholars.

PRK 402 Topics in Scholarship, Leadership and Service VIII 0.
Offered in Spring Only. Prerequisite: PRK 401, restricted to Park Scholars. Interdisciplinary seminar will promote understanding of scholarship, leadership, and service. Students hold a dinner with a William Friday Award recipient, establish their class legacy for the campus, and work with younger students on developing their leadership styles. Students continue to volunteer in the community. Students may need to use public transportation, which is free to NC State Students with their id, to perform required public service. Restricted to Park Scholars.

turfgrass management, golf shop operations, food & beverage control, customer services, personnel management, and tournament operations.

PRT 200 Leisure Behavior, Health and Wellness 3. Offered in Fall Spring Summer. Leisure as a lifelong resource for human satisfaction and fulfillment; its potential for physical, mental, social and emotional growth and emotional growth and development of the individual. Leisure opportunity areas presented and evaluated.

PRT 210 Golf Management I 1. Offered in Spring Only.
Prerequisite: PRT 156. Emphasis on concepts, techniques, and practices of teaching golf skills; understanding the Professional Golfers' Association Constitution; rules of golf, golf tournament operations; and golf car fleet management.

PRT 211 Golf Management II 1. Offered in Fall Only.
Prerequisite: PGM Majors, PRT/PEG 210. Advanced concepts, techniques, and practices of teaching golf; golfer development programs, golf club design and repair.

PRT 212 Golf Instructor Development 2. Offered in Fall Only.
Prerequisite: PRT 156 and PRT 210. Students will learn to teach using a variety of instructional methods including various technologcalmethods. Students will also learn to teach to students with a variety of learning styles including visual, auditory and kinesthetic. The students will learn the fundamental theories and concepts of the golf swing as well as basic ball flight laws.

PRT 214 Introduction to Adventure Education 3. Offered in Fall Only. History and philosophy, social psychology of adventure, theories of adventure, benefits, risk-taking behavior, current trends and issues, research and evaluation, and model programs. Field trip required. Students are responsible for their own transportation for field trip.

Principles and practices of leadership in adventure education and recreation programs; group management, trip planning, staffing, group dynamics, health and safety issues, risk management and other relevant topics.

PRT 220 Commercial Recreation and Tourism Management 3.
Offered in Fall and Spring. Prerequisite: PRT 152. Commercial recreation and the tourism industry, including its origin, present characteristics, behavioral foundations and societal impacts. Emphasis on recreation administration in the commercial sector.

PRT 238 Diversity and Inclusion in Recreation and Sport 3.
Offered in Fall and Spring. Prerequisite: PRT 152. Provides knowledge, attitude awareness and resources needed to provide programs, services and facilities for all people. Students gain an understanding of people’s differences and potential barriers to participation. 10 hours of volunteer work with people who have disabilities is required. Students are responsible for providing their own transportation to and from volunteer work. PRT, SMT and PGM Majors Only; PRT minors.

PRT 250 Management of Park and Recreation Facilities 3.
Offered in Fall and Spring. Prerequisite: PRT 152. Management principles applied to park, recreation, sport areas and facilities. Emphasis on operational efficiency, quality service, fiscal responsibility and maintenance management. Laboratory provides for application of management and maintenance principles.
PRT 266 Introduction to Sport Management 3. Introduction to concepts and practices of effective sport programming and management at the professional, collegiate and community levels. Overview of various program delivery systems such as fitness, instructional sport, informal sport, and intramural sport. Examination of management elements of sport programming, including planning, personnel, finance, facilities, risk and liability and marketing.

PRT 277 Psychological & Cultural Dimensions of Sport 3. Prerequisite: Sport Management or PRT Majors, PRT 266. The psychological behavior of the individual in physical activity and sport. The development of sport and the sports industry, political and cultural significance of sport, and sport in international relationships. The relationship between sport, gender, class, ethnicity, health, drugs, violence, education, and life long physical activity.

PRT 286 Writing and Speaking in Sports Organizations 3. Offered in Fall and Spring. Prerequisite: Sport Management or PRT Majors, PRT 266. Concepts related to effective communication within sport organizations. Including interpersonal communication, group communication, public speaking, use of electronic media, and basic knowledge and understanding of media in sport and sport enterprises.

PRT 311 Golf Course Turf Grass Management 3. Offered in Fall Only. Prerequisite: PGM Majors, Sophomore standing. PRT 211. Introduction to the roles and responsibilities of the golf course superintendent as well as the practices and procedures associated with golf course turfgrass management. Preparation for completion of Level II Turfgrass Management, elements of the Professional Golfers' Association of America's Professional Golf Management apprentice program. Periodically class/lab meetings require transportation to area golf facilities. Students are expected to provide their own transportation accommodations.

PRT 312 Golf Management III 1. Offered in Spring Only. Prerequisite: PGM Majors, PRT 311. Advanced concepts, techniques, and practices of golf management: business analysis, planning and operations, and analysis of the golf swing. Preparation for completion of PGA of America's Professional golf Management Level II knowledge tests and skills simulations.

PRT 315 Organization and Administration of Adventure Programs 3. Offered in Spring Only. Prerequisite: PRT 152. Overview of the organizational and administration of adventure programs and services, professional standards, programming, management, staffing, budgeting, public relations, liability and risk management.

PRT 320 Convention and Visitor Services 3. Offered in Fall Only. Prerequisite: PRT 152. An examination of the programmatic issues of providing visitor services for conventions, meetings, group tours and special events. The focus is on the planning and delivery of visitor service programs designed to enhance visitor experiences in a community.

PRT 350 Outdoor Recreation Management 3. Offered in Fall and Spring. Prerequisite: PRT 152. Concepts and methods of outdoor recreation planning and management explored with emphasis on the public sector. Current issues relative to recreation provision identified and debated.

PRT 351 Outdoor Consortium 3. Offered in Spring Only. Examines outdoor recreation and resource management approaches and research results from an applied perspective. Students will practice problem-solving techniques and interact with a wide variety of park managers and planners. This course culminates in a week-long field experience that may conflict with other scheduled courses. Field experience held in conjunction with four other universities in the Great Smoky Mountains National Park. A fee will be assessed for the trip.

PRT 358 The Recreation Program 3. Offered in Fall and Spring. Prerequisite: PRT 152. Theoretical and applied approaches to the recreation program planning process. Basic elements of programming using a variety of recreational settings and diversity of practical experience.

PRT 359 Leadership and Supervision in Recreation 3. Offered in Fall and Spring. Prerequisite: PRT 250. Systematic principles for managing human resource component of parks, recreation and tourism organizations. Leadership, group dynamics, human resources planning and organizing, employee recruitment, selection and supervision.

PRT 365 Arts Management in Recreation 3. Offered in Fall Only. Introduction to arts management in recreation programs; emphasis on the importance and benefits of arts to the individual and community. Understanding and appreciation of the role of the arts in a comprehensive recreation program plan. Emphasis on arts management principles including philosophy, fiscal, technical and physical community resources.

PRT 366 Sport Programming 3. Offered in Fall and Spring. Prerequisite: Sport Management and PRT Majors, PRT 266. Foundations, administrative support systems, delivery systems and desirable practices of sport programming. Program delivery systems overview with emphasis on problems and solutions associated with sport programs. Topics include sport league administration, youth sport delivery issues, sport tournament operations, community based sport delivery issues, college/university recreation sport delivery.

PRT 375 Internship Orientation 1. Offered in Fall Only. Prerequisite: PRT 152. Preparation for recreation and park internship. Resume writing, interviewing skills, cover letters and internship search techniques and resources.

PRT 376 Sport Administration 3. Prerequisite: Sport Management and PRT Majors, PRT 266. Concepts related to policy development, organization and management specific to sport organizations. Including theories and practices of policy development and implementation, management theories, organizational behavior, the strategic management process, organizational design, managing change, and operational planning.

PRT 380 Analysis and Evaluation in Parks, Recreation 3. Offered in Fall and Spring. Prerequisite: 300-level Statistics course, PRT 359. Examination of the steps involved in analyzing and estimating the impact of recreation and parks services. Includes relevant issues and useful approaches for systematic analysis. Emphasis is placed on an understanding and development of various types of systematic evaluation designs. Activities leading to the analysis and development of performance reports to assess and improve managerial operational efficiency are covered.

PRT 406 Sports Law 3. Offered in Fall Only. Fundamental principles of law, especially tort and contract law, applied to sports situations. Analysis of liability of sports personnel in various roles including participant, coach, promoter, trainer and official. Analysis of common law court decisions in sports contexts well as key state and federal statutory legislation such as civil rights and antitrust.

PRT 407 Services, Facilities and Event Marketing 3. Offered in Fall and Spring. Prerequisite: PRT 358. Examination of marketing methods as applied to Parks, Recreation, Tourism and Sport Management facilities and programs. Aspects of advanced marketing: market research, marketing strategy and revenue-generation in both public and private settings. Credit will not be given for both PRT 407 and PRT 507.
PRT 410 Food and Beverage Management 3. Offered in Spring Only. Prerequisite: PGM Majors, Junior standing. PRT 312. Introduction to practices and procedures in food and beverage service. Basics of food service needs, cost controls, legal issues affecting food and beverage service, staffing, and customer satisfaction. Critical elements of food costing, purchasing, inventory control, menu planning, and security. Preparation for completion of Level III Food and Beverage control elements of the Professional Golfers’ Association of America’s Professional Golf Management Internship Program.

PRT 411 Club Management 3. Offered in Spring Only. Prerequisite: Junior standing, PRT 152. Introduction to practices and procedures in contemporary club management. Application of general management functions to club environments including human resources, training, financial management marketing; leadership food and beverage service operations facilities and risk management; legal issues; and career planning. Preparation for completion of Club Management elements of the Professional Golfers’ Association of America’s Professional Golf Management Internship Program.

PRT 412 Golf Course Architecture 3. Offered in Fall Only. Prerequisite: PRT 211. Basic principles of golf course design. Historical architectural influences on current golf course design trends. Strategic golf course design principles, shot values, construction practices, environmental issues, and maintenance issues. Golf course design and design implications. Restricted to PGM and Landscape Arch. Majors. Junior Standing.

PRT 413 Golf Management IV 3. Offered in Fall Only. Prerequisite: PGM Majors, PRT 312, Senior standing. Advanced concepts, techniques, and practices of golf management: swing concepts of teaching, supervising and delegating, merchandising and inventory control. Preparation for completion of PGA of America’s Professional Golf Management Level III knowledge tests and skill simulations.

PRT 414 PGA Apprentice Program Completion 0. Offered in Spring Only. Checkpoint mechanism to register the successful completion of the Professional Golfers’ Association Apprentice requirement.

PRT 420 Resort Planning and Management 3. Offered in Spring Only. Prerequisite: PRT 152. Theory and practical applications of planning, accommodations management, food and beverage operations, recreation programs and management in the resort industry.

PRT 442 Recreation and Park Interpretive Services 3. Offered in Spring Only. The principles and practices of environmental and historical interpretation. Personal (attended) and non-personal (unattended) interpretive communication techniques. Comprehensive planning and implementation of interpretive programs, and equipment and facilities used in environmental and historical interpretation. One overnight field trip required.

PRT 449 Human Dimensions of Natural Resources in Australia 3. Offered in Summer. Corequisite: PRT 450. This 3.5 week study abroad program examines human dimensions of natural and environmental conservation in Australia. The course will involve an orientation and lectures from faculty at James Cook University. Students will explore the natural environments in Australia including the Great Barrier Reef, Tropical Rainforest and Outback; learn about sustainable development and protection of the natural environment through educational travel, field trips, active participation, lecture presentations and seminars, written assignments, research projects and reflective exercises. Students must apply through NCSU Study Abroad Office. Students must pay program fees, airfare, some meals and incidentals (~$6200 in 2010).

PRT 450 Sustaining Natural Resources in Australia 3. Offered in Summer. Corequisite: PRT 449. This 3.5 week study abroad program will examine issues related to natural history and environmental conservation in Australia. This course will involve an orientation and lectures from Australian university faculty. Students will explore natural environments in Australia including the Great Barrier Reef, Tropical Rainforest and Outback; learn about sustainable development and protection of the natural environment through educational travel, field trips, active participation, lecture presentations and seminars, written assignments, research projects and reflective exercises. Students must apply through NCSU Study Abroad Office. Students must pay program fees, airfare, some meals and incidentals (~$6200 in 2010).

PRT 451 Principles of Recreation Planning and Facility Development 3. Offered in Fall and Spring. Prerequisite: PRT 358. Introduction to practices and techniques of the planning and implementation of interpretive programs, and equipment and facilities used in environmental and historical interpretation. One overnight field trip required.

PRT 452 Golf Course Architecture 3. Offered in Fall Only. Prerequisite: PRT 211. Basic principles of golf course design. Historical architectural influences on current golf course design trends. Strategic golf course design principles, shot values, construction practices, environmental issues, and maintenance issues. Golf course design and design implications. Restricted to PGM and Landscape Arch. Majors. Junior Standing.

PRT 453 Administrative Processes of Recreation/Park Organizations 3. Offered in Fall Only. Prerequisite: PRT 359. Basic administrative processes; the internal organization of the recreation/park department; board and executive relationships; legal foundations and legal liability considerations; personnel practices and policies; and public relations administration.

PRT 454 Parks and Recreation Finance and Administration 3. Offered in Fall and Spring. Prerequisite: PRT 359. Recreation and park fiscal administration, sources of finance for operating and capital expenditures, revenue activities, financial planning, budgeting, expenditure policies, auditing and planning for recreation and park services, decision-making tools, legal aspects of administration.

PRT 455 Personnel and Administrative Practices for Zoos and Aquariums 3. Personnel and administrative practices identified with zoos and aquariums. Administrative philosophy and application, organizational structure, personnel management, fiscal procedures, communications, specific administrative problems.

PRT 456 Issues in Golf Management 3. Offered in Spring Only. Prerequisite: PGM Majors, Senior standing, PRT 156. Critical analysis of issues in professional golf management; integration of knowledge, theory and experience from course work and internship experiences; preparation for completion of the Professional Golfers’ Association of America’s Golf Professional Training Program.

PRT 458 Special Events Planning 3. Offered in Spring Only. Prerequisite: PRT 358. Theoretical and applied approaches to the planning of special events. Components and considerations of event planning, applied to various recreational settings. Participation in a community special event is required. Attendance at professional conference also required.

PRT 466 Sport Finance and Economics 3. Prerequisite: Sport Management and PRT Majors, PRT 256, ACC 210, and (ARE 201 or EC 201 or EC 205). Concepts include sources of revenue for financing, principles of budgeting, spreadsheet utilization, and financial management of sport facilities and enterprises. Additional topics include fundraising principles and methods, economic impact principles and their application to sport venues and events, economic theory applied to sport manufacturing, service industries, professional sports, stadiums and arenas, intercollegiate sports, and the sport club industry.

PRT 475 Recreation and Park Internship 8. Offered in Fall Spring Summer. Prerequisite: PRT 350, PRT 358, PRT 359, PRT 375, PRT 380, 100 hours of approved work experience. Provides
prospective park, recreation and leisure service professionals a 400-hour (ten week) learning experience in a selected agency or organization, under the joint supervision of a qualified manager and a university internship supervisor.

PRT 476 Sport Marketing 3. Offered in Fall and Spring. Prerequisite: PRT 486, Sport Management or PRT Majors, PRT 266. Fundamental marketing principles and concepts related to the sport industry. Overview of marketing mix, marketing strategies and the bases of segmentation, sponsorship, licensing, fundraising and merchandising. Special emphasis on the marketing of sport and its strong relationship to research. Credit will not be given for both PRT 476 and PRT 407.

PRT 477 Park, Recreation and Tourism Management 3. Offered in Fall and Spring. Integration of knowledge, theory and methods from coursework and experience; development and presentation of comprehensive operational and management problems and plans. Designed to encourage students to function as professionals and to relate areas of specialty to the broader Parks, Recreation and Tourism Management profession. Must be taken during student's last semester of coursework.

PRT 486 Senior Seminar in Sports Management 3. Offered in Spring Only. Prerequisite: Sport Management Majors, Senior standing, PRT 476. Issues affecting sport management at a national and global level. Interactive effect of strategies and decisions in each cognate area in sport management. Professional ethics and the notion of rights and responsibilities will be examined in the context of sport marketing, finance, communications, risk management and other management functions inherent in the sport enterprise. Students will also examine various theories of ethics and concepts of morality and develop a personal philosophy for social responsibility and management values.

PRT 491 Special Topics in Recreation 1-3. Offered in Fall Spring Summer. Investigation and analysis of a problem associated with recreation resources.

POLITICAL SCIENCE

PS 101 Internet Research 1. Offered in Fall Spring Summer. Tools and techniques for conducting Internet research and electronic literature reviews. Documentation and ethics of using and citing information sources.

PS 102 Data Analysis 1. Offered in Fall Spring Summer. Statistical analysis of governmental and survey data. Introduction to data sets and collecting, computerizing and analyzing political and social data.

PS 103 Designing Political Web Pages 1. Offered in Fall Spring Summer. Principles of effective internet communication in political professions, for constituency contact and grassroots mobilization, and use of web documents by politicians and political organizations. Design of web page documents and creation of internet directories.

PS 200 Workshop in Political Science 1. Offered in Fall and Spring. Core questions in political science using current political issues, events and debates as examples. Emphasis on methods of investigating political questions and the role of values in political debates.

PS 201 American Politics and Government 3. Offered in Fall Spring Summer. Analysis of American political institutions and processes, including the constitution, political culture, campaigns and elections, political parties, interest groups, the media, the president, congress, the federal courts, and public policy. Discussion of contemporary and controversial issues in American politics. Emphasis on placing current issues in comparative and historical perspective where relevant.

PS 202 State and Local Government 3. Offered in Fall Spring Summer. State and local governments within the context of the American federal system. Special emphasis on federalism, the constitutional/legal relationships between state and local governments, and the institutions, organizational forms, and political processes in American state and local government.

PS 203 Introduction to Nonprofits 3. Offered in Fall and Spring. Development of nonprofit organizations and the contributions of nonprofits in the U.S., other countries, and the international community; political, social, and economic roles of nonprofits; nonprofit governance; partnerships with government and other nonprofits; types of organizations in the nonprofit sector; contemporary policy issues. Service project with minor transportation costs.

PS 204 Problems of American Democracy 3. Offered in Fall Only. Political problems in America from the perspective of political theory. Democracy, economics and politics, racial and sexual equality, civil disobedience, and individual freedom.

