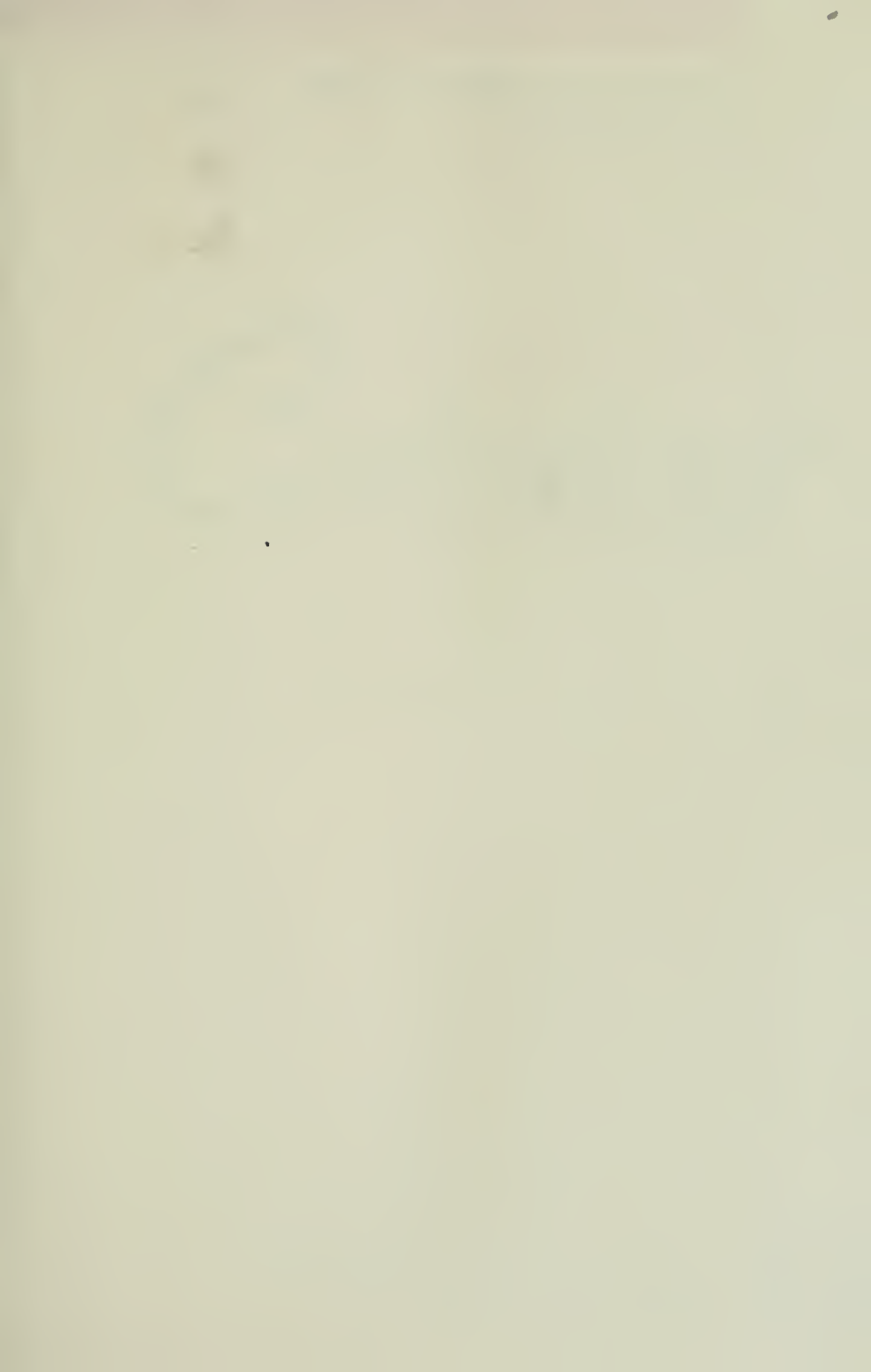


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1999  
NORTH CAROLINA STATE  
UNIVERSITY

GRADUATE  
Catalog

North Carolina State University  
Raleigh, North Carolina



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This catalog is intended for informational purposes only. Requirements, rules, procedures, courses and informational statements set forth herein are subject to change. Notice of changes will be conveyed to duly enrolled students and other appropriate persons at the time such changes are effected.

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THE  

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GRADUATE  

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SCHOOL

# Graduate Catalog



**North Carolina State University**

**Raleigh, North Carolina**



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# NORTH CAROLINA STATE UNIVERSITY

North Carolina State University (NC State) is a national center for research, teaching and extension. As a Land-Grant state university, it shares the distinctive characteristics of these institutions nationally--broad academic offerings, extensive public service, national and international activities, and large-scale extension and research programs.

North Carolina State University is committed to equality of educational opportunity and does not discriminate against applicants, students or employees based on race, color, national origin, religion, sex, age or handicap. Moreover, NC State is open to people of all races and actively seeks to promote racial integration by recruiting and enrolling a larger number of African-American students.

NC State's rich and varied academic program is comprised of 96 undergraduate degree programs, master's degrees in 86 fields of study, 52 doctoral degree programs and the doctor of veterinary medicine program. The University offers approximately 2,900 courses.

Research activities span a broad spectrum of scientific, technological and scholarly endeavors with a budget of some \$170 million annually.

Extension offices in each of the state's 100 counties and on the Cherokee Indian reservation assist in carrying the University's teaching and research programs throughout the state. The diversity of these programs spans such fields as agriculture, design, education, engineering, forestry, humanities, management, marine and environmental sciences, textiles, veterinary medicine, and the physical, social and life sciences.

The University's annual expenditures reach approximately \$454 million, and its permanent employees total about 6,000. There are more than 2,700 faculty and professional staff, including approximately 2,000 graduate faculty. Among the many honors and recognitions received by members of the faculty are seven memberships in the National Academy of Science and five in the National Academy of Engineering, 44 named professorships, 14 distinguished university professorships and 16 Graduate Alumni Distinguished Professors.

NC State's campus, located just west of the downtown area of Raleigh, totals some 1,800 acres. This includes the central campus of 623 acres with some 166 buildings,

the adjacent Centennial Campus of 1,000 acres under development, and the 182-acre College of Veterinary Medicine campus.

In addition, the University has some 88,000 acres statewide, including one research and endowment forest of 78,000 acres. Near the campus are 2,500 acres containing research farms; biology and ecology sites; genetics, horticulture and floriculture nurseries; teaching and research forests; and Carter-Finley Stadium.

With a total enrollment of more than 27,500, the University has approximately 18,800 undergraduate students, 5,150 graduate students, 3,280 lifelong education students and 284 in veterinary medicine. The student population consists of approximately 16,180 men and 11,357 women, including 2,607 African-Americans and 1,640 other minority students. Students come to NC State from every state in the union and at least 90 foreign countries are represented by 1,058 international students.

The University is organized in nine colleges, the School of Design and the Graduate School. The nine colleges are Agriculture and Life Sciences, Education and Psychology, Engineering, Forest Resources, Humanities and Social Sciences, Management, Physical and Mathematical Sciences, Textiles and Veterinary Medicine. In addition, a complex of divisions and programs provides for a wide range of special programs in academic affairs, research and extension.

North Carolina State University is one of three Research Triangle Universities, along with Duke University and the University of North Carolina at Chapel Hill, forming the 30-mile triangle which encompasses the Research Triangle Park and includes the Research Triangle Institute, a not-for-profit, contract research organization founded by the three universities.

NC State is a member of the National Association of State Universities and Land-Grant Colleges. It is also a member of the American Council on Education, the College Entrance Examination Board, the Council of Graduate Schools, the National Commission on Accrediting and the Southern Association of Colleges and Schools.

NC State is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees. Numerous professional fields are also accredited by national accrediting agencies.



## **Nondiscrimination Statement**

North Carolina State University is dedicated to equality of opportunity within its community. Accordingly, North Carolina State University does not practice or condone discrimination, in any form, against students, employees or applicants on the grounds of race, color, national origin, religion, sex, age or disability. North Carolina State University commits itself to positive action to secure equal opportunity regardless of those characteristics.

North Carolina State University supports the protection available to members of its community under all applicable Federal laws, including Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, Sections 799A and 845 of the Public Health Service Act, the Vietnam Veterans Readjustment Assistance Act of 1974, and Executive Order 11246, the Americans with Disabilities Act of 1990, and the Family Medical Leave Act of 1993. For information concerning these provisions, contact:

Ms. Joanne Woodard  
Interim University Affirmative Action Officer  
304-A Holladay Hall  
Box 7101  
North Carolina State University  
Raleigh North Carolina 27695-7101  
Phone:(919) 515-3148 or 515-4559

## **Code of Student Conduct**

North Carolina State University is committed to academic integrity, and all students are required to adhere to the *NCSU Code of Student Conduct*. Graduate students may also refer to the *NCSU Graduate Student Rights and Responsibilities* document.

## **Additional Information**

If additional information is needed, contact the Graduate School, 103 Peele Hall, P. O. Box 7102, North Carolina State University, Raleigh, N.C. 27695-7102 (telephone 919/515-2872).

# ADMINISTRATION

Larry K. Monteith, *Chancellor*

Phillip J. Stiles, *Provost and Vice Chancellor*

Debra W. Stewart, *Vice Provost and Dean of Graduate School*

Charles G. Moreland, *Vice Chancellor for Research, Outreach and Extension*

George L. Worsley, *Vice Chancellor for Finance and Business*

Thomas H. Stafford Jr., *Vice Chancellor for Student Affairs*

Jeffrey P. McNeill, *Vice Chancellor for University Advancement*

## Deans of Colleges and Schools

Durward F. Bateman, *Dean, Agriculture and Life Sciences*

Marvin J. Malecha, *Dean, Design*

Joan J. Michael, *Dean, Education and Psychology*

John B. Gilligan, *Interim Dean, Engineering*

Larry W. Tombaugh, *Dean, Forest Resources*

Margaret A. Zahn, *Dean, Humanities and Social Sciences*

Richard J. Lewis, *Dean, Management*

Jerry L. Whitten, *Dean, Physical and Mathematical Sciences*

Robert A. Barnhardt, *Dean, Textiles*

Oscar J. Fletcher, *Dean, Veterinary Medicine*

## Graduate School--Administrative Office

D. W. Stewart, *Dean*

R. S. Sowell, *Associate Dean*

M. F. King, *Associate Dean*

T. Melton, *Associate Dean*

# Administrative Board of the Graduate School

	Term Expires
D. W. Stewart, <i>Dean</i>	
R. S. Sowell, <i>Associate Dean</i>	
M. F. King, <i>Associate Dean</i>	
T. Melton, <i>Associate Dean</i>	
S. M. Bedair, <i>Professor of Electrical and Computer Engineering and Materials Science and Engineering</i>	December, 1997
B. G. Beezer, <i>Professor of Educational Leadership and Program Evaluation; Associate Dean for Academic Affairs, College of Education and Psychology</i>	June, 1999
A. J. De Grand, <i>Professor of History</i>	February, 1997
J. G. Gilligan, <i>Professor of Nuclear Engineering; Associate Dean for Academic Affairs, College of Engineering</i>	June, 1998
B. Hammerberg, <i>Professor of Microbiology, Pathology and Parasitology</i>	December, 1999
C. R. Knoeber, <i>Professor of Economics</i>	April, 1997
C. D. Livengood, <i>Professor of Textile Engineering, Chemistry and Science; Associate Dean for Academic Programs, College of Textiles</i>	August, 1998
G. E. Mitchell, <i>Professor of Physics and Director of Graduate Programs</i>	July, 1997
J. L. Oblinger, <i>Professor of Food Science; Associate Dean and Director of Academic Programs, College of Agriculture and Life Sciences</i>	June, 1999
C. D. Raper, Jr., <i>Professor of Soil Science and Director of Graduate Programs</i>	June, 1999
S. S. Snyder, <i>Associate Professor of Psychology and Director of Graduate Programs</i>	June, 1997
D. L. Solomon, <i>Professor of Statistics; Associate Dean of Academic Affairs, College of Physical and Mathematical Sciences</i>	June, 1998
P. Tesar, <i>Professor of Architecture</i>	August, 1999
B. E. Wilson, <i>Associate Professor of Parks, Recreation and Tourism Management</i>	June, 1999

# THE CALENDAR

NOTE: This calendar is subject to periodic review and revision.

## SPRING SEMESTER, 1996

January 10	Wed.	First day of classes
January 15	Mon.	Holiday (Martin Luther King, Jr. Day)
January 18	Thurs.	Last day to add a course without permission of instructor
January 25	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or to change from credit to audit with a refund or reduction. (NOTE: The tuition and fees charge is based on the official number of hours and course carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
February 21	Wed.	Academic Difficulty Reports due
February 22	Thurs.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below.
March 8	Fri.	Spring vacation begins at 10:20 p.m.
March 18	Mon.	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus; Registration advising for 1996 Summer Sessions and Fall Semester begins
March 22	Fri.	Last day to withdraw or drop a course at the without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
March 29	Fri.	<i>Deadline for submission of theses or dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 1996. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses</i>
April 5	Fri.	Holiday (Good Friday)
April 26	Fri.	Last day of classes

April 29-May 7	Mon.-Tues.	Final examinations
May 11	Sat.	Spring Commencement

## SUMMER SESSIONS, 1996

### *First Session*

May 21	Tues.	First day of classes
May 22	Wed.	Last day to add a course without permission of instructor
May 24	Fri.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund ( <i>NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.</i> ) TRACS closes at 5:00 p.m. (After this day, drops processed in 1000 Harris Hall)
June 4	Tues.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
June 5	Wed.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
June 21	Fri.	Last day of classes
June 24-25	Mon.-Tues.	Final examinations

### *Second Session*

July 1	Mon.	First day of classes
July 2	Tues.	Last day to add a course without permission of instructor
July 3	Wed.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in August, 1996. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
July 4	Thurs.	Holiday (Independence Day)
July 5	Fri.	No classes

July 8	Mon.	Classes resume at 7:30 a.m.
July 8	Mon.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund ( <i>NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.</i> ) TRACS closes at 5:00 p.m. (After this day, drops processed in 1000 Harris Hall)
July 17	Wed.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
July 18	Thurs.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
August 5	Mon.	Last day of classes
August 6	Tues.	Reading day
August 7-8	Wed.-Thurs.	Final examinations

### FALL SEMESTER, 1996

August 21	Wed.	First day of classes
August 28	Wed.	Last day to add a course without permission of instructor
Sept. 2	Mon.	Holiday (Labor Day)
Sept. 5	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or change from credit to audit with a refund or reduction. ( <i>NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.</i> ) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
October 3	Thurs.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
October 4	Fri.	Academic Difficulty Reports due
October 11	Fri.	Fall vacation begins at 1:15 p.m.; 1:45 p.m., Centennial Campus



October 16	Wed.	Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus
October 21	Mon.	Registration advising for 1997 Spring Semester begins
October 25	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
October 27	Sun.	TRACS registration opens for 1997 spring semester
November 8	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in December, 1996. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
November 26	Tues.	Thanksgiving vacation begins at 10:20 p.m.
December 2	Mon.	Classes resume at 8:05 a.m.; 8:35 a.m. Centennial Campus
December 6	Fri.	Last day of classes
December 9-17	Mon.-Tues.	Final examinations
December 18	Wed.	Fall Graduation Exercise

### SPRING SEMESTER, 1997

January 8	Wed.	First day of classes
January 20	Mon.	Holiday (Martin Luther King, Jr. Day)
January 15	Thurs.	Last day to add a course without permission of instructor
January 23	Thurs.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course or to change from credit to audit with a refund or reduction. <i>(NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.)</i> TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
February 19	Wed.	Academic Difficulty Reports due
February 20	Thurs.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to

		change from credit to audit at the 400 level or below
March 7	Fri.	Spring vacation begins at 10:20 p.m.
March 17	Mon.	Classes resume at 8:05 a.m.; 8:35 a.m., Centennial Campus. Registration advising for 1995 Summer Sessions and Fall Semester begins
March 7	Fri.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
March 27	Thurs.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 1997. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
March 28	Fri.	Holiday (Good Friday)
April 25	Fri.	Last day of classes
April 28-May 6	Mon.-Tues.	Final examinations
May 10	Sat.	Spring Commencement

## SUMMER SESSIONS, 1997

### *First Session*

May 20	Tues.	First day of classes
May 21	Wed.	Last day to add a course without permission of instructor
May 23	Fri.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund. (NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.) TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
June 3	Tues.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
June 4	Wed/	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to



		change from credit to audit at the 500 or 600 level
June 20	Fri.	Last day of classes
June 23-24	Mon.-Tues.	Final examinations

### Second Session

July 1	Tues.	First day of classes
July 2	Wed.	Last day to add a course without permission of instructor
July 4	Fri.	Holiday (Independence Day)
July 7	Mon.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in August, 1997. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
July 7	Mon.	Last day to register (includes payment of tuition and fees) or to add a course. Last day to withdraw or drop a course with a refund. <i>(NOTE: The tuition and fees charge is based on the official number of hours and courses carried at 5:00 p.m. on this day.)</i> TRACS closes at 5:00 p.m. (after this day, drops processed in 1000 Harris Hall)
July 16	Wed.	Last day to withdraw or drop a course without a grade at the 400 level or below. Last day to change from credit to audit at the 400 level or below
July 17	Thurs.	Last day to withdraw or drop a course without a grade at the 500 or 600 level. Last day to change from credit to audit at the 500 or 600 level
August 4	Mon.	Last day of classes
August 6-7	Wed.-Thurs.	Final examinations

### FALL SEMESTER, 1997

August 20	Wed.	First day of classes
Sept. 1	Mon.	Holiday (Labor Day)
October 9	Fri.	Fall vacation begins
October 14	Mon.	Classes resume

November 7	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in December, 1997. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
November 25	Tues.	Thanksgiving vacation begins at 10:20 p.m.
December 1	Mon.	Classes resume
December 5	Fri.	Last day of classes
December 8-16	Mon.-Tues.	Final examinations
December 17	Wed.	Fall Graduation Exercise

### SPRING SEMESTER, 1998

January 7	Wed.	First day of classes
January 19	Mon.	Holiday (Martin Luther King, Jr. Day)
March 6	Fri.	Spring vacation begins at 10:20 p.m.
March 16	Mon.	Classes resume
March 27	Fri.	<i>Deadline for submission of theses and dissertations to the Graduate School, in final form as approved by advisory committees, by candidates for master's and doctoral degrees in May, 1998. Last day for unconditional pass on final oral examinations by candidates for master's degrees not requiring theses.</i>
April 10	Fri.	Holiday (Good Friday)
April 24	Fri.	Last day of classes
April 27-May 5	Mon.-Tues.	Final examinations
May 9	Sat.	Spring Commencement

# THE GRADUATE SCHOOL

Graduate instruction was first offered at North Carolina State University in 1893, and the first doctoral degree was conferred in 1926. In the ensuing years, the Graduate School has grown steadily and now provides instruction and facilities for advanced study and research in the fields of agriculture and life sciences, design, education, engineering, forest resources, humanities and social sciences, management, physical and mathematical sciences, textiles and veterinary medicine.

The Graduate School is currently composed of more than 2,000 graduate faculty members. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the University's 5,150 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. Additionally, a cooperative agreement exists among the Graduate Schools of the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro, Duke University and North Carolina State University which increases the educational and research possibilities associated with each.

## Graduate Student Association

The Graduate Student Association (GSA) is an academic, political and social organization comprising all graduate students. It is governed by elected officers and representatives from departmental GSA chapters. Officially recognized by the university as the voice of graduate students, it provides graduate student representation on various university committees. The GSA president has full voting membership on the Administrative Board of the Graduate School and meets regularly with other university officials.

Some services provided by the GSA include travel reimbursement for presenting original research at professional conferences, a graduate student orientation, a teaching effectiveness workshop and outstanding TA awards, cash rebates to departmental chapters and assistance with electronic communications among NC State graduate students.

The GSA can provide answers to questions regarding graduate student life and may be contacted via departmental representatives or the GSA president, whose telephone number can be obtained from the Graduate School. Students may also visit the GSA Home Page embedded in the Graduate School's Home Page on the World Wide Web. All graduate students are invited to attend the monthly meetings and become involved with the GSA.

# GENERAL INFORMATION

## Application

Applications for admission must be accompanied by the following: two official transcripts from all colleges and universities previously attended, references from at least three people who know of the student's academic record and potential for graduate study, a non-refundable application fee of \$55 and, in most cases, an official statement of the student's Graduate Record Examination or other standardized test scores. Application and reference forms may be obtained by writing or visiting the Graduate School, 103 Peele Hall, Box 7102, North Carolina State University, Raleigh, N. C. 27695-7102. When completed, all application materials should be returned according to instructions. Application is made for a specific degree program and date of enrollment (see "Admission").

## International Students

Students whose native language is other than English, regardless of citizenship, must submit TOEFL (Test of English as a Foreign Language) scores as evidence of ability to use English at a level of competence sufficient for graduate work. The minimum requirement for admission is a TOEFL score of 550, with scores of 50 on at least two of the sections and no section score below 45. (Minimum score subject to change; departments may establish a higher minimum requirement.) The test date must be within 24 months of the application deadline date before the semester for which the application is being reviewed. An *official* score report issued by the Educational Testing Service is required. All international students must be cleared by the Department of Foreign Languages and Literatures at the beginning of their initial semester in residence and may be required to take additional course work in English. The international applicant must also provide the University with verification that the required funds are available to support the proposed program of advanced study. Foreign nationals in the United States at the time application is made must also provide information regarding their current visa status. The University provides special forms to be used by the applicant in supplying this information.

## Admission

The procedures followed in evaluating an applicant's potential for success in graduate work and the criteria used for admissions decisions vary according to programs and colleges/schools and reflect an evaluation of the applicant's potential to engage in graduate work and the capability of the individual programs to accommodate additional students. Most programs consider applications as they arrive, while others accumulate applications and make recommendations on

admission at certain times during the year. Generally, requests for admission are considered by departmental admissions committees which forward the departmental recommendations to the Dean of the Graduate School.

Students are admitted to full or provisional status in a specific degree program. Admission is granted for a specific semester or summer term. Any change in the admission date must be requested in writing and approved by the department and Graduate School. Once the requirements for that degree program have been completed, no further registration as a graduate student will be permitted unless admission to a new graduate classification has been formally approved. Students with special objectives may request admission in the "Graduate-Unclassified Status" (see next page) or register in the "Post-Baccalaureate Studies" program (see p. 17) through the Division of Lifelong Education.

## ADMISSION TO DEGREE PROGRAMS

**Full Graduate Standing:** To be considered for admission in full graduate standing, an applicant must have a baccalaureate degree from a college or university recognized as standard by a regional or general accrediting agency and must have at least a "B" average in the undergraduate major or in the latest graduate degree program.

**Provisional Admission:** 1. Provisional admission may be granted to applicants with bachelor's degrees from accredited institutions who lack undergraduate work considered essential for graduate study in a major field. Course work, without graduate credit, will be required to make up such deficiencies before admission to full status can be granted.

Applicants with bachelor's degrees from nonaccredited institutions may be granted provisional admission when their academic records warrant this status. Additional course work will be required of such students when deficiencies in previous training are apparent.

Full graduate standing is granted when the deficiencies responsible for the provisional status are corrected, provided the student has maintained a satisfactory academic record (3.0 Grade Point Average) on all course work taken in a graduate classification. A change from provisional status to full graduate standing is effected only upon the recommendation of the department in which the student is seeking the degree.

2. Students with bachelor's degrees from accredited institutions whose scholastic records are below the standards for admission to full graduate standing may be admitted provisionally when unavoidable, extenuating circumstances affected their undergraduate averages or when progressive improvement in their undergraduate work warrants provisional admission. Students admitted provisionally under these



circumstances will have their status changed to full graduate standing after completion of nine or more graduate credit hours following admission provided the student has maintained a GPA of at least 3.0

A graduate student is not eligible for appointment to an assistantship or fellowship while on provisional status.

## **MEDICAL HISTORY AND IMMUNIZATION RECORDS**

All graduate students admitted to a degree program are required by State law to submit a report of medical history and immunization documentation prior to completing their initial registration. This report must document immunization against tetanus/diphtheria, measles, German measles, polio and a TB skin test. NC State students returning to Graduate School must have their medical history on file updated. The required reports should be received in the Student Health Service at least thirty days before registration. If this requirement is not met, dismissal from school is mandatory under the law.

## **GRADUATE-UNCLASSIFIED STATUS**

The Graduate-Unclassified status is a temporary classification and students admitted to this status are not candidates for degrees. They may take courses for graduate credit but may not apply more than 10 credits earned while in this status to any program leading to an advanced degree at this institution. Unclassified graduate students are expected to meet the same admissions requirements that apply to graduate students in full standing. Any individual having an interest in applying for admission as a Graduate-Unclassified Student should correspond with the Graduate Dean describing his or her particular interests and objectives prior to making application.

### **Special Graduate-unclassified Status for International Student Visitors**

1. International student visitors must state their educational objectives at NC State and the time expected to accomplish those objectives. The educational objective may not be to seek a graduate degree at NC State.
2. They are expected to meet the same minimum academic admission requirements that apply to graduate students in full standing.
3. They are expected to meet the same TOEFL requirements that apply to international students who are admitted to master's and doctoral programs if they plan to take courses. If they plan to register for Departmental Research 699 only, they are not required to take the TOEFL.
4. They must be recommended by the Director of Graduate Programs in the department in which they plan to take courses or do research.
5. They may be in this special admission status for a period not to exceed one year.
6. They may hold a research assistantship but may not hold a teaching assistantship.
7. They will not be eligible for tuition remission.

## POST-BACCALAUREATE STUDIES (PBS)

The Post-Baccalaureate Studies (PBS) classification is designed for U. S. citizens who wish to undertake academic work beyond the baccalaureate degree but who are not currently admitted to a degree program. This classification is not open to international students with the exception of the spouse of a regularly enrolled NC State student. In special cases where students are sponsored by an agency of the U. S. government for specialized, non-degree study, approval may be given by the Graduate School for registration in the Post-Baccalaureate Studies classification. The following policies apply to students who wish to register for PBS:

1. All must have baccalaureate degrees from accredited institutions of higher education. Registration is through the Division of Lifelong Education.
2. All classes taken for credit by PBS students will be graded in the usual manner that applies for the particular course (A +/- through F or S,U). All courses taken at NC State will show on the student's transcript.
3. If the student is admitted as a graduate student, a maximum of nine hours may apply toward the minimum requirements of the degree for which the student is enrolled, including hours approved for graduate credit while classified as a senior, unclassified undergraduate or professional engineering student. The first nine hours of course work taken at the graduate level in the PBS category will be accepted toward degree requirements unless a request for some other combination of nine hours is made by the student's advisory committee and approved both by the college/school dean and Graduate Dean.
4. Ten hours of PBS credit is allowed when one course is a 4-hour lab course.
5. The grade point average (GPA) of a graduate student who has credits in the PBS category will be based on all courses taken at the 400-600 level. However, no course taken six (6) years prior to enrollment into a program can be used to meet the requirements for a later master's degree at NC State.
6. Registration is limited to a maximum of two courses per semester. Individuals who are employed full-time should limit their PBS registrations to one course per semester.
7. The PBS classification carries with it no implication that the student will be admitted to the Graduate School in any degree classification.
8. All course work accepted for degree credit must be approved by the student's advisory committee as being germane to the program. Requests for degree credit for courses completed in the PBS classification are considered after admission to a graduate degree program when the student's Plan of Graduate Work is filed with the Graduate School.
9. PBS students are expected to familiarize themselves with Graduate School policies and to seek further advice or clarification as needed.

## **EVENING DEGREE PROGRAMS**

Students unable to attend day classes may complete all courses required for a graduate degree in certain areas by enrolling in late afternoon and evening classes. Some of the areas available include: accounting, economics, education, English, industrial engineering, history, liberal studies, life sciences, management, public administration, public history and technical communication. Contact the department of interest for further information.

## **COLLEGE OF ENGINEERING PROFESSIONAL DEGREE PROGRAM**

Professional degree students are admitted as undergraduate students, are classified as "PR" students and are subject to rules and regulations as established and administered by the Dean of the College of Engineering.

A professional degree student who is subsequently admitted to the Graduate School may, with the approval of the master's advisory committee, the major department and the Graduate School receive graduate credit for a maximum of nine hours credit for courses in which a grade of "B" or higher was received.

## **COOPERATING RALEIGH COLLEGES**

The Cooperating Raleigh Colleges (CRC) is a voluntary organization comprised of North Carolina State University, Meredith College, Peace College, St. Augustine's College, St. Mary's College and Shaw University. Graduate programs are currently offered only at NC State and Meredith College, but the organization provides the opportunity for graduate students to enroll at either institution for a course or courses not offered on their home campus.

Any NC State graduate degree student who is enrolled in at least three graduate credit hours on the NC State campus may take a course at Meredith College during the fall or spring semester, provided that (a) the course is not taught on the NC State campus and (b) the advisory committee considers the course educationally desirable.

NC State students may not register for more than a total of two courses in any semester at Meredith, and no more than six of the required academic credits for a master's degree at NC State may be accepted from that institution. Grades from Meredith are not used in computing a student's NC State grade point average.

Under this agreement, regular tuition and fees are paid to NC State. Certain special fees may be required for specific courses at Meredith, and the student is responsible for paying these fees.



## CERTIFICATE RENEWAL

Public school personnel who are primarily interested in "certification credit" may enroll in the PBS program through the Division of Lifelong Education without forwarding transcripts of previous work to the Graduate School. In such cases, the College of

Education and Psychology will be responsible for assessing the adequacy of the applicant's qualifications for enrollment in the course(s) concerned.

## Registration and Records

The Office of Registration and Records must have authorization from the Dean of the Graduate School before a graduate student in any classification will be permitted to register for classes. This authorization will be sent to the Office of Registration and Records at the time the student is notified of acceptance for graduate study. All students attending classes must be registered for credit or audit. Grade records are furnished the students at the end of each scheduled school term.

## INTERINSTITUTIONAL REGISTRATION

NC State participates in an Interinstitutional Registration program with the University of North Carolina at Chapel Hill, the University of North Carolina at Greensboro and Duke University. Under this agreement, graduate students enrolled at NC State may undertake course work on these campuses upon the recommendation of their advisory committees. Courses offered by North Carolina A&T State University and by the University of North Carolina at Charlotte over the Microelectronics Center of North Carolina communications system are also available through Interinstitutional Registration.

Even though taking a course on another campus, the graduate student is exclusively under the administrative direction of the NC State Graduate School. Enrollment for courses on other campuses will take place on this campus, using special forms obtained from the Department of Registration and Records. The Graduate School shall consider courses taken on other campuses as a part of the student's normal load, and the billing for such work will be through the NC State University Cashier's Office. During the summer the procedure is somewhat different in that a student must be enrolled in a least one course on the NC State campus during the same session as the requested interinstitutional registration.

When the grading system on the campus being visited is different from the NC State system, grades received under Interinstitutional Registration will be converted to the NC State system. "H," "P," "L" and "F" grades earned at the University of North Carolina at Chapel Hill and "E," "G," "S" and "F" grades earned at Duke University will be converted to "A," "B," "C" and "F" grades, respectively.

## COURSE LOAD

A full-time graduate course load is 9 to 15 credits per semester (including audits) and 3-6 credits per summer session (including audits). Audits in subjects in which the student has no previous experience will be evaluated at full credit value in determining course load. Audits taken as repetition of work previously accomplished are considered at one half of their value in calculating course loads. With the single exception of foreign language audits, all audit registrations must fall within the range of maximum permissible course loads.

Foreign students on F-1 and J-1 visas are required by the Immigration and Naturalization Service to carry a full-time course of study to remain in status.