PS 205 Law and Justice 3. Offered in Fall Spring Summer. Role of law from practical, political and theoretical perspective; linkages between law and justice in addressing social problems, such as gun control; drug legalization; civil disobedience; gender equality; and property rights; the impact of media on public perceptions of law and justice.

PS 231 Introduction to International Relations 3. Offered in Fall Spring Summer. Evolution of relations among nations and of the roles of the United Nations and other international institutions, including changes in the world political system since the end of the cold war.

PS 236 Issues in Global Politics 3. Offered in Fall and Spring. Selected problems facing the world community, related political issues, and international responses to them, including international trade, economic development, wars, arms control, terrorism, ethnic conflict, human rights, status of women, population growth, food security, and environmental degradation.

PS 241 Introduction to Comparative Politics 3. Offered in Fall Only. Introductory comparative analysis of a selected variety of political systems always including some developed democracies, some communist states and some developing countries. A minimum familiarity with the American political system is assumed.

PS 298 Special Topics in Political Science 1-6. Experimental course at the freshman and sophomore levels.

PS 301 The Presidency and Congress 3. Offered in Spring Only. Prerequisite: PS 201. Historical development, selection, and internal organization of the presidency and congress. Discussion of the relations between the branches and the influence of public opinion, interest groups and parties on the federal government. Analysis of the legislative process.

PS 302 Campaigns and Elections in the US Political System 3. Offered in Fall Only. Prerequisite: PS 201. Campaigns and elections in the United States with emphasis on presidential and congressional primary and general elections. Development of theoretical propositions
concerning how and why people vote, how and why candidates campaign, and behavioral reasons underlying candidates' successes and failures. Special emphasis on the role of the mass media in the electoral process.

**PS 303 Race in U.S. Politics 3. Offered in Spring Only.** Race in American politics with emphasis on the African-American political experience: civil rights legislation, voting rights, political representation, campaigns and party politics, survey attitudes, and public policies including affirmative action.

**PS 305 The Justice System in the American Political Process 3. Offered in Fall Spring Summer.** Criminal justice process and civil justice system in the American judiciary, including court organization and legal professionals such as police, attorneys and judges; formulation and implementation of policies by law enforcement and the courts; impact of political system upon police, attorneys and judges; interaction between public and legal professionals in judicial decision making. Students who have successfully completed PS 306 or PS 311 may not receive credit for PS 305.

**PS 306 Gender and Politics in the United States 3. Offered in Spring Only. Prerequisite: PS 201.** This course explores the role of gender in contemporary American politics. The course examines the historical course of gender politics to see how we have arrived at the present state. It investigates the activities that women and men play in modern politics-voting, running for office, serving in office, etc., and how women and men perform these activities in different ways. The course also focuses on major areas of public policy that affect women and men in different ways.

**PS 307 Introduction to Criminal Law in the United States 3. Offered in Fall and Spring.** Principles underlying the criminal law in the United States and classification of crimes, criminal act, factors affecting criminal responsibility and various types of offenses. Observation of state and federal court sessions.

**PS 308 Supreme Court and Public Policy 3. Offered in Spring Only.** The role of the Supreme Court in American politics, with emphasis on the use of litigation as a form of political activity. Readings include relevant court cases as well as descriptions of the Supreme Court in action.

**PS 309 Equality and Justice in United States Law 3. Offered in Spring Only.** Equality and justice in American law; federal and state court interpretation of constitutional and statutory law. Topics include racial justice; prisoners' rights and just punishments; nontraditional families and reproductive technologies; gay rights; immigration law; criminal justice practices.

**PS 310 Public Policy 3.** Introduction to public policy formulation and analysis, including agenda-setting strategies, problems of legitimation, the appropriations process, implementation, evaluation, resolution, and termination.

**PS 312 Introduction to Public Administration 3. Offered in Fall and Spring.** Administration in city, state and national governments: effectiveness and responsiveness, involvement in policy areas, and issues of ethics and responsibilities.


**PS 315 Public Leadership 3. Offered in Spring Only.** Nature and varieties of political leadership by elected and appointed officials in government, officials and volunteers in nonprofit organizations, and leaders of political movements and community groups drawing on literature in political science, self-assessment of student's leadership characteristics and examination of outlets for political leadership activity.

**PS 320 U.S. Environmental Law and Politics 3. Offered in Fall and Spring.** Emergence of the environment as an issue in United States politics. Law and policy pertaining to air and water pollution, land-use, water, energy, toxic substances, and wilderness. Roles of national and state governments, scientists, corporations, and citizens groups in addressing environmental problems.

**PS 331 U.S. Foreign Policy 3. Offered in Fall and Spring.** The content, formulation, and execution of U.S. foreign policy during the postwar period, with concentration on major issues and trends, the instruments for implementing foreign policy, and analysis of the policy-making process.

**PS 335 International Law 3. Offered in Spring Only.** Purpose and effectiveness of international law, including the rights and duties of sovereign states, peaceful settlement of disputes, laws of war, humanitarian law and role of non-state actors. Emphasis on formal legal reasoning and political analysis.

**PS 336 Global Environmental Politics 3. Offered in Fall and Spring.** International politics, laws, and policies pertaining to global environmental problems in the realms of population, pollution, climate change, biological diversity, forests oceans, fisheries, Antarctica, and outer space.

**PS 339 Politics of the World Economy 3. Offered in Spring Only.** Politics of international trade and payments, including barriers to trade, dispute settlement, multinational corporations, financial crises, international economic institutions and the problems of economic underdevelopment.

**PS 341 European Politics 3. Offered in Fall Only: Comparative analysis of the interests, institutions and processes that determine political stability and economic security in Europe, including the political and economic development of Europe, the role of parties and party politics, the institutions and politics of the European Union.

**PS 342 Politics of China and Japan 3. Offered in Fall and Spring.** Politics, public policy, and foreign affairs of China and Japan.

**PS 343 Government and Politics in South Asia 3. Offered in Fall Only.** Survey of government structures, politics, foreign policies and economic policies of India, Pakistan, Bangladesh and Sri Lanka. Democratization; religious, ethnic and sectarian conflicts; nuclear proliferation; Kashmir conflict; and economic development.

**PS 345 Governments and Politics in the Middle East 3.** Historical, geographic, religious, and political-economic factors of the Middle East. Particular attention is given to the internal politics of selected countries, as well as issues of international concern.

**PS 361 Introduction to Political Theory 3. Offered in Fall Spring Summer.** Nature and purpose of politics, as treated by such writers as Plato, Aristotle, St. Augustine, Machiavelli, Locke, Rousseau, Mill, Marx, and Nietzsche.

**PS 362 American Political Thought 3. Offered in Spring Only.** American ideas and institutions as viewed from the perspective of great
American political thinkers, such as Frederick Douglass, Thomas Jefferson, James Madison, Alexander Hamilton, Henry David Thoreau, Abraham Lincoln, Franklin Roosevelt, and Malcolm X.

PS 371 Research Methodology of Political Science 3. Offered in Fall Spring Summer. Prerequisite: ST 314 or (ST301 and ST302). Research methods in social science and quantitative analysis in political science and public policy including research design, data collection, statistical analysis and computer applications.

PS 391 Internship in Political Science 1-6. Offered in Fall Spring Summer. Internship in a governmental agency, interest group, or like organization involves seminar or formal report.

PS 401 American Parties and Interest Groups 3. Offered in Spring Only. American parties and interest groups as instruments for mobilizing electorates, shifting public opinion and setting political priorities. The role of parties and interest groups in operating and financing elections. Strategies, tactics and problems of parties and interest groups influencing elected officials, bureaucrats and the policy process.


PS 408 Urban Politics 3. Examination of politics in small towns, cities, counties, and urban regions including political development of cities, groups in urban politics, governmental institutions, local government officials, citizen participation, suburban development, metropolitan reform, and intergovernmental relations.

PS 409 Black Political Participation in America 3. Offered in Fall Only. African American political participation in the United States; political culture, socialization, and mobilization, with a focus on the interaction between African Americans and actors, institutions, processes, and policies of the American political system.

PS 411 Public Opinion and the Media in American Politics 3. Prerequisite: PS 201. Nature, content, origins, and effects of public opinion in the American political system; role of the mass media in articulating and shaping public opinion; issues concerning measurement of public opinion.

PS 413 Criminal Justice Field Work 4. Offered in Fall and Spring. Prerequisite: Acceptance in Criminal Justice Option; Senior standing; SOC 306 and PS 311. Supervised observation and experience in a criminal justice agency. Study of relationships between ongoing programs and relevant political and sociological theory and research. Weekly seminars, small groups and individual conferences. Presentation of an integrative report.

PS 415 Administration of Justice 3. Offered in Fall Only. Prerequisite: PS 311 and Junior standing. Politics and administration in the American system of justice. Credit will not be given for both PS 415 and PA 515.

PS 418 Gender Law and Policies 3. Offered in Fall Only. Prerequisite: Nine hours of Political Science. Law and policy pertaining to contemporary gender issues. Examination of agenda setting, policy formation, implementation, judicial interpretation and evaluation of selected issues, such as reproductive policies, equal employment and sexual abuse.

PS 431 The United Nations and Global Order 3. Prerequisite: PS 231 or PS 236 or PS 335. United Nations in contemporary world politics. Functions and operation of central organs, commissions, and specialized agencies. Role in addressing global issues including peacekeeping, arms control, human rights, economic and social development, and environment.

PS 432 Violence, Terrorism, and Public Policy 3. Offered in Fall and Spring. Prerequisite: SOC 300 or PS 371. The course examines interpersonal and group violence in contemporary societies and the causes for its occurrences. Specific forms of violence that will be examined include domestic violence, gangs, homicide, and terrorism, domestically and internationally. Throughout the course students will use data to critically evaluate policies and practices to prevent and control violence and will examine potential solutions to the problems of violence.

PS 433 Global Problems and Policies 3. Offered in Fall Only. Prerequisite: PS 231 or PS 236 or PS 241. Critical analysis of issues and events in world politics, including terrorism, drug trafficking and money laundering, transmission of infectious diseases, democratization, globalization and economic development.

PS 434 Ethnic Conflict and Political Violence 3. Offered in Spring Only. In this course, students will examine the phenomenon of ethnic conflict in the modern world. Why is ethnicity such a potent source of conflict? How important is "ethnicity" as opposed to politics, economic, or other factors in generating ethnic conflict? Is ethnic conflict inevitable? Why is it more prominent in some places than others? What can states, international organizations, and peoples of the world do to prevent or ameliorate interethnic strife? We will examine these questions through a mix of theoretical readings and in-depth case studies of sectarian violence, terrorism, state failure and collapse, riots, and racial tensions, and etc.

PS 437 U.S. National Security Policy 3. Prerequisite: PS 331. Formulation and implementation of United States national security policy, including its military, political and economic dimensions. Historical evolution of US policy primarily from the end of World War II through the end of the Cold War and to its contemporary context.

PS 443 Seminar in Latin American & Caribbean Politics 3. Offered in Spring Only. Prerequisite: Six hours of Political Science including PS 231. Comparative political development in Latin America and the Caribbean. Emphasis on democratization and implications for US foreign policy. Credit cannot be given for both PS 443 and PS 343.

PS 444 Comparative Systems of Law and Justice 3. Prerequisite: PS 311 and Junior standing. Legal culture and administration of justice in various countries and in the U.S. Emphasis on the impact of legal ideology on crime, political justice, police administration, corrections and judicial process. Credit will not be given for both PS 445 and PS 545.

PS 462 Seminar in Political Theory 3. Offered in Spring Only. Prerequisite: PS 361 or Consent of Instructor. A special area in political theory through selected texts, independent research, and seminar reports. Topics vary from year to year, such as ancient and modern political thought, democratic theory, and political theory in literature.

PS 463 Public Choice and Political Institutions 3. Offered in Fall Only. Prerequisite: Junior standing or Senior standing. Political Science Majors, 12 hours of Political Science Courses. Examination of public choice approach to political science. Analysis of political institutions and how they modify human behavior and influence political and policy outcomes. Fulfills department's undergraduate senior seminar requirement.
PSE 201 Pulping and Papermaking Technology 3. Offered in Spring Only. Survey of the pulping and papermaking processes. Covers characteristics of wood and different types of fiber, key equipment and process variables for pulping, bleaching and chemical recovery processes, with emphasis on the kraft process. Papermaking variables and equipment, particularly on a Fourdrinier machine, secondary fiber processing, and aspects of printing and converting discussed.

PSE 211 Pulp and Paper Internship 1. Offered in Fall Only. Prerequisite: PSE 201. Experience in the pulp and paper industry. Problem solving in an industrial setting to gain insight of pulp and paper technology. Written report required.


PSE 322 Wet End and Polymer Chemistry 4. Offered in Fall Only. Prerequisite: PSE 212, CH 221, and CH 222. Prepares students to solve problems related to chemical usage on paper machines. Subjects include water chemistry, paper machine operations, fibers, fillers, alum, sizing agents, polyelectrolytes, colloidal interactions, strength agents, dyes, strategies to optimize retention, dewatering strategies, strategies to achieve more uniform paper, strategies to improve production rates, recycling aqueous coatings, and wet-end chemical process control.

PSE 332 Wood and Pulping Chemistry 3. Offered in Spring Only. Prerequisite: CH221, CH222, CH223, CH224. Introduction to carbohydrate chemistry focusing on the structure and reactivity of wood polysaccharides, hemicelluloses and cellulose and on the chemical structure of lignins and wood extractives. Special emphasis on the chemical reaction of wood components occurring in pulping and bleaching processes.

PSE 355 Pulp and Paper Unit Processes 13. Offered in Fall Only. Prerequisite: CHE 205. Selected topics in chemical engineering as applied in the pulp and paper industry. Emphasis on computational practice.

PSE 360 Pulp and Paper Unit Processes II 3. Offered in Spring Only. Prerequisite: PSE 201, PSE 355 or CHE 311. Application of chemical engineering principles to the analysis of pulp and paper unit processes. Emphasis on practical problems in fluid dynamics, heat transfer, mass transfer and thermodynamics. Problem solution techniques include hand calculation and computer simulation tools.

PSE 371 Pulping Process Analysis 3. Offered in Spring Only. Prerequisite: PSE 201. Preparation and evaluation of different types of wood pulp. A new wood raw material is selected each year with the purpose of studying and critically evaluating the principal pulping and bleaching variables.

PSE 416 Process Design and Analysis 3. Offered in Spring Only. Prerequisite: PSE 417. Design, management and analysis of technical projects. Emphasis on concepts and techniques used in economic analysis of projects. Use of computer simulation for process design and cost analyses. Team projects to analyze cost and operating feasibility of proposed major mill modification. Written and oral presentations required throughout the semester.


PSE 425 Bioenergy & Biomaterials Engineering 3. Offered in Fall Only. Prerequisite: For PSE Majors: (MAE 301 or CHE 316) and PSE 360; For CHE Majors: CHE 312 and CHE 316; For BAE Majors: MAE 301 and BAE 402. This course acquaints students with the basic science, terminology, technology, economic concepts, and engineering concepts associated with the conversion of biomass into energy and materials. Topics include: biomass types and properties; biochemical platforms; thermochemical platforms; unit operations; the biorefinery; biocomposites. Some design content is included. Targeted to engineering students with a suitable background (PSE, CHE, BAE).

PSE 465 Paper Physics and Product Design 3. Offered in Spring Only. Study of fundamental knowledge on the structure and properties of fibers and fibrous products, and the related physical and physiochemical mechanisms. Product design exercises will apply the fundamental understanding to specific end use requirements.


PSE 475 Process Control in Pulp and Paper 3. Offered in Fall Only. Overview of the various aspects of control including process modeling, design of control loops and stability analysis in pulp and paper systems.
paper. Emphasis on distributed digital control (DDC), including hands-on programming and control loop development on an DDC computer.

**PSYCHOLOGY**

**PSY 200 Introduction to Psychology** 3. Offered in Fall Spring Summer. Survey of basic principles for the understanding of behavior and experience including development, learning, cognition, biological foundations, perception, motivation, personality, behavior abnormalities, measurement of individual differences, and social processes. The value of scientific observation and experimentation to the development of psychological understanding is emphasized.

**PSY 201 Controversial Issues in Psychology** 3. Offered in Fall Only. Students will explore contemporary controversial issues within several areas of psychology (biological, human development, cognitive processes, mental health, psychological treatment, and social psychology) and encounter the diverse approaches used by psychologists and other scientists. Students will have the opportunity to refine and use their critical thinking skills as they inquire into basic psychological concepts relevant to issues they help select and will practice confronting differing opinions responsibly and respectfully to fully contribute to and gainfully receive from the university community.

**PSY 220 Orientation to Psychology** 1. Offered in Fall Only. Orientation for new or potential Psychology majors. Analysis of expectations and demands of the psychology degree programs. Exploration of the challenges and opportunities presented by various post-baccalaureate educational and career options.

**PSY 230 Introduction to Psychological Research** 3. Offered in Fall and Spring. Prerequisite: PSY 200. This course is an introduction to the principles of scientific research. Students will develop and test research hypotheses in accordance with methods approved by the American Psychological Association. Methods of analyzing data and the interpretation of research findings will be stressed. Students will work in teams to collect, analyze, report, and prove a professional presentation of a group research project. The course is restricted to psychology majors and must be taken under the graded option.

**PSY 240 Introduction to Behavioral Research I** 3. Offered in Fall and Spring. Prerequisite: PSY or HRD Majors, PSY 200, Corequisite: PSY (ST) 241. Introduction to quantitative methods in psychology, including measurement, experimental control, validity, and fundamentals of research design. Discussion of distributions and statistical inference.

**PSY 241 Introduction to Behavioral Research I Lab** 1. Offered in Fall and Spring. Prerequisite: PSY or HRD Majors, PSY 200, Corequisite: PSY (ST) 240. Students design, analyze and report a variety of simple experiments.

**PSY 242 Introduction to Behavioral Research II** 3. Offered in Fall and Spring. Prerequisite: PSY or HRD Majors, PSY (ST) 240. Corequisite: PSY (ST) 243. Continuation of PSY (ST) 240. Ethics of Research in Psychology. Techniques for the development of research proposals. Statistical techniques for data analysis including non-parametrics, one-way and two-way ANOVA and introduction to correlation and regression.

**PSY 243 Introduction to Behavioral Research II Lab** 2. Offered in Fall and Spring. Prerequisite: PSY or HRD Majors, PSY (ST) 240, Corequisite: PSY (ST) 242. Design and analysis of a major research project.

**PSY 307 Industrial and Organizational Psychology** 3. Offered in Fall Spring Summer. Prerequisite: PSY 200 or PSY 201. Theory and research on how individuals respond and are responded to in social situations. Topics include: organizational and management theory; work motivation and job satisfaction; job and organizational analysis; performance evaluation; personnel recruitment, selection, and placement; and personnel training and development.

**PSY 311 Social Psychology** 3. Offered in Fall Spring Summer. Prerequisite: PSY 200 or PSY 201. Theory and research on how individuals respond and are responded to in social situations. Topics include: attitude formation and change, affiliation, attraction, self and interpersonal perception, interpersonal relationships, aggression, helping behavior, intergroup behavior, and group dynamics.

**PSY 312 Applied Psychology** 3. Prerequisite: PSY 200 or PSY 201. Covers diverse areas of psychological practice, related methods and ethical issues. Includes illustrative cases of psychological practice in health, education, work settings, law, sports, consumer markets, and cross-cultural settings. Explores professional roles and contributions in the contexts of social, organizational and technological change.

**PSY 340 Ergonomics** 3. Offered in Fall Only. Prerequisite: PSY 200 or PSY 201. Concepts from ergonomics, environmental psychology, and cognitive psychology related through design examples to problems of everyday living. Criteria of efficiency, comfort and safety evaluated relative to the design of activity, products, and the environment. Topics include: visual and auditory perception, information processing, physical activity, noise and lighting, work space design, workload, and product design.

**PSY 345 Psychology and the African American Experience** 2. Offered in Fall Only. Prerequisite: PSY 200 or PSY 201. Historical and cultural examination of the psychological experiences of African American experience from pre-American times to the present. Focus on mental health, personality, identity development, racism, oppression, psychological empowerment and an African-centered world view. Discussion of contemporary issues within the African American community.

**PSY 350 Human Resource Development Skills** 3. Offered in Fall Only. Prerequisite: HRD Majors, Junior standing. Corequisite: PSY 495, COM 112. Theoretical, conceptual and intervention principles of human resource development practice in public and private settings; ethics and values; individual, group and organizational behavior; assessment methods; intervention methods. Emphasis on applying principles to internship settings.

**PSY 360 Community Psychology Principles and Practice** 3. Offered in Fall Only. Prerequisite: PSY 200. This course provides an introduction to the field of community psychology. The aim of this course is to help empower students to contribute to effective social change in their communities. Community psychology focuses upon person-environment interactions and the ways individuals navigate between different social contexts (e.g. schools, neighborhood, community, and society). Community psychologists employ a variety of methodological approaches to understand the social issues facing communities today such as juvenile violence, homelessness, HIV/AIDS, and domestic violence.

**PSY 370 Personality** 3. Prerequisite: PSY 200. Major personality theories. Definition of personality associated with each theory as well as the assumptions and principles used in accounting for human behavior. Theories evaluated considering recent research.
PSY 376 Developmental Psychology 3. Offered in Fall Spring Summer. Prerequisite: PSY 200, PSY 201 or PSY 304 or EDP 304. Behavioral development during the life span, including study of current theories and project work with persons at various stages of the life cycle.

PSY 400 Perception 3. Offered in Fall Spring Summer. Prerequisite: PSY 200 or PSY 201, Junior standing. Anatomy and physiology of the major sensory systems, their relationship to central structures of the brain, important and/or common pathological conditions. Basic issues and techniques of psychophysics. Perceptual phenomena and theory, with an emphasis on topics in two-and three-dimensional spatial perception, including the perceptions of size, depth and motion. Consideration of perceptual phenomena in practical settings.

PSY 406 Psychology of Gender 3. Offered in Fall and Spring. Prerequisite: PSY 200, PSY 201 or HSS 200. Current theory and research on perceived and actual biological, social, cognitive, personality and emotional similarities and differences of men and women throughout the lifespan. The construction and consequences of gender in our society and others. Credit cannot be given for both PSY 406 and PSY 506.

PSY 410 Learning and Motivation 3. Offered in Fall Only. Prerequisite: PSY 200, Junior standing. Introduction to the primary laboratory research areas in learning and motivation: classical conditioning, operant conditioning, verbal learning, drive theory, and the role of motives. Emphasis upon research on conditioning and its motivational processes as the foundations for techniques in behavior modification. Examination of both the uses and limitations of current information on learning and motivation.

PSY 416 Psychology of Emotion 3. Offered in Fall Only. Prerequisite: PSY 200. Introduction to the classic and contemporary theories of emotion, with strong emphasis on how data provide evidence to test theory. Biological, cognitive, social, and cultural foundations are explored.

PSY 420 Cognitive Processes 3. Offered in Fall Spring Summer. Prerequisite: PSY 200, Junior standing. Introduction to research and theory in cognition, including such topics as memory, acquisition and use of language, reading, problem-solving, reasoning, and concepts.

PSY 425 Introduction to Cognitive Science 3. Offered in Fall Only. Prerequisite: One upper-level course in either PHI, PSY, CSC or Linguistics. Philosophical foundations and empirical fundamentals of cognitive science, an interdisciplinary approach to human cognition. Topics include: the computational model of mind, mental representation, cognitive architecture, the acquisition and use of language. Students cannot receive credit for both PHI/PSY 425 and PHI/PSY 525.

PSY 430 Biological Psychology 3. Offered in Fall and Spring. Prerequisite: BIO 105/106 or BIO 181. Biological mechanisms of behavior, including elementary neuroanatomy and neurophysiology, sensory and motor processes, and their application to motivation, learning, and psychological processes.

PSY 431 Health Psychology 3. Offered in Fall and Spring. Introduction to health psychology. This course provides an overview of the field of health psychology, which is concerned with how behavior and psychological states influence physical health (i.e., how people stay healthy, why people become ill, and how people respond to illness). Application of psychological theory and research methods to such topics as: pain, stress and coping, helplessness and control, reactivity to stress, the effectiveness of behavioral interventions in health, illness prevention, health maintenance, recovery from injury and chronic pain, adjustment to chronic illness, treatment compliance.

PSY 436 Introduction to Psychological Measurement 3. Offered in Spring Only. Prerequisite: PSY 240-241. The basic principles of psychological measurement, including elementary statistical concepts, reliability, and validity. Emphasizes measurement in the science of psychology. Application of measurement principles to a wide variety of measurement problems.


PSY 475 Child Psychology 3. Offered in Fall and Spring. Prerequisite: PSY 200 or 304 or EDP 304. PSY 376. Theories, methods, and phenomena of child psychology and application of this information to the enhancement of child development. Multiple aspects of development, including physical, cognitive/intellectual, and social/emotional development, from conception to adolescence. Emphasis on recent research findings in developmental psychology.

PSY 476 Psychology of Adolescent Development 3. Offered in Fall Spring Summer. Prerequisite: PSY 200 or EDP 304. Theories, principles, and issues of human psychological development emphasizing adolescence. Cognitive, social, and physical changes; their interaction. Implications for teaching and parenting adolescents.

PSY 491 Special Topics in Psychology 3. Offered in Fall and Spring. Prerequisite: PSY 200. Exploration in depth of advanced areas and topics of current interest in psychology.

PSY 495 Human Resource Development Practicum 1-8. Offered in Fall and Spring. Supervised practicum in a human resource development organization during two consecutive semesters. Application of human resource development knowledge and skills.

PSY 497 Senior Seminar in Psychology 2. Offered in Spring Only. Readings and discussions in depth of a special topic, which integrates several fields covered in the undergraduate psychology or HRD major.

PSY 498 Psychology Honors Seminar 3. Seminar and independent study under faculty direction. Provides the undergraduate psychology honors students with an opportunity to practice skills in designing, conducting, and evaluating research. The student, working closely with a faculty advisor, designs a research approach to a particular body of literature, accumulates appropriate data, and analyzes and evaluates the data. Must take two semesters.

PSY 499 Individual Study in Psychology 1-6. Offered in Fall and Spring. Corequisite: PSY 493 for HRD majors during their work semester. Individual research project (literature review, experiment, survey, field study) open to any undergraduate, under the direction of a Psychology Department faculty member.

PHYSICS

PY 101 Perspectives on Physics 1. Offered in Fall Only. Orientation to the current practice of physics, including discussion of
historical background, scientific viewpoint, current topics, and careers in physics. Visits to departmental research laboratories.

**PY 123 Stellar and Galactic Astronomy 3. Offered in Fall and Spring.** Introductory, descriptive survey of stars, galaxies and cosmology, designed primarily for non-science majors. Exotic recent discoveries such as quasars, pulsars, and black holes will be included. Complements PY 124, Solar System Astronomy. Companion laboratory course PY 125.

**PY 124 Solar System Astronomy 3. Offered in Fall and Spring.** Introductory, descriptive survey of the solar system designed primarily for non-science majors, including current results from space probes, history of astronomy, and the motions of the moon, stars, and planets in the night sky. Complementary course covering stars, galaxies and cosmology (PY 123). Companion laboratory course (PY 125).

**PY 125 Astronomy Laboratory 1. Offered in Fall and Spring. Corequisite: PY 123 or 124.** Introduction to astronomical observing. Twelve exercises include astronomical instruments; the nature of light; Kepler's and Newton's laws of motion; the constellations, planets, binary stars, stellar clusters, and galaxies. Use of small telescopes to observe celestial objects.

**PY 126 Computer-based Astronomy Laboratory 1. Offered in Fall and Spring. Corequisite: PY 123 or PY 124.** Ten computer-based laboratory exercises in astronomy. Celestial coordinates, motions of celestial objects, and bright stars and constellations. Simulated observing of planets, stars, and galaxies, with data reduction and analysis.


**PY 133 Conceptual Physics: Optics 4. Offered in Fall and Spring.** Fundamentals of optics from a conceptual rather than a mathematical viewpoint. Applications of optics ranging from everyday phenomena to modern optical devices; from rainbows to lasers. Properties of light, color, optical devices, light in the atmosphere, vision in animals and man, light in modern physics, light in the cosmos.

**PY 201 University Physics I 4. Offered in Fall Only. Corequisite: MA 141.** First course of three semester sequence for students majoring in physical and mathematical sciences. Calculus used throughout. Principles of classical Newtonian mechanics covered in detail.


**PY 203 University Physics III 4. Offered in Fall Only. Prerequisite: PY 202, MA 241. Corequisite: MA 242.** Third course of three semester sequence designed primarily for students majoring in physical and mathematical sciences. Calculus is used throughout. Principles of wave optics and modern physics are covered in detail.

**PY 204 General Physics 3. Prerequisite: MA 141.** Introduction to physics, including the study of mechanics, sound, heat, and thermodynamics. The analytical approach is employed with emphasis on problem solving. Identical to PY 205, except that there is no laboratory. Offered only through Independent Study by Extension. Credit cannot be earned for both PY 204 and PY 205.

**PY 205 Physics for Engineers and Scientists I 4. Offered in Fall and Spring Summer. Prerequisite: MA 141 with a grade of C- or better or MA 241 Placement.** First semester of a two-semester sequence in introductory physics, with laboratory. A calculus-based study of mechanics, sound and heat.

**PY 206 General Physics Laboratory 1. Offered in Fall Spring Summer. Prerequisite: PY 204.** Approximately ten experiments taken from the fields of mechanics, sound, heat and thermodynamics. Enrollment subject to approval of Physics Department. Not open to students having credit for PY 205.

**PY 208 Physics for Engineers and Scientists II 4. Offered in Fall Spring Summer. Prerequisite: MA 107 or MA 111.** First semester of a two-semester sequence in introductory physics, with coordinated laboratory problem-solving experiences. A calculus-based study of electricity, magnetism, optics and modern physics. Credit not allowed for more than one of PY 208, PY 202, and PY 212.

**PY 211 College Physics I 4. Offered in Fall Spring Summer. Prerequisite: MA 107 or MA 111.** First semester of a two-semester introductory sequence in non-calculus physics, with laboratory. Electricity, and magnetism, light, modern physics. Credit not allowed for more than one of PY 211, PY 201 or PY 205.

**PY 212 College Physics II 4. Offered in Fall Spring Summer. Prerequisite: PY 211.** Second semester of a two-semester introductory sequence in non-calculus physics, with laboratory. Electricity, and magnetism, light, modern physics. Credit not allowed for more than one of PY 212, PY 202, and PY 208.

**PY 299 Special Problems in Physics 1-3. Offered in Fall Spring Summer.** Study in experimental or analytical topics in classical and modern physics.

**PY 328 Stellar and Galactic Astrophysics 3. Offered in Spring Only. Prerequisite: PY 202 or PY 208.** Introduction to the study of stars, galaxies, and the universe. Stars and stellar evolution; interstellar medium; galaxies and galaxy clusters; cosmology. Recent developments in the understanding of neutron stars, black holes, active galaxies, quasars and inflationary cosmologies.

**PY 341 Spacetime Physics 3. Offered in Spring Only. Prerequisite: PY 203 or 407.** Introduction to spacetime physics in accordance with Einstein's special theory of relativity; time dilation, twin paradox, Doppler effect, relativistic space travel, four-vectors, relativistic momentum and energy conservation laws in high energy physics. Consequences of Einstein's gravitational theory in cosmology; models of the expanding universe, neutron stars, black holes and the "big bang" hypothesis. 

**PY 401 Quantum Physics I 3. Offered in Fall and Spring. Prerequisite: C- or better in PY 411.** An introduction to the basic principles of quantum physics with an emphasis on selected applications to atoms, molecules, solids, nuclei and elementary particles.

**PY 402 Quantum Physics II 3. Offered in Fall and Spring. Prerequisite: C- or better in PY 401.** An introduction to the basic principles of quantum physics with an emphasis on selected...
applications to atoms, molecules, solids, nuclei and elementary particles.

PY 407 Introduction to Modern Physics 3. Offered in Fall Spring Summer. Prerequisite: MA 242, PY 208. Major developments in modern physics: special relativity, origin of the quantum theory, atomic and molecular structure, radioactivity, properties of nuclei. Credit not allowed for both PY 203 and PY 407.

PY 411 Mechanics I 3. Offered in Fall Only. Prerequisite: C- or better in PY 202 or C- or better in PY 208, and Corequisite of MA 341. First semester of a two-semester sequence in particle and continuum mechanics at the intermediate level. Focuses on single-particle dynamics: Elementary Newtonian mechanics, harmonic oscillator, central force motion, conservation laws, motion in non-inertial frames, Coriolis and centrifugal forces, Lagrangian dynamics, Hamilton's equations.

PY 412 Mechanics II 3. Offered in Spring Only. Prerequisite: C- or better in PY 411. Second semester of a two-semester sequence in particle and continuum mechanics at the intermediate level. Focuses on dynamics of systems of particles and continua: Center of mass, collisions, rigid bodies, inertia tensor, principal axes, stress and strain tensors, mechanical properties of fluids and solids; Waves in discrete and continuum systems, coupled oscillators, normal modes, elements of special relativity.

PY 413 Thermal Physics 3. Offered in Spring Only. Prerequisite: PY 203 or 407, MA 341. An introduction to statistical mechanics and thermodynamics. The statistical study of physical systems emphasizing the connection between the statistical description of macroscopic systems and classical thermodynamics. Concepts of heat, internal energy, temperature and entropy. Classical and quantum statistical distributions.

PY 414 Electromagnetism I 3. Offered in Fall Only. Prerequisite: C- or better in PY 203 or C- or better in PY 407, and MA 341. First semester of a two-semester sequence. An intermediate course in electromagnetic theory using the methods of vector calculus. Electrostatic field and potential, dielectrics, solution to Laplace's and Poisson's equations, magnetic fields of steady currents.

PY 415 Electromagnetism II 3. Offered in Spring Only. Prerequisite: C- or better in PY 414. Electromagnetic induction, magnetic fields in matter, Maxwell's equations, wave guides, radiation.

PY 452 Advanced Physics Laboratory 3. Offered in Fall and Spring. Introduction to laboratory electronics and instrumentation. Experiments in mechanics; electromagnetism; electronics; optics; and atomic, nuclear, plasma and solid state physics. Senior Physics students only.

PY 463 Fluid Physics 3. Offered in Fall Only. Prerequisite: MA 341 and PY 208. A derivation of the basic equations governing fluid motion in a rotating coordinate system. Equations include conservation of mass or the continuity equation, momentum equations, thermodynamic energy equation and the vorticity equation. Application of equations to simplified oceanic flows which include surface gravity waves, inertial motion, geostrophic motion, Ekman dynamics and vorticity dynamics.

PY 499 Independent Research in Physics 1-6. Offered in Fall Spring Summer. Study and research in physics. Topics for experimental or theoretical investigation.

REL 101 Elementary Biblical Hebrew I 3. Offered in Fall and Spring. Prerequisite: MA 242, PY 208. Major developments in the study of Biblical Hebrew. Reading is drawn primarily from the Book of Genesis and some attention given to exegetical method.

REL 102 Elementary Biblical Hebrew II 3. Offered in Fall and Spring. Prerequisite: REL (FLH) 101. A continuation of REL (FLH) 101 with increased emphasis upon reading selected prose passages.

REL 200 Introduction to the Study of Religion 3. Historical, theoretical, and methodological introduction to the study of religion. Critical analysis of development of the discipline of Religious Studies. Preparation for all advanced study in Religious Studies theory and method, as well as training to study religious traditions of the world.

REL 201 Intermediate Biblical Hebrew I 3. Offered in Fall and Spring. Prerequisite: REL (FLH) 101. Continuing development of vocabulary and understanding of grammar and syntax through reading of selected prose and poetic passages in the Hebrew Bible. Exegetical matters are considered.

REL 202 Intermediate Biblical Hebrew II 3. Offered in Fall and Spring. Prerequisite: REL (FLH) 201. Exclusive attention devoted to reading and interpreting selected prose and poetic passages in the Hebrew Bible.

REL 230 South Asian Religious Traditions 3. Hindu, Buddhist, Jain, Sikh, Islamic, Christian, Jewish, and Zoroastrian religious traditions in comparative perspective. Religious and cultural history through literature, film, and art of India, Pakistan, Bangladesh, Sri Lanka, Nepal, and Afghanistan. Doctrine, practice, teaching tales, and issues of change and conflict in South Asia and in the diaspora, especially the USA.

REL 298 Special Topics in Religious Studies 3. Selected studies in religion that do not appear regularly in the curriculum. Topics will be announced for each semester in which the course is offered.