Graduate students holding assistantships are restricted to the following maximum semester course loads: full time, 3 hours; three-quarters time, 6 hours; one-half time, 9 hours; one-quarter time, 12 hours. External employment obligations of students on assistantships plus their assistantship obligations should not exceed these limits. Additionally, graduate assistants are limited to the following maximum totals of credit hours over the duration of their appointments:

<i>Assistantship Classification</i>	<i>Length of Appointment</i>	<i>Maximum Credit Hours</i>
Full time	9 months	6
Full time	12 months	9
3/4 time	9 months	12
3/4 time	12 months	16
1/2 time	9 months	18
1/2 time	12 months	24
1/4 time	9 months	24
1/4 time	12 months	30

### Drop Dates for Minicourses

The drop date for a five-week minicourse is the last day of the third week of the mini-course. The drop date for a seven-week minicourse is the last day of the fourth week of the minicourse.

## GRADING AND ACADEMIC STANDING

### Types of Grading Systems

In order to receive graduate degree credit, a grade of "C-" or higher is required. To graduate, a student must have a minimum 3.0 average on all graduate course work as well as all courses on the Plan of Graduate Work. This policy is strictly enforced.

Performance in *lecture* courses is evaluated as "A+" through "F" with a plus/minus designation if elected by the instructor. All grades on courses taken for graduate credit as an undergraduate at NC State and all grades on courses taken in a graduate classification at NC State in courses numbered 400 and above are included in the graduate grade point average. Courses at the 300 level and below are not eligible for graduate credit and subsequently do not affect the graduate GPA.

Performance in *research, seminar and special problems* courses is evaluated as either "S" (Satisfactory) or "U" (Unsatisfactory), and these grades are not used in computing the grade point average. However, a student who receives a "U" on any course will not receive credit for that course and may be required to repeat it.

Courses regularly graded "A+" through "F" may not be taken for "S," "U" grading by graduate students. The "Master Listing of Approved Graduate Courses" identifies the approved grading for each 500- and 600-level course. Generally, courses numbered through the 590 series and the 690 series will receive "S" or "U" grading. Other course numbers usually carry letter grading. Any deviation from the approved grading for a particular course must be requested by the department and approved by the Graduate Dean prior to teaching the course. Also included in the GPA calculations and the determination of academic standing are those credits earned in a PBS classification which becomes a part of the Plan of Graduate Work.

### Incompletes

At the discretion of the instructor, students may be given an "IN" (Incomplete) grade for work not completed because of a serious interruption in their work not caused by their own negligence. An "IN" must not be used, however, as a substitute for an "F" when the student's performance in the course is not passing. 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. Only work missed may be averaged into the grades already recorded for that student. A student who received as "IN" must complete the unfinished work to have the Incomplete converted to a final grade by the end of the next semester in which the student is enrolled provided that this period is not longer than 12 months from the end of the semester or summer session in which the Incomplete was received; otherwise, the "IN" will be automatically converted to "F" or "U," in accord with the grading approved for the particular course. All grades of "IN" must be cleared prior to graduation. 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 incomplete course.

Except in the case of Interinstitutional Registration (see p. 19), grades on courses transferred from another institution will not be included in computing the grade point average.

### **Academic Warning, Probation and Termination**

Graduate students are given a notice of academic warning if they have accumulated less than nine hours at the 400-level or above and have less than a 3.0 GPA. Graduate students are placed on academic probation if they accumulate nine or more but less than eighteen credit hours at the 400-level or above and have a grade point average of less than 3.0 GPA. A student's graduate study is terminated if eighteen or more credit hours at the 400-level or above are accumulated with a grade point average of less than 3.0 GPA. In the case of program termination, no further registration in a graduate classification will be permitted. Under extenuating circumstances the student will be reinstated upon the written recommendation of the department and approval by the Graduate Dean. Departments have the prerogative of recommending the termination of a student's graduate admission at any time.

Students who are eligible to attend the first summer session are eligible to attend either or both summer sessions. For example, students who receive a notice of "Graduate Admission Terminated" at the end of the first summer session may register for second summer session unless the major department recommends otherwise.

### **Eligibility for Assistantship, Fellowship or Traineeship**

A graduate student must be in good academic standing (3.0 GPA or better average) to be eligible for appointment to an assistantship, fellowship or traineeship and must be registered in each semester in which the appointment is in effect.

## **CONTINUOUS REGISTRATION**

After a student is admitted to the Graduate School and enrolls for the first time, she/he is required to maintain continuous registration, *i.e.*, be enrolled each semester, excluding summer sessions, until she/he has either graduated or her/his graduate program at NC State has been terminated. All students who graduate during the second summer session must be registered for either the first or second summer session. A student in good academic standing who must interrupt her/his graduate program for good reasons may request a leave of absence from graduate study for a definite period of time, normally not to exceed one year. The request should be made at least one month prior to the term involved. Upon endorsement of the request by the student's graduate advisory committee and Director of Graduate Programs, and approval by the Graduate School, the student would not be required to be registered during the leave of absence. The time that the student spends on an approved leave of absence will be included in the time allowed to complete the degree, *i.e.*, 6 years for master's and 10 for doctoral. Graduate students whose programs have been terminated because of failure to maintain continuous registration and who have not been granted a leave of absence during a fall or spring semester will be required to reapply for admission if they wish to resume their graduate studies at NC State.



## SENIORS

A member of the senior class may, with prior approval of the Dean of the Graduate School, register for graduate credit in courses at the 400 and 500 levels as long as the combined graduate and undergraduate credit load is not more than 15 hours. Seniors with an accumulated grade point average of 3.2 or better in their major may enroll for a combined graduate and undergraduate credit load of 18 hours upon the recommendation of the student's advisor and approval by the department and the Graduate School. No more than six hours of graduate credit may be accumulated by a senior, and those graduate credits may not be applied toward the requirements for a baccalaureate degree. Courses at the 600 level are not ordinarily open to undergraduates, although occasional exceptions are made for senior honor students. Seniors desiring to take courses for graduate credit should contact their major advisers who will forward appropriate requests to the Graduate Dean for approval.

## AUDITS

Students wishing to audit courses must have the approval of their advisers and of the instructors teaching the courses. While auditors receive no course credit, they are expected to attend class regularly. The degree to which auditors must participate in class beyond regular attendance is optional with the instructors; any such requirements should be clearly explained to the auditors in writing at the beginning of the semester. An instructor who feels that an auditor has failed to fulfill the stipulated requirements is justified in marking "NR" (no recognition given for audit) on the grade report roll.

## GRADUATION

There are three official graduations for graduate students per year, occurring at the end of the fall and spring semesters and at the end of the second summer session. Formal commencement exercises are held at the end of spring and fall semesters, but any student who graduated the preceding second summer session is eligible to participate in the December commencement. Any doctoral candidate wishing to have the degree conferred *in absentia* must notify the Graduate School in writing; master's candidates should contact their departments or programs.

### Diploma Order Request Cards

The diploma order request card is the form used to order a diploma for a student anticipating graduation at the end of a particular semester or second summer session. The cards are normally due to the Graduate School Office by the end of the ninth week of classes during the fall and spring semesters and by the graduation deadline noted in The Calendar for the second summer session graduation. Students graduating in the spring are awarded their diplomas during the commencement exercises. In the fall those doctoral graduates attending the commencement exercises receive their diplomas, while the diplomas for those doctoral graduates not attending

the exercises and the master's graduates are mailed by the Department of Registration and Records. The diplomas for those students graduating at the end of second summer session and those not attending a formal commencement exercise are mailed by Registration and Records which is also responsible for the ordering of diplomas.

Students earning a Master of Arts, Master of Science, Doctor of Education or Doctor of Philosophy degree will receive diplomas designating the degree but not the program of study. Students earning master's degrees in a designated field will receive diplomas indicating the field of specialization, *i.e.*, Master of Forestry. Students with co-majors will have those identified on their transcripts but not on their diplomas.

## Tuition and Fees

A statement of tuition and fees is mailed to each preregistered student approximately five weeks before the beginning of any term. The statement must be returned with full payment or complete financial assistance information by the due date appearing on the statement. Normally the due date is approximately two weeks before classes begin. Non-preregistered students are required to pay their tuition and fees before registering.

### SEMESTER RATE SCHEDULE—1995-96 ACADEMIC YEAR (ALL RATES ARE SUBJECT TO CHANGE WITHOUT NOTICE)

	<b>RESIDENTS OF NORTH CAROLINA*</b>	<b>NONRESIDENTS**</b>
<i>Hours</i>	<i>Tuition and Fees</i>	<i>Tuition and Fees</i>
0-Thesis	\$277	\$ 854
0-2	251	1,265
3-5	369	2,348
6-8	620	3,663
9	869	4,927

**SUMMER SESSION RATE SCHEDULE—1996**

**RESIDENTS OF NORTH CAROLINA**

**NONRESIDENTS**

<i>Hours</i>	<i>Tuition and Fees</i>	<i>Tuition and Fees</i>
0-Thesis	\$196	\$ 503
1	217	626
2	293	956
3	328	1,286
4	384	1,617
5	440	1,947
6	495	2,277
7	551	2,607
8	607	2,938
9	662	3,268
10	718	3,598
11	774	
12	830	
13	885	

(\*For definition of in-state and out-of-state rates, see pp. 27-30. \*\*Under certain conditions, nonresident students who have been offered an assistantship, traineeship or fellowship may be eligible for reduced tuition rates; see tuition remission on p. 26.)

*O-Thesis Courses:* The following GR courses are assessed the 0-Thesis rate:

GR 596S	Master's Summer Research
GR 597	Master's Examination Only
GR 598	Master's Thesis Preparation
GR 695	Doctoral Preliminary Examination Only
GR 696S	Doctoral Summer Research
GR 697	Doctoral Dissertation Research
GR 698	Doctoral Dissertation Preparation

*Audits:* During semester when registered and paying for other course work: One audit free, each additional audit same cost as for credit;

During semester when not registered for other course work: Same cost as for credit;

During any summer session: Same cost as for credit.

*Full-time Faculty or Staff:* \$ 7

*Microfilming Doctoral Dissertation:* \$57

## **FULL-TIME FACULTY AND EMPLOYEES**

Full-time faculty of instructor rank and above and other full-time employees of the University who hold membership in the Teachers' and State Employees' Retirement System may register for credit or as auditors with free tuition privileges for one course in any academic term at any campus of the University of North Carolina. Free tuition privileges do not apply during the summer. Each applicant for free tuition must submit through regular channels a form provided by the University.

## **TUITION REMISSION**

Unless tuition is expressly provided by the terms of an assistantship or fellowship, a recipient must pay tuition at the rate determined by his or her residence status. However, a nonresident graduate student awarded an assistantship or a fellowship may be eligible for a reduced tuition rate (tuition remission) comparable to the in-state rate. Further information may be obtained by contacting the department of major interest.

If a student has been granted tuition remission and that student terminated his/her program or goes off the assistantship which provided him/her with entitlement to tuition remission, the student will be billed for the remainder of the out-of-state tuition by the University Cashier's Office.

## **REFUND POLICY**

Refunds for official withdrawals from NC State are prorated, based upon the percentage of the enrollment period attended. No refunds are made for official withdrawals after 50% of the enrollment period. The prorated withdrawal schedule will be publicized through university media after it is established.

## **COOPERATIVE EDUCATION PROGRAM**

The Cooperative Education Program (co-op) is designed to enhance the quality of instruction and learning by providing interested, qualified graduate students a broader understanding of their fields of study and their applicability to the world of work. Over 500 partners in industry, business and government request graduate students for their co-op positions primarily on a full-time basis. Job offers are made by the employer based on student qualifications. Employer needs are a reflection of the labor market. Work assignments are supervised by the employer and monitored by the co-op program staff. On average, 75 graduate students are at work each semester and earn an average of \$16.50 per hour. Co-op participants must enroll each term of employment at a cost of \$316 in 1996-97.

For admission to the program, students must meet the following criteria:

- ◆ Full-time enrollment at NC State immediately prior to the first work session.



- ◆ Presentation of an NC State transcript when applying for the program.
- ◆ A minimum grade point average of 3.0.
- ◆ Attendance at a co-op orientation session.
- ◆ Written approval of the graduate advisor or Director of Graduate Programs.
- ◆ An interview with the Cooperative Education Director or Coordinator.

International students must also meet visa regulations pertaining to curricular practical training. Further information is provided at orientation sessions. Call 515-4427 for a schedule.

## 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 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 each classification, who must show his or her entitlement by the preponderance (the greater part) of the residuary information.

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

*Parent's 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, nondomiciliary 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 re-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 residency 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 in-state tuition status.

*Military Personnel*--A North Carolinian who serves outside the State in the armed forces does not lose North Carolina domicile simply by reason of such service. Students from the military may prove retention or establishment of residence by reference, as in other cases, to residency acts accompanied by residency intent.

In addition, a separate North Carolina statute affords tuition rate benefits to certain military personnel and their dependents even though not qualifying for the in-state tuition rate by reason of twelve months' legal residence in North Carolina. Members of the armed services, while stationed in and concurrently living in North Carolina, may be charged a tuition rate lower than the out-of-state tuition rate to the extent that the total of entitlements for applicable tuition costs available from the federal government, plus certain amounts based under a statutory formula upon the in-state tuition rate, is a sum less than the out-of-state tuition rate for the pertinent enrollment. A dependent relative of a service member stationed in North Carolina is eligible to be charged the in-state tuition rate while the dependent relative is living in North Carolina with the service member and if the dependent relative has met any requirement of the Selective Service System applicable to the dependent relative. These tuition benefits may be enjoyed only if the applicable requirements for admission have been met; these benefits alone do not provide the basis for receiving those derivative benefits under the provisions of the residence classification statute reviewed elsewhere in this summary.

*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 end 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 domiciled outside North Carolina does not by itself cause loss of legal residence, marking the beginning of the grace period.

*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 next 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 only 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 a resident for tuition purposes and then both abandons and reacquires North Carolina domicile within a 12-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 in-state 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 re-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 non-resident 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.

*Prevailing North Carolina Law*--General Statute (G.S.) 116-143.1 is the prevailing statute governing residence status classification. A copy of the applicable law and/or implementing regulations is available for inspection in the Office of Graduate

Admissions, 103 Peele Hall. Residence-and-Tuition Status Applications are also available in the same office and questions should be directed to that office.

## **Financial Support for Graduate Students**

### **Fellowships and Graduate Assistantships**

Graduate students may receive financial support through fellowships, traineeships and teaching or research assistantships sponsored by federal, state and private agencies. Prospective students may request consideration for financial assistance by completing the appropriate sections of the admissions application form. Applicants for these awards should correspond directly with the department of major interest concerning the availability of awards and related information. Enrolled students should contact the major department. Prospective and enrolled graduate students are encouraged to apply for national, regional and foundation fellowships in addition to awards sponsored through the University. Information on how to apply for this type of financial assistance is available in the Graduate School. Enrolled or prospective students may also consult the Financial Aid Office for information on federal loan programs.

Unless tuition is expressly provided by the terms of the award, an award recipient must pay tuition at the rate determined by his or her residence status. However, a nonresident graduate student awarded an assistantship or a fellowship may be eligible for a reduced tuition rate comparable to the in-state rate. Further information may be obtained by contacting the department of major interest.

A graduate student must be in good academic standing (3.0 GPA or better average) to be eligible for appointment to an assistantship, fellowship or traineeship and must be registered in each semester in which the appointment is in effect. This also means that if an assistantship holder covered by tuition remission terminates his/her studies after the last day to withdraw from the University or to drop a course with a refund (approximately seven days after classes commence), that student will be responsible for the prorated part of tuition and fees.

### **RESEARCH AND TEACHING ASSISTANTSHIPS**

The University offers approximately 2,100 assistantships each year. Stipend rates for teaching and research assistantships are competitive with other universities. For further information on the availability of assistantships, applicants should contact the program area of interest.



## DEPARTMENTAL FELLOWSHIPS

Some departments or programs offer fellowships. Students are nominated for these fellowships by their departments or programs with selection being made by faculty committees or by the Graduate School. For additional information concerning such fellowships, the applicant should contact the appropriate college, department or program. Examples of such fellowships are listed below:

PHY Training Grant, USDA National Needs Fellowship, Biotechnology Fellowship and Purina Mills Research Fellowship, all through the College of Agriculture and Life Sciences; Dairyman Inc. Fellowship in the Department of Animal Science; Pioneer Hybred International in the Department of Crop Science; Chemical Industries Institute for Toxicology through the Toxicology Program; Fellowship through the Department of Plant Pathology; E. G. Moss and R. J. Reynolds Fellowships through the N. C. Agricultural Research Service in the College of Agriculture and Life Sciences; Harkema Fellowship in the Department of Zoology; NASA Traineeship, Eastman Scholarship and ARO Fellowships in the Department of Mechanical and Aerospace Engineering; Nuclear Energy Fellowship, Fusion Technology Fellowship and Murray Fellowship through the Department of Nuclear Engineering; Dupont Manufacturing Systems Fellowship through the Integrated Manufacturing Systems Engineering Institute; Kimley-Horn Graduate Scholarship and Carolina Asphalt Association, Inc., through the Department of Civil Engineering; ECE Levels I, II and III Supplementary Fellowships, IBM Graduate Fellowship (solid state electronics), IBM Graduate Fellowship in Manufacturing Research, IBM Graduate Fellowship in Computer Networking and Dupont Graduate Fellowships through the Department of Electrical and Computer Engineering; Dupont Fellowship in Chemical Engineering, Phillips Graduate Fellowship, Southeastern Regional and PIA Supplemental Fellowship in the Department of Chemical Engineering; Dean's Fellowships in the College of Engineering, Microelectronics Center of N.C. and National Consortium for Minorities in Engineering (GEM), all through the College of Engineering; SOHIO Fellowship in the Department of Physics; Gertrude M. Cox Fellowship in the Department of Statistics; Mary Lee and Luther Barnhardt Scholarship in the Department of History; Title IX Fellowship in the Department of Political Science and Public Administration; H. W. Close Fellowship through the College of Textiles.

## NATIONAL, REGIONAL AND FOUNDATION FELLOWSHIPS

These awards are made to an individual rather than to the University. Recipients are chosen through competitions expressive of the terms of each award. Examples of these awards held by currently enrolled graduate students follow:

National Science Foundation (NSF) Graduate Research Fellowship  
Ford Foundation Predoctoral Fellowship for Minorities  
Department of Defense National Defense Science and Engineering Graduate Fellowship (DOD NDSEG)  
Department of Energy Computational Science Graduate Fellowship  
NASA Graduate Student Researchers Program - Underrepresented Minority Focus Award  
National Consortium for Graduate Degrees for Minorities in Engineering Inc. (GEM) Fellowship  
National Physical Science Consortium: Graduate Fellowships for Minorities and Women in the Physical Sciences

Applications and/or information on the above fellowship programs are available in the Graduate School.

## Graduate School Fellowships

The African-American Graduate Assistance Grant (AAGAG) is a grantsmanship program created by NC State to aid in the support of African-American graduate students in all graduate programs of the University.

The AAGAG program provides stipends on a financial need basis up to \$5,000 for the academic year. Recipients must be full-time, new or continuing students pursuing master's or doctoral degrees at NC State. The Graduate School should be contacted for further information.

Alumni Association Graduate Fellowship Supplements are funded by the NC State Alumni Association each year in an effort to recruit outstanding graduate students, with the highly competitive award process being coordinated through the Graduate School office. For the 1995-96 academic year twenty-six Graduate Fellowship Supplements were funded; twenty-four of these were awarded across campus and two were awarded to support the management of University Archives. These supplements are awarded on a one-time-only basis as a financial incentive *and beyond whatever* fellowship or assistantship may be offered. In addition, two Alumni Association Graduate International Fellowships are awarded through the International Student Office.

Graduate Assistance in Areas of National Need: The U.S. Department of Education provides support to expedite completion of the doctoral degree for graduate students committed to a career of teaching and research in an identified area of national need. In addition to an annual stipend of up to \$14,400 depending on financial need, the program reimburses educational expenses. To date, NC State has awarded 126 fellowships to graduate students studying electronic materials, biotechnology and scientific computation. Information is available in the Graduate School.

**Incentive Scholarship and Grant Program for Native Americans (ISGPNA):** The General Assembly of North Carolina has provided funds for doctoral fellowships under the ISGPNA Program for a number of grants to American Indian students interested in pursuing doctoral degrees at NC State. The fellowships have a maximum value of \$5,000 annually.

To be eligible for a fellowship, interested students must be enrolled full-time and in good standing in a doctoral degree program, meet state residency requirements, have financial need and be an American Indian under the program's definition. This definition states that an eligible individual is one who maintains cultural identification as an American Indian through membership in an Indian tribe recognized by the State of North Carolina or by the federal government or through other tribal affiliation or community recognition.

The **Jerry J. Collier Scholarship** provides support to an NC State alumnus(a) who participated in a varsity sport during his/her undergraduate tenure and who is entering a graduate program at NC State. The criteria for selection include academic credentials and statement of goals and objectives. The scholarship is \$2,000 for the academic year and is renewable. Information is available in the Graduate School.

**Minority Presence Grant Program:** Under the Board of Governors general Minority Presence Grant Program, African-American students may be eligible for special financial assistance if they are residents of North Carolina, enrolled full-time and demonstrate financial need.

The Minority Presence Grant Program for Doctoral Study, Law and Veterinary Medicine provides stipends of up to \$4,000 for the academic year, with an option of \$500 in additional support for study in the summer sessions, for African-American residents of North Carolina who are selected to participate. Recipients must be full-time students pursuing doctoral degrees, law degrees or degrees in veterinary medicine at East Carolina University, NC State, University of North Carolina at Chapel Hill or The University of North Carolina at Greensboro.

**National Science Foundation (NSF) Graduate Research Traineeships** provide support to increase the number of talented undergraduates enrolling in doctoral programs in critical and emerging areas of science, mathematics and engineering. Since 1994, NC State has been awarded 10 traineeships to support doctoral students studying either scientific computation or instructional technology for science education. In addition to an annual stipend of \$14,100, the program reimburses educational expenses. Information is available in the Graduate School.

**Patricia Roberts Harris Graduate Fellowships** provide funds for minority or women graduate students who demonstrate financial need and who plan to enroll in programs where such students are traditionally underrepresented nationally. Currently, fellowships are offered in engineering, physics, biochemistry, animal

science, botany, genetics and counselor education. Thirteen fellowships, each in the amount of up to \$14,400/year, were awarded through the Graduate School in 1993-94. Tuition and fees are also paid. Information pertaining to the fellowships is available in the Graduate School.

## Other Financial Aid

### LONG-TERM LOANS

Graduate students who are American citizens or eligible noncitizens may apply for long-term, low interest loans through the Financial Aid Office. To qualify for loans, students must be making satisfactory academic progress towards a degree and must complete the appropriate application materials to demonstrate that all federal eligibility requirements for loan consideration have been met. The *Free Application for Federal Student Aid* is the form required by NC State to document eligibility for federal loan assistance. In addition, students must complete the university's *Institutional Application* and have a *Financial Aid Transcript* sent to the NC State Financial Aid Office from every institution previously attended (regardless of whether aid was applied for or received at those institutions). Although students are expected to apply for and to accept any available assistantships or fellowships provided by the Graduate School, it is recommended that students not wait for these decisions to be made before applying for financial aid through the Financial Aid Office. If graduate assistantships or fellowships are offered, and borrowing no longer becomes necessary, students have the option to cancel their requests for loan assistance at any point.

*Federal Stafford Loans (Subsidized and Unsubsidized):* Funding for these loans is provided by private lenders. Since they are partially supported by the federal government, however, students must follow federal guidelines in applying for aid to qualify. Information on specific application procedures, loan maximums, interest rates and participating lenders may be obtained from the Financial Aid Office. Students who apply for these loans and demonstrate need by federal definition qualify for Subsidized Stafford Loans, meaning that the federal government pays the interest on the loan while the student is enrolled on at least a half-time basis. If no need is demonstrated, students may still borrow to meet the cost of education (minus other resources, such as scholarships, fellowships and tuition remissions) through the Unsubsidized Stafford Loan Program. Students who receive unsubsidized loans are charged interest while enrolled, although they may elect to capitalize interest payments to repay with principal upon completion of degree. For both subsidized and unsubsidized loans, repayment of principal is deferred until completion of the degree or until termination of at least half-time enrollment status.

*Other Loan Options:* Because of limited institutional funds, graduate students generally are expected to apply for the maximum Federal Subsidized and Unsubsidized Stafford Loans for which they are eligible if funding is needed to assist



with educational expenses. Students who need to borrow more than the maximum amounts possible through those loan programs (the combined annual maximum is \$18,500) will be considered for other loan funds administered by the Financial Aid Office if sufficient funding is available.

## **WORK-STUDY JOBS**

The *Federal Work-Study Program* is a federal program designed to provide part-time jobs to students who apply for financial aid using the *Free Application for Federal Student Aid* and who document need by federal guidelines. Effort is made to assign students to jobs with their special interests and skills. Most of the jobs are on-campus, but limited opportunities for off-campus employment in community service areas are also available.

## **PART-TIME JOBS**

Other jobs not based on need are listed at the Financial Aid Office and are open to all students.

## **SHORT-TERM EMERGENCY LOANS**

Loans, usually in amounts of \$100 or less, to meet emergency expenses may be obtained on short notice (generally on the day of application) at the Financial Aid Office. These loans, in that they are designed for short-term, emergency use, must be repaid within about 30 days. A loan may not be taken out between semesters or between summer sessions.

## **Military Education and Training**

The Reserve Officer Training Corps (ROTC) selects interested University students for enrollment in Army ROTC (AROTC) or in Air Force ROTC (AFROTC) for officer education and training leading toward a commission.

The Army and Air Force ROTC departments educate and train University students, graduate and undergraduate, for a commission in their respective military services. These students must have four full semesters (undergraduate or graduate) remaining at the time they enter the ROTC Program (exceptions for Army ROTC are noted below). Uniforms and books for ROTC are provided. Transfer credit is allowed for previous ROTC course work at other institutions.

Graduate students who will be at NC State for at least two years may, upon successful completion of a six-weeks' summer leadership training period, be enrolled in the ROTC Program. Entry requirements for the AROTC program may also be met by having met any *one* of the following requirements:

1. Completed basic level ROTC courses as an undergraduate.
2. Be an honorably discharged veteran.
3. Have completed military basic training and be a member of a Reserve Component Unit of any branch of the Armed Forces or National Guard.

Air Force ROTC offers a Flight Screening Program for selected cadets which is conducted by an Air Force flying school in Texas during the summer at no expense to the student. Students successfully completing ROTC flight screening may be selected for further flight training as an Air Force pilot.

Graduate students enrolled in the junior and senior years of ROTC receive \$150 per month. Scholarships which pay all tuition, fees and costs of required text books in addition to the \$150 per month are available on a competitive basis.

Special provisions for veterans are made in Army ROTC whereby they are granted placement credit for their prior service experience and training. Additionally, Army ROTC offers the student several points of entry into the ROTC Program, through ROTC placement credit for college courses or other worthwhile experiences that contribute to the requisite skills of a second lieutenant. Army ROTC counselors are available to evaluate the students' prior learning experiences and advise them as to where they can be placed in ROTC. Under the Army's Simultaneous Membership Program, the graduate student may participate in the Army Reserve or National Guard and receive approximately \$151 per month in addition to the \$150 monthly stipend. The National Guard provides up to \$1,000 tuition costs per year for its members.

Additional information on Army ROTC may be obtained from the Professor of Military Science, Room 154, Reynolds Coliseum (515-2428) and Air Force ROTC from the Professor of Aerospace Studies, Room 145, Reynolds Coliseum (515-2417).

## Health Services

The Student Health Service, located in Clark Hall, offers health care to students in a campus facility staffed by seven full-time physicians, five Nurse Practitioners, a pharmacist, laboratory technicians, registered nurses, health educators and support staff.

During fall and spring semester, the Health Service is open 8:00 a.m. to 11:00 p.m. Monday-Friday and 8:00 a.m.-4:00 p.m. weekends (except during holidays and breaks). Appointments are needed to see a health care provider and may be made in person at the Health Service or by calling 515-7107 (8:00 a.m.-4:45 p.m.). Gynecology appointments are made at 515-7762. Urgent medical problems will be seen at the clinic without appointment. Physicians maintain office hours Monday

through Friday, 8:30 a.m.-4:15 p.m. During summer sessions, Student Health Service is open Monday-Friday, 8:00 a.m.-5:00 p.m.

All currently enrolled students are eligible for medical care. The pre-paid health fee covers professional services such as nurse and M.D. visits, laboratory tests, cold medications and health education. There is a nominal charge for x-rays, prescriptions and specialty clinics. Students are responsible for all services received off-campus, *e.g.*, off-campus M.D., hospital or lab/x-ray.

## **HEALTH INSURANCE**

NC State strongly encourages each student to have accident and sickness insurance protection, either by their parents' group policy or under the NC State Student Insurance Plan. The policy offered by the University helps cover the cost of referrals to off-campus specialists or to hospitals for serious illnesses. For your protection, do not be uninsured! International students are **required** to have health insurance.

A brochure describing the NC State student plan is mailed to all students in July. Call (919) 515-2563 for additional information.

# **Housing**

## **OFF-CAMPUS HOUSING**

The Housing Assignments Office maintains listings of off-campus housing accommodations provided by private landlords and students seeking roommates; however, arrangements for off-campus housing must be made by students seeking accommodations. The listings change frequently, and most landlords and tenants prefer to complete the rental transaction in person rather than by telephone or mail. The Housing Assignments Office, 1112 Pullen Hall, is open from 7:30 a.m. until 5:00 p.m., Monday through Friday.

## **EDWARD S. KING VILLAGE**

The University also maintains 296 apartments in E. S. King Village for students with families, for single parents and graduate students. Rental rates are far below market value. (Specific rates for studio, one- and two-bedroom apartments) can be obtained by calling (919) 515-2430. The E. S. King fax number is (919) 515-7613. E. S. King Home Page resides at <http://www2.ncsu.edu/ncsu/housing/eskv/eskv.html> on the Internet.

## **ON-CAMPUS HOUSING**

The University furnishes housing for approximately 7,100 students. The residence halls are grouped in three areas: East, Central and West Campus. Each of the areas

provides laundry facilities, convenience stores, computer labs, grassy areas for sports and more.

The 1996-97 rental fee for a basic residence hall double room is \$925 per student per semester (the premium hall rate is \$1,210 per student per semester), subject to change on an annual basis. For more information about amenities and/or availability, call the Housing Assisgments Office at (919) 515-2440. The Housing and Residence Life fax number is (919) 515-3542. The Housing and Residence Life Home Page resides at <http://www2.ncsu.edu/ncsu/housing> on the Internet.

# GRADUATE PROGRAMS

The Graduate School offers programs of study leading to the master's degree in 86 fields and the doctorate in 52. Each student's program is planned with an advisory committee of graduate faculty members to provide the opportunity for gaining advanced knowledge in the particular field of study. Graduate education is the final stage in the development of intellectual independence. It is different from undergraduate education in that the student is encouraged to establish premises, to hypothesize and to defend both the procedure and the conclusions of independent investigation. The burden of proof for the verifiability of knowledge rests on the student, not on the faculty member. Emphasis is placed upon the student's scholarly development through formal course work, seminars, research and independent investigation.

Graduate students are expected to familiarize themselves with the requirements for the degrees for which they are candidates and are held responsible for the fulfillment of these requirements.

## Master's Degrees

The Graduate School offers programs of study leading to the Master of Science degree, the Master of Arts degree and the Master's degree in certain designated fields.

### MASTER OF SCIENCE AND MASTER OF ARTS

For all Master of Science and Master of Arts degrees, the programs are planned with the objective of making possible a reasonable, comprehensive mastery of the subject matter in a chosen field. In most cases, the Master of Science and Master of Arts programs provide training and experience in research in order to familiarize the student with the methods, ideals and goals of independent investigation. In these cases, representative of most Master of Science and Master of Arts degree programs, a thesis is required. A small number of Master of Science and Master of programs do not require a thesis.

### MASTER'S DEGREE IN A DESIGNATED FIELD

A number of departments and programs offer master's degrees in designated fields. These are professional degrees and do not require a thesis.

### REQUIREMENTS FOR MASTER'S DEGREES

All departments and programs offering master's degrees may choose to offer the degree



as an "Option B" program which has a different set of requirements from regular master's programs. A small number of departments and programs have chosen Option B. These programs will be identified in the section of this catalog titled "Fields of Instruction." Differences between the requirements of regular programs vs. Option B programs, where appropriate, are identified below.

## **GRADUATE ADVISOR AND GRADUATE ADVISORY COMMITTEE**

All students in master's programs must have a graduate advisor who is a member of the Graduate Faculty in the student's major department or program. The graduate advisor is appointed by the Director of Graduate Programs. In addition, all students, except those in Option B programs, must have a graduate advisory committee. The advisory committee is composed of at least three members of the Graduate Faculty. The graduate advisor serves as chair or co-chair of the committee. If the student has a minor, then one of the committee members must be from the minor department or program. The graduate advisory committee is appointed by the Director of Graduate Programs in the student's department or program. At the time of the request for a permit to schedule the final oral examination, the Graduate School verifies that the committee is constituted properly.

## **PLAN OF GRADUATE WORK**

The student's program of study is planned so as to provide a comprehensive view of the major field of interest and in related areas of knowledge, sometime constituting a minor. As great a latitude is permitted in the selection of courses as is compatible with the well-defined major and, in many cases, supporting courses or a minor. In general, it is expected that at least two-thirds of the credits will be in the major. If there are credits in a minor or supporting areas, they normally would not exceed one-third of the total. Since there are many possible combinations of course work, a specific Plan of Graduate Work is developed by the advisory committee with the student. The course work to be taken by the student and the thesis topic, where applicable, must be approved by the student's advisory committee and the Director of Graduate Programs in the student's department or program. This should be done prior to completion of one-half of the credits on the plan.

## **CREDITS**

A minimum of 30 semester credit hours is required for all master's degrees; however, many programs require more than thirty. Also, many students, in order to gain the breadth desired in their program or to make up deficits in their undergraduate degree, will actually take more credit hours than the minimum required by the program. At least 20 semester hours must come from 500- and 600-level courses. No more than two credit hours of departmental seminar may be included in the minimum 30-credit program. Programs that require a thesis may include no more than six hours of research credit



(699) in the minimum 30- credit-hour program. Research credit is not appropriate in the non-thesis programs. Non-thesis programs may include no more than six hours of independent study credits in the minimum 30-credit program. Courses at the 400 level counted toward the minimal 30-hour requirement may not come from the major field.

**Transfer credit:** No more than six of the minimal 30-hour requirement will be accepted from other institutions. A graduate course which has been completed with a grade of "B" or better may be considered for transfer to a master's program provided that it has been completed in a graduate or post-baccalaureate classification at an accredited graduate school. Exceptions are allowed for transfer from foreign institutions if the department or program provides the Graduate School with adequate documentation that the course is relevant to the degree with appropriate content and level of instruction resulting in student competencies at least comparable to those of students taking the equivalent course at NC State and that the course was taught by faculty who are qualified to teach at the master's degree level. Transfer credit may not be used to fill the 20-hour 500- and 600-level requirement. Credit accepted by extension reduces the amount of credit that may be transferred from other institutions.

**Transfer of Undergraduate Credit:** Graduate credit may be allowed for up to 6 hours of the minimal 30-hour requirement for courses taken at NC State provided that it is at the 400 level or higher, that the grade is "B" or better, that it was not counted to fulfill undergraduate requirements, and that it is recommended by the student's undergraduate advisor prior to enrollment in the course. No graduate credit will be allowed for excess credits completed in an undergraduate classification at another institution.

**Credit by Extension:** A maximum of six semester credits taken prior to admission to a graduate program and earned through NC State extension study may be applied toward the minimal 30-hour requirement provided that the courses are graduate-level and taught by members of the NC State Graduate Faculty. If a student has been admitted to the Graduate School, six additional semester credits earned through NC State extension study may be used to meet the minimal 30-hour requirement. No graduate credit will be allowed for courses completed by extension at universities other than NC State. Credit accepted by extension reduces the amount of credit that may be transferred from other institutions.

**Credit by Examination:** Credit by examination in graduate courses may be awarded for up to six credit hours. Passage of the examination entitles the student to credit only for the course; letter grades are not allowed for credit by examination. Credit by examination may not be obtained for research, seminars, project courses or audits. Residency requirements are not fulfilled by courses in which credit is awarded by examination. Credit by examination is permitted when all of the following conditions exist: a course required on the Plan of Graduate Work is not taught within time periods indicated by the Graduate Catalog or in time periods limited by agreements with outside agencies; the student requesting the examination has not previously registered for the

course, either for credit or audit; the academic standards for credit by examination are commensurate with the academic standards for the course; the examination for credit is approved by the Director of Graduate Programs and the examination is prepared by and supervised by appropriate faculty; credit is to be given only when the performance is judged to be equivalent to a "B" grade or higher; only one examination for credit is to be permitted for the same course; the request for credit by examination is approved by the Graduate School.

**Credits from Previous NC State Master's Degree:** Only six credits from a previous NC State master's degree may be counted toward the minimal 30-hour requirement.

**Second Master's in the Same Field:** The Graduate School will not admit or transfer a student to a master's program if he/she holds a master's degree in the same discipline without a statement of justification by the student's Director of Graduate Programs.

## MINOR

The Graduate School does not require a minor; however, individual departments and programs may require a minor. All students, except those in Option B programs, have the option of selecting a minor. In most cases, the minor will be in a single department or program. In some cases, an interdisciplinary minor, consisting of related credits from more than one department or program, will be selected. When a student does select a minor, the minor credits on the Plan of Graduate Work must be approved by the graduate advisory committee member, and, in some cases, the Director of Graduate Programs, from the minor department or program.

## CO-MAJOR

Students may co-major at the master's level with the approval of both departments and/or programs and appropriate representation on the advisory committee. Co-majors must be within the same degree area, *i.e.*, Master of Science and Master of Science, Master of Arts and Master of Arts, Master's degree in a designated field and Master's degree in a designated field. Co-majors must meet all requirements of both departments and/or programs. On degree is awarded, and the co-major is noted on the transcript. Enrolled co-majors will be classified in one program for record purposes.

## LANGUAGE REQUIREMENTS

A reading knowledge of one foreign language (Germanic, Romance or Slavic) is required by some programs for the Master of Arts and the Master of Science degrees. Other departments may designate that the language requirement be filled from among those languages in which the Department of Foreign Languages and Literatures conducts testing. Students should contact the major department for specific language requirements.

Proficiency can be demonstrated in one of two ways:

1. By passing a traditional reading knowledge examination, which can be requested by the student at any time from the Department of Foreign Languages and Literatures.
2. By passing the final examination in a course especially designed for graduate students who have no previous knowledge of a foreign language or who wish to refresh their knowledge of a language. The Department of Foreign Languages and Literatures offers such courses, normally in the fall, for each of the three major foreign languages: French (FLF 401), German (FLG 401) and Spanish (FLS 401). These courses concentrate exclusively on teaching students to understand the written word and do not provide instruction or testing in speaking and original composition. Failure to pass the course carries with it no penalty other than the fact that the student's language requirement will remain unfulfilled. These courses are neither counted for credit nor used in computing the grade point average.

## THESIS

Theses prepared by candidates for the Master of Science and Master of Arts degrees, in programs requiring the thesis, must present an original investigation into a subject which has been approved by the student's advisory committee and the Director of Graduate Programs in the student's major. Three copies of the thesis in final form as approved by the advisory committee, each signed by the members of the advisory committee, must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. Detailed information on the form and organization of the thesis is presented in the Graduate School's *Thesis and Dissertation Guide* which is available at the NC State Bookstores.

## COMPREHENSIVE WRITTEN EXAMINATIONS

Written examinations covering the subject matter of the major and supporting fields and/or the minor may be required. When required, such examinations must be successfully completed prior to requesting a permit to schedule the comprehensive final oral examination. Information concerning written examination schedules should be obtained from the student's department or program.

## COMPREHENSIVE FINAL ORAL EXAMINATIONS

Candidates for master's degrees, except those in Option B programs, must pass a comprehensive oral examination to demonstrate to the advisory committee that he/ she possesses a reasonable mastery of the subject matter of the major and supporting fields and that this knowledge can be used with promptness and accuracy. This examination may not be held until all other requirements, except completion of the course work in current registration during the final semester, are satisfied. A request for a permit to



schedule the examination may be filed with the Dean of the Graduate School after the above conditions are met. The Graduate School will check to determine that the advisory committee and the courses taken by the student meet Graduate School requirements. If all requirements are met, the permit to schedule the final examination will be forwarded to the Director of Graduate Programs within 10 working days of receipt of the request. Upon receipt of the permit, the student may proceed to schedule the exam at a time that is convenient to all members of the advisory committee. In those programs which require the thesis, the thesis must be submitted in complete form, except for such revisions which may be necessary as a result of the final exam, to all members of the advisory committee at least two weeks prior to the exam.

A unanimous vote of approval of the advisory committee is required for passing the oral examination. Approval of the examination may be conditioned, however, upon completion of additional work to the satisfaction of the advisory committee. A formal reexamination will not be required in this case. Failure of a student to pass the oral examination terminates the student's graduate work at NC State unless the graduate advisory committee unanimously recommends a reexamination. Only one reexamination will be given. A form giving the date that the exam was conducted and the result of the examination and signed by all members of the advisory committee is forwarded to the Dean of the Graduate School by the Director of Graduate programs in the student's department or program. A student may appeal all committee actions by written application to the Dean of the Graduate School.

Oral examinations for master's degree candidates are open to the Graduate Faculty by right and to the University community by unanimous consent of the advisory committee and the student being examined. Discussions and decisions regarding the student's performance are private to the advisory committee.

Students in Option B master's programs are not required to take a final oral examination.

## **RESIDENCE**

Students engaged in a course of study leading to the master's degree are required to be in residence, pursuing graduate work, for a minimum of one full academic year or its equivalent.

## **TIME LIMIT**

All requirements for the master's degree must be completed within six calendar years, beginning with the date that the student registers for courses carrying graduate credit applicable to the degree program, unless a more restrictive time limit has been established by the student's department or program or his/her college or school.

# Summary of Procedures for Master's Degrees

## ALL STUDENTS

- ◆ Application materials and required fees received.
- ◆ Application materials reviewed by department or programs.
- ◆ Department or program forwards recommendation regarding applicant's admissibility to the Graduate Dean.
- ◆ The Graduate School reviews the recommendation and the student is notified of the action taken on the request for admission.
- ◆ Student arrives, reports to the department or program, is assigned a graduate advisor and develops a roster of courses and credits with the advisor.
- ◆ Student complies with requests from Graduate School for updated copies of transcripts from previous colleges or universities.
- ◆ Student signs patent agreement and files with Graduate School.
- ◆ Student subject to continuous registration policy until graduation.
- ◆ Student passes language examination, if required.
- ◆ Student passes written examination, if required.
- ◆ Student submits diploma order form by end of ninth week of the semester or summer session of anticipated graduation.
- ◆ A grade point average of at least 3.0 for the degree requirements as well as on overall graduate course work at NCSU is required for graduation.
- ◆ All degree requirements must be completed within six calendar years, beginning with the date the student commences courses carrying graduate credit applicable to the degree program, unless a more restrictive time limit has been established by the department/program or academic college/school.

## STUDENTS IN OPTION B PROGRAMS

- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisor and approved by Director of Graduate Programs prior to completion of one-half the credits on the plan.
- ◆ Director of Graduate Programs submits requests for graduation checkout to the Graduate Dean no later than 30 working days after the first day of the semester (seven working days after the first day of the summer session) in which the student is taking the last course on his/her Plan of Graduate Work and anticipates graduation.

## STUDENTS IN NON-THESIS PROGRAMS

- ◆ Graduate advisory committee of three or more Graduate Faculty members is appointed by the Director of Graduate Programs.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and approved by the

Director of Graduate Programs prior to completion of one-half the credits on the plan.

- ◆ When all requirements except completion of the course work in the final semester are satisfied, Director of Graduate Programs requests that the Graduate School issue permit to schedule the final oral examination.
- ◆ If Graduate School requirements are met, a permit to schedule the final examination is issued by the Graduate School within 10 working days of receipt of the request.
- ◆ Final examination is scheduled and conducted.
- ◆ Final examination report, including date and result of the examination, submitted to the Graduate School by the Director of Graduate Programs. Report should be received by the Graduate School within five working days of the examination.
- ◆ The deadline date for unconditionally passing the final examination in order for the student to graduate in a given semester or summer session appears in The Calendar in this catalog as well as other Graduate School calendars.

## STUDENTS IN THESIS PROGRAMS

- ◆ Graduate advisory committee of three or more Graduate Faculty members is appointed by the Director of Graduate Programs.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and approved by the Director of Graduate Programs prior to completion of one-half the credits on the plan.
- ◆ A copy of a preliminary draft of the thesis, if required, is submitted to the chair of the student's advisory committee.
- ◆ When all requirements except completion of the course work in the final semester are satisfied and after the thesis is complete except for such revisions as may be necessary as a result of the exam, the Director of Graduate Programs requests that the Graduate School issue permit to schedule the final oral examination.
- ◆ If Graduate School requirements are met, a permit to schedule the final examination is issued by the Graduate School within 10 working days of receipt of the request.
- ◆ At least two weeks prior to the final oral examination, the chair of the student's advisory committee submits the thesis, if required, to the other members of the advisory committee for review.
- ◆ Final examination is scheduled and conducted.
- ◆ Final examination report, including date and result of the examination, submitted to the Graduate School by the Director of Graduate Programs. Report should be received by the Graduate School within five working days of the examination.



- ◆ Student submits three copies of the thesis, signed by each member of his/ her advisory committee, to the Graduate School.
- ◆ The deadline date for submitting three copies of the thesis to the Graduate School in order for the student to graduate in a given semester or summer session appears in The Calendar in this catalog as well as other Graduate School calendars.
- ◆ The thesis is reviewed by the Graduate School to insure that the format conforms with the specifications prescribed in the *Thesis and Dissertation Guide*.

## Doctor of Philosophy and Doctor of Education Degrees

The doctorate symbolizes the ability of the recipient to undertake original research and scholarly work at the highest levels without supervision. The degree is therefore not granted simply upon completion of a stated amount of course work but rather upon demonstration by the student of a comprehensive knowledge and high attainment in scholarship in a specialized field of study. The student must demonstrate this ability by writing a dissertation reporting the results of an original investigation and by passing a series of comprehensive examinations in the field of specialization and related areas of knowledge.

### ADVISORY COMMITTEE AND PLAN OF GRADUATE WORK

An advisory committee of at least four graduate faculty members, one of whom will be designated as chair, will be appointed by the Dean of the Graduate School upon the recommendation of the director of graduate programs of the major department. The committee, which must include at least one representative of the minor field, will, with the student, prepare a Plan of Graduate Work which must be approved by the director of graduate programs of the major department and the Graduate School. In addition to the course work to be undertaken, the subject of the student's dissertation must appear on the plan; and any subsequent changes in committee or subject or in the overall plan must be submitted for approval.

The program of work must be unified, and all constituent parts must contribute to an organized program of study and research. Courses must be selected from groups embracing one principal subject of concentration, the major, and, when appropriate, from a cognate field, the minor. Normally, a student will select the minor work from a single discipline or field which, in the judgment of the advisory committee, provides relevant support to the major field. However, when the advisory committee finds that the needs of the student will best be served by work in an interdisciplinary minor, it has the alternative of developing a special set of courses in lieu of the usual minor.

## CO-MAJOR

Students may co-major at the doctoral level with the approval of both departments and the appointment of a co-chair from each department on the advisory committee. Co-majors must meet all requirements for majors in both departments. One degree is awarded and the co-major is noted on the transcript. Co-majors are not permitted between Doctor of Philosophy and Doctor of Education degree programs. Enrolled co-majors will be classified in only one program for record purposes.

## RESIDENCE REQUIREMENT

For the Doctor of Philosophy and the Doctor of Education degrees, the student is expected to be registered for graduate work at an accredited graduate school for at least six semesters beyond the baccalaureate degree.

The basic University residence requirements are defined below. However, academic colleges/schools have the prerogative of establishing more restrictive requirements within the respective schools. (The College of Education and Psychology requires a minimum of one academic year of full-time resident study).

At least two residence credits, as defined below, must be secured in continuous residence (registration in consecutive semesters) as a graduate student at the University. Failure to take work during the summer does not break continuity; however, summer work may be used in partial fulfillment of this requirement.

Residence credit is determined by the number of semester hours of graduate work carried during a given term. During a regular semester, residence credit is calculated in the following manner:

<i>Semester Credits (Hours)</i>	<i>Residence Credits</i>
9 or more	1
6-8	2/3
less than 6 (including registration for "DR" Dissertation Preparation" or "Disserta- tion Research")	1/3

The residence credit for a six-week summer term is equal to one-half of the corresponding amount for a regular semester. For example, six semester hours carried during a summer session will earn one-third of a residence credit; less than six credit hours will earn one-sixth of a residence credit.

## LANGUAGE REQUIREMENTS

A reading knowledge of at least one modern foreign language (Romance, Germanic or Slavic) is required by some departments for the Doctor of Philosophy degree. Other departments may designate that the language requirement be filled from among those languages in which the Department of Foreign Languages and Literatures conducts testing. Doctoral students should contact the major department for specific language requirements. For the Doctor of Education degree, the decision as to whether or not there will be a language requirement is left to the student's advisory committee.

The Department of Foreign Languages and Literatures offers courses in French, German and Spanish especially designed for graduate students who have no previous knowledge of a foreign language or who wish to refresh their knowledge of a language. These courses concentrate exclusively on teaching students to understand the written word and do not provide instruction or testing in speaking and original composition. A passing grade on the final examination in one of these courses is sufficient evidence of a reading knowledge of the language.

To demonstrate comprehension in depth of one language, a student must not only prove that one possesses a reading knowledge of the language but also that he or she is proficient in the oral and compositional elements of that language. Students desiring to master one language in depth should consult the head of the Department of Foreign Languages and Literatures concerning the specific courses which will be necessary to achieve this comprehension; specific arrangements will depend upon the student's background in the language.

Students whose native language is other than English may use English as one of the languages when two are required for the Doctor of Philosophy degree. When English is submitted in partial fulfillment of the dual language requirement, the native language may not be used as the other language.

When only one language is required in the student's program, certification for that language must occur on this campus.

## PRELIMINARY COMPREHENSIVE EXAMINATIONS

After completing the language requirement but not earlier than the end of the second year of graduate study and not later than one semester (four months) before the final oral examination, each doctoral student is required to take the preliminary comprehensive examinations. The examinations consist of two parts: written examinations and an oral examination. Requirements for written examinations in the minor field are left to the discretion of the department in which the student is minoring.

The written portion may be conducted in one of two ways. In the first, each member of the advisory committee prepares a set of questions for the student's response, and answers to each set are returned to the appropriate member for grading. This procedure is used by departments which have a relatively small number of doctoral students.

Many of the larger departments have developed departmental written examinations to be used for all students, and scheduled dates are announced well in advance. Where written departmental examinations of this kind are used, the student will be expected to make arrangements to schedule these examinations. Regardless of the method employed, the questions involved may cover any phase of the course work taken by the student during graduate study or any subject logically related to an understanding of the subject matter in the major and minor areas of study. The questions are designed to measure the student's mastery of the subject matter and the adequacy of preparation for research. Failure to pass the written preliminary examinations terminates the student's work at this institution, subject to departmental and/or school policies with respect to reexamination.

Upon satisfactory completion of the written portion of the preliminary examinations and after completion of all course work relevant to the examination, authorization for the preliminary oral examination is requested from the Graduate School. This examination is conducted by the student's advisory committee and a representative from the Graduate School and is open to all graduate faculty members. The student and the examining committee will be notified by the Graduate School of the arranged time and place. The oral examination is designed to test the student's ability to relate factual knowledge to specific circumstances, to use this knowledge with accuracy and promptness and to demonstrate a comprehensive understanding of the field of specialization and related areas.

A unanimous vote of approval by the members of the advisory committee is required for the student to pass the preliminary oral examination. Approval may be conditioned, however, on the successful completion of additional work in some particular field(s). All committee actions may be appealed by written application to the Graduate Dean.

Failure to pass the preliminary oral examination terminates the student's work at this institution unless the examining committee recommends a reexamination. No reexamination may be given until at least one full semester has elapsed, and only one reexamination is permitted.

## CANDIDACY

A doctoral student is admitted to candidacy upon passing the preliminary examinations without conditions or after fulfilling any conditions specified by the advisory committee.



## FINAL ORAL EXAMINATION

The final oral examination is scheduled after the dissertation is complete except for such revisions as may be necessary as a result of the examination, but not earlier than one semester or its equivalent after admission to candidacy and not before all required course work has been completed or is currently in progress. The examination consists of the candidate's defense of the methodology used and the conclusions reached in the research, as reported in the dissertation. It is conducted by an examining committee, which consists of the student's advisory committee and a Graduate School representative. This examination is open to the University community.

A unanimous vote of approval of the advisory committee is required for passing the final oral examination. Approval may be conditioned, however, on the student's meeting specific requirements prescribed by the student's advisory committee. Failure of a student to pass the examination terminates one's work at this institution unless the advisory committee recommends a reexamination. No reexamination may be given until one full semester has elapsed and only one reexamination is permitted.

## THE DISSERTATION

The doctoral dissertation presents the results of the student's original investigation in the field of major interest. It must represent a contribution to knowledge, be adequately supported by data and be written in a manner consistent with the highest standards of scholarship. Publication is expected.

The dissertation will be reviewed by all members of the advisory committee and must receive their approval prior to submission to the Graduate School. Three copies of the document signed by all members of the student's advisory committee must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. Prior to final approval, the dissertation will be reviewed by the Graduate School to insure that the format conforms to the specifications prescribed in the *Thesis and Dissertation Guide*. Detailed information on form and organization of the dissertation is presented in the University's *Thesis and Dissertation Guide* which is available in the NC State Bookstores.

The University has a requirement that all doctoral dissertations be microfilmed by University Microfilms International, of Ann Arbor, Michigan, which includes publication of the abstract in *Dissertation Abstracts International*. The student is required to pay for the microfilming service. (See "Special Registration and Fees" under "Tuition and Fees.")

## TIME LIMIT

Doctoral students are allowed a maximum of six calendar years from admission to the doctoral program to attain candidacy for the degree and a maximum of ten calendar years to complete all degree requirements. Academic colleges/schools or departments may have more restrictive requirements than the above stated policy.

### Summary of Procedures for Doctor of Philosophy and Doctor of Education Degrees

- ◆ Application materials and required fee received.
- ◆ Application materials reviewed by department or program.
- ◆ Department or program forwards recommendation regarding applicant's admissibility to Graduate Dean
- ◆ Graduate School reviews the recommendation and notifies the student of the action taken on the request for admission.
- ◆ Student arrives, reports to the department or program, is assigned a graduate advisor and develops a roster of courses and credits with the advisor.
- ◆ Student complies with requests from Graduate School for updated copies of transcripts from previous colleges or universities
- ◆ Student signs patent agreement and files with Graduate School
- ◆ Student subject to continuous registration policy until graduation.
- ◆ Advisory committee of at least four graduate faculty members appointed by the Graduate Dean upon the recommendation of the director of graduate programs.
- ◆ Graduate Dean appoints a Graduate School Representative to student's committee.
- ◆ A dissertation subject is selected and an outline of the proposed research submitted to the student's advisory committee and the director of graduate programs for review and approval.
- ◆ Plan of Graduate Work prepared by the student, in consultation with and with the approval of his/her graduate advisory committee and director of graduate programs, and forwarded to the Graduate School for approval as soon as feasible after completion of 12 hours of course work.
- ◆ Student passes language examination(s), if required.
- ◆ Written examinations in the major and minor fields are scheduled no earlier than the end of the second year of graduate study and not later than one semester before the final oral examination.
- ◆ When all written examinations have been completed satisfactorily, the chairman or the director of graduate programs requests the scheduling of the preliminary oral examination at least two weeks prior to the suggested date. Upon approval of the request, the Graduate School notifies the student and the examining committee of the time and place.



- ◆ The report of the examination is sent to the Graduate School and if the examination has been passed without conditions, the student is admitted to candidacy.
- ◆ A copy of the preliminary draft of the dissertation is submitted to the chair of the student's advisory committee for review.
- ◆ At least two weeks prior to the final oral examination, the chair of the student's advisory committee submits the dissertation to advisory committee members for review. A copy is submitted to the Graduate School Representative at least one week prior to the exam.
- ◆ One semester or its equivalent after admission to candidacy or later, after the dissertation is complete except for such revisions as may be necessary as a result of the final examination, and at least two weeks prior to the suggested date, the student's advisory committee chair or director of graduate programs requests the scheduling of the final oral examination. Upon approval of the request, the student and the examining committee, including the Graduate School representative, are notified of the time and place of the examination.
- ◆ Results of the final oral examination are forwarded to the Graduate School.
- ◆ Upon passing the final oral examination, three copies of the dissertation signed by each member of the student's advisory committee and five copies of the abstract must be submitted to the Graduate School by a specific deadline in the semester or summer session in which the degree is to be conferred. One copy each of the University Microfilms Agreement, the Survey of Earned Doctorate, and the Graduate School Exit Survey forms must be completed and submitted with the dissertation.
- ◆ The dissertation is reviewed by the Graduate School to insure that the format conforms with the specifications prescribed in the *Thesis and Dissertation Guide*.
- ◆ All course work scheduled in a graduate degree classification must be completed prior to graduation.
- ◆ A grade point average of at least 3.0 for the degree requirements as well as on overall graduate course work at NC State is required for graduation.
- ◆ The doctoral residence requirement of 2 residence credits must be satisfied.
- ◆ All degree requirements must be completed within ten years from admission to the doctoral program.

# THE NC State Libraries

The NC State Libraries is dedicated to offering the fullest information resources and services to its user community. The library system consists of the main D. H. Hill Library; four branches serving the specialized needs of programs in design, natural resources, textiles and veterinary medicine; and an affiliated library serving the College of Education and Psychology.

The Libraries' collections contain nearly 2.5 million volumes of books and bound journals, 4.2 million microforms, more than 18,800 serials, and several hundred electronic resources. The collections are particularly strong in the biological and physical sciences, engineering, agriculture, forestry, textiles and architecture, with the arts, humanities and social sciences also well represented. The NC State Libraries is a depository for U.S. government documents and a U.S. Patent Depository offering access to U.S. patents from 1790 to date. The Media Center has a growing collection of audio, video and multimedia materials and is equipped with equipment for group and individual use.

The NC State Libraries Information System extends access to a growing array of online resources, accessible from library terminals and from remote locations. Not only can users search the NC State Libraries' holdings by author, title, subject and keyword, but they can also search the collections of Duke, UNC-Chapel Hill and N. C. Central, along with a growing number of databases. The state-of-the art Information Technologies Teaching Center offers instruction in use of the latest information technologies.

As a further aid to graduate and faculty research, the Libraries provides interlibrary loan services to obtain material from other research libraries. Direct borrowing privileges are available with Duke University, UNC-Chapel Hill and other UNC system schools. Other library services include orientation tours for graduate students and faculty and lectures on library use for all new students. In-depth reference service, geared to the individual needs of graduate students, is also available.

## Institutes

**RESEARCH TRIANGLE** - The unique "Research Triangle" in North Carolina has captured national and international attention. It is comprised of the Research Triangle Park, a world-renowned research park, and three major research universities. Because of this wealth of educational and research opportunities, the Triangle area contains the highest total of Ph.D. scientists and engineers on a per capita basis in the nation. The Triangle Universities—NC State, the University of North Carolina at Chapel Hill and Duke University—have a subsidiary campus in the Research Triangle Park—the Research Triangle Institute. The Institute, which operates as a contract research organization, has an annual research revenue of approximately \$122 million.

The Research Triangle Park, founded in 1959, now has more than 59 public and private industrial research facilities, situated on 6,800 acres of land. Over 34,000 people work in the park and over 30,000 additional jobs have been created outside the Park as a result of

its existence. Organizations in the Park include such government facilities as the National Humanities Center, the National Institute of Environmental Health Sciences, the Environmental Protection Agency, and the National Center for Health Statistics. Private companies such as Glaxo Wellcome, Northern Telecom and Reichhold Chemicals have their North American headquarters in the Park. Two major, state-supported research initiatives in Microelectronics and Biotechnology are located in the Park and North Carolina's Supercomputing Center is housed there as well. Faculty and graduate students from the universities work closely with many of the Park companies. Scientists and researchers from companies like Glaxo Wellcome, IBM and Becton-Dickinson frequently hold adjunct appointments in one or another of the Triangle Universities.

**INSTITUTE OF STATISTICS** - The Institute of Statistics is composed of two sections, one at Raleigh and the other at Chapel Hill. At NC State, the Institute provides statistical consulting services to all branches of the institution, sponsors research in statistical theory and methodology and coordinates the teaching of statistics at the undergraduate and graduate levels. The instructional and other academic functions are performed by the Department of Statistics, which forms a part of the Institute.

**WATER RESOURCES RESEARCH INSTITUTE** - The Water Resources Institute is a unit of the UNC System and is located on the campus of NC State. The deans of the College of Engineering and College of Agriculture and Life Sciences, the Vice Chancellor for Research at NCSU and two faculty members from UNC-Chapel Hill serve as a board of directors. The Institute was established to promote a multidisciplinary attack on water problems, to develop and support research in response to the needs of North Carolina, to encourage strengthened educational programs in water resources, to coordinate research and educational programs dealing with water resources and to provide a link between the state and federal water resources agencies and related interests in the university.

Research and educational activities are conducted through established departments and schools of the University System. All senior colleges and universities of North Carolina are eligible to participate in the Institute's research program. Basic support for the Institute's program is provided by appropriations from the State of North Carolina and the U. S. Department of the Interior, under the Water Research and Development Act of 1984. The Institute sponsors research and educational symposia and seminars, encourages the development of specialized training opportunities and provides a means for the continuing evaluation and strengthening of the University System's total water resources program.

## Special Laboratories, Facilities and Centers

**ACADEMIC COMPUTING FACILITIES** - The Computing Center provides computing services and networking services via the University's Computer Communications System. This system links many computing systems on campus, including the on-line library catalog, and also provides access to the Internet.

The Computing Center facility includes a UNIX-based client/server environment and software, including word processing, electronic mail, spreadsheets and math tools. Several networked public facilities are located on campus. The Computing Center also provides an

array of centralized services including consultation, short courses, software licensing, campus electronic information system through World-Wide Web and a library of public domain software.

A number of specialized computing facilities also exist in most colleges/schools which provide specialized education and research computing for their students. The University participates in the North Carolina Supercomputing Center and provides high bandwidth communications to CRAY vector and parallel supercomputers at the Center.

**BIOLOGY FIELD LABORATORY** - The Biology Field Laboratory is located eight miles from the University campus and comprises a 20-acre pond, 180 acres of extremely varied vegetation types and a modern laboratory building. The latter contains two laboratories, one for class use and another principally for research.

The many unique ecological situations found in this area make it ideal for use by advanced classes of most biological science departments. Likewise, the area is well adapted to a variety of research projects by faculty, graduate students and undergraduates because of its habitat diversity. The close proximity of the laboratory facility to the campus makes possible many types of behavioral, physiological, ecological, taxonomic and limnological studies that could be accomplished only with great difficulty at other locations.