REL 300 Religious Traditions of the World 3. Offered in Fall Spring Summer. Major Eastern and Western religious traditions with attention to their basic teachings and practices as well as to the historical, geographical, social, and political settings in which they have arisen and developed.

REL 309 Religion and Society 3. Prerequisite: 3 cr. in SOC, 200 level. Religious beliefs, practices and organizations addressed as social phenomena. Structural functionalism, conflict and subjectivism as theoretical orientations for understanding influences between religion and society. Relationship of religions to family, government, and economy and to social divisions, conflict and change.

REL 311 Introduction to the Old Testament 3. Study of Old Testament books, examining their content, background and development. Comparisons of the biblical material with other Ancient Near Eastern literature. Assessment of contributions from archeology and literary studies to clarifying the text.

and their relationships, early controversies with Judaism and the emergence of church structure and teaching.

REL 314 Introduction to Intertestamental Literature 3. Intertestamental literature in the context of Jewish history, institutions and beliefs of the Intertestamental Period (ca. 300 B.C.-ca. 100 A.D.).

REL 317 Christianity 3. Development of Christianity from its origins to the present; events, persons, ideas, beliefs and practices which were most significant in this development.

REL 320 Religion in American History 3. Offered in Fall Only. Prerequisite: 3 hours of History or Sophomore standing. Representative people, movements and thought in the major religions within the context of American society and culture.

REL 323 Religious Cults, Sects, and Minority Faiths in America 3. Offered in Fall Only. Religious cults, sects and minority faiths in America, including Mormonism, Christian Science and Jehovah's Witnesses. Also covers such alternate groups as the holiness-charismatic movement and the Unification Church. Origins, development and teachings of these groups within the context of American culture and religion.

REL 327 Issues in Contemporary Religion 3. Responses of contemporary Western religious thinkers to crises of religion and to challenges posed by the 20th century including the Nazi Holocaust, social injustice (liberation theologies - black, feminist, Third World), ecological crisis, threat of nuclear warfare, and conflicts between religions.

REL 331 The Hindu Tradition 3. Basic religio-philosophical concepts, social institutions, and individual practices of Hindu civilization from earliest Vedic times to the present. Focus on major traditions: Action (karma), Knowledge (jñana), and Devotion (bhakti), with emphasis on disciplines (yoga), myth, symbol, art.

REL 332 The Buddhist Traditions 3. History and structure of the Buddhist tradition analyzed through the "three jewels": the Buddha, the Monastic Community (sangha), and the Teachings (dharma). Emphasis on fundamental religio-philosophical concepts, social history and ritual practices of Southern Buddhism, early Mahayana development, and Tantric ideals. Growth of the traditions in China and Japan.


REL 334 Japanese Religions 3. Offered in Fall Only. Survey of various strands of Japanese religious life from prehistoric times until present. Kami worship; primary Buddhist schools in Japan; Japanese Christianity; Confucianism; and New Religions.

REL 340 Islam 3. Offered in Fall Only. Introductory survey of the Islamic religious tradition. Examination of the primary historical, literary, and theological sources for Islamic religious thought in global contexts. Topics include the Prophet Muhammad, the development of the early Muslim community, Islamic religious practice, Sunni and Shi'i Islam, Sufism, theology, law and Islamic art and architecture.

REL 350 Introduction to Judaism 3. Offered in Spring Only: A survey of Jewish religious traditions from the bible through the present day. Evolution of major religious ideas through classical texts including torah, Talmud, philosophical and mystical literature, and contemporary fiction.

REL 383 Religion, Globalism, and Justice 3. Prerequisite: One course in religion, philosophy, history, political science, anthropology or sociology. Issues and problems in religion and societies since 1945. Historical, theoretical, sociological, and cultural approaches to globalism and religion. Inquiry into the role of ethical reasoning in religious debates on the problem of globalization.

REL 402 Early Christianity to the Time of Eusebius 3. Offered in Spring Only. Prerequisite: One of: REL 312, REL 317, or HI 207. Growth and diffusion of early Christianity from the end of the first century up to the time of Eusebius and the conversion of Constantine (early fourth century); Christianity in its Greco-Roman environment; Roman policy towards Christianity; heterodox Christian movements; anti-heretical writings; orthodox institutions of authority.

REL 407 Islamic History to 1798 3. Prerequisite: 3 hours of history. Credit will not be given for both HI 407 and HI 507. The history of the Islamic Near East to 1798. Topics include the East Mediterranean before Islam, Muhammad and the development of Islam, sources of Muslim civilization, Islamic law, science, philosophy, art and architecture, Islam in Spain, India, Asia and Africa, the Crusades, the Ottomans, Islam and Europe.

REL 408 Islam in the Modern World 3. Prerequisite: 3 hours of history or religious studies. Evolution of modern Islam from 17th century to the present. Primary emphasis on North Africa, the Middle East and South Asia. Pre-modern Islamicate empires, reform and revival. Historical origins of current issues in the Islamic world.

REL 412 Advanced Readings in the Christian Gospels 3. Offered in Spring Only. Prerequisite: REL 312 or REL 317. Close study of the varieties of gospel writings, both canonical and non-canonical, in early Christianity. Analysis of the constituent features of the gospels (parables, healing narratives, sermons), and their "pre-history"; the use of the gospels in the reconstruction of the life and ministry of Jesus; and critical methods in gospel research.

REL 413 The Life and Letters of the Apostle Paul 3. Offered in Fall Only. Prerequisite: REL 312 or REL 317. Intensive study of the apostle Paul and his writings in their historical, literary and religious contexts. Sources for the life and ministry of Paul; the structure and theology of the Pauline and deutero-Pauline epistles; the influence and image of Paul in early Christianity; and contemporary controversies and issues in the study of Paul.

REL 423 Religion and Politics in 20th Century America 3. Offered in Spring Only. Prerequisite: one 300-level course in religion, philosophy, or history. Issues and problems in religion and politics in the United States since 1900. Historical, theoretical, sociological, and cultural approaches to religion and politics. Inquiry into the relations between religion and the state. Responses of religious traditions to American social and political issues.

REL 471 Darwinism and Christianity 3. Offered in Fall Only. Prerequisite: One course in religious studies, biological sciences, philosophy of science, or history of science. Evolutionary biology and Christianity. Darwin's evolutionary theory; neo-Darwinism; conflicts between evolutionary theory and Christian thought; methodological parallels and differences between science and religion; proposals for divine action in an evolutionary world.

REL 472 Women and Religion 3. Offered in Fall Only. Prerequisite: one course in religious studies or women's and gender studies. Historical, literary, and theological sources dealing with
portrayals of women and women's religious experience in several religious traditions of the world through different historical periods, from ancient to modern. Impact of feminist theory on the academic study of religion; methodological issues surrounding the study of women's religious history; role of religion in shaping attitudes toward women and their status in society.

REL 473 Religion, Gender, and Reproductive Technologies 3. Examines comparative religious ethics concerning gender marriage, parenthood, children, and the relationship of human beings to the "natural". Relates these views to new and emerging reproductive and genetic technologies. Compares the internally diverse perspectives of three major religious traditions with regard to their interpretations of these technologies. Analyzes the impact of particular uses of these technologies on the rights of women and girls. Students cannot earn credit for both REL 473 and REL 573.


REL 484 Myth and History in Religious Biography 3. Prerequisite: 300-level course in REL, HI, or ENG. Cross-cultural typology of religious biography, including sacred biography, hagiography, confessional biography, autobiography, and myth; structure and function of myth in creating the biographical image of religious subjects; hermeneutic theory and methodological strategies for reading and interpreting individual life histories; multiple case-studies including Buddha, Moses, Jesus, Muhammad, Luther and Krishna-Caitanya.


REL 491 Advanced Readings in Theological and Religious Literature 3. Prerequisite: 300-level course in Religion. Critical analysis of advanced theological works; close reading of primary texts; methods of interpretation (hermeneutics). Course may be used for individualized study programs by arrangement with the instructor.

REL 496 Seminar in Religious Studies 3. Prerequisite: 300-level course in Religion. Advanced research and writing in selected topics; application of contemporary and historical methods for the study of religion; hermeneutic theory. Open primarily to Religious Studies majors and minors.

REL 498 Special Topics in Religious Studies 1-6. Prerequisite: 6 hours REL. Detailed investigation of selected topics in religion. Topics determined by faculty members in consultation with head of the department. Course may be used for individualized study programs.

SOC 202 Principles of Sociology 3. Offered in Fall Spring Summer. Introduction to sociology. Analyses of key processes and institutions including interaction, inequality, organization, socialization, and social change. Includes core sociological concepts, methods, theories.

SOC 203 Current Social Problems 3. Offered in Fall Spring Summer. Examination of social problems linked to structures of economic, political, gender and racial inequality; including poverty, disease, racism, sexism, unemployment, psychological distress, educational failure, environmental destruction and violence. Possible solutions viewed from a variety of perspectives. Includes core sociological concepts, methods and theories.

SOC 204 Sociology of Family 3. Offered in Fall Spring Summer. Contemporary American family structures and processes and their development. Focus on socialization, mate selection, marital adjustment and dissolution. Includes core sociological concepts, methods, theories.

SOC 205 Jobs and Work 3. Offered in Fall Spring Summer. Work experience in terms of intrinsic and extrinsic rewards for worker. Work experience as intersection of occupation, industry, organization, region, and time period. Research skills for comparing job options to individual goals. Includes core sociological theories, concepts and methods.

SOC 206 Social Deviance 3. Offered in Fall Spring Summer. Social processes in the creation and maintenance of deviant populations: classification, objectification of social meanings, functions of subcultures and social outcomes of the deviance-ascription process. Includes core sociological concepts, methods, theories.

SOC 220 Cultural Geography 3. Offered in Fall and Spring. Investigates the world's past and present cultural diversity by studying spatial patterns of population, language, religion, material and non-material culture, technology and livelihoods, communities and settlements and political organization and interaction.

SOC 241 Sociology of Agriculture and Rural Society 3. Offered in Fall and Spring. Application of sociological concepts, methods, theories and styles of reasoning to major social problems facing rural America. Changing structure of agriculture; social impact of agricultural technology; rural community growth and decline; rural industrialization; rural poverty, natural resources and environmental issues in rural America. Includes core sociological concepts, methods, theories.

SOC 261 Technology in Society and Culture 3. Offered in Fall and Spring. Processes of social and cultural change with a focus on role of technological innovation. Cross-cultural emphasis. Workplace changes and societal risks associated with technological innovations. Special attention to the role of scientists and engineers in socio-cultural change. Topical case studies apply course concepts and principles. Core sociological and anthropological concepts, methods, theories.

SOC 295 Special Topics in Sociology 1-3. Offered in Fall Spring Summer. Offered as needed to present 200-level subject materials not normally available in regular course offerings or for new courses on a trial basis.

SOC 300 Social Research Methods 4. Offered in Fall Spring Summer. Prerequisite: SOC 202, Corequisite: ST 311. Basic methods of social research, research design, sampling, data collection, measurement, and analysis; the relationship between theory and research. Laboratory exercises on computer applications.

SOC 301 Human Behavior 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. The development of personality as a consequence of social interactions and behavior of individuals in social contexts. Processes of learning, socialization, social perception, organization, stability and change of attitudes, norms, norm-formation
and conformity, social roles and role strain, interpersonal attraction, and intergroup and intragroup relations.

SOC 304 Women and Men in Society 3. Offered in Fall and Spring. Prerequisite: 3 cr. in SOC, 200 level. A sociological analysis of women and men in contemporary American society. Perpetuation of and change in gender stratification using sociological concepts, theories and research. How gender expectations developed and transmitted. Historical data and research on diversity in American society used for analysis of causes and consequences of gender inequality.

SOC 305 Racial and Ethnic Relations 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. Study of the nature of the relationships among racial and ethnic groups in societies around the world but with emphasis on the United States. Explores topics such as inequalities of wealth, power, and status, racism, conflict, and social boundaries among groups. Current trends in intergroup relations are discussed.

SOC 306 Criminology 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. Study of processes whereby behavior is defined as crime and persons are identified as criminals. Includes a sociological investigation of agencies of law enforcement, adjudication, corrections and prevention; patterns of criminal behavior; explanations of variations in criminality with emphasis on sociocultural and sociopsychological theories.

SOC 309 Religion and Society 3. Prerequisite: 3 cr. in SOC, 200 level. Religious beliefs, practices and organizations addressed as social phenomena. Structural functionalism, conflict and subjectivism as theoretical orientations for understanding influences between religion and society. Relationship of religions to family, government, and economy and to social divisions, conflict and change.

SOC 310 Managers, Work, and Organizations 3. Offered in Fall Spring Summer. Prerequisite: Any 200-level SOC, SOC 205 recommended. Sociological analysis of managers, who they are, and what they do. How recent changes in the U.S. economy have altered managers' work. How managers influence and adapt to the organizational environment. Relationship of management and labor in the production process.

SOC 311 Community Relationships 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. Institutions, organizations and agencies found in modern communities; social problems and conditions with which they deal; their interrelationships and trends toward comprehensive planning.

SOC 342 International Development 3. Offered in Fall Only. Prerequisite: 3 cr. in SOC, 200 level. Sociological explanations of the causes of development and underdevelopment and origins of the present world system with emphasis on lesser developed countries. Recent global changes in the world situation including the increasing internationalization and interdependence of all countries.

SOC 351 Population and Planning 3. Offered in Fall Only. Prerequisite: 3 credits in SOC at the 200 level. Effects of births, deaths and migration on population size, composition and distribution. Socioeconomic and political implications of demographic change. Impact of alternative policies on demographic processes.

SOC 381 Sociology of Medicine 3. Offered in Fall and Spring. Prerequisite: 200 level Sociology. Use of theory and empirical studies to understand the social etiology of disease health practices, practitioners, and institutions, and the special area of mental health. Historical as well as contemporary examples of social influences on, and effects of, health throughout the world, but especially in the United States. Core sociological concepts, methods, theories.

SOC 395 Special Topics in Sociology 1-3. Offered in Fall Spring Summer. Prerequisite: 3 credits of a 200-level Sociology. Offered as needed to present 300-level subject materials not normally available in regular course offerings or for new courses on a trial basis.

SOC 400 Theories of Social Structure 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. Contributions of Durkheim, Marx, Weber and others to contemporary macro-level sociological theories. Origins and development of functionalist and conflict approaches. Theories of social solidarity, class structure, the state, bureaucratization, ideology. Uses of original works.

SOC 401 Theories of Social Interaction 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC, 200 level. Contributions of Weber, Simmel, Mead, Homans, Goffman, and others to contemporary micro-level sociological theories. Origins and development of symbolic interaction, ethnomethodology, exchange theory and dramaturgy. Theories of the self, social construction of reality, emotions, interpersonal relationships. Interrelationship of theory and research; use of original works.

SOC 402 Urban Sociology 3. Prerequisite: SOC 300. Urban social structures emphasizing determinants and consequences of changes in urban places and life styles. Current urban problems and various approaches to urban social planning.

SOC 404 Families and Work 3. Offered in Spring Only. Prerequisite: SOC 200 level, SOC 300. Sociological analysis of the interplay between economy and family. How men and women make decisions regarding work and family. Theory and research techniques appropriate to the student of work/family conflicts.

SOC 405 Racism in the U.S. 3. Prerequisite: SOC 300. The course will examine the nature of racism in American society and its correlates: prejudice, discrimination, racial conflict, and racial oppression. Emphasis on the history and development of racism in the U.S. as well as its impact on minority groups. Sociological explanations for the emergence and continuation of racism.

SOC 407 Sociology of Sexualities 3. Offered in Spring Only. Prerequisite: 3 hours SOC 200 level, 300 level. Exploration of sexuality in a social context. Relationship between sexuality, gender and power in the U.S. Historical trends in behaviors and identities: social movements and sexual issues; current behavioral trends. Some issues covered: identity, social construction, sexual meanings.

SOC 410 Sociology of Organizations 3. Prerequisite: 3 cr. in SOC, 200 level, SOC 300. Application of sociological theories to study of organizational structures and processes. Special attention to control and coordination, relations with other organizations, and decision making.

SOC 413 Criminal Justice Field Work 4. Offered in Fall and Spring. Prerequisite: SOC 306 and PS 305, Senior standing in Criminal Justice option. Supervised observation and experience in a criminal justice agency. Study of relationships between ongoing programs and relevant political and sociological theory and research. Weekly seminars, small groups and individual conferences. Presentation of an integrative report.

SOC 414 Social Class 2. Prerequisite: SOC 300. The universality of social inequality, its bases and consequences. Relationship of social inequality to social class, life chances, life styles and social mobility. Theories and research methods pertinent to the study of social class.

SOC 425 Juvenile Delinquency 3. Offered in Fall Spring Summer. Prerequisite: 3 cr. in SOC 200-level; SOC 300. Nature and extent of juvenile delinquency; measurement problems; and biogenic, psychogenic and sociogenic theories of delinquency causation. Policy implications of delinquency theories for treatment and prevention. Evaluation of treatment and prevention programs.

SOC 427 Sociology of Law 3. Offered in Fall Only. Prerequisite: 3 cr. in SOC 200-level; SOC 300. Sociological concepts, theories and research of law as social control. Social forces behind the creation, maintenance and application of law in American Society.

SOC 428 Formal Institutions of Social Control 3. Offered in Spring Only. Prerequisite: 3 hours SOC 200 level; SOC 300. Development, structure and behavior of formal institutions of social control in the United States (police, courts, corrections); divergent philosophies of punishment that guide the juvenile and adult criminal justice system, dimensions of inequality that influence processing decisions and effectiveness of formal institutions in controlling violations of legal norms.


SOC 430 Community and Crime 3. Offered in Spring Only. Prerequisite: 3 credits in SOC 200 level; SOC 300. Neighborhood development, structure and processes as related to delinquency, crime and criminality. Divergent theories of the effect of neighborhood context on crime and crime on neighborhood processes. The interaction of person and neighborhood context. Implications of community processes for social control.

SOC 432 Violence, Terrorism, and Public Policy 3. Offered in Fall and Spring. Prerequisite: SOC 300 or PS 371. The course examines interpersonal and group violence in contemporary societies and the causes for its occurrences. Specific forms of violence that will be examined include domestic violence, gangs, homicide, and terrorism, domestically and internationally. Throughout the course students will use data to critically evaluate policies and practices to prevent and control violence and will examine potential solutions to the problems of violence.