**CENTER FOR ADVANCED ELECTRONIC MATERIALS PROCESSING (AEMP)** - The Center for Advanced Electronic Materials Processing was established in 1988 and is one of the 21 NSF Engineering Research Centers in the nation. The center's program is interdisciplinary and involves collaboration among chemists, physicists, materials scientists and electrical, chemical, computer and mechanical engineers. The research focuses on the development of electronic materials processing technologies that will provide the capability of producing submicron electronic devices. The program emphasizes low thermal budget processes using plasma and thermal and optically assisted techniques as well as the automation and control of those processes. It is a joint effort with researchers from the University of North Carolina (Chapel Hill and Charlotte), Duke University, North Carolina A&T State University and MCNC.

**CENTER FOR ASEPTIC PROCESSING AND PACKAGING STUDIES (CAPPS)** - The Center for Aseptic Processing and Packaging Studies 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 center is funded by the National Science Foundation, NC State and industrial members from food, pharmaceutical and packaging industries. The objectives of the center are to support industrially relevant, fundamental research in aseptic processing and packaging, to enhance product quality and improve efficiency, and to communicate information gained from basic research to industry for development and marketing.

Graduate students working on CAPPS projects will be exposed to industrial concerns and given the opportunity to work first-hand with industry in solving problems and making practical application of their research.



**CENTER FOR ADVANCED COMPUTING AND COMMUNICATION - CACC** is an NSF-sponsored Industry/University Cooperative Research with research sites at NC State and Duke University. An advisory board comprised of representatives of member companies and government agencies meets twice a year to direct the Center's research activities. Faculty and graduate students also work closely with each member's technical staff on a variety of research projects.

The Center's mission is to carry out basic and applied research on problems having both industrial and academic relevance, to transfer these results to the members and to provide students with a challenging educational opportunity. The research goal is to create concepts, methods and tools for use in the analysis, design and implementation of advanced computer and communication systems. CACC is uniquely equipped to serve as a testbed for new networking hardware, software and protocols because of its state-of-the-art Networking, Multimedia and Imaging Laboratories.

**CENTER FOR ENGINEERING APPLICATIONS OF RADIOISOTOPES** - 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 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 and industrial computed tomography. Excellent experimental facilities are available including solid state detectors and the NC State PULSTAR Reactor. The Center's programs are financed largely by an Associates Program of Industrial Members and contracts and grants from industry and federal agencies.

**CENTER FOR LEARNING TECHNOLOGIES** - The Center for Learning Technologies (CLT) is a multimedia service facility located in the College of Education and Psychology. Students are instructed through workshops, classes and/or individualized training in the effective delivery of information and the design/production of instructional materials using a variety of computer technologies.

**CENTER FOR RESEARCH AND DEVELOPMENT IN MATHEMATICS AND SCIENCE EDUCATION** - The center, one of ten centers in the North Carolina Mathematics and Science Education Network, is the only research and development center in the network. Established within the Department of Mathematics and Science Education in 1984, the center conducts research and development activities for precollege students, preservice teachers, in-service teachers and a University faculty. The center identifies areas of need in mathematics and science education and forms partnerships with federal, state, local and private funding agencies to work collaboratively to address the needs. Grants have been obtained from the National Science Foundation, Office of Education, State Department of Public Instruction, Local Education Agencies and IBM to introduce changes that incorporate technology and active learning into the mathematics and science curriculum, K-16. In addition, the center supports graduate students and provides them with opportunities to write grants and to design, conduct and report on educational research.

**CENTER FOR RESEARCH IN SCIENTIFIC COMPUTATION** - 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, engineering and applied mathematics. Data-massive and/or computationally intensive problems provide ideal projects for training graduate students in applied mathematics. With advanced computing methodologies, students and post-doctoral fellows address important issues in processes of modelling and 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.

**CENTER FOR SOUND AND VIBRATION** - The Center for Sound and Vibration, established in 1969 and administered within the Department of Mechanical and Aerospace Engineering, is composed of faculty pursuing the solution of a wide variety of problems such as occur in machinery and aircraft design particularly related to vibration and sound. Graduate programs exist at M.S. and Ph.D. levels in fields such as noise and vibration control, aeroacoustics, hearing conservation, computer-aided machinery design, active control of vibration and sound, and signal processing. Outstanding experimental facilities, which include large anechoic and reverberant rooms and computer graphics equipment, are available. The Center's programs are financed largely by grants and contracts from industry and federal and state agencies.

**DIAGNOSTIC TEACHING CLINIC** - The Diagnostic Teaching Clinic is operated by the graduate program in special education within the College of Education and Psychology for the purposes of providing graduate students with opportunities to gain both observational and applied clinical experience in diagnosing and teaching exceptional students of all ages. The clinic accepts referrals from local school systems and from agencies and individuals within the community. Staff, which includes graduate interns, evaluates the referred clients, develops educational programs for them in conjunction with the referring agency and demonstrates teaching techniques for the benefit of those persons who will work with the children. This clinic is open during the day, late afternoon and early evening hours during the fall and spring semesters and throughout the summer months and is utilized by graduate students from several departments with allied curricula in education and psychology.

**ELECTRIC POWER RESEARCH CENTER** - The Electric Power Research Center is a university/industry cooperative research center established in 1985 within the College of Engineering. The Center is funded by the university and sponsoring organizations from the various sectors of the electric utility industry including equipment manufacturers and fuel vendors. The purpose of the Center is to foster the excellence of research and graduate-level degree programs in electric power systems engineering. Motivation for industrial firms to join with the Center derives from close university/industry interaction, the pooling of membership dues to sponsor research of mutual interest and the enhanced professional and research opportunities provided to faculty and students. While the current research program mainly involves faculty from the Department of Electrical and Computer Engineering and the



Department of Nuclear Engineering, the Center facilitates access to all the various resources of the University.

**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 (CALs) Center for Electron Microscopy is located in Gardner Hall, the College of Engineering (COE) Analytical Instrumentation Facility (AIF) is in Burlington Engineering Labs and the College of Veterinary Medicine (CVM) Electron Microscopy Laboratory is located in the NCSU College of Veterinary Medicine on Hillsborough Street.

**The CALs Center for Electron Microscopy** offers complete service support in all areas of Biological Electron Microscopy. The Center has two scanning microscopes: a Philips 505T and a JEOL T-300 and two transmission electron microscopes: a JEOL 100S and a Philips 400T-STEM equipped with a C400M computer control system. The Center is also equipped with all of the necessary biological preparatory equipment.

Formal instruction is provided through the microbiology curriculum for transmission electron microscopy, scanning electron microscopy and ultramicrotomy. The Center also provides support, service and training in a wide variety of digital imaging. Advanced techniques are provided on an individual basis or through workshops.

**The COE Analytical Instrumentation Facility (AIF)** is equipped with an Hitachi S-3200N variable pressure scanning transmission microscope (VPSEM), two high resolution JEOL 6400F field emission scanning electron microscopes (FESEM) and a Cameca IMS-6f Ion Microscope. One 6400F is equipped with a Link Pentafet energy dispersive x-ray system capable of detecting low Z elements (down to boron). In addition, all microscopes are equipped with both film and direct digital imaging capabilities. Digital data acquisition capability allows direct computer display and storage of images greatly facilitating image processing and utilization for reports and publications.

The S-3200N VPSEM accommodates large (6-inch diameter) specimens and in the variable pressure mode can image wet, oily and non-conductive specimens in their natural state with up to 35Å resolution, greatly reducing or eliminating sample preparation requirements.

The JEOL 6400F field emission SEMs can handle up to 6-inch diameter samples and operate at very low accelerating voltages while maintaining high spatial resolution. The superior brightness and small spot size of the cold cathode field emission electron sources on JEOL 6400F instruments enable them to resolve 14Å at an accelerating voltage of 30 keV and 70Å at 1.0 keV.

The state-of-the-art Cameca IMS 6f Ion Microscope is a high-performance, secondary ion mass spectrometry (SIMS) equipped with oxygen, cesium and gallium ion sources providing ppb to ppt sensitivity for most elements and a digital data acquisition system for acquiring and processing both 2-D and 3-D elemental distributions with atomic layer depth resolution and <0.1µm lateral resolution.

All microscopes are supported by complete materials specimen preparation, dark room and data processing facilities including several light microscopes and x-ray diffractometers. AIF analytical professionals teach regularly scheduled courses as well as short courses covering the analytical techniques available through AIF. They are also available for collaboration with and direct one-on-one instruction for graduate students.

**The CVM Electron Laboratory for Advanced Electron and Light Optical Methods (LAELOM)** - The CVM Laboratory for Advanced Electron and Light Optical Methods (LAELOM) is a research/service/teaching facility housing all the optical equipment to examine cytological, histological and gross specimens, and the equipment to perform morphometric analyses, and to prepare material for presentations and publication. Individuals can prepare their own cryosections for light microscopy and immunological staining and can also prepare their own transmission and scanning electron microscopy samples. In addition, the LAELOM can prepare any and all of these materials for investigators. The LAELOM offers individual training in light microscopy, morphometry and darkroom work as well as a formal course in biological transmission and scanning electron microscopy techniques. A course covering photography in scientific illustration is taught in the LAELOM as part of the summer Biotechnology program. A Philips 410LS transmission electron microscope, a JEOL JSM-35 scanning electron microscope, an automated Olympus VANOX photomicroscopes and a Wild photo-microscope are available to students and investigators as well as a fully equipped negative processing and print processing darkroom. Equipment is available to make 2 x 2 slides for presentations and to prepare posters and publication prints. The LAELOM offers consultation services for all these techniques in terms of specimen preparation, film selections, and cost determinations for purposes of grant preparation.

**HIGHLANDS BIOLOGICAL STATION** - NC State is an institutional member of the Highlands Biological Foundation which provides support for the Highlands Biological Station of the University of North Carolina. This is an inland biological field station located at Highlands, North Carolina. The town of Highlands is in the heart of the Southern Appalachians at an elevation of 3,823 feet. The area has an extremely diverse biota and the highest rainfall in the eastern United States.

Facilities are available throughout the year for pre-and post-doctoral research in botany, zoology, soils and geology. The laboratory building with research rooms and cubicles and the library are well equipped for field-oriented research. Also, five cottages and a dining hall are located on the edge of a six-acre lake. In addition to 16 acres surrounding the lake, the station owns several tracts of undisturbed forested land available for research. Research grants available through the Station provide stipends for room, board and research expenses.

**INTEGRATED MANUFACTURING SYSTEMS ENGINEERING INSTITUTE** - The Integrated Manufacturing Systems Engineering Institute was established at NC State in 1984 to provide interdisciplinary educational, research and technology transfer program in manufacturing systems engineering. The objectives of this program are to educate engineers in the theory and practice of integrated manufacturing systems technology; to conduct basic and applied research on topics in cooperation with industry on problems of contemporary manufacturing system; and to engage in technology transfer with industry.

Central to all aspects of the Institute's operation and activity is in the integration of computer-aided processes in the design and control of manufacturing facilities. Through both internally and externally funded research projects the Institute contributes to the solution of generic design and manufacturing engineering problems and provides a vehicle for technology transfer.

**LEARNING RESOURCES LIBRARY** - The Learning Resources Library, administered by the College of Education and Psychology, is located in Poe Hall. The library maintains a collection of print and audio-visual materials with emphasis on teaching methods, research, administration and psychology. An extensive collection of state-adopted secondary level textbooks includes French, Spanish, language arts, mathematics, science, social studies and vocational education. Audio-visual equipment is available for instruction, research and previewing.

**MARS MISSION RESEARCH CENTER** - The Mars Mission Research Center is one of eight University Space Engineering Research Centers established by NASA to broaden the nation's engineering capability to meet the critical needs of the civilian space program. The goal of the center is to focus on educational and research technologies used in the design of spacecraft for planetary exploration with particular emphasis on Mars. It is a cooperative program involving faculty, undergraduate and graduate students at NC State and N.C. A&T State University. The research is a cross-disciplined program involving (1) hypersonic aerodynamics and propulsion, (2) composite materials and fabrication, (3) light-weight structures and (4) spacecraft controls. Students and faculty conduct part of their research at NASA Centers and participating industries.

**MATERIALS RESEARCH CENTER** - The Materials Research Center was established in 1984 at NC State as an interdisciplinary program involving persons representing the Department of Chemistry, Electrical and Computer Engineering, Materials Science and Engineering and Physics. The present thrust area of the Center concerning thin films and coatings serves as a focal point for this cooperative research. The experimental efforts are conducted within the four departments noted above.

**MCNC** - NC State is a participating member of MCNC which conducts research programs in information and electronics technologies in partnership with other North Carolina institutions. Other participating institutions are the UNC-Chapel Hill, Duke University, North Carolina A&T State University, UNC-Charlotte and the Research Triangle Institute.

Faculty and students at NC State have access to the use of MCNC facilities on sponsored research projects. Areas of interest include systems design, systems engineering, integrated circuit fabrication technology, semiconductor materials, device physics, advanced packaging and interconnection technologies, microelectromechanical systems (MEMS), high performance computing and advanced networking research and development. Departments at NC State which are actively involved in the program include electrical and computer engineering, computer science, physics, chemistry, and materials science and engineering.

**NUCLEAR REACTOR PROGRAM** - The Nuclear Reactor Program (NRP) provides specialized nuclear facilities to the North Carolina academic and industrial communities. These facilities are used for teaching, research and service. The NRP supports graduate research and undergraduate programs in a wide variety of academic departments. The NRP facilities include the PULSTAR Nuclear Reactor, the Nuclear Services Analytical Laboratories, Health



Physics Laboratories and the Scaled Pressurized Water Reactor Facility (SPWRF). The PULSTAR Reactor is a 1-Megawatt research and training reactor. Irradiation capabilities include wet and dry vertical ports, horizontal beam tubes, a pneumatic transfer system and a graphite thermal column. Neutron radiography, prompt gamma activation analysis and neutron depth profiling facilities are permanently installed.

The Nuclear Services Laboratories are well-equipped to perform routine reactor irradiations, neutron activation analysis, isotope production and low level counting. The laboratories maintain ten high-purity Ge and GeLi detectors, two multi-station Nuclear Data Acquisition and Analysis Systems, a Liquid Scintillation Counting System, an Alpha Spectroscopy System, sample preparation equipment and an extensive set of standards. The SPWRF is a non-nuclear working scale model of a two-loop pressurized water reactor. The SPWRF is used for teaching pressurized water reactor technology and for various research activities.

The Nuclear Reactor Program is part of the Department of Nuclear Engineering and is located in the Burlington Engineering Laboratories on the main NC State campus.

**ORGANIZATION FOR TROPICAL STUDIES** - NC State is an institutional member of the Organization for Tropical Studies (OTS), a consortium of North and Central American universities which maintains field research and teaching facilities in Costa Rica. Each year OTS offers a series of courses that are open to NC State graduate students including tropical biology, agroecology, agroforestry and tropical agricultural biology. These 8-week courses, offered in winter and summer, are taught in Costa Rica and make use of a network of OTS field stations located throughout the country.

The OTS facilities in Costa Rica also provide a unique opportunity for tropical research by NC State graduate students and faculty. The principal field station, located in the northeastern Atlantic lowlands, has excellent laboratory and housing facilities and provides access to a 3,500-acre tract owned by OTS. Another station is located at mid-elevation in southeastern Costa Rica near the Panamanian border. OTS also utilizes various other sites, including a seasonally dry area in the northwestern part of the country and a high-elevation area at 10,000 feet in the Talamanca range. More information about OTS may be obtained through the International Programs Office.

**PESTICIDE RESIDUE RESEARCH LABORATORY** - The Pesticide Residue Research Laboratory is a facility in the College of Agriculture and Life Sciences devoted to determining the environmental fate of pesticide residues primarily in air, plants, soils and water. Although the laboratory is administered through the Department of Toxicology, it serves the total needs of the College in cooperative research projects requiring pesticide residue analysis.

Although the laboratory functions as a focal point for residue research involving interdepartmental cooperation, the faculty in the laboratory conduct independent research on the fate of pesticides, indoors, after applications in urban environments and their movement and persistence in plants, soils and water after agricultural applications.

The laboratory is equipped with gas, High Performance Liquid and Capillary Electrophoresis chromatographs, a GC/MS and all ancillary items required to prepare samples for quantita-

tion. Graduate study can be undertaken in any aspect of pesticide residue research either in the Pesticide Residue Research Laboratory or through one of the cooperating departments.

**PRECISION ENGINEERING CENTER** - The Precision Engineering Center was established in 1982. The goal is to develop techniques for metrology and manufacturing at tolerances below those attainable with current technology. For example, fabrication of future electro-optical devices will require manufacturing tolerances better than 1 millionth of an inch. This goal requires new methods for measuring and controlling the parts being produced or the process being performed. Specific research objectives involve the study of metrology systems, control algorithms, machine structural dynamics, optics, materials, and microprocessors and the details of many different fabrication processes. An interdisciplinary team of faculty from Mechanical and Aerospace Engineering, Materials Science and Engineering, Computer Science and Physics along with research staff and graduate students are working together to address these research areas. The Center is housed in a state-of-the-art facility on the Centennial Campus.

**PSYCHOEDUCATIONAL CLINIC AND LABORATORIES** - The Department of Psychology operates the Psychoeducational clinic located in Poe Hall. The clinic provides both a service to the public and training for school psychology graduate students. School-age child assessment and program development are the major services provided. Coordination of internships and practica is also administered through this facility.

Each graduate program in psychology also has laboratory facilities, either independently or shared. Thus, the experimental psychology program has laboratories for neuropsychology, auditory and visual perception, cognition and operant behavior. There is also a training and development laboratory as well as facilities for ergonomics, cognitive and social developmental psychology, human resource development, industrial/organizational and vocational psychology and social psychology. The latter facilities include one-way viewing rooms with recording equipment.

**SEA GRANT COLLEGE PROGRAM** - North Carolina Sea Grant College Program is a state/federal partnership program involving all campuses of the University of North Carolina system. A majority of its activities, however, are conducted at the NC State campus. Sea Grant combines the university's expertise in research, extension and education to focus on practical solutions to problems in the area of coastal and marine resource use and conservation. Graduate and undergraduate research opportunities rest with individual project directors on campus via special graduate fellowship program administered through the program office.

**SOUTHEASTERN PLANT ENVIRONMENTAL LABORATORIES - PHYTOTRON** - The Southeastern Plant Environment Laboratory, often referred to as the NC State Phytotron, is especially designed for research dealing with the response of plants and microorganisms to their environment. A high degree of environmental control makes possible simulation of a wide range of climates found in tropical, temperate and northern zones.

Research in the Phytotron deals with all phases of plant biology. Although the majority of the studies are conducted with agricultural and horticultural crop species, the Phytotron can accommodate ecological investigations, plant biology problems of the space program, experimental taxonomy and air pollution studies as well as basic physiological, biochemical



and plant molecular biology research. The Phytotron facility is available to the resident research staff, participants in graduate research programs of NC State and to domestic and foreign visiting scientists.

**TRIANGLE UNIVERSITIES NUCLEAR LABORATORY - TUNL** is a laboratory for nuclear structure research. Located on the campus of Duke University in Durham, the laboratory is staffed by faculty members and graduate students in the Departments of Physics of Duke University, UNC-Chapel Hill and NCSU. There is extensive collaboration with personnel from the other two participating universities and with the many visiting physicists from the United States and abroad. Particle accelerators are used to bombard target nuclei with an assortment of ions of accurately controlled energy spread and spin orientation. The accelerators are a 15-MeV tandem Van de Graaff accelerator and a 4-MeV Van de Graaff accelerator. Polarized and pulsed beams are available as well as polarized targets. In addition, TUNL physicists perform experiments at major national and international nuclear physics facilities.

## Special Programs

**INTERNATIONAL AREA STUDIES GROUPS** - The International Area Studies Groups, comprising faculty from across the university with common interests in an international studies area, provide a forum for sharing professional experiences; generating and identifying support sources for collaborative scholarly activities; offering seminars for the university; providing a public-service function for the campus and community at large by identifying faculty with expertise in their study area; interacting with visiting scholars and students from the geographic area specific to the study group; and serving an advisory role in institutional linkage development between NC State and universities in the study area. Additional information is available from the International Programs Office.

**RESEARCH PROGRAM AT THE OAK RIDGE ASSOCIATED UNIVERSITIES - NC** State has been a sponsoring institution of Oak Ridge Associated Universities (ORAU) since 1949. ORAU is a private, not-for-profit consortium of 95 colleges and universities and a management and operating contractor for the U.S. Department of Energy (DOE) with principal offices located in Oak Ridge, Tennessee. Founded in 1946, ORAU provides and develops capabilities critical 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 manages the Oak Ridge Institute for Science and Education (ORISE) for DOE. ORISE is responsible for national and international programs in science and engineering education, training and management systems, energy and environment systems, and medical sciences. ORISE's competitive programs bring students at all levels, K-12 through postgraduate, and university faculty members into federal and private laboratories.

ORAU's office for University, Industry and Government Alliances (UIGA) seeks out opportunities for collaborative alliances among its member universities, private industry, and federal

laboratories. Current alliances include the Southern Association for High Energy Physics (SAHEP) and the Center for Bio-Electromagnetic Interaction Research (CBEIR). Other UIGA activities include the sponsorship of conferences and workshops, the Visiting Scholars program, and the Junior Faculty Enhancement Awards.

Contact Jack H. Britt, (919) 829-4213, for more information about ORAU programs.

## University Patent and Copyright Procedures

North Carolina State University is dedicated to teaching, research and extending knowledge to the public.

It is the policy of the University to carry out its scholarly work in an open and free atmosphere and to publish results obtained therefrom freely, limited only by a short time delay in cases in which this is necessary to prepare and file applications. Patentable inventions sometimes arise out of the research activities of its faculty, staff and students which are carried out wholly or in part with University facilities. As a public service institution, the University has an interest in assuring the utilization of such inventions for the public good. Protection must be provided for at least some of these inventions through patents and the licensing thereof to encourage their development and marketing. Patents and their exploitation, however, represent only a small part of the benefits accruing from either publicly or privately sponsored research.

A portion of the research conducted by the University is supported by government and a portion by private industry. Service to the public, including private industry, is an integral part of the University's mission. As a public institution, the University, in its agreements with private industry or other private organizations, must keep the interests of the general public in view. The rights and privileges set forth in cooperative agreements or contracts, with respect to patents and copyrights developed as a result of research partly or wholly financed by private parties, must be fair and just to the inventor(s), the sponsor and the public. Research should be undertaken by the University under support from private parties only if it is consistent with and complementary to the University's goals and responsibilities to the public.

### SECTION 100—Purposes:

The North Carolina State University Patent and Copyright Procedures are designed to implement the Patent and Copyright Policies of The University of North Carolina. The procedures incorporate the interests of the faculty, staff, *and students*, the institution, and the sponsors of research, because in many cases those interests are congruent in desiring to encourage innovation and assure broad dissemination of the results of research. These procedures are designed to stimulate and recognize creativity among the faculty, staff, and students, and to establish an institutional process that is flexible enough to accommodate the different types of research and patentable work conducted at a comprehensive research university such as NC State. Equity and fairness are goals of the procedures in all respects, not only in the distribution of royalty, but also in recognition. Finally, these procedures should

provide an efficient and timely mechanism for reaching a decision about patenting with a minimum involvement of the inventor's time so that he or she may continue to be productive in the laboratory and classroom. To this end the University employs a patents administrator whose duties include providing assistance to faculty, staff *and students* in matters related to inventions.

### **SECTION 200—Ownership:**

1. As defined by the Patent and Copyright Policies of the Board of Governors of The University of North Carolina, to which these Procedures are expressly subject, NC State University has an interest in all inventions of University personnel, *including students*, that are conceived or first actually reduced to practice as a part of or as a result of: (a) University research; (b) activities within the scope of the inventor's employment by, or official association with, the University; and (c) activities involving the use of University time, facilities, staff, materials, University information not available to the public, or funds administered by the University.

2. Faculty, staff, *and students*, whose inventions are made on their own time, outside the scope of their employment or association with the University and without University facilities, materials, or resources and which inventions are, therefore, their exclusive property as specified by the Patent and Copyright Policies, may submit their invention to the University for possible patenting and/or commercial exploitation and management under terms to be agreed upon by the inventor and the University.

3. The provisions of the NC State Patent Procedures are subject to any applicable laws, regulations or specific provisions of the grants or contracts which govern the rights in inventions made in connection with sponsored research.

4. Under the terms of certain contracts and agreements between NC State and various agencies of government, private and public corporations, and private interests, NC State is or may be required to assign or license all patent rights to the contracting party. NC State retains the right to enter into such agreements whenever such action is considered to be both in its best interest and in the public interest. Ordinarily, the University will not agree to grant rights in future inventions to private corporations or businesses except as set forth in these procedures.

5. All faculty, staff *and students* engaged in University related or sponsored research shall sign a Patent Agreement.

6. *Students who are pursuing only non-research related studies shall not be obligated to sign an NC State Patent Agreement. However, if the student should make an invention which is, or may be, subject to University ownership in accordance with the Patent and Copyright Policies, the student shall disclose the invention to the University as provided under these Procedures and the University, together with the student, shall determine an equitable resolution of ownership rights.*

### **SECTION 300—Responsibilities of NC State Personnel (Including Students):**

1. NC State personnel who, either alone or in association with others, make an invention in which NCSU has or may have an interest shall disclose such inventions to the Vice Chancellor for Research. The Vice Chancellor for Research will promptly acknowledge receipt of disclosures and will distribute the disclosures to the Intellectual Property Committee for consideration at its next meeting.

2. For any invention in which the University has an interest, the inventor, upon request of the Vice Chancellor for Research shall execute promptly all contracts, assignments, waivers



or other legal documents necessary to vest in the University or its assignees any or all rights to the invention, including complete assignment of any patents or patent applications relating to the invention.

3. NC State personnel may not: (a) sign patent agreements with outside persons or organizations that may abrogate the University's rights and interests either as stated in the Patent Policies or as provided in any grant or contract funding the research which led in whole or in part to making the invention, nor (b) without prior authorization, use the name of the University or any of its units in connection with any invention in which the University has an interest.

4. *All faculty teaching courses in which students do work that may lead to patentable inventions should inform the students of the existence of the NC State Patent and Copyright Policies and of these Procedures.*

#### **SECTION 400—Suggested Procedures For Record-Keeping:**

1. U.S. patent practice places a premium on witnessed records when two or more parties claim the same invention. The date the idea occurred (the "conception") and the date it was put into practice form ("reduced to practice") are vital. Equally important in the eyes of the U.S. Patent Office is the "diligence" shown by contending inventors. They must prove that they regularly pursued work on the invention, documenting their efforts on a day-by-day basis. The intent of U.S. patent laws is to recognize the first inventor; the one who originated the idea. Under these laws, the first to conceive and reduce to practice will receive a patent if his records bear out his claims; the first to conceive and the last to reduce to practice may win if his records show diligence.

2. *The careful recording of ideas and laboratory data is a matter of routine for industrial researchers. Each entry is complete and up-to-date, signed and witnessed; a legal record of the day's work. Record-keeping is not nearly so simple for the academic investigator, for he or she may work at odd hours or on weekends; may be closeted in a laboratory, an office or at home; and often lacks easy accessibility to suitable witnesses. Still, the keeping of a witnessed laboratory notebook is advisable. Additionally, such records can serve as valuable repositories of new ideas.*

#### **SECTION 500—The Handling of a Disclosure:**

1. When faculty, *students* or staff members make an invention, it shall be their responsibility to discuss their discovery or invention with the Department Head at which time the possibility of exploring patenting should be considered. *Students should first discuss an invention with their instructor, who shall assist them in further discussion within the University.* The Director of Technology Administration is available to discuss possible inventions and to assist faculty, staff and students in the preparation of disclosures. If the invention appears to be a matter that should be considered for patenting, the inventor(s) should prepare a disclosure utilizing guidelines for invention disclosures which can be obtained for the Director of Technology Administration. The Department Head should transmit the disclosure through the Dean of his School to the Vice Chancellor for Research for consideration by the Intellectual Property Committee.

2. Upon receiving a disclosure, the Chairman of the Intellectual Property Committee may refer the disclosure to one of several technical advisory committees to the Intellectual Property Committee. Technical advisory committees will be appointed by the Vice Chancellor for Research and will be composed of faculty and staff who are knowledgeable and experienced in broad disciplinary or cross-disciplinary areas. These individuals will be asked to review the

disclosure from the point of view of whether or not, based on their knowledge, they believe the invention, if patented, would be a strong, viable, commercial product that would have a large market. The technical advisory committee in each area will meet prior to each Intellectual Property Committee meeting if they have any disclosures presented to them, and will discuss the disclosures and make to the Intellectual Property Committee, prior to its meeting, one of the following recommendations:

A. That the disclosure has significant commercial possibilities.

B. That the disclosure does not appear to have significant commercial possibilities.

C. That the technical advisory committee could not determine, based on its knowledge, whether or not the disclosure has significant commercial possibilities.

3. The Intellectual Property Committee will review each written disclosure promptly. The inventor or a representative shall be allowed to examine all written materials submitted to the Committee in connection with the disclosure and to make a written and oral presentation to the Committee. The Committee will decide on a disposition of the invention to secure the interests of the University, the inventor, the sponsor, if any, and the public. Its decision may include, but is not limited to, one or a combination of the following:

A. To submit the disclosure for review by a patent or invention management firm or agent;

B. To make inquiries of potential licensees that may have an interest in the invention, including the financing of a patent application, where applicable;

C. To conduct a patent search concerning the patentability of the disclosure;

D. To apply for a patent with University resources (an option with limited application because of financial constraints);

E. To release University rights to the inventor subject to an agreement to protect the interests of the University, the sponsor, if any, and the public, including an obligation to pay to the University a percentage of future royalties or profits in cases where it is necessary to recognize the University's contribution;

F. To dedicate the invention to the public;

G. To waive further University interest in the invention.

4. Normally, within four weeks of the receipt of the disclosure, the inventor will be notified in writing of the decision of the Committee on (a) the equities involved including financial participation, (b) whether the University plans to file a patent application, or (c) whether the University will accept assignment of the invention for patenting, licensing and/or commercial handling as applicable. If the University chooses not to file a patent application for an invention in which it has rights, or not to license the invention, or not to dedicate it to the public, upon the inventor's written request the invention, at the Committee's discretion, may be released in writing to the inventor, with the permission of the sponsor, if any.

5. In those cases in which the University has obtained a patent without obligation to sponsors, if no arrangement has been made for commercial development within five years from the date of the issuance of the patent, the inventor(s) may request in writing an assignment of the University's patent rights. The Intellectual Property Committee will promptly either grant the request or advise the inventor of the University's plans for the development of the invention.

#### **SECTION 600—Royalty:**

1. NC State shall share with the inventors revenue it receives from patents or inventions. As noted in Section 200 (4), specific provisions of grants or contracts may govern rights and revenue distribution regarding inventions made in connection with sponsored research; consequently, revenues the University receives from such inventions may be exclusive of



payments of royalty shares to sponsors or contractors.

2. The gross royalty revenues (net amount received by the University if there is a specific agreement in a grant or contract with a sponsor) generated by a patent or invention shall be the basis upon which the inventor's royalty is calculated. Unless otherwise agreed, the inventor's share of royalty revenues shall be 25% of the gross revenue. In the case of co-inventors, the 25% of gross revenue shall be subdivided equally among them, unless the inventors, with the concurrence of the Intellectual Property Committee, determine a different share to be appropriate. Applicable laws, regulations or provisions of grants or contracts may, however, require that a lesser share be paid to the inventor. In no event shall the share payable to the inventor or inventors in the aggregate by the University be less than 15% of gross royalties received by the University.

3. To the extent practicable and consistent with State and University budget policies, the remaining revenue received by the University on account of an invention will first be applied to reimburse the University for expenses incurred by it in obtaining and maintaining patents and/or in marketing, licensing and defending patents or licensable inventions and the remainder will be dedicated to research purposes that may include research in the inventor's department or unit, if approved by the Chancellor upon recommendation of the Intellectual Property Committee.