SOC 440 Social Change 3. Offered in Spring Only. Prerequisite: 3 cr. in SOC 200 level; SOC 300. Sources, processes and consequences of social change on macro and micro levels. Applications of classical and contemporary theories to historical and modern examples of social change in international, national, regional, community, and institutional settings. Examples of empirical studies and appropriate methodologies for each level of analysis.

SOC 445 Inequality, Ideology, and Social Justice 3. Offered in Fall Only. Prerequisite: 3 hours of 200-level SOC and SOC 300. Systematically addresses the question of why people believe what they do about the legitimacy of inequality; explores the role of self-interest, secular and religious values, considers specific types of ideology such as meritocracy, racism, sexism, colonialism; applies various theories to explain patterns of belief; looks at the role of media and propaganda in shaping beliefs.

SOC 450 Environmental Sociology 3. Offered in Fall Only. Prerequisite: 3 hours SOC 200 level, SOC 300. Systematic relations between natural environment and human societies. Dependency on the natural world. Population technology, cultural and economic influences on ecosystems. Development of environmentalism and alternative models for understanding threats and potentials. current environmental issues and considerations of their global contexts.

SOC 457 Corporate Power in America 3. Offered in Spring Only. Prerequisite: (SOC 202 or SOC 203) and SOC 300. Examines the nature, distribution, and exercise of power in U.S. society. Emphasizes corporate power and its relationship to government. Topics include membership in the upper class and the power elite, media and shaping of public opinion, the culture of politics, formation of political consciousness, and the emergence of oppositional and reactionary social movements.

SOC 465 Social Aspects of Mental Health 3. Offered in Spring Only. Prerequisite: SOC 300. A survey of the role of social environment and life experiences in mental health and mental disorder, focusing on the link between social inequality and emotional inequality. Topics include the social construction of mental illness and the classification process, social distribution of mental health, explanations of mental health differences. Special emphasis on adolescent and adult traumas that shape the life course.

SOC 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

SOC 493 Special Problems in Sociology 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Arrangements must be initiated by student and approved by a faculty advisor and departmental teaching coordinator.

SOC 495 Special Topics in Sociology 1-3. Offered as needed to present materials not normally available in regular course offerings or for new courses on a trial basis.

SOC 498 Independent Study in Sociology 1-6. Prerequisite: Six hours SOC above the 200 level. A detailed investigation of a topic in sociology. Topic and mode of study determined by the faculty member(s) in consultation with the department head.

SOIL SCIENCE

SSC 103 Introductory Topics in Crop, Soil and Turfgrass Sciences 1. Offered in Fall Only. Introduction to the scope, purpose, and objectives of a university education with an emphasis on areas related to Crop, Soil and Turfgrass Sciences. Students will explore university, college and departmental resources, academic policies and procedures, opportunities for minors, career opportunities, and current trends and issues in our related disciplines. Students cannot receive credit for both CS 103 and ALS 103. Freshman Only; PAA, PAB, PAC, PAE, PCB, SST, TFG.
SSC 185 Land and Life 3. Offered in Fall Only. Land quality and the social, economic and political practices of societies utilizing different land resources. The underlying physical reasons for land quality differences and land management options for technological, primitive and developing societies. Stresses macro and micro scale societal responses to land quality.

SSC 200 Soil Science 3. Offered in Fall Spring Summer. Prerequisite: One semester of college chemistry. Fundamentals of soils including origin, composition and classification; their physical, chemical, and biological properties; significance of these properties to soil-plant relationships and soil management.

SSC 201 Soil Science Laboratory 1. Offered in Fall and Spring. Hands-on laboratory experience in fundamentals of soils including origin, composition and classification; their physical, chemical, and biological properties; significance of these properties to soil-plant relationships, soil management and the environment.

SSC 323 Water Management 3. Offered in Fall Only. Water management principles applied to agriculture; hydrologic cycle, runoff, surface and sub-surface drainage, soil conservation measures to reduce erosion and sedimentation, irrigation, pond construction, open channel flow, water rights and environmental laws pertaining to water management. Emphasis on problem solving.

SSC 324 Elementary Surveying 1. Offered in Fall Only. Theory and practice of plane surveying to include measuring distances as well as record keeping differential leveling, profile leveling, topographic mapping, stadia surveying and the use of these tools in agricultural applications.


SSC 341 Soil Fertility and Fertilizers 3. Offered in Fall Only. Prerequisite: SSC 200. Principles of managing plant nutrition for crop production, fertilizer materials, crop fertilization, soil fertility maintenance, and management practices for optimizing nutrient use; soil and plant tissue testing as diagnostic tools in nutrient management.

SSC 342 Soil Fertility Laboratory 1. Offered in Fall Only. Corequisite: SSC 341. Soil sampling and analyses for acidity and nutrient content. Calculating lime and fertilizer recommendations and calibrating fertilizer spreaders. Discussion of fertilizer materials and calculation of least cost blends. Computer programs to confirm recommendations and least cost blends. Field trip to a fertilizer distributor and to a fertilizer user.

SSC 361 Role of Soils in Environmental Management 3. Offered in Spring Only. Prerequisite: SSC 200. Importance of soils in land application of municipal, industrial and agricultural wastes; onsite disposal of domestic wastewater; bioremediation of contaminated sites; erosion and sedimentation control; farm nutrient management; and nonpoint source water pollution.

SSC 435 Precision Agriculture Technology 3. Offered in Spring Only. Overview of technology available for implementation of a comprehensive precision agriculture program. Topics include computers, GPS, sensors, mechanized soil sampling, variable rate control system, yield monitors, and postharvest processing controls. Applications of precision agriculture in crop planning, tillage, planting, chemical applications, harvesting and postharvest processing. Credit may not be received for BAE/SSC 435 and BAE/SSC 535.

SSC 440 Geographic Information Systems in Production Agriculture 3. Offered in Spring Only. Prerequisite: SSC 341. Fundamentals of the global positioning system, geographic information systems, and site-specific management. Geospatially located soil sampling strategies will be addressed as well as appropriate interpolation methods for point-sampled data. The course will cover variable rate fertilizer recommendation models and the technology necessary for variably applying fertilizer. Spatial measurement of crop yields.

SSC 452 Soil Classification 4. Offered in Spring Only. Prerequisite: SSC 200. Genesis, morphology, and classification of soils; characterization of soils according to their diagnostic properties; interpreting soil use potential; emphasis on North Carolina soils and their taxonomy; field exercise in soil mapping and site evaluation; several field trips, one overnight.

SSC 461 Soil Physical Properties and Plant Growth 3. Offered in Fall Only. Prerequisite: SSC 200. Soil physical properties and their influence on plant growth and environmentally sound land use; soil solid-porosity-density relationships, soil water, heat and air relations and transport. Principles and applications of these topics using current literature in agronomy, turf, horticulture, water quality, waste management and urban land use.

SSC 462 Soil-Crop Management Systems 3. Offered in Spring Only. Prerequisite: CS 213, CS 414, SSC 342, SSC 452; senior standing. Unites principles of soil science and crop science with those of allied areas into realistic agronomic applications; practical studies in planning and evaluation of soil and crop management systems.

SSC 470 Wetland Soils 3. Offered in Fall Only. Prerequisite: SSC 200, SSC 452 recommended. Wetland definitions, concepts, functions and regulations; chemical, physical and morphological characteristics of wetland soils. Wetland soil identification using field indicators and monitoring equipment; principles of wetland creation, restoration and mitigation. Special project required for SSC 570. Two mandatory field trips. Credit will not be given for both SSC 470 and SSC 570.

SSC 472 Forest Soils 3. Offered in Spring Only. Prerequisite: SSC 341, or FOR 304. Soil as a medium for tree growth; relation of soil physical, chemical and biological factors to the practice of silviculture; extensive soil management in the forest and intensive soil management in forest nurseries and in seed orchards; relation of soil and site to forest genetics, ecology, pathology and entomology.

SSC 490 Senior Seminar in Crop Science and Soil Science 1. Offered in Spring Only. Review and discussion of current topics in crop science, soil science, agronomy and natural resource management. Preparation and presentation of scientific information in written and oral format. Senior standing in Agronomy, Plant and Soil Sciences, or Turfgrass Science.

SSC 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with the prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator and the academic dean prior to the experience.

SSC 493 Special Problems in Soil Science 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources.

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Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator prior to the experience.

**STATISTICS**

**ST 101** Statistics by Example 3. Sampling, experimental design, tables and graphs, relationships among variables, probability, estimation, hypothesis testing. Real life examples from the social, physical and life sciences, the humanities and sports. Credit not allowed if student has prior credit for another ST course.

**ST 240** Introduction to Behavioral Research I 3. Offered in Fall and Spring. Prerequisite: PST and HRD Majors, PST 200, Corequisite: PST (ST) 241. Introduction to quantitative methods in psychology, including measurement, experimental control, validity, and fundamentals of research design. Discussion of distributions and statistical inference.

**ST 241** Introduction to Behavioral Research I Lab 1. Offered in Fall and Spring. Prerequisite: PST 200, PST and HRD Majors, Corequisite: PST (ST) 240. Students design, analyze and report a variety of simple experiments.

**ST 242** Introduction to Behavioral Research II 3. Offered in Fall and Spring. Prerequisite: PST or HRD Majors, PST (ST) 240, Corequisite: PST (ST) 243. Continuation of PST (ST) 240. Ethics of Research in Psychology. Techniques for the development of research proposals. Statistical techniques for data analysis including non-parametrics, one-way and two-way ANOVA and introduction to correlation and regression.

**ST 243** Introduction to Behavioral Research II Lab 2. Offered in Fall and Spring. Prerequisite: PST or HRD Majors, PST (ST) 240, Corequisite: PST (ST) 242. Design and analysis of a major research project.

**ST 301** Statistical Methods I 3. Prerequisite: MA 141 and either PMS 100 or E 115. Contemporary description and analysis of single samples of data. Graphical data presentation methods for determination of patterns and relationships among variables. Classical and robust alternative methods for single sample data summary procedures. Probability concepts, sampling, and expectations. Confidence interval and hypothesis testing for sample mean and proportion. Computer use emphasized.

**ST 302** Statistical Methods II 3. Prerequisite: ST 301. Confidence intervals and hypothesis testing with graphics in multiple samples and/or variables cases: tests for means/proportions of two independent groups, analysis of variance for completely randomized design, contingency table analysis, correlation, single and multiple linear regression; design of experiments with randomized blocks, factorial design and analysis of covariance. Computer use emphasized.

**ST 305** Statistical Methods 4. Offered in Fall and Spring. Prerequisite: MA 141 and either PMS 100 or E 115. Basic concepts of data collection, sampling, and experimental design. Descriptive analysis and graphical displays of data. Probability concepts, and expectations. Normal and binomial distributions. Sampling distributions and the Central Limit Theorem. Confidence intervals and hypothesis testing. Tests for means/proportions of two independent groups. One factor analysis of variance. Understanding relationships among variables; correlation and simple linear regression. Computer use is emphasized.

**ST 311** Introduction to Statistics 3. Examining relationships between two variables using graphical techniques, simple linear regression and correlation methods. Producing data using experiment design and sampling. Elementary probability and the basic notions of statistical inference including confidence interval estimation and tests of hypothesis. One and two sample t-tests, one-way analysis of variance, inference for count data and regression. Credit not allowed if student has prior credit for another ST course or BUS 350.

**ST 312** Introduction to Statistics II 3. Offered in Fall and Spring. Prerequisite: ST 311. A further examination of statistics and data analysis. Inference for comparing multiple samples, experimental design, analysis of variance and post-hoc tests. Inference for correlation, simple regression, multiple regression, and curvilinear regression. Analysis of contingency tables and categorical data. No credit for students who have credit for ST 305.

**ST 350** Economics and Business Statistics 3. Offered in Fall Spring Summer. Prerequisite: MA 114; College of Management Majors must have passed Software Applications Proficiency Requirement. Introduction to statistics applied to management, accounting, and economic problems. Emphasis on statistical estimation, inference, simple and multiple regression, and analysis of variance. Use of computers to apply statistical methods to problems encountered in management and economics.

**ST 351** Data Analysis for Economists 3. Offered in Fall Only. Prerequisite: BUS/ST 350. Tools for describing and analyzing data as used in economics. Probability, random variables, sampling, point and interval estimation. Hypothesis testing and regression analysis with emphasis on economic applications.

**ST 361** Introduction to Statistics for Engineers 3. Offered in Fall Spring Summer. Statistical techniques useful to engineers and physical scientists. Includes elementary probability, frequency distributions, sampling variation, estimation of means and standard deviations, basic design of experiments, confidence intervals, significance tests, elementary least squares curve fitting. Credit not allowed for both ST 361 and ST 370 or ST 380.

**ST 370** Probability and Statistics for Engineers 3. Offered in Fall and Spring. Prerequisite: MA 241. Calculus-based introduction to probability and statistics with emphasis on Monte Carlo simulation and graphical display of data on computer workstations. Statistical methods include point and interval estimation of population parameters and curve and surface fitting (regression analysis). The principles of experimental design and statistical process control introduced. Credit not allowed for both ST 370 and ST 361 or ST 380.

**ST 371** Introduction to Probability and Distribution Theory 3. Offered in Fall Spring Summer. Prerequisite: MA 241, Corequisite: MA 242. Basic concepts of probability and distribution theory for students in the physical sciences, computer science and engineering. Provides the background necessary to begin study of statistical estimation, inference, regression analysis, and analysis of variance.

**ST 372** Introduction to Statistical Inference and Regression 3. Offered in Fall Spring Summer. Prerequisite: ST 371. Statistical inference and regression analysis including theory and applications. Point and interval estimation of population parameters. Hypothesis testing including use of t, chi-square and F. Simple linear regression
and correlation. Introduction to multiple regression and one-way analysis of variance.

**ST 380 Probability and Statistics for the Physical Sciences 3.** Offered in Fall and Spring. Prerequisite: MA 241. Introduction to probability models and statistics with emphasis on Monte Carlo simulation and graphical display of data on computer laboratory workstations. Statistical methods include point and interval estimation of population parameters and curve and surface fitting (regression analysis). Credit not allowed for both ST 380 and ST 361 or ST 370.

**ST 401 Experiences in Data Analysis 4.** Offered in Summer. Prerequisite: Permission of Instructor and either ST 311 or ST 305. This course will allow students to see many practical aspects of data analysis. Each section of this course will expose students to the process of data analysis in a themed area such as biostatistics or environmental statistics. Students will see problems of data collection and analysis through a combination of classroom demonstrations, hands on computer activities and visits to local industries.

**ST 412 Long-Term Actuarial Models 3.** Offered in Fall Only. Prerequisite: MA 241 or MA 231, Corequisite: MA 421, BUS(ST) 350, ST 301, ST 305, ST 311, ST 361, ST 370, ST 371, ST 380 or equivalent. Long-term probability models for risk management systems. Theory and applications of compound interest, probability distributions of failure time random variables, present value models of future contingent cash flows, applications to insurance, health care, credit risk, environmental risk, consumer behavior and warranties.

**ST 413 Short-Term Actuarial Models 3.** Offered in Spring Only. Prerequisite: MA 241 or MA 231, and one of MA 421, ST 301, ST 305, ST 370, ST 371, ST 380, ST 421. Short-term probability models for risk management systems. Frequency distributions, loss distributions, the individual risk model, the collective risk model, stochastic process models of solvency requirements, applications to insurance and business decisions.

**ST 421 Introduction to Mathematical Statistics I 3.** Offered in Fall Only. Prerequisite: MA 242. First of a two-semester sequence of mathematical statistics, primarily for undergraduate majors and graduate minors in Statistics. Introduction to probability, univariate and multivariate probability distributions, and their properties, distributions of functions of random variables, random samples and sampling distributions.

**ST 422 Introduction to Mathematical Statistics II 3.** Offered in Spring Only. Prerequisite: ST 421. Second of a two-semester sequence of mathematical statistics, primarily for undergraduate majors and graduate minors in Statistics. Random samples, point and interval estimators and their properties, methods of moments, maximum likelihood, tests of hypotheses, elements of nonparametric statistics and elements of general linear model theory.

**ST 430 Introduction to Regression Analysis 3.** Offered in Fall Only. Prerequisite: (ST 302 or ST 305) and (MA 305 or MA 405). Regression analysis as a flexible statistical problem solving methodology. Matrix review; variable selection; prediction; multicolinearity; model diagnostics; dummy variables; logistic and non-linear regression. Emphasizes use of computer.

**ST 431 Introduction to Experimental Design 3.** Offered in Spring Only. Prerequisite: ST 302 or ST 305. Experimental design as a method for organizing analysis procedures. Completely randomized, randomized block, factorial, nested, Latin squares, split-plot and incomplete block designs. Response surface and covariance adjustment procedures. Stresses use of computer.

**ST 432 Introduction to Survey Sampling 3.** Offered in Spring Only. Prerequisite: ST 302 or ST 305. Design principles pertaining to planning and execution of a sample survey. Simple random, stratified random, systematic and one- and two-stage cluster sampling designs. Emphasis on statistical considerations in analysis of sample survey data. Class project on design and execution of an actual sample survey.

**ST 435 Statistical Methods for Quality and Productivity Improvement 3.** Offered in Fall Only. Prerequisite: ST 302 or ST 305. Use of statistics for quality control and productivity improvement. Control chart calculations and graphing, process control and specification; sampling plans; and reliability. Computer use will be stressed for performing calculations and graphing.

**ST 445 Introduction to Statistical Computing and Data Management 3.** Offered in Spring Only. Corequisite: ST 302 or ST 305. Use of computers to manage, process and analyze data. Concepts of research; data management; JCL and utility programs; use of statistical program package for data analyses and graph production; and writing statistical programs to perform simulation experiments. Major paper required.

**ST 495 Special Topics in Statistics 1-6.** Offered in Fall Spring Summer. Prerequisite: Six hours of ST. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction.

**ST 498 Independent Study In Statistics 1-6.** Offered in Fall Spring Summer. Prerequisite: Six hours of ST. Detailed investigation of topics of particular interest to advanced undergraduates under faculty direction.

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**SCIENCE, TECHNOLOGY & SOCIETY**

**STS 210 Women and Gender in Science and Technology 3.** Offered in Fall Only. Interdisciplinary introduction to the reciprocal relationships between scientific/technological research and contemporary understanding of gender. Special emphasis on social factors influencing scientists and engineers in their professions.

**STS 214 Introduction to Science, Technology, and Society 3.** Offered in Fall Only. Introduction to the field of Science, Technology, and Society (STS), including most important STS scholars, major schools of thought, and important theoretical and empirical issues in STS.

**STS 257 Technology in the Arts 3.** Offered in Fall Only. The interaction between technology and the arts with an emphasis on developments in Western art of the twentieth century. Historical and emerging issues include: sound and film recordings, the addition of sound to films, the impact of films and television on theater, the impact of radio, computer applications to music, the visual arts, and literature.

**STS 301 Science and Civilization 3.** An inquiry into the scientific achievement and cultural impact of three different, but interrelated, models (or paradigms) of understanding the world and man's place in it; the Ancient-Medieval model of Aristotle, Ptolemy and Aquinas; the 17th century model of Newtonian physics; and the emerging, but fragmentary, 20th century model based upon the new physics of Einstein, Planck and Heisenberg.

**STS 302 Contemporary Science, Technology and Human Values 3.** Interdisciplinary evaluation of recent and potential influences of
current scientific and technological developments on society. Emerging social, ethical, and intellectual issues include: The adequacy of contemporary scientific frameworks; the relations among science, technology, and society; the social consequences of scientific and technological applications, and human prospects and possibilities.

**STS 303 Humans and the Environment 3. Offered in Fall and Spring.** Interactions among human populations in the biophysical system and the environment. Emphasis on current issues, ecological principles and their relationships to basic biophysical processes; considers food, population dynamics, public land and common resources, renewable natural resources, pollution, water resources, energy and non-renewable resources.

**STS 304 Ethical Dimensions of Progress 3. Offered in Fall Only.** Multidisciplinary examination of traditional western notion of progress, focusing on ethical issues raised by concept of progress, and connections between science, technology and society. Places relationships such as engineering and social responsibility within the context of present day redefinitions of the notion of progress.

**STS 320 Ethics in Engineering 3.** Engineering in American culture and the emerging ethical issues confronting the professions; corporate responsibility, personal rights, whistle blowing, conflicts of interest, professional autonomy, risk assessment, sustainable development, and the place and purpose of Engineering codes of ethics.

**STS 322 Technological Catastrophes 3. Offered in Fall Only.** Interdisciplinary examination of the human, organizational and technical factors contributing to the causes and impacts of recent technological accidents such as the Bhopal chemical leak, the space shuttle Challenger explosion, the Chernobyl nuclear accident, and the Exxon Valdez oil spill. Evaluation of risk assessment, risk perception and risk communication strategies. Consideration of options for living with complex technological systems.

**STS 323 World Population and Food Prospects 3.** Examination of the dynamics of population size and food needs, production, distribution and utilization. Consequences of inadequate nutrition and food choices, efforts to increase the compatibility of effective food production systems and alternate crops and cropping systems examined.

**STS 324 Alternative Futures 3.** Perspectives on possible alternative futures as well as the cutting edge of the present. Nature and likelihood of various alternatives. Methodology and limitations of forecasting, selected futurist issues and interactions between present and possible future technologies and human values.

**STS 325 Bio-Medical Ethics 3. Offered in Fall and Spring.** Interdisciplinary examination and appraisal of emerging ethical and social issues resulting from recent advances in the biological and medical sciences. Abortion, euthanasia, physician-assisted suicide, compromised infants, aids, reproductive technologies, and health care. Focus on factual details and value questions, fact-value questions, fact-value interplay, and questions of impact assessment and policy formulation.

**STS 326 Technology Assessment 3.** Impacts of technologies as they are applied in society. Description and forecasting of effects, interactions, and potential irreversibilities.

**STS 402 Peace and War in the Nuclear Age 3.** An interdisciplinary examination of contemporary wars and international conflict, arms, races, nuclear strategy and defense policy, arms control, theories and strategies of peace.

**STS 403 Seminar in Science, technology, and Society 3.** Prerequisite: STS 214, STS or STB Majors. Capstone course for the Science, Technology, and Society (STS) major. Review of the principal theoretical and empirical issues of the field. Research project focused on each student's STS specialty.

**STS 405 Technology and American Culture 3.** An interdisciplinary study of the role of technology in American culture which examines the ideological, political, social, economic, and institutional contexts of technological change from the 1760's to the present, and explores the cultural impacts of new technological systems.

**STS 412 Entering the 21st Century: Agricultural, Technological & Environmental Perspective 3.** Systems approach to predictions about the world in the 21st century from the perspectives of agricultural and environmental studies. Attention to food production, fisheries, forests, water, energy, material resources for fuel, climate, and population. Guest lectures and class projects.

**STS 451 The Practice of Science and the Arts 3. Offered in Fall Only.** An introduction to the practice of scientists and artists in terms of the beginning of their projects, their modes of moving forward, their goals, and the nature of completeness in their work. The relation of art and science in theory and practice.

**STS 471 Darwinism and Christianity 3. Offered in Fall Only.** Prerequisite: One course in religious studies, biological sciences, philosophy of science, or history of science. Evolutionary biology and Christianity. Darwin's evolutionary theory: neo-Darwinism; conflicts between evolutionary theory and Christian thought; methodological parallels and differences between science and religion; proposals for divine action in an evolutionary world.

**STS 484 Cross Cultural Technology Transfer 3. Offered in Fall Only.** Technology transfer into cultures with different values and traditions. Special attention to the role of local and international organizations and to gender and environmental concerns. Case studies: crop science, water, energy, forest resources, banking, information technology.

**STS 490 Issues in Science, Technology, and Society 3. Offered in Fall Spring Summer.** Examination of a significant issue, method, or historical episode in the area of science, technology, and society.

**STS 491 Independent Study in Science, Technology, and Society 3. Offered in Fall Spring Summer.** Independent investigation and appraisal of a significant issue, method, or historical episode in the area of science, technology, and society.

## SOCIAL WORK

**SW 201 Community Social Services 4. Offered in Fall and Spring.** This course, the basis for all other social work courses, provides an introduction to generalist practice and an overview of social work practice in a variety of settings. Successful completion of this course is a prerequisite for all advanced SW courses. This course is designed to acquaint them, their impact, who pays for them, and who works in them. 40-hour preprofessional placement is required; intern liability insurance is required. Transportation to and from agency and/or community settings is the responsibility of the student.

**SW 290 The Development of Social Welfare and Social Work in the U.S. 3. Offered in Fall and Spring.** This course reviews the major
policy and program developments in American social welfare and the emergence and development of professional social work. Emphasis will be on the socio-cultural context of policy and programs, and the ideas and ideals that shape social welfare. In addition, the basic elements of social policy development will be considered. This course provides the history, mission, philosophy, and evolution of social welfare policies and services that form the foundation of social welfare, particularly as they relate to poverty, racism, and efforts to address the needs of oppressed and marginalized populations.

**SW 300 Research Methods in Social Work 3. Offered in Fall and Spring. Prerequisite: Social Work Majors or Social Work Minors, ST 311.** Course provides an overview of the principles and methods of basic social work research. Substantive research knowledge, quantitative and qualitative research methodology are highlighted. Research ethics within the context of social work purposes and values are emphasized. Course exposes students to how high quality research in social work is designed and conducted and how it can assist in making important decisions about the design and implementation of projects, programs, and policies that address the social needs of diverse groups.

**SW 307 Social Welfare Policy: Analysis and Advocacy 3. Offered in Fall and Spring. Prerequisite: SW 290.** Course enables students to understand the processes by which social welfare policies are developed and implemented as well as the ways in which people can intervene to affect these processes. Students have the opportunity to review recent developments in national and state social welfare policies and programs in major areas such as poverty, welfare, social security, housing, health and mental health care, and child welfare. The course focuses on the development of students' policy analysis and advocacy skills.

**SW 310 Human Behavior Theory for Social Work Practice 3. Offered in Fall and Spring. Prerequisite: SW 201.** Designed to introduce theory regarding human life development for students intending to practice social work. Students learn to recognize ways in which diversity characterizes and shapes the human experience and is critical to the formation of identity, the extent to which a culture's structures and values may oppress, marginalize, alienate, create or enhance privilege and power. Course surveys major theoretical frameworks and normative developmental variations. Students learn to apply these theories and knowledge from the liberal arts to understand biological, psychological, social, cultural, and spiritual development. Transportation to and from agency and/or community setting is the responsibility of the student.

**SW 312 Multicultural Social Work 3. Offered in Fall and Spring.** Course prepares students to work with diverse groups of people locally and globally defined by gender, ethnicity, race, national origin, sexual orientation, income, physical and mental ability, age and religion. Emphasis is placed on defining and developing skills for culturally competent social work generalist practice with these populations through students' self-examination, experiential learning, and critical reading of class material. This course helps students develop competencies in critical self-reflection, multicultural values and ethics, knowledge, awareness and skills in a variety of ways so that they can work against manifestations of social injustice. Students are expected to provide their own transportation as needed.

**SW 320 Social Work Practice I 4. Offered in Fall and Spring. Corequisite: Social Work Majors, and a prerequisite or corequisite of SW 310.** First of a three-course sequence. Practice I presents the generalist social work practice method and focuses on interviewing skills, engaging clients in the helping process, and integrating theory and social work practice. It addresses ethical and professional standards and emphasizes understanding and applying systems and ecological frameworks to practice situations. It examines strengths-based assessment, the phases of the helping relationship, and the dynamics of change in interpersonal helping relationships, within a framework of human rights, social justice, and diversity. 40-hour preprofessional placement required; intern liability insurance required. Transportation to and from agency and/or community settings is the student's responsibility.

**SW 405 Social Work Practice II 4. Offered in Fall and Spring. Prerequisite: Social Work Majors, SW 320, Corequisite: SW 480/SW 408.** Second of a three-course sequence (Practice I, II, and III). Practice II examines generalist social work roles and techniques with families and groups. Building on the foundation interviewing and engagement skills presented in Practice I, it focuses on assessment, planning, and intervention with individuals, families and small groups within a framework of human rights, social justice, and diversity. 40-hour preprofessional placement is required, intern liability insurance is required. Transportation to and from agency and/or community settings is the student's responsibility.

**SW 408 Social Work Practice III 3. Offered in Fall and Spring. Prerequisite: Social Work Majors, SW 320, Corequisite: SW 405, SW 480.** Course prepares students for practice with organizations, communities, policy structures, and institutions that are viewed as both tools and targets for change efforts. Course emphasizes multiculturalism, diversity, and social justice in relation to social systems. It is designed to provide social work practitioners with the means to help organizations and communities empower themselves to make change through networking, political participation, leadership development, mobilization, utilization of resources, and other strategies and techniques. Transportation to and/or from community settings is the responsibility of the student.

**SW 412 Social Work in Schools 3. Offered in Fall and Spring. Prerequisite: Nine credits in Social Work courses, including SW 320.** Models and roles relevant to school social work practice. Cooperative work with school personnel in the identification, prevention and treatment of social, emotional and behavioral problems of children and interventive techniques with parents and community groups. For individuals preparing for social work practice in the public schools and for school social workers seeking licensure.

**SW 413 African American Families: History, Tradition, and Community 3. Offered in Spring Only.** Characteristics, traditions, history and strengths of African American families and their relationship to other social institutions, social advocacy and social policy development. African-centered worldview and relevant theory pertaining to best practice with African American families.

**SW 414 Social Work Practice in Health Care 3. Offered in Fall and Summer. Prerequisite: SW 201.** Practice skills and knowledge required of social workers in health care settings. Multi-disciplinary team work in health care. Social components of major illnesses and disabilities, including prevention and rehabilitation. Emotional, cultural, economic and social factors in health and illness. Health needs of specific population groups.


**SW 416 Addiction Recovery and Social Work Practice 3. Offered in Fall Only. Prerequisite: SW 310.** Knowledge and skills in identifying Alcohol and Other Drugs (AOD) problems, screening, assessment, intervention, referral, and prevention: history of AOD problems and treatment, AOD classification, effects and signs/symptoms of AOD, models of addiction, diversity, assessment,
diagnosis, intervention, treatment modalities, mutual-help groups, family dynamics, prevention, and ethical considerations. Students cannot receive credit for both SW 416 and SW 516.

**SW 417 Social Work and Aging** 2. Physical, psychological, social, and cultural theories of the aging process as it relates to social work practice, social policy, and services for working with older adults and their families. Emphasis on mental and physical well-being, diversity, social and economic justice, intergenerational issues, policy and programs. Credit is not allowed for both SW 417 and SW 517.

**SW 420 The Legal Aspects of Social Work** 2. Offered in Fall and Spring. Legal environment of the social work profession. Relationships among legal processes, the delivery of social work services and client problems.

**SW 440 International Learning Experience in Social Work** 6. Offered in Summer. A seven week learning experience in Guatemala. Through this course, the student will develop a global perspective of social welfare and social work practice, will learn about the people and culture of the Lake Atitlan area of Guatemala, will learn the variety of resources available in response to social need, and will enhance or develop Spanish language competence. All costs associated with learning opportunities and activities for this course are included in the cost of the program.

**SW 480 Preparation for Field Work** 1. Offered in Fall and Spring. Prerequisite: Social Work Majors, SW 320, Corequisite: SW 405, SW 408. Introduction to aspects of field placement process and necessary skills for a successful internship. Application, interview, ethical practice, documentation, supervision and learning contract.

**SW 490 Field Work in Social Services** 12. Offered in Fall and Spring. Prerequisite: Social Work Majors, SW 405, SW 408, SW 480. Supervised placement in a social service organization; demonstration of CSWE core competencies and professional practice behaviors. Weekly integrative seminar. Intern liability insurance required. Students are expected to provide their own transportation to the internship site.

**SW 495 Special Topics in Social Work** 3. Offered in Fall Spring Summer. Detailed investigation of a topic in social work. Topic and mode of study determined by faculty member.

**SW 498 Independent Studies in Social Work** 1-6. Offered in Fall Spring. Prerequisite: Junior standing or Senior standing, Social Work Majors or Social Work Minor. Nine credits in social work courses. Independent or small group study of a social work practice or social welfare area.

**T 101 Introduction to the College of Textiles** 2. Offered in Fall Only. Introduction topics related to the College of Textiles, the textile industry, all textile curricula, advising, academic skills, team work, research and personnel involved in the college.

**T 102 Introduction to Product Evolution** 2. Offered in Fall and Spring. Students explore the new product development (NPD) process through analysis of case studies of how textile products are designed and developed for a variety of sectors of our economy, including automotive, medical, industrial, furniture, and clothing. Students develop critical thinking skills as they read a variety of texts and respond using several forms of writing techniques.

**T 110 Textiles Scholars Forum** 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

**T 200 Introduction to Textiles** 3. Offered in Spring Only. Survey of textiles including technical and economic history of the industry; physical and chemical processes involved in producing textile products from raw materials; unique aesthetic, physical and chemical properties of textiles and how these properties are determined by raw materials and production processes; and influence of properties of textile materials on their utilization and performance. Not open to students required to take TT 105; open to transfer students.

**T 210 Textiles Scholars Forum** 0. Offered in Fall and Spring. Interdisciplinary seminar series with presentations by distinguished faculty members and experts drawn from technical, academic, business and government communities. Discussions of major public issues and topics of contemporary concern.

**T 491 Honors Seminar in Textiles** 1. Offered in Fall and Spring. A seminar on current university and industrial research in the field of textiles.

**T 493 Industrial Internship in Textiles** 3. Offered in Fall Spring Summer. Paid professional-level work experience in textiles, relating academic training in science and technology to industrial practice under professional guidance. Written and final oral presentation used for grading. Limited to three hours per student.

**T 495 International Collaboration in Textiles Research** 1-6. Offered in Fall Spring Summer. Directed undergraduate research in Textiles and/or Apparel related areas that requires collaboration with students at an institution abroad. The research project is structured as an international team project in an applied field that allows students in different countries to work together using various communication tools. Students shall arrange international contacts and provide a written proposal of the project to the undergraduate administrator or course coordinator prior to registration.

**T 497 Independent Research in Textile Engineering, Chemistry and Materials Science I** 3. Offered in Fall Spring Summer. Independent research in Textile Engineering, Chemistry and Materials Science topics through experimental, theoretical and literature studies. Written and oral reports required.

**T 498 Independent Research in Textile Engineering, Chemistry and Materials Science II** 1-3. Offered in Fall Spring Summer. Prerequisite: T 497. Independent research in Textile Engineering, Chemistry and Materials Science topics through experimental, theoretical and literature studies. Written and oral reports required.

**TDE 101 Introduction to Technology Education** 1. Offered in Fall Only. Orientation to technology teacher education curricula. Overview of the philosophy, objectives and scope of technology education programs in the public schools, multicultural and individual differences of students. A study of current technology issues will be conducted throughout the course.
TDE 110 Materials & Processes Technology 4. Offered in Fall and Spring. Basic knowledge and skills needed to process common materials and produce functional products of woods, metals, plastics, and composite materials. Includes laboratory safety, use of hand tools, operation of materials, and teaching strategies. Laboratory experiences in materials testing and construction of multi-material projects.

TDE 161 Imaging Technology 4. Offered in Fall and Spring. Basic principles of imaging for mass reproduction including relief, gravure, offset lithography, screen, and electronic printing. Projects in prepress design and plate making techniques including digital and conventional photography and understanding of how visual art and technology principles are combined to communicate effectively. Students will be responsible for transportation to field trips.

TDE 207 Introduction to Teaching Technology Education 3. Offered in Spring Only. Introduction to teaching technology education programs in middle and secondary schools. Field experiences and course assignments including three hours each week assisting classroom teachers in the public schools. Students are responsible for their own transportation to the field experience sites.

TDE 221 Construction Technology 3. Offered in Spring Only. Prerequisite: TED/TDE 110. Overview of structures and their construction. Drawings and models completed in a laboratory environment to simulate construction methods.

TDE 261 Communication Technology 3. Offered in Spring Only. Technological means of communication and their historical, present, and potential impacts on society, culture, economy, politics, ethics, and the environment. Lab experiments, audio and video production, and development of learning activities for middle school and secondary school students.

TDE 276 Transportation Technology: Energy, Power and Infrastructures 3. Offered in Fall Only. Prerequisite: TED/TDE 110. Theoretical and practical aspects of transportation. Topics include energy conversion, application of power, infrastructures for transmission and control of energy, transportation systems and industries, and conservation of energy. Activities include laboratory testing, experiments, development of activities for teaching secondary students about transportation technology, and use and care of equipment.