#### **SECTION 700—Inventor Requests for Waiver of University Rights:**

1. If an inventor believes that the invention was made outside the general scope of his or her University duties, and if the inventor does not choose to assign the rights in the invention to the University, he or she shall, in the invention disclosure, request that the Intellectual Property Committee determine the respective rights of the University and the inventor in the invention and shall also include information on the following points:

- A. The circumstances under which the invention was made and developed;
- B. The employee's official duties at the time of the making of the invention;
- C. The inventor's intention to request an acknowledgment that the University has no claim if such request is deemed appropriate;
- D. The extent to which the inventor is willing voluntarily to assign domestic and foreign rights in the invention to the University if it should be determined that an assignment of the invention to the University is not required under the Patent and Copyright Policies;
- E. The inventor's intention to request that the University prosecute a patent application if it should be determined that an assignment of the invention to the University is not required under the Patent and Copyright Policies.

#### **SECTION 800—Publication and Public Use**

1. North Carolina State University strongly encourages scholarly publication of the results of research by faculty and students. Though the Patent and Copyright Policies do not limit the right to publish, except for short periods of time necessary to protect patent rights, publication or public use of an invention constitutes a statutory bar to the granting of a United States patent for the invention unless a patent application is filed within one year of the date of such publication or public use. Publication or public use also can be an immediate bar to patentability in certain foreign countries.

2. In order to preserve rights in unpatented inventions, it shall be the duty of the inventor, or of his or her supervisor if the inventor is not available to make such report, to report immediately to the Vice Chancellor for Research any publication, submission of manuscript

for publication, sale, public use, or plans for sale or public use, of an invention, if a disclosure has previously been filed. If an invention is disclosed to any person who is not employed by the University or working in cooperation with the University upon that invention, a record shall be kept of the date and extent of the disclosure, the name and address of the person to whom the disclosure was made, and the purpose of the disclosure.

After disclosure to the Intellectual Property Committee, the inventor shall immediately notify the Vice Chancellor for Research of the acceptance for publication of any manuscript describing the invention or of any sale or public use made or planned by the inventor.

#### **SECTION 900—Contractual Arrangements:**

1. North Carolina State University will follow Federal Regulations with respect to election of title in contracts and grants with Federal agencies.

2. The University normally reserves the right to ownership of patents on inventions arising out of research supported in whole or in part by grants or contracts with non-governmental organizations or firms. Contracts or agreements which are entered into between the University and such organizations or agencies should contain clauses setting forth such a reservation unless deviations therefrom are requested by the sponsor and approved by the Vice Chancellor for Research. In the interest of fair treatment to the sponsor in consideration for an investment and in the interest of discharging the University's obligation to the public in the application of its facilities and employee time and talent, special provisions may be negotiated by the Vice Chancellor for Research in such non-government sponsored contracts on options such as the following:

A. The University will retain rights to patents arising out of such sponsored research but, if a significant portion of the research costs are borne by the sponsor, including direct costs, the sponsor may be assured a non-exclusive, non-assignable license at a most favorable royalty rate for the use of the patent.

B. Other patent licensing alternatives may be negotiated in the research contract based on factors which will promote effective and expeditious transfer of the technology. Research sponsors are encouraged to seek guidance from the Office of the Vice Chancellor for Research.

C. In order to protect the potential patent interests of both parties in such contracts in which the sponsor is accorded patent rights, the following procedure may be specified:

"When in the course of the sponsored research project the investigator or investigators conceive or reduce to practice some discovery which appears to be patentable, then the inventor(s) will immediately inform the sponsors and the University of such discovery and will, for a specified period as negotiated (normally three months but in any case not more than twelve months), make available to the sponsor all pertinent information and disclosures which may be required for the development of an appropriate patent application. During this period, the investigators agree not to disclose this material to the public and agree to cooperate in the sponsor's effort to secure the patent. At the end of this agreed period, the investigators and the University will be free to proceed with publications and making public such other documents as they may choose. With the exception of the above mentioned agreed period, the University will operate industry sponsored contracts in the normal manner with no other special considerations being given to the sponsor. Under no circumstances will the sponsor have the right to prevent the publication of material or information derived during the conduct of the program or as a result thereof other than for the agreed period indicated above."

Prior written agreement of the investigators involved in research investigations to be carried out under these conditions must be secured by the University to enable the University to discharge its agreed obligations under such a contract.

#### **SECTION 1000—Patent Management and Administration:**

1. North Carolina State University recognizes that the evaluation of inventions and discoveries and the administration, development and processing of patents and licensable inventions involves substantial time and expense and requires talents and experience not ordinarily found among its faculty and staff; therefore, it employs the Director of Technology Administration to provide assistance. The University may contract with outside agents for certain services. It may enter into a contract or contracts with an outside organization covering specific inventions or discoveries believed to be patentable and patents developed therefrom or covering all such inventions, discoveries and patents in which the University has an interest. The University may manage an invention using its own resources.

2. The Chancellor shall appoint a Intellectual Property Committee consisting of no fewer than three members. The Vice Chancellor for Research shall serve as Chairman of the Committee. The Committee shall review and recommend to the Chancellor or the Chancellor's delegate changes in these Procedures, decide upon appropriate disposition of invention disclosures, resolve questions of invention ownership, recommend to the Chancellor the expenditure of invention royalties, and make such recommendations as are deemed appropriate to encourage disclosures and to assure prompt and effective handling, evaluation, and prosecution of invention opportunities and to protect the interests of the University and the public. The Director of Technology Administration shall serve as staff for the Committee and shall attend all meetings.

#### **SECTION 1100—Copyright Procedures:**

1. As a general rule, all rights to copyrightable material are the property of the author. The distribution or royalties, if any, is a matter of arrangement between the author and his or her publishers or licensees. Different treatment may be accorded by the University in case of specific contracts providing for an exception, in cases where the University or sponsor may employ personnel for the purpose of producing a specific work, where different treatment is deemed necessary to reflect the contribution of the institution to the work, as in the case of software or audiovisual material, or where a sponsored agreement requires otherwise. All agreements concerning copyright ownership should be in writing and should be signed by the parties and approved by the Vice Chancellor for Research prior to the commencement of the work.

2. An institute, center, or other unit of the University that is itself a publisher and that engages faculty members and other employees to write for publication by that unit as a part of their professional duty or produce other copyrightable materials, such as audiovisual materials or computer software, may, subject to the approval of the Vice Chancellor for Research, adopt rules providing that copyright on materials prepared by such faculty members and other employees in the course of their professional work for that unit vests in the University and not in the author.

3. Guidelines and procedures for determining faculty, staff and student ownership of computer software were adopted by the NC State Board of Trustees, effective July 1, 1987, and are available from the Office of the Vice Chancellor for Research or the Office of Technology Administration, Room 1 Holladay Hall.



# FIELDS OF INSTRUCTION

This section identifies and gives pertinent information about all the fields of study that participate in graduate education at NC State. There are a total of 86 different fields that offer graduate degrees. In addition, there are eight fields that offer minors at the graduate level and eleven areas that support graduate support graduate education through offering graduate level courses or in some other capacity. Fields of instruction that offer graduate degrees are listed first. Information given for each field include the faculty, requirements for admission to and completion of the degree program(s), student financial support, courses offered and other relevant information. Following the degree offering fields is a listing other fields of instruction which offer graduate minors, graduate courses or support graduate education in some other way. To avoid duplication, basic Graduate School requirements for admission and completion of graduate degree programs are not duplicated for each field of instruction. Only those requirements that are unique to the field are given in the sections on the individual fields. Graduate School requirements for admission are given in detail on pages 14-15 and for completion of degree programs on pages 39-53 in this catalog and are summarized on pages 75 and 76.

## Fields Offering Graduate Degrees

The Graduate School offers major programs of study in the following fields. Except where noted by an ♦ or an exception in parentheses, these programs required the Graduate Records Examination (GRE) scores and will not take action on applications unless accompanied by scores for at least the GRE General (Aptitude) Test (verbal, quantitative and analytical):

Accounting - Master of (GMAT)

Adult and Community College Education - Master of Education, M.S., Ed.D. (GRE or MAT)

Aerospace Engineering - M.S., Ph.D.

Agricultural Economics - M.S. (Exceptions apply; consult program)

Agricultural and Extension Education - M.S. (GRE or MAT)

Agricultural Education - Master of Education

Agriculture - Master of (Consult program of interest)

Animal Science - M.S., Ph.D.

Applied Mathematics - M.S., Ph.D. (and GRE Subject Test)

Architecture - Master of (Exceptions apply; consult program)

Biochemistry - M.S., Ph.D.

Biological and Agricultural Engineering - Master of, M.S., Ph.D. (Exceptions apply; consult program)

Biomathematics - Master of, M.S., Ph.D.

Botany - M.S., Ph.D.

Chemical Engineering - Master of, M.S., Ph.D.  
 Chemistry - Master of, M.S., Ph.D. (Not required but strongly encouraged)  
 Civil Engineering - Master of, M.S., Ph.D.  
 Computer Engineering - M.S., Ph.D.  
 Computer Science - Master of, M.S., Ph.D. (and GRE Subject Test)  
 Counselor Education - Master of, M.S., Ph.D. (GRE or MAT)  
 Crop Science - M.S., Ph.D.  
 Curriculum and Instruction - Master of Education, M.S., Ph.D. (GRE or MAT)  
 Economics - Master of, M.A., Ph.D. (Exceptions apply; consult program)  
 Educational Research and Policy Analysis - Ph.D. (GRE or MAT)  
 Electrical Engineering - Master of, M.S., Ph.D.  
 ♦Engineering--Master of (Off-campus program only)  
 English - M.A.  
 Entomology - M.S., Ph.D.  
 Fiber and Polymer Science - Ph.D.  
 Food Science - M.S., Ph.D.  
 Forestry - Master of, M.S., Ph.D.  
 Genetics - M.S., Ph.D.  
 Graphic Design - Master of (Exceptions apply; consult program)  
 Health Occupations Teacher Education - Master of Education, M.S. (GRE or MAT)  
 Higher Education Administration - Master of Education, M.S., Ed.D. (GRE or MAT)  
 History - M.A.  
 Horticultural Science - M.S., Ph.D.  
 Immunology - M.S., Ph.D.  
 Industrial Design - Master of (Not required but strongly encouraged)  
 Industrial Engineering - Master of, M.S., Ph.D.  
 Integrated Manufacturing Systems Engineering - Master of (Exceptions apply; consult program)  
 International Development, Technology for - Master of  
 Landscape Architecture - Master of (Not required but strongly encouraged)  
 ♦Liberal Studies - M.A.  
 ♦Life Sciences - Master of (Consult program of interest)  
 Management - M.S. (GMAT)  
 Marine, Earth and Atmospheric Sciences - M.S., Ph.D. (and GRE Subject Test)  
 Materials Science and Engineering - Master of, M.S., Ph.D. (Exceptions apply; consult program)  
 Mathematics - M.S., Ph.D. (and GRE Subject Test)  
 Mathematics Education - Master of Education, M.S., Ph.D. (MR, GRE or MAT; PhD, GRE only)  
 Mechanical Engineering - Master of, M.S., Ph.D.  
 Microbiology - M.S., Ph.D.  
 Middle Grades Education - Master of Education, M.S. (GRE or MAT)  
 Natural Resources Administration - Master of, M.S.  
 Nuclear Engineering - Master of, M.S., Ph.D. (Exceptions apply; contact program)



Nutrition - M.S., Ph.D.  
 Occupational Education - Master of Education, M.S., Ed.D. (GRE or MAT)  
 Operations Research - Master of, M.S., Ph.D. (Exceptions apply; contact program)  
 Parks, Recreation and Tourism Management - Master of, M.S.  
 Physics - M.S., Ph.D. (and GRE Subject Text)  
 Physiology - M.S., Ph.D.  
 Plant Pathology - M.S., Ph.D.  
 Political Science - M.A. (and GRE Subject Test. Not required but strongly encouraged)  
 Poultry Science - M.S. (Not required but strongly encouraged)  
 Psychology - M.S., Ph.D. (and GRE Subject Test and MAT. Not required but strongly encouraged)  
 Public Administration - Master of  
 Public History - M.A.  
 Rural Sociology - M.S.  
 Science Education - Master of Education, M.S., Ph.D (MR, GRE or MAT; PhD, GRE only)  
 Sociology - Master of, Ph.D.  
 ♦Soil Science - M.S., Ph.D.  
 Special Education - Master of Education, M.S. (GRE and MAT)  
 Statistics - Master of, M.S., Ph.D.  
 Technical Communication - M.S.  
 Technology Education - Master of Education, M.S., Ed.D. (GRE or MAT)  
 Textile Chemistry - M.S.  
 Textile Engineering - M.S.  
 Textile Management and Technology - Master of, M.S.  
 Textile Materials Science - M.S.  
 Textile Technology Management - Ph.D. (GRE or GMAT)  
 Toxicology - Master of, M.S., Ph.D.  
 Training and Development - Master of Education, M.S. (GRE or MAT)  
 Veterinary Medical Sciences - M.S., Ph.D.  
 Wildlife Biology - Master of, M.S. (GRE and GRE Subject Test not required but strongly encouraged)  
 Wood and Paper Science - Master of, M.S., Ph.D.  
 Zoology - M.S., Ph.D. (and GRE Subject Test. Not required but strongly encouraged)

Departments not normally requiring GRE scores may in special instances require their submission as additional information to be used in making a judgment of the student's potential for succes in a graduate program.

The following fields and units, while not offering graduate degrees, support graduate education by offering graduate minors and graduate courses or in some other capacity:

Anthropology	Design
Artificial Intelligence	Ecology
Biological Sciences	Education
Biomedical Engineering	Engineering

Biotechnology  
Business Management  
Communication  
Computational Engineering and  
Science

Foreign Languages and Literatures  
Pest Management  
Philosophy  
Plant Physiology  
Solid State Sciences  
Water Resources

## BASIC GRADUATE SCHOOL REQUIREMENTS

### Basic Requirements for Admission

Basic requirements for admission to the Graduate School include two official transcripts from all colleges and universities previously attended, references from at least three people who know of the student's academic record and potential for graduate study, a non-refundable \$55.00 application fee, Test of English as a Foreign Language (TOELF) scores for students whose first language is not English, and, in most cases, an official statement of the student's Graduate Record Examination (GRE) scores and/or other standardized tests. The minimum TOEFL score, unless otherwise specified, is 550, with scores of at least 50 on at least two of the sections and no section score below 45. The student's area of special interest may have additional requirements which are included in the individual program descriptions to follow.

### Basic Requirements for Master's Degrees

A minimum of 30 semester credit hours is required for all master's degrees; however, many programs require more than thirty. Also, many students, in order to gain the breadth desired in their program or to make up deficits in their undergraduate degree, will actually take more credit hours than the minimum required by the program. At least 20 semester hours must come from 500- and 600-level courses. No more than two credit hours of departmental seminar may be included in the minimum 30-credit program. Programs that require a thesis may include no more than six hours of research credit (699) in the minimum 30-credit-hour program. Research credit is not appropriate in the non-thesis programs. Non-thesis programs may include no more than six hours of independent study credits in the minimum 30-credit program. Courses at the 400 level counted toward the minimal 30-hour requirement may not come from the major field.

### Basic Requirements for Doctoral Degrees

The doctorate symbolizes the ability of the recipient to undertake original research and scholarly work at the highest levels without supervision. The degree is therefore not granted simply upon completion of a stated amount of course work but rather upon demonstration by the student of a comprehensive knowledge and high attainment in scholarship in a specialized field of study. The student must demonstrate this ability by passing written and oral preliminary comprehensive examinations in the field of

specialization and related areas of knowledge, where applicable, and by successfully defending the methodology used and conclusions reached in the research, as reported in the dissertation, in an open oral examination. In addition, the student must meet the residence requirement as described earlier.

## COURSES

The courses listed in this catalog are planned for the academic years 1996-1997 and 1997-1998, unless indicated.

Courses at the 500- and 600-level are graduate courses, but 500-level courses are open to advanced undergraduate students, unless otherwise specified. Graduate standing is a prerequisite for all 600-level courses.

### Course Descriptions

For a description of courses being offered, either consult the Graduate School Home Page on the World Wide Web at <http://www2.acs.ncsu.edu/grad/> or obtain a copy of the course catalog, listing all undergraduate and graduate courses, which is under development.

# MAJOR FIELDS OF STUDY

## Accounting

Degree Offered: Master of Accounting

### GRADUATE FACULTY

*KPMG Peat Marwick Professor* C. J. Messere, *Head of the Department*  
*Associate Professor* R.L. Peace, *Director of Graduate Programs*  
Box 8113, (919) 515-4431, bob\_peace@ncsu.edu

*Professors:* J. W. Bartley, K. B. Frazier, P. F. Williams; *Associate Professor:* G. J. Zuckerman; *Assistant Professors:* M. S. Beasley, B. C. Branson, F. A. Buckless, Y. A. Chen, K. A. Krawczyk, R. L. McClenny, D. P. Pagach, R. B. Sawyers

The Master of Accounting (MAC) is a professional degree designed to prepare students for careers as public accountants, internal auditors or tax specialists. Graduates will be prepared to complete the CPA Examination.

**Admission Requirements:** Successful applicants typically have a Graduate Management Admissions Test (GMAT) score above 500 and a 3.0 minimum undergraduate GPA. The best-qualified applicants will be accepted up to the number of spaces available for new students. Exceptions to the minimum GPA and GMAT score may be made because of the consideration given to other relevant factors. Prerequisite courses for admission to the master's program include accounting and certain other courses that are the equivalent of those required for an undergraduate degree in accounting. Applicants may receive provisional admission prior to completion of the prerequisites, but will not be admitted to 500-level courses until prerequisites are completed. Complete information and application forms can be obtained from the Director of Graduate Programs.

**Master's Degree Requirements:** A minimum of 6 (maximum of 9) non-ACC credits are required. There are no required courses, but all programs of study are subject to approval by the Director of Graduate Programs. The curriculum is designed to allow concentrations of course work in either auditing or taxation.

**Other Relevant Information:** Master's students must begin the degree program in the fall semester, and they must carry at least two classes.

In order to assure that an application will be considered for the next fall semester, all application forms, transcripts, applicable fees, resumes, letters of recommendation and other relevant material must be received no later than March 1. Applicants wishing to



receive early notification of the admission decision should submit all required documents prior to December 1 of the year prior to admission.

### GRADUATES COURSES

ACC 508 ADVANCED COMMERCIAL LAW.  
ACC 510 ADVANCED FINANCIAL ACCOUNTING.  
ACC 515 ACCOUNTING THEORY AND CURRENT ISSUES.  
ACC 519 INTEGRATED ACCOUNTING PRACTICE.  
ACC 521 PRODUCTION COST ANALYSIS AND CONTROL.  
ACC 525 ADVANCED MANAGEMENT ACCOUNTING.  
ACC 530 ADVANCED INCOME TAX.  
ACC 533 ACCOUNTING AND TAX RESEARCH METHODOLOGY.  
ACC 534 TAXATION OF CORPORATIONS AND SHAREHOLDERS.  
ACC 535 TAXATION OF PARTNERSHIPS AND S CORPORATIONS.  
ACC 536 TAXATION OF ESTATES, TRUSTS AND GIFTS.  
ACC 537 TAX PLANNING AND BUSINESS STRATEGY.  
ACC 550 AUDITING IN A COMPUTER ENVIRONMENT.  
ACC 551 ADVANCED AUDITING.  
ACC 552 ADVANCED AUDITING AND ACCOUNTING CASES.  
ACC 581 SURVEY OF FINANCIAL ACCOUNTING.  
ACC 582 SURVEY OF MANAGEMENT ACCOUNTING.  
ACC 588 SPECIAL TOPICS IN ACCOUNTING.  
ACC 598 INDEPENDENT STUDY IN ACCOUNTING.

## Adult and Community College Education

Degrees Offered: Ph.D., Ed.D., M.S., M.Ed.

### GRADUATE FACULTY

*Professor W. L. Deegan, Head of the Department*  
*Associate Professor E. I. Farmer, Director of Graduate Programs*  
Box 7801, (919) 515-6238, farmer@poe.coe.ncsu.edu

*Joseph D. Moore Distinguished Professor G. A. Baker III*

*Professors:* E. J. Boone, J. C. Glass Jr., E. MacPhail-Wilcox, R. C. Serow, R. G. Taylor Jr., G. B. Vaughan.; *Visiting Professor:* L. F. Harper; *Professors Emeriti:* M. P. Burt, G. L. Carter, Jr., M. S. Knowles; *Associate Professors:* H. D. Akroyd, R. Gillett-Karam, J. M. Groff; *Visiting Associate Professors:* J. L. Burrow, J. B. Nichol.; *Assistant Professors:* P. F. Bitting, S. A. J. Colin III, J. L. Keedy, W. Lee, J. R. Valadez, A. L. Wilson; *Visiting Assistant Professors:* D. J. Eaker-Rich, J. J. Hoey IV, B. I. Mallette, R. E. Parries, J. M. Pettitt; *Adjunct Assistant Professors:* P. J. Fairchild, M. F. Gast, N. E. Hagan, E. S. Knott

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* L. F. Bunn, R. D. Mustian, R. W. Shearon; *Associate Professor:* R. T. Liles

The department offers degrees in adult and community college education, higher education administration, training and development, educational research and policy analysis, and health occupations teacher education to meet the professional needs of administrators, supervisors, specialists and instructors in community colleges, four-year colleges and universities, business and industry, the professions and other adult education organizations. Program concentrations include adult and continuing education, community college leadership and higher education, and training and development.

*Admission Requirements:* In addition to Graduate School admission requirements, the Department requires supplemental evidence of qualifications. Specific information regarding admission can be obtained by contacting the Director of Graduate Programs.

*Master's Degree Requirements:* The M.S. and M.Ed. programs requires a minimum of 30 or 36 credit hours, respectively. A graduate course in statistics and a thesis are required for the M.S.

*Doctoral Degree Requirements:* The Ed.D. program requires extensive research work and may include participation in a supervised internship experience. The doctoral program must be completed within seven years from the date of admission. One academic year of full-time residency is required.

*Student Financial Support:* A few graduate assistantships may be available to students in this program.

*Other Relevant Information:* Students may concentrate in adult and continuing education (continuing professional education, educational gerontology), health occupations, four-year colleges and universities, community and technical colleges, and training and development.

## GRADUATES COURSES

EAC 500 COMMUNITY COLLEGE AND TWO-YEAR POSTSECONDARY EDUCATION.

EAC 503 THE PROGRAMMING PROCESS IN ADULT AND COMMUNITY COLLEGE EDUCATION.

EAC 504 LEADERSHIP IN HIGHER AND COMMUNITY COLLEGE EDUCATION.

EAC 505 GROUP PROCESS IN ADULT AND COMMUNITY COLLEGE EDUCATION.

EAC 510 ADULT EDUCATION: HISTORY, PHILOSOPHY, CONTEMPORARY NATURE.

EAC 517 CURRENT ISSUES IN HIGHER EDUCATION.

EAC 532 HEALTH CARE DELIVERY SYSTEMS AND ENVIRONMENTS.

EAC 535 CURRICULUM AND INSTRUCTION IN THE HEALTH PROFESSIONS.

EAC 536 ISSUES AND TRENDS IN EDUCATION FOR THE HEALTH PROFESSIONS.

- EAC 538 INSTRUCTIONAL STRATEGIES IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 539 EDUCATIONAL GERONTOLOGY.
- EAC 540 EXTENSION IN DEVELOPING COUNTRIES.
- EAC 543 ADULTHOOD AND LEARNING: THE LATER YEARS.
- EAC 545 DEATH AND DYING: A LIFESPAN ISSUE.
- EAC 549 FINANCE IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 550 THE ENVIRONMENT FOR LEARNING IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 559 THE ADULT LEARNER.
- EAC 567 EDUCATION OF SPECIAL ADULT POPULATIONS.
- EAC 578 LAW AND HIGHER EDUCATION.
- EAC 579 CONCEPTS AND PRINCIPLES OF EVALUATION APPLIED TO NON-FORMAL ADULT EDUCATION PROGRAMS.
- EAC 582 ORGANIZATION AND OPERATION OF TRAINING AND DEVELOPMENT PROGRAMS.
- EAC 585 QUALITATIVE RESEARCH IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 586 METHODS AND TECHNIQUES OF TRAINING AND DEVELOPMENT.
- EAC 596 TOPICAL PROBLEMS IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 599 RESEARCH PROJECTS IN EDUCATION.
- EAC 600 ORGANIZATIONAL CONCEPTS AND THEORIES APPLIED TO ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 601 ADMINISTRATIVE CONCEPTS AND THEORIES APPLIED TO ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 603 THE COLLEGE AND UNIVERSITY PRESIDENCY.
- EAC 607 THE POLITICS OF HIGHER EDUCATION.
- EAC 610 ADVANCED QUALITATIVE RESEARCH METHODS.
- EAC 616 HISTORY OF HIGHER EDUCATION IN THE UNITED STATES.
- EAC 621 INTERNSHIP IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 637 PRACTICUM IN HEALTH OCCUPATIONS.
- EAC 696 SEMINAR IN ADULT AND COMMUNITY COLLEGE EDUCATION.
- EAC 699 THESIS AND DISSERTATION RESEARCH.
- ELP 514 FORMATIVE IDEAS IN AMERICAN EDUCATION.
- ELP 515 EDUCATION AND SOCIAL DIVERSITY.
- ELP 518 INTRODUCTION TO EDUCATION LAW.
- ELP 532 INTRODUCTION TO EDUCATIONAL INQUIRY.
- ELP 534 ETHICS AND EDUCATIONAL DECISION MAKING.
- ELP 535 DECISION RESEARCH IN EDUCATION.
- ELP 536 QUALITATIVE RESEARCH IN EDUCATION AND POLICY ANALYSIS.
- ELP 541 PRACTICUM IN EDUCATION ADMINISTRATION.
- ELP 550 PRINCIPLES OF EDUCATIONAL ADMINISTRATION.
- ELP 569 THE PRINCIPALSHIP.
- ELP 580 EVALUATION THEORY AND PRACTICE IN EDUCATION.
- ELP 589 PERSONNEL APPRAISAL IN EDUCATION.
- ELP 597 SPECIAL PROBLEMS IN EDUCATION.
- ELP 599 RESEARCH PROJECTS IN EDUCATIONAL LEADERSHIP AND PROGRAM EVALUATION.
- ELP 614 CONTEMPORARY EDUCATIONAL THOUGHT.
- ELP 618 SCHOOL LAW FOR THE ADMINISTRATOR.
- ELP 620 CASES IN EDUCATIONAL ADMINISTRATION.
- ELP 621 INTERNSHIP IN EDUCATIONAL LEADERSHIP AND PROGRAM EVALUATION.
- ELP 632 APPLIED RESEARCH METHODS IN EDUCATION.
- ELP 697 PROBLEMS OF RESEARCH DESIGN IN EDUCATION.
- ELP 699 THESIS AND DISSERTATION RESEARCH.

# Aerospace Engineering

For a listing of graduate faculty and program information, see mechanical and aerospace engineering.

# Agricultural and Extension Education

Degree Offered: M.S.

## GRADUATE FACULTY

*Professor R. W. Shearon, Head of the Department*

*Associate Professor J. W. Flowers, Director of Graduate Programs*

Box 7607, (919) 515-2707, flowers@poe.coe.ncsu.edu

*Professors: G. W. Bostick Jr., D. M. Jenkins, G. E. Moore, R. D. Mustian; Professor*

*Emeritus: W. L. Carpenter; Associate Professors: L. R. Jewell, B. M. Kirby, R. T.*

*Liles*

The agricultural and extension education program provides for advanced study for professionals in agricultural education, extension education or related careers. Programs of study may be designed to meet the individual needs of the student. Courses may be selected that lead to advanced teacher licensure in agriculture or an emphasis in extension education leading to advancement in careers in the Cooperative Extension Service. Additional specialization in the student's teaching or extension field is provided through a minor or advised elective courses.

**Admission Requirements:** In addition to the Graduate School admission requirements, the department requires either GRE or the Miller's Analogies Test (MAT) scores, three positive references and a statement of career goals and/or research interests. An interview (personal or by telephone) is also required.

**Master's Degree Requirements:** The department offers an M. S. degree, which requires a thesis for which the student receives six hours of credit. In addition, an M.Ed. degree in agricultural education is available through the curriculum and instruction program as a non-thesis program track. Both master's degree programs require a total of 36 credit hours. Minors are optional but, if selected, require a minimum of nine credit hours.

**Doctoral Degree Requirements:** Doctoral programs with specializations in agricultural and extension education are offered through the Department of Adult and Community College Education and through the occupational education program.



*Student Financial Support:* A limited number of research and/or teaching assistantships are available on a competitive basis. Other financial aid is available on a competitive basis from the Graduate School.

## GRADUATE COURSES

AEE 521 PLANNING PROGRAMS IN AGRICULTURAL EDUCATION.

AEE 522 OCCUPATIONAL EXPERIENCE IN AGRICULTURE.

AEE 523 ADULT EDUCATION IN AGRICULTURE.

AEE 524 AGRICULTURAL OCCUPATIONS.

AEE 590 SPECIAL TOPICS IN AGRICULTURAL COMMUNICATIONS.

AEE 591 SEMINAR IN AGRICULTURAL AND EXTENSION EDUCATION.

AEE 593 SPECIAL PROBLEMS IN AGRICULTURAL AND EXTENSION EDUCATION.

AEE 595 SPECIAL TOPICS IN AGRICULTURAL AND EXTENSION EDUCATION.

AEE 624 SUPERVISION IN AGRICULTURAL EDUCATION.

AEE 699 RESEARCH IN AGRICULTURAL AND EXTENSION EDUCATION.

## **Agricultural Economics**

For a listing of graduate faculty and program information, see economics.

## **Agricultural Education**

For a listing of graduate faculty and program information, see agricultural and extension education for the Master of Science in agricultural and extension education degree and curriculum and instruction for the Master of Education in agricultural education degree.

## **Agriculture**

Several departments in the College of Agriculture and Life Sciences offer programs leading to the Master of Agriculture and/or the Master of Life Sciences. These are non-thesis degrees that are designed for students who wish to emphasize course work in a graduate program. As such it requires a total of 36 semester hours. A minimum of four semester hours in special problems is required and not more than six semester hours will be allowed. A minimum of 20 credit hours of 500- or 600-level course work is required.

# Animal Science

Degrees Offered: Ph.D., M.S., Master of Agriculture

## GRADUATE FACULTY

*Professor* K. L. Esbenshade, *Head of the Department*  
*William Neal Reynolds Professor* E. J. Eisen, *Director of Graduate Programs*  
Box 7621, (919) 515-4017, gene\_eisen@ncsu.edu

*Professors:* L. S. Bull, K. R. Butcher, E. V. Caruolo, J. C. Cornwell, R. G. Crickenberger, W. J. Croom, Jr., D. G. Davenport, R. W. Harvey, W. L. Johnson, E. E. Jones, R. L. McCraw, B. T. McDaniel, R. M. Petters, O. W. Robison, J. W. Spears, L. W. Whitlow, J. C. Wilk; *Visiting Professor:* R. E. McDowell.; *Professors Emeriti:* E. R. Barrick, R. F. Behlow, J. R. Jones, C. A. Lassiter, J. M. Leatherwood, J. G. Lecce, J. E. Legates, C. L. Markert, R. D. Mochrie, R. M. Myers, I. D. Porterfield, A. H. Rakes, H. A. Ramsey, F. D. Sargent, F. H. Smith, L. C. Ulberg, G. H. Wise; *Associate Professors:* B. P. Alston-Mills, J. D. Armstrong, J. H. Eisemann, W. L. Flowers, W. E. M. Morrow, J. Odle, S. P. Washburn; *Visiting Associate Professor:* G. G. Gomez; *Adjunct Associate Professor:* M. T. Coffey; *Associate Professors Emeriti:* E. U. Dillard, J. J. McNeill; *Assistant Professors:* C. E. Farin, B. A. Hopkins, J.-M. Luginbuhl, M. H. Poore, M. T. See; *Visiting Assistant Professors:* S. L. Ash, J. A. Moore

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* J. H. Britt, W. M. Hagler Jr., D. K. Larick; *Professor (USDA):* J. C. Burns; *Associate Professors:* G. W. Almond, G. A. Benson, M. D. Whitacre; *Assistant Professor:* C. M. Williams

Animal science offers an opportunity for training in a diversity of basic sciences and the integration of such knowledge into the framework of a living system. Students may major or co-major in animal science or one of the following disciplines: biochemistry, genetics, microbiology, nutrition, physiology or statistics. Students may also concentrate in management and production areas.

*Admission Requirements:* Factors considered for admission include: grade point average, scores on the GRE (for M.S. and Ph.D. applicants), undergraduate courses, letters of recommendation and a member of the Animal Science Department faculty willing to serve as the applicant's advisor.

*Master of Science:* The minor is optional but external faculty representation is required on the advisory committee.

**Doctoral Degree Requirements:** Majors in animal science do not have specific course requirements. Each student's course program is developed in consultation with the Ph.D. advisory committee. The minor is optional but external faculty representation is required on the advisory committee.

**Student Financial Support:** The department offers a limited number of half-time research assistantships on a competitive basis. To be eligible for support, applicants must have a minimum grade point average of 3.2.

**Other Relevant Information:** To provide an opportunity for students to develop their teaching skills, all graduate students are required to assist in the departmental teaching program, regardless of source of financial support.

### GRADUATES COURSES

ANS 500 ADVANCED RUMINANT NUTRITION.  
ANS(PHY) 502 REPRODUCTIVE PHYSIOLOGY OF MAMMALS.  
ANS(GN) 508 GENETICS OF ANIMAL IMPROVEMENT.  
ANS 510 ADVANCED LIVESTOCK MANAGEMENT.  
ANS(NTR) 516A,B,C,D ANIMAL NUTRITION RESEARCH METHODS.  
ANS 520 LIVESTOCK PRODUCTION IN WARM CLIMATES.  
ANS(PHY) 580 MAMMALIAN ENDOCRINOLOGY.  
ANS 590 TOPICAL PROBLEMS IN ANIMAL SCIENCE.  
ANS(GN) 603 QUANTITATIVE GENETICS AND BREEDING.  
ANS(NTR,PO) 605 MINERAL METABOLISM.  
ANS 606 MAMMALIAN EMBRYO MANIPULATION.  
ANS(NTR,PHY,VMS) 632 COMPARATIVE PHYSIOLOGY OF THE DIGESTIVE SYSTEM.  
ANS 699 RESEARCH IN ANIMAL SCIENCE.

## Applied Mathematics

For a listing of graduate faculty and program information, see mathematics.

## Architecture

Degrees Offered: Master of Architecture

### GRADUATE FACULTY

*Professor C. A. Saccopoulos, Head of the Department*  
*Associate Professor J. P. Rand, Director of Graduate Programs*  
Box 7701, (919) 515-7114, carbuckle@unity.ncsu.edu

*Graduate Alumni Distinguished Professor:* H. Sanoff

*Professors:* P. Batchelor, R. P. Burns Jr., R. H. Clark, M. J. Malecha, J. W. Place, G. J. Reuer, P. Tesar; *Visiting Professors:* E. F. Harris Jr.; *Professors Emeriti:* G. L. Bireline, E. W. Taylor; *Associate Professors:* F. C. Harmon, J. O. Tector; *Associate Professor Emeritus:* D. W. Barnes Jr.; *Assistant Professors:* S. L. Roe, R. L. Spears; *Visiting Assistant Professor:* I. D. Fatea

The Department of Architecture offers three tracks to the Master of Architecture degree: Track 1 is for applicants with a four-year undergraduate degree in architecture and may be completed in two years of full-time study. Track 2 is for applicants holding a five-year NAAB-accredited Bachelor of Architecture degree and normally requires three semesters in residence. Track 3 is for students with degrees in fields other than architecture. This track normally requires four semesters of preparatory work before entering the final two-year program of graduate study. Some applicants with design-related academic or professional experience may be able to complete the preparatory work in less than four semesters. Curriculum requirements for the M.Arch. degree are held to a minimum in order to permit students the necessary flexibility to achieve individual educational and professional goals.

A variety of courses are available within the Department of Architecture in urban and community design, architectural history and theory, methods and programming, architectural conservation, professional practice, building technology and environmental systems.

### **Admission Requirements**

In addition to documents required by the Graduate School, students apply to the Master of Architecture program by submitting the following documents by January 15: 1. Personal Data form; 2. GRE scores (Track 3 applicants only); 3. Portfolio; 4. Statement of purpose. Applicants will be considered on an individual basis. Exceptions to Graduate School policy may be made for students indicating other qualifications and professional experience.

### **Master's Degree Requirements**

The department stipulates the minimum course credits based on educational and professional goals to individualize a plan of study.

### **Student Financial Support**

There are limited provisions for tuition remission permitting out-of-state students to pay in-state tuition. The department awards a number of teaching and research assistantships on the basis of ability and need, and applications are available from the graduate secretary. Students are also encouraged to apply for competitive national fellowships.



## GRADUATES COURSES

ARC 543 ANALYSIS OF PRECEDENT.  
ARC 544 ARCHITECTURAL CONSERVATION.  
ARC 546 THEORY OF BUILDING TYPES.  
ARC 551 DESIGN METHODS AND PROGRAMMING.  
ARC 561 THE PRACTICE OF ARCHITECTURE.  
ARC 570 ANATOMY OF THE CITY.  
ARC 571 URBAN HOUSING.  
ARC 573 ENVIRONMENTAL PERCEPTION.  
ARC 574 PLACE AND PLACE MAKING.  
ARC 575 PARTICIPATORY DESIGN IN ARCHITECTURE.  
ARC 580 SPECIAL TOPICS IN ARCHITECTURE.  
ARC 591 SPECIAL PROJECT IN ARCHITECTURE.  
ARC 595 INDEPENDENT STUDY.  
ARC 600 ADVANCED ARCHITECTURAL DESIGN (SERIES).  
ARC 681 FINAL PROJECT RESEARCH IN ARCHITECTURE.  
ARC 688 FINAL PROJECT STUDIO IN ARCHITECTURE.

## Biochemistry

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor J. W. Moyer, Interim Head of the Department*  
Box 7622, 919-515-2581, [jmoyer@bchserver.bch.ncsu.edu](mailto:jmoyer@bchserver.bch.ncsu.edu)

*University Professor:* E. C. Theil  
*William Neal Reynolds Professor:* W. L. Miller

*Professors:* P. F. Agris, E. S. Maxwell, J. D. Otvos, E. C. Sisler; *Adjunct Professors:* K. S. Korach; *Professors Emeriti:* F. B. Armstrong, L. W. Aurand, H. R. Horton, J. S. Kahn, I. S. Longmuir; *Associate Professors:* L. K. Hanley-Bowdoin, C. C. Hardin, J. A. Knopp, P. L. Wollenzien; *Assistant Professors:* J. C. Hall, C. L. Hemenway

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* H. M. Hassan, D. E. Sayers, H. E. Swaisgood

The graduate program in biochemistry is designed to prepare individuals for careers in research and teaching. Emphasis is primarily focused on laboratory research, where graduate students work closely with faculty. The department is well equipped to conduct research in biochemistry, biophysics, molecular biology and molecular genetics.

**Admission Requirements:** Students entering the graduate program in biochemistry should have a bachelor's degree in biochemistry, chemistry or a related physical or biological science, including undergraduate courses in organic chemistry, calculus, physics and one year of physical chemistry, as well as biochemistry/molecular biology.

**Master of Science Degree Requirements:** Up to 6 of the 30 credits required may be earned in laboratory rotations (BCH 692) and thesis research (BCH 699). On average, completion of the M.S. degree requires 2 to 3 years.

**Doctoral Degree Requirements:** Requirements for the Ph.D. degree include a minimum of 30 credit hours in course work and thesis research, including at least two advanced courses in biochemistry/molecular biology; teaching experience. Formal course work may be completed within three semesters; on average, completion of the Ph.D. degree requires 5 years.

**Student Financial Support:** The department endeavors to meet the financial needs of students accepted into its doctoral program. Essentially all admitted students are offered the opportunity to apply for graduate teaching and research assistantships.

**Other Relevant Information:** The Department of Biochemistry is jointly administered by the Colleges of Agriculture and Life Sciences and Physical and Mathematical Sciences. The department, committed to a strong research environment, interacts with other life science departments on campus as well with the other research universities and institutes of the Research Triangle area.

## GRADUATES COURSES

- BCH 552 EXPERIMENTAL BIOCHEMISTRY.
- BCH 553 METABOLISM AND MOLECULAR BIOLOGY.
- BCH 590 SPECIAL TOPICS IN BIOCHEMISTRY.
- BCH 601 MACROMOLECULAR STRUCTURE.
- BCH 603 MACROMOLECULAR SYNTHESIS AND REGULATION.
- BCH 605 MOLECULAR BIOLOGY OF THE CELL.
- BCH 651 BIOPHYSICAL CHEMISTRY.
- BCH 653 BIOCHEMISTRY OF HORMONE ACTION.
- BCH(GN) 658 NUCLEIC ACIDS: STRUCTURE AND FUNCTION.
- BCH(GN) 661 ADVANCED MOLECULAR BIOLOGY OF THE CELL.
- BCH 691 SEMINAR IN BIOCHEMISTRY.
- BCH 692 LABORATORY ROTATIONS.
- BCH 695 SPECIAL TOPICS IN BIOCHEMISTRY.
- BCH 699 BIOCHEMICAL RESEARCH.

# Biological and Agricultural Engineering

Degrees Conferred: Ph.D., M.S., Master of Biological and Agricultural Engineering

## GRADUATE FACULTY

*Professor D. B. Beasley, Head of the Department*

*Professor J. H. Young, Director of Graduate Programs*

Box 7625, (919) 515-6714, jim\_young@ncsu.edu

*Distinguished University Professor, William Neal Reynolds Professor and Graduate Alumni Distinguished Professor: R. W. Skaggs*

*Professors: C. F. Abrams Jr., J. C. Barker, D. B. Beasley, R. W. Bottcher, F. J. Humenik, E. G. Humphries, G. J. Kriz, W. F. McClure, R. P. Rohrbach, R. S. Sowell, L. F. Stikeleather, P. W. Westerman, D. H. Willits; Professor (USDA): T. B. Whitaker; Adjunct Professor: L. M. Safley; Professors Emeriti: H. D. Bowen, J. W. Dickens, L. B. Driggers, W. H. Johnson, F. M. Richardson, R. E. Sneed, C. W. Suggs, E. H. Wiser; Associate Professors: G. R. Baughman, S. M. Blanchard, C. G. Bowers Jr., R. L. Huffman, G. D. Jennings, J. E. Parsons, A. R. Rubin; Visiting Associate Professor: G. T. Roberson; Assistant Professors: M. D. Boyette, J. J. Classen, R. O. Evans Jr., S. A. Hale; Visiting Assistant Professor: J. D. Spooner; Senior Researcher: S. C. Mohapatra*

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors: D. D. Hamann, A. E. Hassan, K. R. Swartzel; Visiting Professor: T. W. Ruffy Jr.; Associate Professor: T. M. Losordo; Assistant Professors: B. E. Farkas, S. C. Roe*

Course offerings or research facilities are available in the following areas: bio-instrumentation, biomechanics, human engineering, bioprocessing, food packaging and processing, biological systems modeling, aquaculture, hydrology, water table management, ground water management, animal waste management, non-point source pollution, power and machinery, soil and water, structures and environment, food and process engineering, electrical and electronic systems, forest mechanization, robotics, and machine vision.

*Admission Requirements:* A baccalaureate in biological or agricultural engineering or the equivalent is the preferred prerequisite for admission. Those with strong academic background in the physical or biological sciences may also be admissible with a requirement for certain additional background undergraduate work. In the case of appli-

cants with master's degrees, a master's GPA of at least 3.2 is required for admission. Exceptions to the overall undergraduate GPA requirements may be made for cases where performance in the major or during last two years was at or above the 3.0 level.

GRE scores are recommended for those with academic performance records near the minimal level. Applicants without engineering degrees from domestic accredited institutions must submit GRE scores to be considered for admission. Admission decisions are made by a faculty review committee. The best-qualified applicants will be accepted up to the number of spaces available for new students.

*Master's Degree Requirements: (M.BAE):* This non-thesis degree requires 33 hours of approved graduate course work and a directed special project which must comprise from 3-6 hours credit. A minor is required. *(M.S.):* A minor is required.

*Doctoral Degree Requirements:* Course hour requirements are flexible but typically include at least 36 hours beyond a master's degree. Direct admission without a master's is possible in exceptional cases. A minor is required.

*Student Financial Support:* Graduate assistantships are available to students in this program on a competitive basis.

### GRADUATES COURSES

- BAE 501 INSTRUMENTATION AND CONTROL FOR BIOLOGICAL SYSTEMS.
- BAE(VMS) 522 MECHANICS OF BIOLOGICAL MATERIALS.
- BAE 552 INSTRUMENTATION FOR AGRICULTURAL RESEARCH AND PROCESSING.
- BAE 572 IRRIGATION AND DRAINAGE.
- BAE(SSC) 573 HYDROLOGIC AND WATER QUALITY MODELING.
- BAE(CE) 578 AGRICULTURAL WASTE MANAGEMENT.
- BAE(FS) 585 FOOD RHEOLOGY.
- BAE 590 SPECIAL PROBLEMS.
- BAE(SSC) 671 THEORY OF DRAINAGE--SATURATED FLOW.
- BAE(SSC) 674 THEORY OF DRAINAGE--UNSATURATED FLOW.
- BAE(SSC) 680 TRANSPORT AND FATE OF CHEMICALS IN SOILS AND NATURAL WATERS.
- BAE 690 SPECIAL TOPICS.
- BAE 695 SEMINAR.
- BAE 699 RESEARCH IN BIOLOGICAL AND AGRICULTURAL ENGINEERING.

## Biomathematics

Degrees Offered: Ph.D., M.S., Master of Biomathematics

### GRADUATE FACULTY

*Professor K. H. Pollock, Director of Graduate Programs*  
Box 8203, (919) 515-1957, pollock@stat.ncsu.edu



**Professors:** H. T. Banks, J. W. Bishir, S. P. Ellner, J. F. Gilliam, T. Johnson, D. W. Nychka, H. E. Schaffer, J. F. Selgrade, R. E. Stinner, G. G. Wilkerson; **Adjunct Professor:** L. B. Crowder, P. H. Morgan; **Associate Professors:** B. G. Fitzpatrick, C. E. Smith, H. T. Tran; **Assistant Professor:** T. B. Kepler; **Adjunct Assistant Professors:** P. M. Dixon, J. S. Kimbell, M. W. Lutz, T. K. Pierson

Biomathematics is an interdisciplinary graduate program offering courses and research opportunities in basic and applied mathematical biology. Degree programs are flexible, to accommodate students with backgrounds in the biological, mathematical or physical sciences. The program also offers Ph.D. and master's-level minors. A brochure with additional information on requirements, courses, faculty and current research can be obtained by writing the program director.

**Admission Requirements:** Applicants should have either a bachelor's degree in biology with evidence of aptitude and interest in mathematics, or a bachelor's in a mathematical science with evidence of aptitude and interest in biology. Advanced (multivariate) calculus, linear algebra and general biology are prerequisites for all BMA courses, and deficiencies in these should be remedied during the first year of graduate study. The application must include a narrative statement (1-2 pages) of the applicant's goals and reasons for interest in the BMA program.

**Master's Degree Requirements:** The M.S. and M.BMA. degrees require BMA 567 or 611, 571-572; 2 upper-level biology courses; and 3 courses from the mathematical sciences or statistical sciences. The M.S. degree requires a thesis, and the M.BMA. requires two additional courses and a written project.

**Doctoral Degree Requirements:** Course requirements consist of a "core" and a "concentration" in some area of biology or mathematical sciences. Core requirements are: BMA 571-572, 610 and 611; 3 upper-level biology courses from at least two areas (e.g., physiology and evolution); and additional courses from the mathematical or statistical sciences. Concentration consists of either a Ph.D. co-major in a biological or mathematical science or a coherent series of 5 graduate courses approved by the student's committee, which must include a two-semester sequence and at least one 600-level course.

**Financial Assistance:** TAs (generally in the Department of Statistics), RAs and internships are available. Awards are based on GRE scores, transcripts and letters of recommendation. RAs usually are held by continuing students. To receive full consideration for financial aid, the completed application must be received by March 1.

**Other Relevant Information:** All students are required to participate in the BMA Graduate Seminar. Course requirements can be met by examination or by demonstrating that an equivalent course was completed at another university.

## GRADUATES COURSES

BMA 567 MODELING OF BIOLOGICAL SYSTEMS.  
BMA(MA,ST) 571 BIOMATHEMATICS I.  
BMA(MA,ST) 572 BIOMATHEMATICS II.  
BMA 591 SPECIAL TOPICS.  
BMA(MA,OR,ST) 610 STOCHASTIC MODELING.  
BMA(OR) 611 SYSTEM MODELING THEORY.  
BMA 691 ADVANCED SPECIAL TOPICS.  
BMA 694 SEMINAR.  
BMA 699 RESEARCH.

## Botany

Degrees Offered: Ph.D., M.S., Master of Life Sciences

### GRADUATE FACULTY

*Professor E. Davies, Head of the Department*

*Professor C. G. Van Dyke, Director of Graduate Programs*

Box 7612, (919) 515-2727, gerald\_vandyke@ncsu.edu

*University Research Professor: W. F. Thompson*

*Professors: N. S. Allen, U. Blum, W. F. Boss, R. C. Fites, J. W. Hardin, J. F. Thomas, T. R. Wentworth; Professor (USDA): H. E. Pattee; Visiting Professor: W. S. Chilton; Professors Emeriti: C. E. Anderson, R. J. Downs, W. W. Heck, R. L. Mott, G. R. Noggle, E. D. Seneca, J. R. Troyer; Associate Professors: R. L. Beckmann, R. S. Boston, J. M. Burkholder, J. E. Mickle, J. M. Stucky; Assistant Professor: D. Robertson*

### ASSOCIATED MEMBERS OF THE PROGRAM

*Professors: M. M. Goodman, E. C. Sisler; Professors (USDA): S. C. Huber, D. E. Moreland; Visiting Professor: T. W. Rufty Jr.; Associate Professor: H. V. Amerson; Associate Professor (USDA): K. O. Burkey*

Course offerings or research facilities are available in the following areas: molecular genetics and physiology of development and signal transduction; biochemistry of crown gall; fungal diseases; physiological ecology of freshwater, marine and terrestrial plants; community ecology; composite plant systematics; ultrastructure and anatomy.

*Admission Requirements:* In special situations, students with an undergraduate GPA of less than 3.00 (on a 4.00 scale) may be admitted provisionally. If students lack certain prerequisites (*i.e.* in mathematical, chemical, biological or other areas), additional

courses may be required that do not qualify for graduate credit. The best qualified students will be accepted when spaces are available for new students.

***Master's and Doctoral Degree Requirements:*** Courses from each of the four botany subdisciplines (ecology, physiology, anatomy and systematics) are required. Students must earn a letter grade of at least a "B" in these courses. Other requirements include: a graduate statistics course, a thesis (for the Ph.D. and M.S., but not the M.L.S.), a comprehensive examination (Ph.D.), oral thesis defense and a one-semester teaching responsibility per degree.

***Other Relevant Information:*** Graduate research and teaching assistantships and tuition remission information are available from the department. Graduate students are expected to attend and participate in the seminar program every semester they are in residence. The department is host to several training grants in plant cell and molecular biology founded by the McKnight Foundation, the Tri-Agency (NSF,DOE,USDA) and NASA.

### GRADUATE COURSES

- BO 510 PLANT ANATOMY.
- BO(CS,HS) 518 BIOLOGICAL CONTROL OF WEEDS.
- BO 522 ADVANCED MORPHOLOGY AND PHYLOGENY OF SEED PLANTS.
- BO 544 PLANT GEOGRAPHY.
- BO 545 PALEOBOTANY.
- BO(CS,GN,HS) 547 CELL AND TISSUE TECHNIQUES IN PLANT BREEDING.
- BO 551 ADVANCED PLANT PHYSIOLOGY I.
- BO 552 ADVANCED PLANT PHYSIOLOGY II.
- BO 554 LABORATORY IN ADVANCED PLANT PHYSIOLOGY II.
- BO(ZO) 560 PRINCIPLES OF ECOLOGY.
- BO 561 PHYSIOLOGICAL ECOLOGY.
- BO 565 PLANT COMMUNITY ECOLOGY.
- BO(MB) 574 PHYCOLOGY.
- BO(MB,PP) 575 THE FUNGI.
- BO(MB,PP) 576 THE FUNGI-LAB.
- BO 580 PLANT MOLECULAR BIOLOGY.
- BO 590 TOPICAL PROBLEMS.
- BO(PP) 625 ADVANCED MYCOLOGY.
- BO(GN,MB,PP) 627 FUNGAL GENETICS AND PHYSIOLOGY.
- BO 631 WATER RELATIONS OF PLANTS.
- BO 633 PLANT GROWTH AND DEVELOPMENT.
- BO(ZO) 660 ADVANCED TOPICS IN ECOLOGY I.
- BO 662 APPLIED COASTAL ECOLOGY.
- BO 691 BOTANY SEMINAR.
- BO 693 SPECIAL PROBLEMS IN BOTANY.
- BO 699 RESEARCH.

# Chemical Engineering

Degrees Offered: Ph.D, M.S., Master of Chemical Engineering

## GRADUATE FACULTY

*Hoechst-Celanese and Graduate Alumni Distinguished Professor* R. G. Carbonell,  
*Head of the Department*

*Professor* C. K. Hall, *Director of Graduate Programs*

Box 7905, (919) 515-2324, hall@eos.ncsu.edu

*Camille Dreyfus Professor:* H. B. Hopfenberg

*Distinguished University Professor:* D. F. Ollis

*Hoechst-Celanese Professor:* R. M. Felder

*Professors:* K. J. Bachmann, P. S. Fedkiw, R. M. Kelly, P. K. Kilpatrick, P. K. Lim, M. R. Overcash, G. W. Roberts, C. J. Setzer, R. M. Thorogood; *Adjunct Professor:* J. Preston; *Professors Emeriti:* J. K. Ferrell, D. B. Marsland, A. S. Michaels, V. T. Stannett; *Associate Professors:* B. D. Freeman, S. A. Khan, H. H. Lamb, S. W. Peretti, H. M. Winston; *Adjunct Associate Professors:* P. M. Schlosser, J. J. Spivey, J. L. Williams; *Assistant Professors:* C. S. Grant, G. N. Parsons; *Adjunct Assistant Professor:* R. T. Chern

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* H. Jameel, T. W. Joyce; *Associate Professor:* C. M. Balik

Research activities in the department include: biochemical engineering, catalysis and reaction engineering, computer-aided design and manufacturing, electronic materials, electrochemical engineering, environmental engineering; polymer science and engineering, thermodynamics and computer simulation, and transport phenomena.

*Admissions Requirements:* Students admitted to the graduate program normally have a bachelor's degree in chemical engineering or its equivalent. Students with undergraduate degrees in chemistry, physics or other engineering disciplines may be admitted but will be required to make up undergraduate course work deficiencies in chemical engineering without graduate credit. The most promising candidates will be accepted up to the number of spaces available.

*Master of Science Degree Requirements:* A set of 5 core courses is strongly recommended. The thesis must be defended in a final public oral examination.



*Master of Chemical Engineering Degree Requirements:* A 3-credit project is required. A set of 5 core courses is strongly recommended.

*Doctor of Philosophy Degree Requirements:* Students normally take a set of 5 core courses, two advanced chemical engineering courses and at least 6 credits of dissertation research. A thesis is required; this must be defended in a final public oral examination. In addition, the candidate must: (1) submit and defend an original written proposition in any area of chemical engineering, and (2) submit and defend a proposal to perform his/her thesis research.

### GRADUATE COURSES

CHE 511 CHEMICAL ENGINEERING PROCESS MODELING.  
CHE 513 THERMODYNAMICS I.  
CHE 515 TRANSPORT PHENOMENA I.  
CHE 516 TRANSPORT PHENOMENA II.  
CHE 517 CHEMICAL REACTION ENGINEERING.  
CHE 521 SEPARATION PROCESSES.  
CHE(OR) 527 OPTIMIZATION OF ENGINEERING PROCESSES.  
CHE 543 POLYMER SCIENCE AND TECHNOLOGY.  
CHE 551 BIOCHEMICAL ENGINEERING.  
CHE 552 SEPARATION PROCESSES FOR BIOLOGICAL MATERIALS.  
CHE(TC) 569 POLYMERS, SURFACTANTS AND COLLOIDAL MATERIALS.  
CHE 597 CHEMICAL ENGINEERING PROJECTS.  
CHE 598 SPECIAL TOPICS IN CHEMICAL ENGINEERING.  
CHE 613 THERMODYNAMICS II.  
CHE 617 ADVANCED CHEMICAL REACTION ENGINEERING.  
CHE 619 ELECTROCHEMICAL SYSTEMS ANALYSIS.  
CHE 660 PHOTOCHEMICAL ENGINEERING: FUNDAMENTALS AND APPLICATIONS.  
CHE(TC) 669 DIFFUSION IN POLYMERS.  
CHE(TC) 671 SPECIAL TOPICS IN POLYMER SCIENCE.  
CHE 695 SEMINAR.  
CHE 697 ADVANCED CHEMICAL ENGINEERING PROJECTS.  
CHE 699 RESEARCH.

## Chemistry

### GRADUATE FACULTY

Degrees Offered: Ph.D., M.S., Master of Chemistry

*Professor R. A. Osteryoung, Head of the Department*

*Professor R. J. Linderman, Director of Graduate Programs*

Box 8204, (919) 515-2548, russell\_linderman@ncsu.edu

*Professors:* R. D. Bereman, L. H. Bowen, C. L. Bumgardner, H. H. Carmichael, D. L. Comins, K. W. Hanck, F. C. Hentz Jr., S. G. Levine, M. L. Miles, C. G. Moreland, J. G. Osteryoung, S. T. Purrington, A. F. Schreiner, E. O. Stejskal, W.

P. Tucker, G. H. Wahl Jr., M. H. Whangbo, J. L. Whitten; *Professors Emeriti*: G. O. Doak, L. D. Freedman, F. W. Getzen, Z. Z. Hugus Jr., R. H. Loeppert, R. C. White; *Associate Professors*: C. B. Boss, E. F. Bowden, T. C. Caves, Y. Ebisuzaki, M. G. Khaledi, W. L. Switzer, D. W. Wertz; *Associate Professors Emeriti*: A. F. Coots, T. M. Ward; *Assistant Professors*: C. R. Corrman, C. B. Gorman, J. D. Martin, D. A. Shultz

## ASSOCIATE MEMBER OF THE PROGRAM

*Professor*: J. D. Otvos

The Department of Chemistry offers programs of study leading to the Doctor of Philosophy, Master of Science and Master of Chemistry degrees. The Ph.D. and M.S. degrees are based on original research, while the Master of Chemistry degree is a non-research degree. Many research projects merge disciplines such as biochemistry, computational science, materials science, physics, statistics and toxicology with chemistry. General courses as well as advanced and special topics courses are offered.

*Admission Requirements*: Applicants should have an undergraduate degree in chemistry or in a closely related field with a strong chemistry background. A GPA of at least 3.0 in the sciences is needed for consideration. GRE General Test scores are required, and the Subject Test is recommended. Admission decisions are made as completed applications are received. For most favorable consideration for the fall term, all application materials should be received by March 1; for spring admission, by August 15.

*Master's Degree Requirements*: The requirements for a Master of Chemistry degree are 27 hours of course work, 3 hours of a critical review paper and an oral examination on the review paper. Students in this program should have present or past experience in a research laboratory.

*Doctoral Degree Requirements*: In the doctoral program, emphasis is placed on original research and a comprehensive knowledge of one's chosen field. There are no definite credit-hour requirements for the doctoral degree.

*Student Financial Support*: Incoming graduate students are supported by departmental teaching assistantships. Outstanding applicants are eligible for supplemental fellowships during their first year of study. Research assistantships are normally available to second-, third-, and fourth-year students. The department also has fellowships for students interested in the area of electronic materials and fellowships for students interested in pharmaceutical and synthetic organic chemistry.

*Other Relevant Information*: The Department of Chemistry is one of five academic departments in the College of Physical and Mathematical Sciences. Several new faculty

have been added in the last few years, thereby enhancing opportunities for graduate research.

### GRADUATE COURSES

CH 501 ADVANCED INORGANIC CHEMISTRY I.  
CH 503 ADVANCED INORGANIC CHEMISTRY II.  
CH 505 PHYSICAL METHODS IN INORGANIC CHEMISTRY.  
CH(MAT) 507 CHEMICAL CONCEPTS IN MATERIALS SCIENCE AND ENGINEERING.  
CH 511 ADVANCED ANALYTICAL CHEMISTRY I.  
CH 513 ADVANCED ANALYTICAL CHEMISTRY II.  
CH 514 ELECTRONICS AND INSTRUMENTATION LABORATORY.  
CH 515 CHEMICAL INSTRUMENTATION.  
CH 517 PHYSICAL METHODS OF ELEMENTAL TRACE ANALYSIS.  
CH 518 TRACE ANALYSIS LABORATORY.  
CH 521 ADVANCED ORGANIC CHEMISTRY I.  
CH 523 ADVANCED ORGANIC CHEMISTRY II.  
CH 525 PHYSICAL METHODS IN ORGANIC CHEMISTRY.  
CH 527 MASS SPECTROMETRY.  
CH 530 ADVANCED PHYSICAL CHEMISTRY.  
CH 531 CHEMICAL THERMODYNAMICS I.  
CH 533 CHEMICAL KINETICS.  
CH 536 CHEMICAL SPECTROSCOPY.  
CH 537 QUANTUM CHEMISTRY.  
CH 539 COLLOID CHEMISTRY.  
CH(MAT,TC) 562 PHYSICAL CHEMISTRY OF HIGH POLYMERS--BULK PROPERTIES.  
CH 595 SPECIAL TOPICS IN CHEMISTRY.  
CH 611 ANALYTICAL SPECTROSCOPY.  
CH 613 ELECTROCHEMISTRY.  
CH 615 CHEMICAL SEPARATION.  
CH 625 ORGANIC REACTION MECHANISMS.  
CH 627 CHEMISTRY OF METAL-ORGANIC COMPOUNDS.  
CH 659 NATURAL PRODUCTS.  
CH(MAT,TC) 662 PHYSICAL CHEMISTRY OF HIGH POLYMERS--SOLUTION PROPERTIES.  
CH 691 SEMINAR.  
CH 695 ADVANCED TOPICS IN CHEMISTRY.  
CH 697 ADVANCED CHEMISTRY PROJECTS.  
CH 699 CHEMICAL RESEARCH.