TDE 330 Manufacturing Technology 3. Offered in Fall Only. Prerequisite: TED/TDE 221 or TED/TDE 276, Corequisite: TED/TDE 481. Manufacturing organization, product design, and production system design. Students design, operate and evaluate a small-scale manufacturing system.

TDE 351 Ceramics: The Art and Craft of Clay 3. Contemporary and historical examples of the art and craft of ceramics will be studied. Experiences in designing ceramic forms and expressing individual ideas through the medium of clay.


TDE 371 Emerging Issues in Technology 3. Offered in Fall Only. Prerequisite: TED/TDE 261, TED/TDE 221, and GC 120. Examination of current and projected technology topics which are growing in importance but are not presently reflected in the Technology Education programs of NC public schools. Laboratory experiences include development, revision, and field testing of appropriate learning activities for middle and high school students in the selected topic areas.

TDE 384 Computer Applications in Industry 3. Offered in Spring Only. Computerized control systems used in industry including computers and controllers, automated machines, and robots. Students design and operate automated systems.

TDE 407 Field Work in Technology Education 1-6. Offered in Fall Spring Summer. Supervised off-campus field experience in Technology Education that relates on-the-job experiences in the field to the technical competencies which are the content of the curriculum. May be repeated for a maximum of 6 credits.

TDE 452 Lab Planning in Technology Education 3. Offered in Spring Only. Prerequisite: Senior standing. Corequisite: TED/TDE 457 or TED/TDE 407. Laboratory planning, management, and safety for technology education. Physical layout, selection, specification, and cost of equipment; the safe operation, repair and maintenance of power and hand tools; specification of expendable supplies, estimating, and ordering.

TDE 456 Curriculum and Methods in Technology Education 3. Offered in Fall Only. Methods of teaching Technology Education. Emphasis on curriculum development, instructional methods, laboratory instruction, meeting needs of special populations, and management of student organizations.

TDE 457 Student Teaching in Technology Education 1-8. Offered in Spring Only. Prerequisite: Admission to Professional semester, Corequisite: TED/TDE 452 or TED/TDE 493. Skills and techniques involved in teaching technology education through practice in a public school setting.

TDE 481 Research & Development in Technology Education 3. Offered in Fall Only. Prerequisite: TED/TDE 330 or TED/TDE 384. Senior design, research, and development experience in technology education. Students research a problem, ideate potential solutions, select a final solution, construct a prototype, and complete a final report analyzing the chosen solution.

TDE 490 Special Problems in Technology Education 1-6. Offered in Fall and Spring. Supervised, independent investigation in a defined area of interest in Technology Education.

TDE 495 Senior Seminar in Technology Education 3. Offered in Spring Only. An in-depth investigation of a topic or a set of problems and/or issues in Technology Education.

TDE 498 Independent Study in Technology Education 1-3. Offered in Fall Spring Summer. Individual or group study of special topics in professional technology education. The topic and mode of study are determined by the faculty member after discussion with the student. May be repeated for a maximum of 6 credits.

TEXTILE ENGINEERING

TE 105 Textile Engineering: Materials and Systems 2. Offered in Spring Only. Corequisite: CH 101. Introduction to textile engineering, polymers and fibers with emphasis on applications. Discussions of what makes macromolecules unique and pairing of material properties to a given application. Other discussions by various TE faculty giving students a picture of the breadth of the program. This course will also help develop leadership/team work skills and oral/written communications.
TE 110 Computer-Based Modeling for Engineers 3. Offered in Fall and Spring. Prerequisite: E 115, Corequisite: MA 141. Introductory course in computer-based modeling and programming using Visual Basic for Applications. Emphasis on algorithm development and engineering problem solving. Methodological development of VBA within applications like Microsoft Excel and Access from specifications; documentation, style; control structures; classes and methods; data types and data abstraction; object-oriented programming and design; graphical user interface design. Projects: design problems from electrical, industrial, textile, and financial systems. Functional relationships will be given and programs will be designed and developed from a list of specifications.

TE 201 Textile Engineering Science 4. Offered in Spring Only. Prerequisite: MA 241, PY 205, TE/ISE 110. Structure, physical and mechanical properties of fibers; structure of assemblies. Structure/property relations. Laboratory exercises in characterization of fiber properties.

TE 205 Analog and Digital Circuits 4. Offered in Spring Only. Prerequisite: C- or better in TE 110, PY 208. Corequisite: MA 341. Fundamentals of analog and digital circuit analysis and design. The course will present the systematic analysis and design of AC and DC circuits using Ohms and Kirchhoff's laws, the node voltage method, Thevenin and Norton's theorem, Laplace Transforms, resistance, capacitance, inductance, operational amplifiers, and frequency response. Next, the design of combinatorial and synchronous sequential circuit design will be covered using Karnaugh maps, laws of Boolean algebra, flip-flops, state machines, and latches. Laboratory exercises will supplement the topics presented in class.

TE 301 Engineering Textile Structures I: Linear Assemblies 3. Offered in Fall Only. Prerequisite: (MAE 206 or CE 214) and MA 242. Engineering analysis of textile structures, especially yarns. Unit processes of production, handling and packaging. Production sequences, intermachine effects, machine design and their consequences on the textile product.


TE 303 Thermodynamics for Textile Engineers 3. Prerequisite: MA 242, PY 208. Introduction to the concept of energy and the laws governing the transfer and transformation of energy with an emphasis on thermodynamic properties and the First and Second Laws of Thermodynamics. The fundamentals of thermodynamics will be emphasized, although more applied examples and problems will be heavily utilized.

TE 401 Textile Engineering Design I 4. Prerequisite: TE 302. The design process including initial specification, design constraints, sources of information and design strategy. Development of fact-finding ability in areas unfamiliar to the student. Analysis of existing designs and the development of improved or new designs.


TE 404 Textile Engineering Quality Improvement 3. Prerequisite: ST 370 and C- or better in TE/ISE 110. Defining and quantifying quality of textile products; quality improvement using statistical process control (SPC) and design of experiment (DOE) techniques.

TE 424 Textile Engineering Quality Improvement Laboratory I 4. Offered in Fall Only. Corequisite: TE 404. Application of process improvement methods to textile systems using statistical software. Laboratory supplements lecture material presented in TE 404.

TE 435 Process Systems Analysis and Control 3. Offered in Fall and Spring. Prerequisite: (MA 341 and TE 205) or CHE 312. Dynamic analysis and continuous control of chemical and material engineering processes. Process modeling; stability analysis, design and selection of control schemes. Solution of differential equations using Laplace transform techniques.


TE 463 Polymer Engineering 3. Offered in Fall Only. Prerequisite: TE 201 or BME 203 and Corequisite of TE 303 or equivalent. Chemical and physical properties of polymers and fibers; thermodynamics of crystallization, time dependent phenomena, fracture mechanics and rheology. Advanced topics in extrusion.

TE 465 Polymer Biomaterials Engineering 4. Offered in Fall Only. Prerequisite: PY 208 and (TE 200 or CH 220 or CH 221) and (MAE 206 or CE 214). In-depth study of the engineering design of biomedical polymers and implants. Polymeric biomaterials, including polymer synthesis and structure, polymer properties as related to designing orthopedic and vascular grafts. Designing textile products as biomaterials including surface modification and characterization techniques. Biodegradable and biocompatible polymers.

TE 467 Mechanics of Tissues & Implants Requirements 3. Offered in Spring Only. Prerequisite: (ZO 160 or BIO 183) and (MAE 314 or CE 313). Application of engineering and biological principles to understand the structure and performance of tendons, ligaments, skin, and bone; bone mechanics; viscoelasticity of soft biological tissues; models of soft biological tissues; mechanics of skeletal muscle; and tissue-derived devices as well as interfaces between native tissues and synthetic devices.

TE 492 Special Topics in Textile Engineering 1-3. Offered in Fall and Spring. Presentation of material not normally available in regular course offerings or offering of new courses on a trial basis. Credits and content determined by faculty member in consultation with the Department Head.
Textile Materials Science

TMS 211 Introduction to Fiber Science 3. Offered in Fall Spring Summer. Prerequisite: TT 105, or PCC 105, Corequisite: MA 131 or 141. Properties of fibers related to type and chemical structure. Fiber classification and identification. Reaction to moisture, stress-strain properties, and methods of measuring physical properties. Relationship between polymer structure, fiber properties and utilization.

TMS 212 Yarn and Fabric Formation and Properties 2. Offered in Fall Only. Prerequisite: TMS 211 and Corequisite: TMS 212. The development of products from textile and fibrous materials is a critical component of new product development in many industries, including textiles, retail, plastics, composites, transporations, and architecture. This course provides the technical information required for scientists to understand how textile and fiber-based products are manufactured, with a practical view to embuing the new knowledge with a molecular level understanding of fibers for unique new product development.

TMS 214 Yarn and Fabric Formation and Properties Lab 1. Offered in Fall Only. Prerequisite: TMS 211 and Corequisite: TMS 212. The development of products from textiles and fibrous materials is a critical component of new product development in many industries. This laboratory course provides hands-on exercises and demonstrations of key textile and fiber-based products are manufactured.

TMS 460 Physical & Mechanical Properties of Textile Materials 3. Offered in Fall Only. Prerequisite: MA 230 or MA 241, PY 211, TMS 211. Structural and physical properties of fibers, yarns and fabrics, including mechanical, thermal, optical, frictional, electrical and moisture properties. Relationships between structure, properties and performance.

TMS 471 Textile Materials Design I 3. Offered in Fall Only. Functional textile materials design, modeling techniques and fault analysis methodologies. Product development from initial design phase, testing, analysis, to prototype production. Project will be completed in TMS 472.


TMS 492 Special Topics in Textile Materials Science 3-4. Offered in Fall and Spring. Presentation of material not normally available in regular course offerings or offering of new courses on a trial basis. Credits and content determined by faculty member in consultation with the Department Head.

Textile Technology

TT 105 Introduction to Textile Technology 3. Offered in Fall and Spring. Introduction to Textile and Apparel, Technology and Management. Structures and production methods for fabrics, yarn, and fibers. Introduction to the nature of polymers and the characteristics of polymers which make them useful for producing fibers that are practically and aesthetically desirable. Design of end products as well as fundamental economic and supply chain issues.

TT 203 Materials, Polymers and Fibers Used in Nonwovens 3. Offered in Fall Only. Prerequisite: MA 141, PY 205. Fundamentals of raw material used in nonwoven processes. Raw material production, chemical and physical properties of nonwoven raw materials and assessment of material properties. Introduction of structure/property relationships for these materials and how these relationships influence end use applications. Credit will not be given for both TT 203 and TMS 211.

TT 221 Yarn Production and Properties I 2. Offered in Fall Spring Summer. Prerequisite: TT 105. Corequisite: MA 131 or MA 141; PY 211 or PY 205. The techniques available for manufacturing yarns from staple fibers. A review of yarn numbering and fiber properties. The principles involved in opening, cleaning, blending, drafting, twisting and winding. Short and long staple spinning systems including a review of opening and cleaning lines, carding, draw frames, roving frames and different spinning machines. Filament yarn processing.

TT 252 Formation and Structure of Textile Fabrics 4. Offered in Fall and Spring. Prerequisite: TT 221. Fundamentals of the conversion of fibers and yarns into woven, knitted, and nonwoven fabrics, and fabrics' conversion systems. Introduction to woven, knitted and nonwoven fabric design structure. Structure, property, and performance relations of textile fabrics. Testing and evaluation of textile structures.

Toxicology

TOX 201 Poisons, People and the Environment 3. Offered in Spring Only. Introduction to the fascinating world of chemical poisons including their many and varied effects on people as well as the environment. Learn how and why poisons have played an important role in history, how to critically evaluate the chemical risk information reported in the media, and the underlying principles of "the basic science of poisons."

TOX 401 Principles of Toxicology 4. Offered in Fall Only. Prerequisite: CH 220 or CH 221; BIO 181 or ZO 160. Introduce students to the basic principles of toxicology. Will cover the history and scope of the field; absorption, distribution, metabolism and elimination fo toxicants; types and mechanisms of toxic action; carcinogenesis; environmental toxicology as well as human and ecological risk assessment.

TOX 415 Environmental Toxicology and Chemistry 4. Offered in Spring Only. Prerequisite: CH 220 or CH 221; BIO 181 or ZO 160 recommended. Environmental toxicology and chemistry including the sources, fate, and effects of chemicals in the environment. Emphasis on contemporary problems in human health and the environment.

TOX 490 Seminar in Environmental Toxicology 1. Offered in Spring Only. Prerequisite: TOX 401. Presentation of research findings by invited scientist; presentation of literature research by students; guidelines for presenting oral and poster presentations at scientific meetings.

TOX 495 Special Topics in Toxicology 1-3. Offered in Fall Spring Summer. Offered as needed to present materials unavailable in regular course offerings or for offering new courses on a trial basis.

TOX 499 Undergraduate Research in Toxicology 1-3. Offered in Fall Spring Summer. Research for students in Toxicology. In lieu of a syllabus, student and professor will prepare a contract which details the research and how the results will be disseminated.
TT 305 Introduction to Nonwoven Products and Processes 3. Offered in Fall and Spring. Prerequisite: TT 252 or (PY 205 and TMS 211), (MA 231 or MA 241), and (PY 211 or PY 208). Corequisite: TT 252 and ST 361. Fiber web/nonwoven fabrics produced directly from fibers or their precursors. Physical and chemical nature of local bonding and fiber entanglement. Viable processes for producing these fabrics. Economic justification for process and production. Product/process interaction. Plant visits whenever possible.

TT 321 Yarn Production and Properties II 3. Offered in Fall and Spring. Prerequisite: TT 221. Fiber and machine interactions in blending, carding, drawing and spinning. Drafting theories and the influence of fiber and machine variables on irregularity. The role of twist on yarn structure, properties and productivity. Developments and limitations in processing technology.

TT 331 Performance Evaluation of Textile Materials 4. Offered in Fall and Spring. Prerequisite: ST 311 or ST 361, TMS 211, TT 221, TT 252 or TT 251, PY 211 or PY 208, and MA 241. Standards, principles and effects of test conditions in measuring basic physical and mechanical properties of textile materials. Design of test and interpretation of test results in relation to end-use performance, product development, process control, research and development and other requirements.


TT 351 Woven Products and Processes 3. Offered in Fall Only. Prerequisite: PY 212 or PY 208. Design and development of various woven textile products including their component properties, performance, requirements, structures, and methods of production. The primary objective of the course is to introduce students to various woven textile products, including those used in automobiles, agriculture, construction, ETC. and stimulate understanding of their structure, performance requirements, and relevant manufacturing principles including braiding.

TT 370 Technical Fabric Design 4. Offered in Spring Only. Prerequisite: Two courses out of TT 341, 351 and 305. Properties of woven, knitted and nonwoven fabrics. Computer techniques and other methods of reproducing structural designs and means of designing fabrics to specifications. Laboratory consists of projects involving design analysis and testing.


TT 380 Management and Control of Textile and Apparel Systems 3. Offered in Fall and Spring. Prerequisite: TT 252. Management approaches, practices and basic economic considerations in the development, production and distribution of industrial and consumer textile and apparel products.


TT 406 Bonding Fundamentals in Nonwovens 3. Offered in Fall Only. Prerequisite: TT 405, MAE 308, MAE 310. Fundamentals of fluid mechanics and heat transfer mechanisms during the bonding of nonwovens. In-depth description of hydroentangling, thermal bonding and needle punching techniques. Modeling methods and laboratory work are assigned.


TT 421 Developments in Yarn Manufacturing 3. Offered in Spring Only. Prerequisite: TT 321. A critical appraisal of developments in yarn manufacturing, with emphasis on their influence on process and product quality and range.


TT 431 Quality Management and Control In Textile Manufacturing 3. Offered in Fall and Spring. Prerequisite: TT 221, TT 252, TT 331, and ST 361 or BUS 350. Principles of quality and process management and control in textile/apparel manufacturing with emphases in quality management systems, quality costs, statistical control chart procedures, process capability, acceptance sampling, and optimal process and product design and improvement methods.

TT 441 Advanced Knitting Systems and Fabrics 3. Offered in Fall Only. Prerequisite: TT 341. Loop forming concepts and mechanisms of complex warp and weft-knit fabrics. Structural design and limitations, potential applications and knitability. Analysis of mechanical systems and tensioning forces on fabric formation. The effect on dimensional and mechanical properties.

TT 451 Advanced Woven Fabric Design 3. Offered in Spring Only. Prerequisite: TT 252 and Senior Standing. Design and production requirements for highly specialized woven fabric structures. The laboratory activities will include a project on design from concept to final production and finishing.

TT 470 Jacquard Woven Fabric Design 3. Offered in Fall Only. Prerequisite: TT 252, TT 371. This course is dedicated to the study of Jacquard woven fabric design and structural technology through the use
of CAD as both an aesthetic and technical tool, and will culminate in each student producing a unique fabric collection based upon his/her developed area of interest. Jacquard design for many different end uses is addressed, from art fabrics to unique specialty products. A field trip in this course will require personal transportation.

**TT 480 Operations Management Decisions for Textiles 3.**
Prerequisite: FTM 380, ACC 210, ST 361, (MA 131 and 132 or MA 141). Quantitative techniques for decision making and management in the textile complex. Applications include vendor selection, plant location, retail inventory management, forecasting demand, project management, and logistics planning. Techniques covered include simulation, PERT/CPM, mathematical modeling.

**TT 481 Design and Technology of Technical Textiles 3. Offered in Spring Only.**
Prerequisite: TT 305, TT 341 and TT 351. Performance requirements of various technical textiles. Underlying principles of design, application, manufacture, and evaluation of fibrous structures intended to meet specific end-use requirement.

**TT 485 Textile Computer Integrated Enterprise 3.**
Prerequisite: FTM 380. Survey of information technology in textile and apparel industries. Topics discussed include: computer aided design (CAD); computer aided manufacturing (CAM); computer aided engineering (CAE); material handling systems; automation and robotics; logistics and warehousing systems; retail product tracking, and Internet resources.

**TT 486 Supply Chain Management in the Textile Industry 3.**
Prerequisite: FTM 380. Study of the operations necessary to produce and distribute a product, starting with the procurement of the raw material used in making the goods and ending with the delivery of the finished product. Topics covered include approaches to solving problems in manufacturing, sourcing, transportation logistics, and retail operations within the Integrated Textile Complex. Credit cannot be given for both TAM486 and MT386.