## Civil Engineering

Degrees Offered: Ph.D., M. S., Master of Civil Engineering

### GRADUATE FACULTY

*Professor E. D. Brill Jr., Head of the Department*  
*Professor H. E. Wahls, Director of Graduate Programs*  
Box 7908, (919) 515-7344, wahls@eos.ncsu.edu

*Distinguished Professor: J. M. Hanson*

**Professors:** S. H. Ahmad, R. H. Borden, E. D. Brill Jr., J. S. Fisher, C. G. Gilbert, A. K. Gupta, K. S. Havner, Y. Horie, D. W. Johnston, N. P. Khosla, W. J. Rasdorf, N. M. Roupail, C. C. Tung; **Adjunct Professor:** L. E. King.; **Professors Emeriti:** M. Ameen, P. D. Cribbins, R. A. Douglas, J. F. Ely, R. E. Fadum, C. L. Heimbach, J. W. Horn, A. I. Kashef, C. L. Mann, S. W. Nunnally, M. E. Uyanik, P. Z. Zia; **Associate Professors:** M. A. Barlaz, J. W. Baugh, Jr., L. E. Bernold, W. L. Bingham, R. C. Borden, A. C. Chao, E. D. Gurley, Y. R. Kim, P. C. Lambe, H. R. Malcom Jr., V. C. Matzen, J. M. Nau, M. F. Overton, M. S. Rahman, J. C. Smith, J. R. Stone; **Assistant Professors:** H. C. Frey, T. Hassan, J. E. Hummer, N. Krstulovic, M. L. Leming, S. K. Liehr, S. R. Ranjithan, A. A. Tayebali; **Adjunct Assistant Professors:** D. R. van der Vaart

## ASSOCIATED MEMBER OF THE PROGRAM

*Assistant Professor* : B. Kasal

## INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

S. Chang, M. R. Salami, J. S. Wu

Graduate programs are offered in coastal and ocean engineering, computer-aided engineering, construction engineering and management, environmental and water resources engineering, geotechnical engineering, structures and mechanics, transportation engineering and materials.

**Admission Requirements:** Provisional admission may be granted to applicants who do not satisfy normal admission criteria but have other special qualifications. Applicants without academic experience in civil engineering may be required to take undergraduate courses to remove deficiencies, without graduate credit. The Graduate Record Examination normally is required of all applicants.

**Master's Degree Requirements: (M.CE.):** The M.CE. is an Option B non-thesis degree with other requirements, such as independent projects or core courses, specified in some areas of specialization. At least two-thirds of a master's program should be in a well-defined major area of concentration. A formal minor is not permitted. **(M.S.):** A thesis is required and a formal minor is optional.

**Doctoral Degree Requirements:** The Ph.D. typically requires one year of full-time course work beyond the master's degree. The program must develop a well-defined major area of concentration and may include supporting courses outside the major or a formal minor in a related field.

**Student Financial Support:** Departmental teaching and research assistantships are available. Full and partial fellowships, which may include tuition and fees, are available



for exceptional U. S. applicants. All financial aid recipients are selected on merit-based competition with other applicants. Applications requesting financial aid should be received by March 1 for Fall admission and by September 1 for Spring admission.

### GRADUATE COURSES

- CE 501 TRANSPORTATION SYSTEMS ENGINEERING.
- CE 502 TRAFFIC OPERATIONS.
- CE 503 HIGHWAY DESIGN.
- CE 504 WATER TRANSPORTATION.
- CE 508 PUBLIC WORKS ENGINEERING—OPERATIONS AND ADMINISTRATION.
- CE 509 PUBLIC WORKS ENGINEERING—ANALYSIS AND DESIGN.
- CE 510 AIRPORT PLANNING AND DESIGN.
- CE 511, 512 CONTINUUM MECHANICS I, II.
- CE 513 THEORY OF ELASTICITY I.
- CE 514 STRESS WAVES.
- CE 520 MATRIX AND FINITE ELEMENT STRUCTURAL ANALYSIS I.
- CE 521 ADVANCED STRENGTH OF MATERIALS.
- CE 522 ELASTIC STABILITY.
- CE 524 ANALYSIS AND DESIGN OF MASONRY STRUCTURES.
- CE 527 ANALYSIS AND DESIGN OF STRUCTURES FOR DYNAMIC LOADS.
- CE 531 STRUCTURAL MODELS.
- CE 534 PLASTIC ANALYSIS AND DESIGN.
- CE 536 THEORY AND DESIGN OF PRESTRESSED CONCRETE.
- CE 537 COMPUTER METHODS AND APPLICATIONS.
- CE 538 INFORMATION TECHNOLOGY AND MODELING.
- CE(MEA) 541 GRAVITY WAVE THEORY I.
- CE 544 FOUNDATION ENGINEERING.
- CE 548 ENGINEERING PROPERTIES OF SOILS I.
- CE 549 SOIL AND SITE IMPROVEMENT.
- CE 551 THEORY OF CONCRETE MIXTURES.
- CE 553 ASPHALT AND BITUMINOUS MATERIALS.
- CE 555 HIGHWAY PAVEMENT DESIGN.
- CE 557 PAVEMENT MANAGEMENT SYSTEMS.
- CE 559 INELASTIC BEHAVIOR OF CONSTRUCTION MATERIALS.
- CE 561 CONSTRUCTION PLANNING AND SCHEDULING.
- CE 562 CONSTRUCTION PRODUCTIVITY.
- CE 563 MATERIALS MANAGEMENT IN CONSTRUCTION.
- CE 564 LEGAL ASPECTS OF CONTRACTING.
- CE 566 BUILDING CONSTRUCTION SYSTEMS.
- CE 571 THEORY OF WATER AND WASTE TREATMENT.
- CE 572 DESIGN OF WATER AND WASTEWATER FACILITIES.
- CE 574 CHEMISTRY AND MICROBIOLOGY FOR ENGINEERS I.
- CE 575 MODELING AND ANALYSIS OF ENVIRONMENTAL SYSTEMS.
- CE 576 ENGINEERING PRINCIPLES OF AIR POLLUTION CONTROL.
- CE 577 ENGINEERING PRINCIPLES OF SOLID WASTE MANAGEMENT.
- CE(BAE) 578 AGRICULTURAL WASTE MANAGEMENT.
- CE 580 FLOW IN OPEN CHANNELS.
- CE 582 COASTAL HYDRODYNAMICS.
- CE 583 ENGINEERING ASPECTS OF COASTAL PROCESSES.
- CE 584 HYDRAULICS OF GROUND WATER.
- CE 585 URBAN STORMWATER MANAGEMENT.
- CE 586 ENGINEERING HYDROLOGY.
- CE 589 SPECIAL TOPICS IN CIVIL ENGINEERING.
- CE 591, 592 CIVIL ENGINEERING SEMINAR.

- CE 598 CIVIL ENGINEERING PROJECTS.
- CE 601 TRANSPORTATION PLANNING.
- CE 603 ADVANCED AIRPORT SYSTEMS DESIGN.
- CE 604 URBAN TRANSPORTATION PLANNING.
- CE 614 PLASTICITY AND LIMIT ANALYSIS.
- CE 615 FINITE DEFORMATION OF MATERIALS I.
- CE 620 MATRIX AND FINITE ELEMENT STRUCTURAL ANALYSIS.
- CE 623 THEORY OF PLATES AND SHELLS.
- CE 625, 626 ADVANCED STRUCTURAL DESIGN I, II.
- CE 627 ADVANCED ANALYSIS AND DESIGN OF STRUCTURES FOR DYNAMIC LOADS.
- CE 628 EARTHQUAKE STRUCTURAL ENGINEERING.
- CE 632 PROBABILISTIC METHODS OF STRUCTURAL ENGINEERING.
- CE 635 ADVANCED THEORY OF CONCRETE STRUCTURES.
- CE 637 COMPUTER-AIDED ENGINEERING SYSTEMS.
- CE 641, 642 ADVANCED SOIL MECHANICS.
- CE 644 GROUND WATER CONTAMINANT TRANSPORT.
- CE 646 DYNAMICS OF SOILS AND FOUNDATIONS.
- CE 661 DESIGN OF TEMPORARY STRUCTURES.
- CE 665 CONSTRUCTION EQUIPMENT SYSTEMS.
- CE 669 AUTOMATION AND ROBOTICS IN CIVIL ENGINEERING.
- CE 671 ADVANCED WATER MANAGEMENT SYSTEMS.
- CE 672 ADVANCED WATER AND WASTE TREATMENT: PRINCIPLES AND DESIGN.
- CE 673 HAZARDOUS WASTE MANAGEMENT AND TREATMENT.
- CE 674 CHEMISTRY AND MICROBIOLOGY FOR ENGINEERS II.
- CE 681 BEHAVIOR AND ANALYSIS OF OCEAN STRUCTURES.
- CE 685 DESIGN OF COASTAL FACILITIES.
- CE 689 ADVANCED TOPICS IN CIVIL ENGINEERING.
- CE 698 ADVANCED READING IN CIVIL ENGINEERING.
- CE 699 CIVIL ENGINEERING RESEARCH.

## Computer Engineering

For a listing of graduate faculty and program information, see electrical and computer engineering.

## Computer Science

Degrees Offered: Ph.D., M.S., Master of Computer Science

### GRADUATE FACULTY

*Professor A. L. Tharp, Head of the Department*

*Associate Professor R. A. Dwyer, Director of Graduate Programs*

Box 8206, (919) 515-2654, [graduate@csc.ncsu.edu](mailto:graduate@csc.ncsu.edu)

*Distinguished University Research Professor: D. L. Bitzer*

*Professors: W. Chou, R. J. Fornaro, R. E. Funderlic, D. F. McAllister, H. G. Perros, W. E. Robbins, C. D. Savage, W. J. Stewart, K. Tai; Adjunct Professor:*

R. J. Plemmons; *Professor Emeritus*: D. C. Martin; *Associate Professors*: D. R. Bahler, W. R. Cleaveland, II, E. W. Davis, Jr., E. F. Gehringer, T. L. Honeycutt, S. P. Iyer, D. S. Reeves, R. D. Rodman, M. F. M. Stallmann, M. A. V. Vouk; *Adjunct Associate Professor*: K. D. Clark; *Assistant Professors*: J. C. Lester, M. P. Singh, S. F. Wu; *Visiting Assistant Professor*: G. N. Rouskas; *Adjunct Assistant Professors*: G. Q. Kenney, J. Mauney, K. J. Ulberg, A. O. Zaghloof; *Assistant Professors Emeriti*: J. W. Hanson, N. F. Williamson

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors*: D. P. Agrawal, C. D. Meyer, Jr., W. E. Snyder; *Associate Professors*: J. W. Baugh Jr., I. Viniotis

The department awarded its first graduate degrees in 1990 and has quickly assumed a respectable place among Ph.D.-granting computer science departments. The faculty has broad-ranging interests in software systems, computer communications and performance analysis, computer architecture, and combinatorial and numerical algorithms.

*Admission Requirements*: Successful applicants have an accredited baccalaureate degree with a B average, including computer science course work at least equivalent to a minor. Applicants must submit scores for the GRE General Tests and GRE Computer Science Subject Test. [Exception: Applicants for the Master of Computer Science curriculum who do not desire financial aid may omit the Subject Test.] The department does not currently admit students on a provisional basis.

*Master's Degree Requirements*: The M.S. requires two core courses and thesis research (typically six credits). The advisory committee may waive the thesis requirement for students who pass the Ph.D. qualifying exams and complete specified course work in lieu of research. The Master of Computer Science is a terminal professional degree granted upon successful completion of 30 hours of course work, including three courses from the core list: CSC 501, CSC 505, CSC 506 and CSC 522.

*Doctoral Degree Requirements*: Ph.D. students normally complete 60 semester hours of post-baccalaureate course work. They must also complete written qualifying examinations in three broad areas (theoretical foundations, software systems and architecture), individualized in-depth written and oral preliminary examinations, and a public defense of a dissertation describing substantial original, independent scholarly work.

*Student Financial Support*: A unique asset is the department's Industrial Assistantship Program, under which graduate students perform part-time work at local firms. During 1995-96, this program supported five students, while 55 more held traditional teaching and research assistantships. Outstanding candidates may receive fellowships or be employed at lecturers.

*Other Relevant Information:* Graduates at all levels are highly respected and well paid locally and elsewhere. Many M.S. and M.CSC. graduates begin or continue careers performing and supervising advanced software development in and around the Research Triangle Park. Most recent Ph.D.s assumed positions of technical leadership in well-known large companies. Despite a competitive academic market, two assumed tenure-track faculty positions and two others declined such offers; two more pursued post-doctoral research.

### GRADUATE COURSES

CSC(ECE) 501 OPERATING SYSTEMS PRINCIPLES.  
CSC 502 COMPUTATIONAL LINGUISTICS.  
CSC (ECE) 505 DESIGN AND ANALYSIS OF ALGORITHMS.  
CSC(ECE) 506 ARCHITECTURE OF PARALLEL COMPUTERS.  
CSC(ECE) 510 SOFTWARE ENGINEERING.  
CSC 511 ARTIFICIAL INTELLIGENCE I.  
CSC 512 COMPILER CONSTRUCTION.  
CSC(ECE) 517 OBJECT-ORIENTED LANGUAGES AND SYSTEMS  
CSC 518 COMPUTER GRAPHICS.  
CSC 522 AUTOMATA, LANGUAGES AND COMPUTABILITY THEORY.  
CSC(MA) 529, 530 NUMERICAL ANALYSIS I, II.  
CSC 541 ADVANCED DATA STRUCTURES.  
CSC 542 DATABASE MANAGEMENT SYSTEMS.  
CSC(IE) 546 MANAGEMENT DECISION AND CONTROL SYSTEMS.  
CSC(OR,IE) 562 COMPUTER SIMULATION TECHNIQUES.  
CSC(ECE) 570 TELECOMMUNICATIONS SYSTEMS ENGINEERING.  
CSC(ECE) 571 COMPUTER NETWORKS.  
CSC(ECE) 572 INTRODUCTION TO COMPUTER COMMUNICATIONS.  
CSC(ECE) 573 INTRODUCTION TO COMPUTER PERFORMANCE MODELING.  
CSC 574 REAL TIME COMPUTER SYSTEMS.  
CSC(IE) 575 VOICE INPUT/OUTPUT COMMUNICATION SYSTEMS.  
CSC(MA,OR) 585 GRAPH THEORY.  
CSC 591 SPECIAL TOPICS IN COMPUTER SCIENCE.  
CSC 593 INDIVIDUAL STUDY IN COMPUTER SCIENCE.  
CSC 602 COMPUTATIONAL SEMANTICS.  
CSC 606 CONCURRENT SOFTWARE SYSTEMS.  
CSC 611 ARTIFICIAL INTELLIGENCE II.  
CSC(ECE) 640 PARALLEL PROCESSING.  
CSC(ECE) 671 ADVANCED COMPUTER PERFORMANCE MODELING.  
CSC(MA) 673 PARALLEL ALGORITHMS AND SCIENTIFIC COMPUTATION.  
CSC(IE) 675 ADVANCES IN VOICE INPUT/OUTPUT COMMUNICATIONS SYSTEMS.  
CSC(ECE) 676 PERFORMANCE EVALUATION OF COMPUTER NETWORKS.  
CSC(ECE) 677 TELECOMMUNICATIONS NETWORK DESIGN.  
CSC 691 ADVANCED TOPICS IN COMPUTER SCIENCE.  
CSC 693 ADVANCED INDIVIDUAL STUDY IN COMPUTER SCIENCE.  
CSC 699 COMPUTER SCIENCE RESEARCH.



# Counselor Education

Degrees Offered: Ph.D., M.S., M.Ed.

## GRADUATE FACULTY

*Professor S. B. Baker, Head of the Department*

Box 7801, (919) 515-2244, sbaker@poe.coe.ncsu.edu

*Professors:* J. A. Anderson, E. R. Gerler Jr., L. K. Jones, D. C. Locke; *Professor Emeritus:* N. A. Sprinthall; *Associate Professors:* H. A. Exum, T. L. Robinson; *Visiting Associate Professor:* T. H. Stafford Jr.; *Associate Professors Emeriti:* J. G. McVay, B. C. Talley Jr.; *Assistant Professor:* S.-M. Ting; *Adjunct Assistant Professor:* J. S. Hall

*Admission Requirements:* Requirements include a 3.00 average (4.00 scale) in the junior and senior years of the undergraduate program and one year of work experience in a human services capacity. The best-qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum grade-point average may be made for students with special backgrounds, abilities and interests.

Admission requirements for the Ph.D. program include, in addition to the general admission requirements, a 48-semester-hour master's degree, the completion of a work sample and a personal interview.

*Master's Degree Requirements:* A minimum of 48 semester hours are required in all master's degree tracks.

*Doctoral Degree Requirements:* Approximately 60 semester hours of required course work in the Ph.D. program in counselor education includes courses in research, behavioral sciences foundation, counselor education theory and professional application.

*Other Relevant Information:* The Council for Accreditation of Counseling and Related Educational Programs (CACREP), a specialized accrediting body recognized by the Council on Post-secondary Accreditation (COPA), has conferred accreditation to the following program areas in the Department of Counselor Education: student development in higher education (M.S., M.Ed.) and the Ph.D. program in counselor education. These program area have admission and curriculum requirements that conform to CACREP standards. The school counseling and community/agency tracks (M.S., M.Ed.) are CACREP-like in preparation for being accredited by CACREP.

## GRADUATE COURSES

- ECD 520 INTRODUCTION TO COUNSELING.
- ECD 521 INTERNSHIP IN GUIDANCE AND PERSONNEL SERVICES.
- ECD 522 INTERNSHIP IN COLLEGE STUDENT DEVELOPMENT.
- ECD 523 INTERNSHIP IN AGENCY COUNSELING.
- ECD 524 CAREER COUNSELING AND DEVELOPMENT.
- ECD 530 THEORIES AND TECHNIQUES OF COUNSELING.
- ECD 533 GUIDANCE AND COUNSELING IN THE SECONDARY SCHOOLS.
- ECD 534 GUIDANCE AND COUNSELING IN ELEMENTARY AND MIDDLE SCHOOLS.
- ECD 535 STUDENT DEVELOPMENT IN HIGHER EDUCATION.
- ECD 536 COMMUNITY SERVICE AGENCIES.
- ECD 540 GENDER ISSUES IN COUNSELING.
- ECD 560 RESEARCH AND ASSESSMENT IN COUNSELING.
- ECD 590 SPECIAL PROBLEMS IN GUIDANCE.
- ECD 599 RESEARCH PROJECTS IN COUNSELOR EDUCATION.
- ECD 621 INTERNSHIP IN COUNSELOR EDUCATION.
- ECD 625 CROSS CULTURAL COUNSELING.
- ECD 631 CAREER DEVELOPMENT THEORY AND RESEARCH.
- ECD 636 OBSERVATION AND SUPERVISED FIELD WORK.
- ECD 637 SEMINAR IN COGNITIVE-DEVELOPMENTAL THEORY AND PRACTICE.
- ECD 638 SEMINAR IN COGNITIVE-DEVELOPMENT RESEARCH.
- ECD 639 GROUP COUNSELING.
- ECD 640 PREPRACTICUM IN COUNSELING.
- ECD 641 PRACTICUM IN COUNSELING.
- ECD 643 THE AMERICAN COLLEGE STUDENT.
- ECD 666 SUPERVISION OF COUNSELING.
- ECD 686 PROFESSIONAL ISSUES IN COUNSELING.
- ECD 699 THESIS AND DISSERTATION RESEARCH.

## Crop Science

Degrees Conferred: Ph.D, M.S., Master of Agriculture

### GRADUATE FACULTY

*Professor D. A. Knauff, Head of the Department*

*Professor R. C. Rufty, Director of Graduate Programs*

Box 7620, (919) 515-3667, becky\_rufty@ncsu.edu

*Distinguished University Professor and William Neal Reynolds Professor: M. M. Goodman*

*Philip Morris Professor: G. F. Peedin*

*William Neal Reynolds Professor: E. A. Wernsman*

*Professors: J. R. Anderson, Jr., D. T. Bowman, A. H. Bruneau, B. E. Caldwell, H. D. Coble, F. T. Corbin, E. J. Dunphy, E. L. Fiscus, J. T. Green, Jr., R. E. Jarrett, H. M. Linker, R. C. Long, J. P. Mueller, J. P. Murphy, R. P. Patterson, C. H. Peacock, W. D. Smith, H. T. Stalker Jr., J. B. Weber, W. W. Weeks, G. G.*

Wilkerson, J. C. Wynne, A. C. York; *Professors (USDA)*: J. C. Burns, J. W. Burton, T. E. Carter Jr., D. S. Fisher, S. C. Huber, J. E. Miller, D. E. Moreland, R. F. Wilson; *Visiting Professor*: T. W. Rufty Jr.; *Adjunct Professor*: K. D. Getsinger; *Professors Emeriti*: C. T. Blake, C. A. Brim, D. S. Chamblee, J. F. Chaplin, W. K. Collins, W. A. Cope, D. A. Emery, W. T. Fike, Jr., D. U. Gerstel, W. B. Gilbert, W. C. Gregory, H. D. Gross, G. R. Gwynn, P. H. Harvey, G. L. Jones, J. A. Lee, W. M. Lewis, R. P. Moore, D. H. Timothy, J. A. Weybrew, A. D. Worsham; *Associate Professors*: D. C. Bowman, R. J. Cooper, D. A. Danehower, T. G. Isleib, S. H. Kay, R. D. Keys, V. A. Sisson, J. F. Spears, A. K. Weissinger, R. Wells, J. W. Wilcut; *Associate Professors (USDA)*: K. O. Burkey, P. Kwanyuen, D. P. Livingston, III, P. H. Sisco Jr.; *Assistant Professors*: R. E. Dewey, K.L. Edmisten, G. P. Fenner, R. W. Heiniger, J.-M. Luginbuhl, F. H. Yelverton; *Visiting Research Assistant Professor*: L. A. Urban

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors*: W. F. Thompson, C. T. Young; *Professor (USDA)*: C. W. Stuber

Areas of specialization include plant breeding, crop production and physiology, forage crops ecology, turfgrass science, weed science, agro-ecology and plant chemistry.

Excellent facilities for graduate training are available. Many special facilities such as preparation rooms for plant and soil samples, cold storage facilities for plant material, greenhouse space, growth control chambers, computer local area network, and access to the plant environment laboratory (Phytotron) are provided if required.

Research farms located throughout North Carolina include a variety of soil and climatic conditions needed for experiments in plant breeding, crop management, forage ecology, turfgrass management and physiology, and weed control.

Strong supporting departments increase opportunities for broad and thorough training. Graduate students in crop science work cooperatively with or obtain instruction in the Departments of Biochemistry, Botany, Chemistry, Computer Science, Entomology, Horticultural Science, Genetics, Mathematics, Microbiology, Plant Pathology, Soil Science and Statistics.

*Admissions Requirements*: To be admitted, a student should be a graduate of an accredited major in agronomy, biology, crop science, genetics, horticulture, plant science or related field of study. Graduates of other programs may be admitted but will be required to make up certain undergraduate deficiencies without graduate credit. Acceptance of applicants is competitive and limited by program space for new students. Exceptions to the 3.0 GPA may be made for students with special backgrounds, abilities or interests.

**Master's Degree Requirements:** One hour of Crop Science Seminar (CS 690) and a minimum of 6 credit hours at the 600 level is required for M.S. candidates. A minimum of 4 hours of special problems (CS 591) is required for the M.Ag. degree. An exit seminar presentation to the department is required.

**Doctoral Degree Requirements:** Course requirements for students are determined through the graduate advisory committee process. Core courses have been identified for students studying physiology, management, production, weed science and plant growth regulation. An exit seminar presentation to the department is required.

**Student Financial Support:** Graduate assistantships and fellowships can be awarded to qualified applicants depending on funding availability and program space. Nonresident tuition may be waived for students granted assistantships.

**Other Relevant Information:** A thesis (M.S. and Ph.D.) or special problems (M.Ag.) outline and graduate plan of work should be submitted to the Director of Graduate Programs by the end of the first regular (spring or fall) semester.

### GRADUATE COURSES

CS 511 TOBACCO TECHNOLOGY.

CS 513 PHYSIOLOGICAL ASPECTS OF CROP PRODUCTION.

CS(HS) 515 WEED SCIENCE RESEARCH TECHNIQUES.

CS(HS) 516 WEED BIOLOGY.

CS(HS) 517 WEED MANAGEMENT SYSTEMS.

CS(HS) 518 BIOLOGICAL CONTROL OF WEEDS.

CS(GN,HS) 541 PLANT BREEDING METHODS.

CS(GN,HS) 542 PLANT BREEDING LABORATORY.

CS(GN,HS) 543 PLANT BREEDING LABORATORY.

CS(FOR,SSC) 577 CONSERVATION AND SUSTAINABLE DEVELOPMENT I.

CS 591 SPECIAL PROBLEMS.

CS(GN,HS) 615 QUANTITATIVE GENETICS IN PLANT BREEDING.

CS(GN,HS) 616 BREEDING METHODS.

CS(GN,HS,PP) 618 BREEDING FOR PEST RESISTANCE.

CS(GN) 619 ORIGIN AND EVOLUTION OF CULTIVATED PLANTS.

CS(GN,HS) 620 MOLECULAR BIOLOGY IN PLANT BREEDING.

CS(HS,SSC,TOX) 625 PESTICIDE CHEMISTRY.

CS(HS,SSC,TOX) 627 PESTICIDE BEHAVIOR AND FATE IN THE ENVIRONMENT.

CS(HS) 629 HERBICIDE BEHAVIOR IN PLANTS.

CS 690 SEMINAR.

CS 699 RESEARCH.



# Curriculum and Instruction

Degrees Offered: Ph.D., M.S., M.Ed.

## GRADUATE FACULTY

*Professor C. L. Crossland, Head of the Department*

*Professor B. J. Fox, Director of Graduate Programs*

Box 7801, (919) 515-3221, fox@poe.coe.ncsu.edu

*Professors:* D. A. Cullinan, P. H. Martorella, B. R. Poulton; *Adjunct Professors:* D. D. Copeland, R. A. Edelfelt.; *Professor Emeritus:* B. M. Parramore; *Associate Professors:* J. F. Arnold, T. P. O'Brien, S. S. Osborne, C. A. Pope, R. J. Pritchard, M. B. Richards, E. J. Sabornie, H. A. Spires, E. S. Vasu; *Clinical Associate Professor:* A. J. Reiman; *Adjunct Associate Professor:* H. A. Fingeret; *Associate Professors Emeriti:* P. J. Rust, L. Thies-Sprinthall; *Assistant Professors:* P. L. Marshall; *Visiting Assistant Professors:* L. G. Aubrecht, M. Terhaar-Yonkers; *Adjunct Assistant Professor:* S. B. Buckner

*Admission Requirements:* A 500-800 word statement describing professional goals. Some areas of study require that applicants be qualified to hold a baccalaureate-level teaching certificate or have teaching experience. GRE scores not more than five years old for the doctoral program, except when scores older than five years are associated with a master's degree completed within five years of the doctoral application.

*Master's Degree Requirements:* A minimum of 36 course credit hours, a written examination and a final oral examination are required. The Master of Science degree requires a thesis approved by the graduate committee.

*Doctoral Degree Requirements:* A minimum of 60 course credit hours which includes 15-18 hours of research and a curriculum specialty and 12 hours of dissertation credit.

*Student Financial Support:* No financial aid is available on a regular basis.

*Other Relevant Information:* The department offers master's degrees in curriculum and instruction with areas of concentration in elementary education, English education, reading, instructional technology-computers, marketing education, social studies and supervision and the Master of Education in agricultural education. Master's degrees in special education are offered in the areas of behavior disorders, learning disabilities and mental retardation. A master's degree in middle grades education includes a dual concentration in language arts and social studies.

## GRADUATE COURSES

- ECI 501 COMPUTER APPLICATIONS IN INSTRUCTION.
- ECI 502 THE SCHOOL CURRICULUM.
- ECI 504 SOCIAL STUDIES IN THE ELEMENTARY SCHOOL.
- ECI 506 EDUCATION OF EXCEPTIONAL CHILDREN.
- ECI 507 FOUNDATIONS OF MIDDLE YEARS EDUCATION.
- ECI 508 EDUCATION OF SEVERELY HANDICAPPED.
- ECI 509 METHODS AND MATERIALS—TEACHING RETARDED CHILDREN.
- ECI 519 EARLY CHILDHOOD EDUCATION.
- ECI 524 TEACHERS AND THE ELEMENTARY SCHOOL CURRICULUM.
- ECI 525 THEORY AND PRACTICE IN TEACHING DIVERSE POPULATIONS.
- ECI 531 MENTAL RETARDATION.
- ECI 542 CONTEMPORARY APPROACHES IN THE TEACHING OF SOCIAL STUDIES.
- ECI 544 THE TEACHING OF COMPOSITION.
- ECI 545 READING IN THE ELEMENTARY SCHOOL.
- ECI 546 READING IN THE CONTENT AREAS.
- ECI 547 LANGUAGE ARTS IN THE ELEMENTARY SCHOOL.
- ECI 548 DEVELOPMENT OF MICROCOMPUTER SOFTWARE FOR INSTRUCTION.
- ECI 551 PRINCIPLES AND PRACTICES OF SUPERVISION.
- ECI 556 LEARNING DISABILITIES.
- ECI 557 METHODS AND MATERIALS IN LEARNING DISABILITIES.
- ECI 558 RESOURCE TEACHING IN SPECIAL EDUCATION.
- ECI 561 EDUCATIONAL DIAGNOSIS AND PRESCRIPTION FOR CHILDREN WITH EXCEPTIONALITIES.
- ECI 562 COMMUNICATION DISORDERS IN THE CLASSROOM.
- ECI 564 CLASSROOM MANAGEMENT IN SPECIAL EDUCATION.
- ECI 571 INTRODUCTION TO THE GIFTED INDIVIDUAL.
- ECI 572 METHODS FOR TEACHING THE GIFTED.
- ECI 573 BEHAVIOR DISORDERS.
- ECI 574 METHODS AND MATERIALS: BEHAVIOR DISORDERS.
- ECI 576 TEACHING/LEARNING APPROACHES FOR EMERGING ADOLESCENTS.
- ECI 583 DESIGN AND EVALUATION OF INSTRUCTIONAL MATERIALS.
- ECI 591 TEACHING LITERATURE FOR YOUNG ADULTS.
- ECI 598 SPECIAL PROBLEMS IN CURRICULUM AND INSTRUCTION.
- ECI 599 RESEARCH PROJECTS IN CURRICULUM AND INSTRUCTION.
- ECI 602 CURRICULUM THEORY AND DEVELOPMENT.
- ECI 606 REMEDIATION OF READING DISABILITIES.
- ECI 614 LITERACY INSTRUCTION FOR COLLEGE STUDENTS: RESEARCH, THEORY AND PRACTICE.
- ECI 620 INTERNSHIP IN CURRICULUM AND INSTRUCTION.
- ECI 621 INTERNSHIP IN READING EDUCATION.
- ECI 622 INTERNSHIP IN SPECIAL EDUCATION.
- ECI 623 INTERNSHIP IN ELEMENTARY EDUCATION.
- ECI 624 INTERNSHIP IN MIDDLE GRADES EDUCATION.
- ECI 625 INTERNSHIP IN INSTRUCTIONAL TECHNOLOGY - COMPUTERS.
- ECI 626 INTERNSHIP IN SOCIAL STUDIES.
- ECI 627 INTERNSHIP IN MENTORING.
- ECI 634 DIAGNOSIS OF READING DISABILITIES.
- ECI 640 PRACTICUM IN CURRICULUM AND INSTRUCTION.
- ECI 641 DIAGNOSTIC-PRESCRIPTIVE PRACTICUM IN READING.
- ECI 642 PRACTICUM IN SPECIAL EDUCATION.
- ECI 643 PRACTICUM IN ELEMENTARY EDUCATION.
- ECI 644 PRACTICUM IN MIDDLE GRADES EDUCATION.
- ECI 645 PRACTICUM IN INSTRUCTIONAL TECHNOLOGY - COMPUTERS.
- ECI 646 PRACTICUM IN SOCIAL STUDIES.

- ECI 647 PRACTICUM IN MENTORING OF TEACHERS.  
 ECI 648 THEORY AND PROCESS IN READING AND LANGUAGE ARTS.  
 ECI 652 RESEARCH APPLICATIONS IN CURRICULUM AND INSTRUCTION.  
 ECI 653 EFFECTIVE TEACHING.  
 ECI 655 TRANSITION PROGRAM FOR STUDENTS WITH MILD DISABILITIES.  
 ECI 657 THEORY AND RESEARCH ON TEACHING AND LEARNING SOCIAL STUDIES.  
 ECI 665 INSTRUCTIONAL SUPERVISION OF TEACHERS.  
 ECI 687 SEMINAR IN CURRICULUM AND INSTRUCTION.  
 ECI 690 ADVANCED SEMINAR IN READING.  
 ECI 699 THESIS AND DISSERTATION RESEARCH.