**TT 499 Textile Senior Project 4. Offered in Fall and Spring.** This is a project based course to be taken in the last semester of the Senior year. This is a capstone course the students work in cross-functional teams to research and solve applied problems in textile related fields. The results of the projects will be presented formally at the end of the semester. Course should be taken in the last semester of the Senior year. It cannot be substituted by other project courses.

**UNIVERSITY STUDIES COURSE**

**USC 101 Introduction to University Education I 1. Offered in Fall Only.** Developmental and academic topics to assist students as they make well-informed decisions about majors. Topics include: transition issues between high school and college; community and diversity; major and career decision making; assessment of interests, skills, and values; available university resources; overview of university majors and minors as well as policies and procedures. FYC students only. Student cannot get credit for both USC 101 and 103.

**USC 102 Introduction to University Education II 1. Offered in Spring Only.**
Prerequisite: USC 101. Continuation of USC 101; Emphasis on making a decision with respect to an undergraduate major. Credit may not be earned for both USC 102 and 104. FYC Students Only; Credit cannot be received for both USC 102 and 104.

**USC 103 Introduction to University Education for Varsity Student Athletes I 1. Offered in Fall Only.** Introduction to University Education for Varsity Student Athletes I provides success strategies for first year student-athletes at North Carolina State University. The course is designed to assist student-athletes with the skills and knowledge needed to meet the academic and personal challenges of university life and the increased responsibilities of adulthood, with special attention to the unique challenges and opportunities of student-athletes. Topics include: goal setting, time management, study skills, critical thinking, interaction with the faculty, NCAA and NCSU continuing eligibility, academic integrity, nutrition, and diversity.

**USC 104 Introduction to University Education for Varsity Student-Athletes II 1. Offered in Spring Only.**
Prerequisite: USC 103. Introduction to University Education for Varsity Student-Athletes II will provide student-athletes with the skills necessary to promote informed decision making in choosing an appropriate major and exploring possible careers. Additional areas of career development, academic success, and personal development will also be addressed as they would relate to the day-to-day responsibilities and challenges that student-athletes face, as well as a review of NCAA and NCSU continuing eligibility.

**USC 105 University Orientation I 1. Offered in Fall Only.**
USC 105 serves as an orientation to academic requirements of the various colleges and departments at N.C. State. A review of study skills, time management, advising procedures, decision making and career exploration through inside and outside of class activities is designed to assist students in developing knowledge of major requirements and requisite comprehension and skills needed to succeed in college. Course is restricted to 31TP students.

**USC 106 University Orientation II 1. Offered in Spring Only.**
Prerequisite: USC 105; USC 106 continues to serve as an orientation to academic requirements of the various colleges and departments at the university. A review of study skills, time management, decision making and career exploration through in and outside of class activities is designed to assist students in making well informed choices about majors. Students will also be required to focus on career interviews as well as the development of university academic networks. Course is restricted to second semester 31TP students.

**USC 110 Freshman Advancement Seminar I.** USC 110 provides an opportunity for a diverse student population to explore the question of race and cultural differences in a global society. This course requires that participants actively explore their biases and cultural prejudices for greater enlightenment. This course challenges sources of conventional information such as media outlets, empirical data and prevailing folklore. The course represents an opportunity to have a positive impact on the matriculation and graduation rate of diverse student populations through positive reinforcemnet, affirmation of cultural heritage and background. Freshman First Year Entering Students Only.

**USC 120 SERV- Seminar Education for Military Veterans/Service Members I. Offered in Fall and Spring.** The USC 120 class will help military veteran/service members transition into the academic environment and campus community. Topics include academic success skills, academic culture, campus resources and student services. Military Veterans (Active and Veteran).

**USC 201 Introduction to the World of Labor 3. Offered in Summer.** Examines the modern workplace, as well as its evolution over the past century. Students will study several issues relating to work, focusing on the power of work, expectations of the employer, as well as culture and conflicts in the workplace. Students will have the opportunity to integrate their learning with practical work experience. Students are responsible for their own transportation to and from their workplace. This is a 5-week course. Must hold sophomore standing; course designed for students with minimal work experience.
USC 210 Introduction to College Tutoring 1. Offered in Fall Spring Summer. GPA 3.0 or higher. All enrolled students must be employed as UTC tutors. The purpose of the course is threefold: to introduce tutors to effective tutoring techniques based on educational research, to help tutors implement a variety of tutoring methods depending on the students' specific needs, and to guide tutors in self-evaluating their individual tutoring progress and goals. Departmental Approval Required.

USC 220 Leadership and the Resident Mentor 3. Course will provide the student basic concepts of involvement theory, group development theory and community development relevant to residence hall living as a paraprofessional leader on the campus; the basic principles related to leadership with emphasis on how one develops and leads with their values, beliefs and attitudes and develop skills involving active listening, communication, conflict management and mediation techniques; basic program development and presentation skills; teaching pedagogy; and diversity issues. Some out of classroom activities are required. Departmental approval required.

USC 298 Special Topics in University Studies 1-3. Offered in Fall Spring Summer. Special Topics in University Studies at the Undergraduate level for offering of courses on an experimental basis.

USC 401 Transitions for the College Graduate 3. Offered in Fall and Spring. Focus on the unique transitions the student will face upon leaving college. Through a variety of formats, students will have the opportunity to explore several aspects of their post-baccalaureate lives and ways in coping with emerging careers, money management, extracurricular retirement, transitional issues, civic engagement, and continuing education opportunities. Explorations of these areas include specific emphasis on developing and refining interviewing skills, professional and personal networks, financial endeavors, and job application and selection.

VETERINARY SCIENCE

VMP 401 Poultry Diseases 4. Offered in Spring Only. Concepts of factors contributing to or causing disease, disease cycle, host responses, and general approaches to prevention and control including management and biosecurity methods, immunization, and medication. Recognition, diagnosis, prevention, control, and treatment of economically significant infectious and noninfectious diseases affecting poultry.

VMP 420 Disease of Farm Animals 3. Offered in Spring Only. Pathology of bacterial, viral, parasitic, nutritional, thermal and mechanical disease processes for farm animals. This emphasis practices for prevention and control of each disease.

WOMEN’S AND GENDER STUDIES

WGS 200 Introduction to Women's and Gender Studies 3. Offered in Fall Only. Introduction to women's and gender studies as an interdisciplinary field spanning the humanities, social sciences and natural sciences. Study of historical perspectives and contemporary understanding of women and gender. Theory, systematic analysis and experimental accounts used to explore complexities of gender, and other identity determinants, mechanisms of power and privilege, and avenues for social change.

WGS 204 Sociology of Family 3. Offered in Fall Spring Summer. Contemporary American family structures and processes and their development. Focus on socialization, mate selection, marital adjustment and dissolution. Includes core sociological concepts, methods, theories.

WGS 210 Women and Gender in Science and Technology 3. Offered in Fall Only. Interdisciplinary introduction to the reciprocal relationships between scientific/technological research and contemporary understanding of gender. Special emphasis on social factors influencing scientists and engineers in their professions.

WGS 293 Special Topics in WGS 3. Offered in Fall and Spring. Examination of varying topics on women and/or gender from an interdisciplinary perspective at an introductory level.

WGS 304 Women and Men in Society 3. Offered in Fall and Spring. Prerequisite: 3 cr. in SOC, 200 level. A sociological analysis of women and men in contemporary American society. Perpetuation of and change in gender stratification using sociological concepts. theories and research. How gender expectations developed and transmitted. Historical data and research on diversity in American society used for analysis of causes and consequences of gender inequality.

WGS 305 Women and Literature 3. Offered in Spring Only. Nineteenth- and twentieth-century womens' literature, as shaped by the intersecting and competing claims of gender, race, sexuality, and culture. Focus on fiction, accompanied by critical readings from American studies, feminist literary criticism, and postmodern theory.

WGS 306 Gender and Politics in the United States 3. Offered in Spring Only. Prerequisite: PS 201. This course explores the role of gender in contemporary American politics. The course examines the historical course of gender politics to see how we have arrived at the present state. It investigates the activities that women and men play in modern politics-voting, running for office, serving in office, etc., and how women and men perform these activities in different ways. The course also focuses on major areas of public policy that affect women and men in different ways.

WGS 310 Women's and Gender Studies Internship 3. Offered in Fall and Spring. Internship program. Introduction to careers that deal specifically with women's issues. Ten-hours-per-week work at a nonprofit or governmental organization. Contextualization of that experience through additional academic requirements.

WGS 327 Language and Gender 3. Offered in Spring Only. Prerequisite: ENG 111, ENG 112. Introduction to the use of language by men and women. Research in Linguistics and Women's Studies addressing issues such as the acquisition of gender-differentiated language, gender and conversational interaction, sexism in language, gender issues in society, and the relationship between language, gender, and other social constructs (e.g., class, culture, and ethnicity).

WGS 330 Women and Health 3. Offered in Fall Spring Summer. Women and Health utilizes an interdisciplinary approach to explore historical perspectives on health, access to health technologies, health policy research, and emerging topics in women's health. The humanities, social sciences, and biological sciences inform inquiry into "hot topics" in health policy, ethics, and the medical sciences. The health of women is dissected through a lens of gender equity and domestic and international perspectives are employed. Students are encouraged to identify and study topics of their own interest.

WGS 360 Women In Music 3. Offered in Spring Only. The role of women in music as patrons, teachers, composers, and performers, placing them within the social, economic, and political framework to which they belong. Emphasis on Western Art Music and the role of
women in popular music. No previous formal training in music is required.

WGS 362 Communication and Gender 3. Offered in Fall and Spring. Prerequisite: Junior standing, COM 112. Effects of gender on the interpersonal communication process. Construction of gendered identities via communication practices. Examination of theories of gender and the role of gender in organizational, institutional, and media communication practices.

WGS 406 Psychology of Gender 3. Offered in Fall and Spring. Prerequisite: PSY 200, 201 or HSS 200. Current theory and research on perceived and actual biological, social, cognitive, personality and emotional similarities and differences of men and women throughout the lifespan. The construction and consequences of gender in our society and others. Credit cannot be given for both PSY 406 and PSY 506.

WGS 407 Sociology of Sexuality 3. Offered in Spring Only. Prerequisite: 3 hours SOC 200 level, 300 level, or equivalent research methods course. Exploration of sexuality in a social context. Relationship between sexuality, gender and power in the U.S. Historical trends in behaviors and identities: social movements and sexual issues; current behavioral trends. Some issues covered; identity, social construction, sexual meanings.

WGS 410 Studies in Gender and Genre 3. Offered in Fall Only. This course examines the ways in which writers have revised the literary genres to include gendered experience. It will focus on a different generic area, such as poetry, fiction, drama or autobiography, depending on its instructor.

WGS 418 Gender Law and Policies 3. Offered in Fall Only. Prerequisite: Nine hours of Political Science. Law and policy pertaining to contemporary gender issues. Examination of agenda setting, policy formation, implementation, judicial interpretation and evaluation of selected issues, such as reproductive policies, equal employment and sexual abuse.

WGS 444 Cross-Cultural Perspectives on Women 3. Offered in Spring Only. Prerequisite: ANT 252 and one of the following: ANT 310, 325, 330 or 346. Comparison of women in a variety of societies: western and non-western; hunting and gathering to industrialized. Cross-cultural perspective on the similarity and diversity of women's statuses and roles. Effect of gender on social position.

WGS 447 History of American Women to 1900 3. The historical experience of women in America from the colonial period to 1890. Women's work, education, legal and political status, religious experience, and sex roles: age, class, race, sexual preference, and region as significant variables in women's experience.

WGS 448 American Women in the Twentieth Century 3. Women's historical experience in America, 1890-1990. Changes in women's work, education, legal and political status, and sex roles, age, class, race, sexual preference and region as significant variables in women's experience. Credit will not be given for both H1 448 and H1 548.

WGS 472 Women and Religion 3. Offered in Fall Only. Prerequisite: one course in religious studies or women's and gender studies. Historical, literary, and theological sources dealing with portrayals of women and women's religious experience in several religious traditions of the world through different historical periods, from ancient to modern. Impact of feminist theory on the academic study of religion; methodological issues surrounding the study of women's religious history; role of religion in shaping attitudes toward women and their status in society.

WGS 473 Religion, Gender, and Reproductive Technologies 3. Examines comparative religious ethics concerning gender marriage, parenthood, children, and the relationship of human beings to the "natural". Relates these views to new and emerging reproductive and genetic technologies. Compares the internally diverse perspectives of three major religious traditions with regard to their interpretations of these technologies. Analyzes the impact of particular uses of these technologies on the rights of women and girls. Students cannot earn credit for both REL 473 and REL 573.

WGS 492 Theoretical Issues in Women's and Gender Studies 3. Offered in Spring Only. Prerequisite: WGS 200. Examination of feminist theory. Study of formative texts in modern feminism, drawn from various disciplines within the humanities, social sciences, and natural sciences. In-depth exploration of feminist perspectives on issues of race, class, gender, sexuality, work and mothering, among others. Analysis of local and global cultural practices using feminist theoretical frameworks.

WGS 493 Special Topics in Women's and Gender Studies 3. Offered in Fall Only. Examination of varying topics on women and/or gender from a multidisciplinary perspective.

WOOD AND PAPER SCIENCE

WPS 100 Introduction to Pulping & Papermaking 1. Offered in Fall Only. Introduction to the paper industry and the Pulp & Paper Science Curriculum. Overview of pulping and papermaking processes including plant tours and laboratory exercises. Two Saturday field trips to paper mills required. Concepts of professional development including resumes, interviewing, and summer job placement procedures.

WPS 104 Introduction to Wood Products 2. Offered in Fall Only. Introduction to College of Natural Resources and University services, including libraries, computer labs, Leadership Development Series. Awareness of size and diversity of wood industry, career potential. Setting career goals, educational and professional development goals.

WPS 202 Wood Anatomy and Properties 3. Offered in Fall Only. Formation, anatomy and properties of wood. Structural features of softwoods and hardwoods and the relationships among anatomy, physiology, physical and mechanical properties. Variability, naturally occurring defects, and wood deterioration are discussed and related to wood utilization. Techniques on hand lens and microscopic identification of wood.


WPS 205 Wood Products Practicum 5. Offered in Summer. Prerequisite: WPS 202 or 203. Preparation of drawings and bill of materials for a furniture item. Parts are machined, assembled, and finished. Lumber grading, drying, and gluing principles. Four to five days are spent visiting industries to provide an appreciation for products and processes. The student is responsible for room and board; transportation is provided.

WPS 210 Wood Products Internship 1. Offered in Fall Spring. Experience in the forest products or related industries with a departmentally selected employer.
WPS 240 Wood Products 3. Offered in Fall Only. Introduction to forest products industries, including the economic importance, current manufacturing technology, raw material requirements and the future of the industries.

WPS 242 Wood Fiber Analysis 2. Offered in Fall and Spring. The macro and micro structure of wood and the relationships of anatomical structures to the physical properties of wood and paper.

WPS 301 Introduction to Wood Chemistry 4. Offered in Spring Only. Prerequisite: CH 101, CH 102, and WPS 202 or 203 or permission. Introduction of polymer science concepts (thermal transitions, molecular weight, viscoelasticity). Detailed instruction on wood chemistry, including wood reactivity, wood decay, the chemical aspects of thermal treatments, the separation of wood into its individual components, the reactivity and modification of the individual components, and the conversion of wood into energy products.

WPS 302 Wood Processing II 4. Offered in Fall Only. Prerequisite: WPS 202 or 203. Theories and techniques of processing raw wood into usable products. Principles of operation of current industrial wood milling equipment including primary and secondary processing. Machining of reconstituted wood products.

WPS 308 Wood Products Process Facilities Infrastructure 4. Offered in Fall Only. Wood Products production methods-simulation, optimization, plant layout and material handling. Plant infrastructure-hydraulics, compressed air, electrical, dust extraction.


WPS 344 Introduction to Quality Control in Wood Products 3. Offered in Spring Only. Prerequisite: ST 361. Statistical quality control techniques applicable to the manufacture of wood products. Control chart techniques for monitoring defects, defectives and measurements. Acceptance sampling procedures. Examples from the wood products industries will be used.

WPS 346 Forest Prod Business Mkgt 3. Offered in Spring Only. This course will examine the business and marketing approaches in the forest products industry from a theoretical as well as an applied perspective. Students will learn the importance of business processes and how products, price, distribution, and promotion plays a role in the purchase behavior of consumers. Students will analyze situations and cases to solve real and hypothetical business problems in the forest products industry.

WPS 350 Wood Products Literature 2. Offered in Spring Only. Prerequisite: Completion of WPS 205. Exploration of the wood products literature, use of library services, oral and written reports, with emphasis on independent study.

WPS 423 Forest Machinery and Systems 3. Offered in Fall Only. Applications of engineering principles to problems in forest operations: power sources; testing; rating and capabilities of forest machinery; power requirements and utilization efficiencies; effects of vehicle design parameters on stability, safety, and operation under load; traction devices and vehicle mechanics.


WPS 444 Wood Composites 3. Offered in Fall Only. Prerequisite: WPS 301 and senior standing in Wood Products. Structure-property relationships of common wood adhesives, bond formation fundamentals, bond performance; manufacture, properties, and processing of wood-based composites such as plywood, particleboard, waferboard, and oriented strandboard, as well as specialty composite products.


WPS 482 Projects in Wood Products 2. Offered in Fall Spring Summer. Individual library or laboratory research projects selected and conducted with the approval and guidance of faculty.

WPS 483 Projects in Wood Products 3. Offered in Fall Only. Exploration of the wood products literature; use of library services and on-line databases, oral and written reports, with emphasis on independent study. Individual library or laboratory research projects selected and conducted with the approval and guidance of faculty.

WPS 491 Special Topics in Wood and Paper Science 1-4. Offered in Fall Spring Summer. Independent study of management or technology problems selected with faculty approval or the offering of experimental courses.

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ZO 492 External Learning Experience 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes facilities and resources which are external to the campus. Contact and arrangements with prospective employers must be initiated by student and approved by the faculty adviser, the prospective employer and the departmental teaching coordinator prior to the experience.

ZO 493 Special Problems/Research Exploration 1-6. Offered in Fall and Spring. A learning experience in agriculture and life sciences within an academic framework that utilizes campus facilities and resources. Contact and arrangements with prospective employers must be initiated by student and approved by a faculty adviser, the prospective employer, the departmental teaching coordinator prior to the experience.

ZO 495 Special Topics in Zoology 1-3. Offered in Fall and Spring. Offered as needed for development of new courses in various areas of zoology.
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