## Economics

Degrees Offered: Ph.D., M.S., M.A., Master of Economics

### GRADUATE FACULTY

*Professor J. A. Brandt, Head of the Department of Agricultural and Resource Economics*

*Professor R. B. Palmquist, Head of the Department of Economics*

*Professor R. M. Fearn, Director of Graduate Programs*

Box 8110, (919) 515-7156, bob\_fearn@ncsu.edu

*Professors:* S.G. Allen, G. A. Carlson, R. L. Clark, L. E. Danielson, J. E. Easley Jr., E. W. Erickson, E. A. Estes, D. Fisher, D. J. Flath, T. J. Grennes, A. R. Hall, D. M. Holthausen Jr., D. N. Hyman, L. A. Ihnen, T. Johnson, C. R. Knoeber, S. E. Margolis, C. L. Moore Sr., E. C. Pasour Jr., D. K. Pearce, R. A. Schrimper, J. J. Seater, M. L. Walden, M. K. Wohlgenant; *Professors Emeriti:* R. C. Brooks, A. J. Coutu, R. D. Dahle, D. M. Hoover, R. A. King, H. L. Liner, P. R. Johnson, T. E. Nichols Jr., B. M. Olsen, R. J. Peeler, C. R. Pugh, J. A. Seagraves, R. L. Simmons, J. G. Sutherland, W. D. Toussaint, C. D. Turner, R. C. Wells, J. C. Williamson Jr.; *Associate Professors:* D. S. Ball, J. C. Beghin, G. A. Benson, L. A. Craig, P. L. Fackler, W. E. Foster, B. Goodwin, A. E. Headen Jr., J. S. Lapp, M. B. McElroy, C. M. Newmark, C. D. Safley, W. N. Thurman, W. J. Wessels, K. D. Zering; *Associate Professor Emeriti:* H. C. Gilliam Jr.; *Assistant Professors:* A. B. Brown, A. W. Oltmans, M. A. Renkow, T. C. Tsoulouhas, T. Vukina

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professor:* D. A. Dickey; *Associate Professors:* J. C. Dutton Jr., E. A. McDermed

The economics graduate program is a joint program of the Department of Agricultural and Resource Economics and the Department of Economics. Emphasis is placed on economic theory and quantitative economic analysis and their application to economic problems. The major fields of specialization are: agricultural economics, econometrics,

environmental-resource economics, industrial organization, international economics, labor economics and macro-monetary economics.

**Admission Requirements:** Minimum background for admission includes intermediate microeconomics and macroeconomics, at least one semester of calculus (two for Ph.D.) and undergraduate statistics. Some students are admitted conditional on their taking certain prerequisites. The submission of GRE scores is strongly recommended and is required for students applying for financial aid.

**Master's Degree Requirements:** The Master of Science in agricultural economics and the Master of Arts in economics require core courses in microeconomics (ECG 501), macroeconomics (ECG 502), statistics (ST 514) and applied econometrics (ECG 561). The Master of Economics has the same core courses requirements but does not have a thesis requirement.

**Doctoral Degree Requirements:** The Ph.D. program has no specific hour requirements but at least six semesters of work beyond the bachelor's degree are required. Students must pass written comprehensive examinations in microeconomics and macroeconomics. Course requirements include two semesters of econometrics and six field courses. An outside minor can substitute for two of the field courses.

**Student Financial Support:** Research and teaching assistantships are available and are awarded on a competitive basis. Most of these assistantships go to Ph.D. students. Students applying for assistantships are advised to apply by February 15 for fall admission.

**Other Relevant Information:** Graduate students on financial support are provided office space or study carrels. Other students may be assigned study carrels if available. All students have access to the economics graduate student computer lab.

## GRADUATE COURSES

ECG 501 PRICE THEORY.

ECG 502 INCOME AND EMPLOYMENT THEORY.

ECG(PRT) 503 ECONOMICS OF RECREATION.

ECG 504 MONETARY AND FINANCIAL MACROECONOMICS.

ECG 505 APPLIED MICROECONOMIC ANALYSIS.

ECG 506 APPLIED MACROECONOMIC ANALYSIS.

ECG 507 MICROECONOMICS AND THE BUSINESS ENVIRONMENT.

ECG 508 MACROECONOMICS AND THE BUSINESS ENVIRONMENT.

ECG 512 LAW AND ECONOMICS.

ECG 515 ENVIRONMENTAL AND RESOURCE POLICY.

ECG 521 MARKETS AND TRADE.

ECG 523 PLANNING FARM AND AREA ADJUSTMENTS.

ECG 533 ECONOMICS OF WORLD FOOD AND AGRICULTURAL POLICY.

ECG 537 HEALTH ECONOMICS.

ECG 540 ECONOMIC DEVELOPMENT.



ECG 551 AGRICULTURAL PRODUCTION ECONOMICS.  
 ECG 555 MANAGERIAL ECONOMICS.  
 ECG(ST) 561 INTERMEDIATE ECONOMETRICS.  
 ECS 562 TOPICS IN APPLIED ECONOMETRICS.  
 ECG 565 MATHEMATICAL METHODS FOR ECONOMICS.  
 ECG 570 ANALYSIS OF AMERICAN ECONOMIC HISTORY.  
 ECG 590 SPECIAL ECONOMICS TOPICS.  
 ECG 598 TOPICAL PROBLEMS IN ECONOMICS.  
 ECG 600 ADVANCED PRICE THEORY.  
 ECG 601 PRICES, VALUE AND WELFARE.  
 ECG 602 ADVANCED INCOME AND EMPLOYMENT THEORY.  
 ECG 603 HISTORY OF ECONOMIC THOUGHT.  
 ECG 604 MONETARY ECONOMICS.  
 ECG 606 INDUSTRIAL ORGANIZATION AND CONTROL.  
 ECG 607 TOPICS IN INDUSTRIAL ORGANIZATION.  
 ECG 610 THEORY OF PUBLIC FINANCE.  
 ECG 615 ENVIRONMENTAL AND RESOURCE ECONOMICS.  
 ECG 616 TOPICS IN ENVIRONMENTAL AND RESOURCE ECONOMICS.  
 ECG 630 LABOR ECONOMICS.  
 ECG 631 POLICY AND RESEARCH ISSUES IN LABOR ECONOMICS.  
 ECG 640 ADVANCED ECONOMIC DEVELOPMENT.  
 ECG 641 AGRICULTURAL PRODUCTION AND SUPPLY.  
 ECG 642 CONSUMPTION, DEMAND AND MARKET INTERDEPENDENCY.  
 ECG 648 THEORY OF INTERNATIONAL TRADE.  
 ECG 649 MONETARY ASPECTS OF INTERNATIONAL TRADE.  
 ECG 650 ECONOMIC DECISION THEORY.  
 ECG(ST) 651 ECONOMETRICS.  
 ECG(ST) 652 TOPICS IN ECONOMETRICS.  
 ECG 682 ADVANCED MACROECONOMICS.  
 ECG 684 MONETARY THEORY.  
 ECG 699 RESEARCH IN ECONOMICS.

## Educational Research and Policy Analysis

For a listing of graduate faculty and program information, see adult and community college education.

## Electrical and Computer Engineering

Degrees Offered: Ph.D., M. S., Master of Electrical Engineering

### GRADUATE FACULTY

*Professor R. M. Kolbas, Head of the Department*

*Professor W. E. Alexander, Director of Graduate Programs*

*Visiting Professor J. W. Mink, Graduate Coordinator*

Box 7911, (919) 515-5091; winser@eos.ncsu.edu; jwm@ecegrad.ncsu.edu

*Graduate Alumni Distinguished Professor: J. B. O'Neal Jr.*

*University Professor: D. R. Rhodes*

*Professors:* D. P. Agrawal, B. J. Baliga, S. M. Bedair, R. K. Cavin III, W. Chou, T. H. Glisson Jr., J. J. Grainger, J. R. Hauser, J. F. Kauffman, M. A. Littlejohn, R. Luo, N. A. Masnari, N. F. Matthews, T. K. Miller, III, L. K. Monteith, H. T. Nagle Jr., A. A. J. Nilsson, C. M. Osburn, S. A. Rajala, A. Reisman, W. E. Snyder, H. J. Trussell, J. J. Wortman; *Visiting Professors:* F. Brglez, G. W. Rubloff, J. R. Suttle; *Adjunct Professors:* S. E. Kerns, J. W. Keyes Jr., M. A. Strocchio, R. J. Trew; *Professors Emeriti:* W. J. Barclay, A. R. Eckels, A. J. Goetze, D. R. Rhodes; *Associate Professors:* S. T. Alexander, G. L. Bilbro, M. Chow, P. D. Franzon, E. F. Gehringer, R. S. Gyurcsik, A. W. Kelley, K. W. Kim, W. Liu, M. C. Ozturk, D. S. Reeves, M. B. Steer, J. K. Townsend, I. Viniotis, M. W. White; *Visiting Associate Professor:* J. J. Brickley; *Adjunct Associate Professors:* J. R. Burke, J. R. Jones, S. S. Lee, J. J. Paulos, D. Temple; *Associate Professors Emeriti:* G. F. Bland, E. G. Manning, W. C. Peterson; *Assistant Professors:* M. E. Baran, T. M. Conte, A. Duel-Hallen, C. S. Gloster Jr., P. K. McLarty; *Visiting Assistant Professors:* R. T. Kuehn, X. Xu; *Adjunct Assistant Professors:* D. L. Dreifus, C. A. Hamilton, A. J. Rindos III, P. I. Santago, J. C. Sutton III, C. K. Williams

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* D. L. Bitzer, S. Khorram, D. F. McAllister, J. Narayan, H. G. Perros, W. E. Robbins, J. F. Schetzina, K. Tai; *Associate Professors:* E. W. Davis Jr., M. F. M. Stallmann, M. A. V. Vouk

## INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

S. Chen, K. Daneshvar, J. H. Kim, P. Lala, R. Z. Makki

*Admissions Requirements:* Admission to the M.S. program requires a B.S. in electrical engineering, computer engineering or computer science, an overall undergraduate GPA of at least 3.2, The minimum acceptable TOEFL score for admission to the M.S. program is 575. Admission is further limited by available room in the elected program of study and meeting the minimum above requirements alone does not guarantee admission.

Admission to the Ph.D. program requires a B.S. or M.S. in electrical engineering, computer engineering or computer science with an overall GPA of at least 3.5. (NOTE: Only exceptional students are admitted without first having an M.S. degree.) The minimum acceptable TOEFL score for admission to the Ph.D. program is 625. Admission is further limited by available room in the elected program of study, and meeting the minimum requirements as given above does not guarantee admission.

*Master's Degree Requirements:* A thesis is optional. Students electing the Option B non-thesis option must meet core course requirements and have at least six credit hours of 600-level ECE courses.

*Doctoral Degree Requirements:* Approximately 30 credit hours are required beyond the M.S. degree or 60 credit hours beyond the B.S. degree. A minimum of 21 of the 30 credit hours or a minimum of 45 of the 60 credit hours must be in scheduled courses. A minor is not required but may be elected. Additional course restrictions apply if a minor is not elected.

The department wishes to evaluate a Ph.D. student's research potential as quickly as possible. Consequently, all Ph.D. students are required to pass a qualifying review before the end of their third semester of study. This review is based on the student's academic performance to date and the results of a project with one of their committee members. Results are presented to the committee in both written and oral form. Based on this review, the committee will decide if the student may continue in the Ph.D. program.

*Student Financial Support:* The department offers financial support to qualified students in the form of teaching assistantships, research assistantships, fellowships and tuition remission.

### GRADUATE COURSES

ECE (CSC) 501 OPERATING SYSTEMS PRINCIPLES.  
ECE 503 INSTRUMENTATION CIRCUITS.  
ECE(CSC) 505 DESIGN AND ANALYSIS OF ALGORITHMS.  
ECE(CSC) 506 ARCHITECTURE OF PARALLEL COMPUTERS.  
ECE(CSC) 510 SOFTWARE ENGINEERING.  
ECE 511 ANALOG ELECTRONICS.  
ECE 513 DIGITAL SIGNAL PROCESSING.  
ECE 514 RANDOM PROCESSES.  
ECE 515 DIGITAL COMMUNICATIONS.  
ECE 516 SYSTEM CONTROL ENGINEERING.  
ECE 520 FUNDAMENTALS OF LOGIC SYSTEMS.  
ECE 521 DIGITAL COMPUTER TECHNOLOGY AND DESIGN.  
ECE 525 OPTICAL SIGNAL PROCESSING.  
ECE 530 PHYSICAL ELECTRONICS.  
ECE 531 PRINCIPLES OF TRANSISTOR DEVICES.  
ECE 532 PRINCIPLES OF MICROWAVE CIRCUITS.  
ECE 533 DIGITAL ELECTRONICS.  
ECE 537 CHARACTERIZATION OF HIGH-SPEED DEVICES.  
ECE 538 INTEGRATED CIRCUITS TECHNOLOGY AND FABRICATION.  
ECE 539 INTEGRATED CIRCUITS TECHNOLOGY AND FABRICATION LABORATORY.  
ECE 540 ELECTROMAGNETIC FIELDS.  
ECE 544 DESIGN OF ELECTRONIC PACKAGING AND INTERCONNECTS.  
ECE 546 VLSI SYSTEMS DESIGN.  
ECE 547 VLSI ARCHITECTURE.  
ECE 550 POWER SYSTEM OPERATION AND CONTROL.  
ECE(PY) 552 INTRODUCTION TO THE STRUCTURE OF SOLIDS.  
ECE 557 PRINCIPLES OF MOS TRANSISTORS.  
ECE 558 DIGITAL IMAGE PROCESSING.  
ECE 559 PATTERN RECOGNITION.  
ECE(CSC)570 TELECOMMUNICATIONS SYSTEMS ENGINEERING.  
ECE(CSC) 571 COMPUTER NETWORKS.

ECE(CSC) 572 INTRODUCTION TO COMPUTER COMMUNICATIONS.  
ECE(CSC) 573 INTRODUCTION TO COMPUTER PERFORMANCE MODELLING.  
ECE 578 OPTICAL FIBER COMMUNICATIONS.  
ECE 591, 592 SPECIAL TOPICS IN ELECTRICAL ENGINEERING.  
ECE 593 INDIVIDUAL TOPICS IN ELECTRICAL ENGINEERING.  
ECE 601 ANALOG VLSI.  
ECE 603 COMPUTER-AIDED CIRCUIT ANALYSIS.  
ECE 604 LOGIC DESIGN FOR TESTABILITY.  
ECE(CSC) 606 CONCURRENT SOFTWARE SYSTEMS.  
ECE 613 ADVANCED FEEDBACK CONTROL.  
ECE 619 MICROWAVE CIRCUITS DESIGN.  
ECE 622 ELECTRONIC PROPERTIES OF SOLID-STATE MATERIALS.  
ECE 623 OPTICAL PROPERTIES OF SEMICONDUCTORS.  
ECE 624 ELECTRONIC PROPERTIES OF SOLID-STATE DEVICES.  
ECE 625 ADVANCED SOLID-STATE DEVICE THEORY.  
ECE(PY) 627 SEMICONDUCTOR THIN FILMS TECHNOLOGY.  
ECE 628 PREPARATION OF ELECTRONIC MATERIALS.  
ECE 629 GROWTH OF THIN FILMS FROM THE VAPOR PHASE.  
ECE 632 POWER SYSTEM STABILITY AND CONTROL.  
ECE 633 COMPUTER ANALYSIS OF LARGE-SCALE POWER SYSTEMS.  
ECE(CSC) 640 PARALLEL PROCESSING.  
ECE 641 SEQUENTIAL MACHINES.  
ECE 642 ARTIFICIAL NEURAL NETWORKS.  
ECE 643 ADVANCED COMPUTER ARCHITECTURE.  
ECE 644 FAULT TOLERANT COMPUTING.  
ECE 646 HIGH PERFORMANCE VLSI DESIGN.  
ECE 647 MULTIDIMENSIONAL DIGITAL SIGNAL PROCESSING.  
ECE 650 DESIGN AUTOMATION FOR VLSI.  
ECE 651 DETECTION AND ESTIMATION THEORY.  
ECE 652 ADVANCED DIGITAL COMMUNICATIONS SYSTEMS.  
ECE 658 DIGITAL IMAGE PROCESSING.  
ECE 659 COMPUTER VISION.  
ECE(CSC) 671 ADVANCED COMPUTER PERFORMANCE MODELLING.  
ECE(CSC) 676 PERFORMANCE EVALUATION OF COMPUTER NETWORKS.  
ECE(CSC) 677 TELECOMMUNICATIONS NETWORK DESIGN.  
ECE 691, 692 SPECIAL STUDIES IN ELECTRICAL ENGINEERING.  
ECE 693 INDIVIDUAL STUDIES IN ELECTRICAL ENGINEERING.  
ECE 699 ELECTRICAL ENGINEERING RESEARCH.

## Electrical Engineering

For a listing of graduate faculty and program information, see electrical and computer engineering.

## Elementary Education

For a listing of graduate faculty and program information, see curriculum and instruction.



# Engineering

*Visiting Professor* M. M. Fikry, *Director of Graduate Programs*  
Box 7902, (919) 515-5440

The College of Engineering offers a program leading to the Master of Engineering. This is primarily an off-campus program. This Option B program requires 30 credit hours and has no residency, final oral examination or thesis requirements. Requirements also include two core courses and a minimum of three courses in a specific concentration. A minimum of five courses, selected from a list specified and approved by the designating department, is required for a designated concentration on the transcript. The VideoBased Engineering Education (VBEE) program offers, each semester, courses, live or by videotape, which may be applied toward the degree.

# English

**Degrees Offered:** M.A. in English, M.S. in Technical Communication

## GRADUATE FACULTY

*Professor* T. D. Lisk, *Head of the Department*

*Associate Professor* H. C. West, *Director of Graduate Programs*

Box 8105, (919) 515-4107, west@social.chass.ncsu.edu

*Associate Professor* S. B. Katz, *Coordinator, M. S. in Technical Communication*

*William C. Friday Distinguished Professor:* W. A. Wolfram

*Professors:* B. J. Baines, G. W. Barrax, J. W. Clark Jr., J. D. Durant, J. A. Gomez, J. M. Grimwood, A. H. Harrison, M. T. Hester, L. T. Holley, J. J. Kessel, L. H. MacKethan, W. E. Meyers, C. R. Miller, C. A. Prioli, M. S. Reynolds, L. Smith, J. J. Smoot, A. F. Stein, J. N. Wall Jr., R. V. Young Jr.; *Professors Emeriti:* P. E. Blank Jr., L. S. Champion, M. Halperen, H. G. Kincheloe, A. S. Knowles, B. G. Koonce Jr., F. H. Moore, W. B. Toole III, M. C. Williams, P. J. Williams; *Associate Professors:* L. J. Betts Jr., M. P. Carter, D. H. Covington, J. Ferster, C. Gross, M. F. King, R. C. Kochersberger Jr., D. L. Laryea, C. Nwankwo, M. E. N. Orr, A. M. Penrose, J. O. Pettis, J. J. Small, D. B. Wyrick; *Associate Professors Emeriti:* E. D. Clark, Sr., E. P. Dandridge Jr., H. A. Hargrave, C. E. Moore, N. G. Smith; *Assistant Professors:* E. Y. Amiran, A. Davis-Gardner, C. R. Haller, M. Halperen, D. J. Herman, R. C. Lane, L. S. May, B. S. Mehlenbacher, J. D. Morillo, J. E. Morrison, M. T. Pramaggiore, S. M. Setzer, L. R. Severin, E. R. Thomas, J. F. Thompson

**ENGLISH:** The Master of Arts program offers course work in English and American literature, rhetoric and composition, linguistics and creative writing. It can serve either as a complete course of study or as the first year of study toward a doctoral degree at another institution.

**Admission Requirements:** Applicants should submit GRE scores (General Aptitude Test) and a writing sample. Undergraduate preparation should include 24 semester hours in English, with 12 of these hours in upper-division literature courses.

**Requirements for M.A. in English:** All students take a distribution of four courses, one each in English literature before 1660, English literature after 1660, American literature and a fourth category including composition theory, rhetoric, linguistics and literary theory. In addition, all students must take an introduction to research and bibliography, pass a language requirement, write a thesis and pass an oral exam on the thesis research.

Beyond these basic requirements, the program permits several emphases. Students interested primarily in the study of literature take additional courses in literature for a total of eight courses. Students interested in creative writing may substitute three workshops in creative writing for two literature courses and present a creative work or series of short works as their thesis. Students interested in the study and teaching of writing may take the composition concentration, which requires specific courses in composition, rhetoric and linguistics; the thesis is on a topic in one of these areas. Students interested in language structure and variation may take the linguistics concentration, which requires four courses in language study and five courses in literature. The thesis may be pure linguistics or its application in rhetoric, composition or literature.

**Student Financial Support:** Teaching assistantships are available for promising students. These students take a course in teaching Freshman English (ENG 696) in the fall semester and, under the supervision of experienced teachers, devote half time in subsequent semesters to teaching freshman composition. ENG 696 gives graduate credit but does not count toward fulfillment of degree requirements.

**Other Relevant Information:** For students who hold "A" certification from the N. C. Department of Public Instruction the department offers the M.A. with Graduate ("G") Certification requiring 30 semester hours of graduate credit in English, as outlined above, and 9 semester hours of graduate credit in Education. Students and faculty in the Department of English are eligible for fellowships to participate in programs sponsored by the Folger Institute of Renaissance and Eighteenth-Century Studies, which is located in Washington, DC, at the Folger Shakespeare Library.

**TECHNICAL COMMUNICATION:** The Master of Science in technical communication is designed to prepare professional communicators for advanced

positions in industry and research organizations; with appropriate electives, students can prepare for careers in software documentation, environmental communication, industrial training in writing and editing, publications management and related areas.

*Admission Requirements:* Applicants should submit a resume and a writing sample. Prerequisites for the program are basic editing, technical writing and computer literacy (ENG 214, ENG 331, and CSC 200).

*Requirements for M.S. in Technical Communication:* The program requires 33 semester hours: four courses in English (in the fields of writing, rhetoric and linguistics), one in communication, one in visual media, one in technical methods and three electives selected to complement the student's professional goals. Students must also satisfy a requirement for one semester of professional work experience.

*Student Financial Support:* Teaching assistantships are available for promising students. These students take a course in teaching technical communication (ENG 697) in the fall semester and, under the supervision of experienced teachers, devote half time in subsequent semesters to teaching technical communication. ENG 697 gives graduate credit but does not count toward fulfillment of degree requirements.

### GRADUATE COURSES

- ENG 515 AMERICAN COLONIAL LITERATURE. .
- ENG 517 ADVANCED TECHNICAL WRITING AND EDITING.
- ENG 524 INTRODUCTION TO LINGUISTICS.
- ENG 525 VARIETY IN LANGUAGE
- ENG 527 CRITICAL DISCOURSE ANALYSIS.
- ENG(FL) 540 SEMINAR IN WORLD LITERATURE.
- ENG 561 MILTON.
- ENG 575 SOUTHERN WRITERS.
- ENG 578 ENGLISH DRAMA TO 1642.
- ENG 579 RESTORATION AND 18TH-CENTURY DRAMA.
- ENG 588 FICTION WRITING WORKSHOP.
- ENG 589 POETRY WRITING WORKSHOP.
- ENG 609 OLD ENGLISH LITERATURE.
- ENG 610 MIDDLE ENGLISH LITERATURE.
- ENG 611 THEORY AND RESEARCH IN COMPOSITION.
- ENG 612 THEORY AND RESEARCH IN PROFESSIONAL WRITING.
- ENG 613 EMPIRICAL RESEARCH IN COMPOSITION.
- ENG(COM) 614 HISTORY OF RHETORIC
- ENG 615 RHETORIC OF SCIENCE AND TECHNOLOGY.
- ENG(COM) 616 RHETORICAL CRITICISM: THEORY AND PRACTICE.
- ENG 617 ONLINE INFORMATION DESIGN AND EVALUATION.
- ENG 620 16TH-CENTURY NON-DRAMATIC ENGLISH LITERATURE.
- ENG 624 MODERN ENGLISH USAGE.
- ENG 625 LANGUAGE VARIATION RESEARCH SEMINAR.
- ENG 626 HISTORY OF THE ENGLISH LANGUAGE.
- ENG 627 LINGUISTICS AND LITERACY.
- ENG 628 LANGUAGE CHANGE RESEARCH SEMINAR.
- ENG 630 17TH-CENTURY ENGLISH LITERATURE.

- ENG 640 HISTORY OF LITERARY CRITICISM.
- ENG 641 CONTEMPORARY LITERARY THEORY.
- ENG 648 AFRICAN-AMERICAN LITERATURE.
- ENG 649 MODERN AFRICAN LITERATURE.
- ENG 650 ENGLISH ROMANTIC PERIOD.
- ENG 651 CHAUCER.
- ENG 655 AMERICAN ROMANTIC PERIOD.
- ENG 658 STUDIES IN SHAKESPEARE.
- ENG 660 VICTORIAN POETRY AND CRITICAL PROSE.
- ENG 662 18TH-CENTURY ENGLISH LITERATURE.
- ENG 663 18TH-CENTURY ENGLISH NOVEL.
- ENG 664 VICTORIAN NOVEL.
- ENG 665 AMERICAN REALISM AND NATURALISM.
- ENG 670 20TH-CENTURY BRITISH PROSE.
- ENG 671 20TH-CENTURY BRITISH POETRY.
- ENG 672 MODERN BRITISH DRAMA.
- ENG 673 MODERN AMERICAN DRAMA.
- ENG 674 COMPARATIVE DRAMA.
- ENG 675 20TH-CENTURY AMERICAN PROSE.
- ENG 676 20TH-CENTURY AMERICAN POETRY.
- ENG 678 LITERARY POSTMODERNISM.
- ENG 682 STUDIES IN LITERATURE.
- ENG 683 STUDIES IN COMPOSITION AND RHETORIC.
- ENG 684 STUDIES IN LINGUISTICS.
- ENG 685 STUDIES IN FILM.
- ENG 686 STUDIES IN THEORY.
- ENG 688 STUDIES IN CREATIVE WRITING.
- ENG 690 DIRECTED READINGS.
- ENG 696 PROBLEMS IN COLLEGE COMPOSITION.
- ENG 697 TEACHING METHODS FOR PROFESSIONAL WRITING.
- ENG 698 BIBLIOGRAPHY AND METHODOLOGY.
- ENG 699 THESIS RESEARCH.

## English Education

For a listing of graduate faculty and program information, see curriculum and instruction.

## Entomology

Degrees Offered: Ph.D., M.S., Master of Agriculture

### GRADUATE FACULTY

*Professor J. D. Harper, Head of the Department*

*Professor W. M. Brooks, Director of Graduate Programs*

Box 7613, (919) 515-3771, wbrooks@ent1.ncsu.edu

*Blanton J. Whitmire Professor: C. Schal*

*Philip Morris Professor: J. W. Van Duyn*



*William Neal Reynolds Professors:* F. L. Gould, G. G. Kennedy

*Professors:* J. T. Ambrose, C. S. Apperson, R. C. Axtell, J. S. Bacheler, J. R. Baker, J. R. Bradley Jr., R. L. Brandenburg, L. L. Deitz, F. P. Hain, R. J. Kuhr, J. R. Meyer, B. M. Parker, R. M. Roe, K. A. Sorensen, P. S. Southern, R. E. Stinner; *Visiting Professor:* F. L. Hastings; *Adjunct Professors:* J. J. Arends, C. Y. Kawanishi, P. M. Marsh; *Professors Emeriti:* W. V. Campbell, M. H. Farrier, K. L. Knight, W. J. Mistic Jr., H. B. Moore, Jr., H. H. Neunzig, R. L. Rabb, R. L. Robertson, C. F. Smith, C. G. Wright; *Associate Professor:* J. F. Walgenbach; *Adjunct Associate Professor:* C. A. Nalepa; *Associate Professor Emeritus:* R. C. Hillmann; *Assistant Professors:* M. E. Barbercheck, D. B. Orr, B. M. Wiegmann; *Visiting Assistant Professors:* D. W. Keever, M. G. Waldvogel; *Adjunct Assistant Professors:* D. A. Herbert Jr., R. C. McDonald, M. D. Tomalski

## ASSOCIATE MEMBER OF THE PROGRAM

*Professor:* H. M. Linker

Course offerings or research facilities are available in the following areas: agricultural entomology, apiculture, behavior, biological control, ecology, forest entomology, host-plant resistance, invertebrate pathology, medical and veterinary entomology, pest management, physiology and molecular biology, population dynamics, soil entomology, urban entomology, systems analysis systematics and toxicology.

*Admission Requirements:* A minimum score of 1000 (verbal plus quantitative) is necessary for admission to the M.A. or M.S. program while a score of 1100 is required for the Ph.D. program. Students are expected to have a background in biology in addition to appropriate courses in chemistry, biochemistry, mathematics, and physics. A "B" average (3.0 GPA) is required in biology courses and an overall 3.0 GPA during the last 2 years of the undergraduate program.

*Student Financial Support:* Graduate assistantships and other forms of aid are available to students as described in the Fellowships and Graduate Assistantships section of the *Graduate Catalog*.

*Other Relevant Information:* Admission is permitted only after acceptable applicants have secured an advisor and appropriate financial support. All students are expected to begin their research as soon as possible upon arrival in the department.

## GRADUATE COURSES

ENT 502 INSECT SYSTEMATICS.  
ENT 503 INSECT MORPHOLOGY AND PHYSIOLOGY.  
ENT(ZO) 509 ECOLOGY OF STREAM INVERTEBRATES.  
ENT 520 INSECT PATHOLOGY.

ENT 531 INSECT ECOLOGY.  
ENT 541 IMMATURE INSECTS.  
ENT 550 FUNDAMENTALS OF INSECT CONTROL.  
ENT 562 INSECT PEST MANAGEMENT IN AGRICULTURAL CROPS.  
ENT(FOR) 565 ADVANCED FOREST ENTOMOLOGY.  
ENT(ZO) 582 MEDICAL AND VETERINARY ENTOMOLOGY.  
ENT 590 SPECIAL PROBLEMS.  
ENT 591 SPECIAL TOPICS IN ENTOMOLOGY.  
ENT 592 AGRICULTURAL ENTOMOLOGY PRACTICUM.  
ENT(TOX) 622 INSECT TOXICOLOGY.  
ENT 690 SEMINAR.  
ENT 699 RESEARCH.

## Fiber and Polymer Science

Degree Offered: Ph.D.

### GRADUATE FACULTY

*Professor* C. D. Livengood, *Program Director*  
Box 8301, (919) 515-3057, charles\_livengood@ncsu.edu

*Professors:* R. L. Barker, S. K. Batra, K. R. Beck, D. R. Buchanan, C. L. Bumgardner, A. H. M. El-Shiekh, H. S. Freeman, R. E. Fornes, P. L. Grady, B. S. Gupta, H. B. Hopfenberg, T. J. Little, R. McGregor, G. N. Mock, M. H. M. Mohamed, H. G. Olf, S. T. Purrington, C. B. Smith, E. O. Stejskal, M. W. Suh, M. H. Theil, C. Tomasino, A. E. Tonelli, P. A. Tucker Jr., S. C. Winchester Jr., C. F. Zorowski;  
*Professors Emeriti:* J. F. Bogdan, D. M. Cates, D. W. Chaney, J. A. Cuculo, R. D. Gilbert, D. S. Hamby, S. P. Hersh, L. A. Jones, P. R. Lord, H. A. Rutherford, V. T. Stannett, W. C. Stuckey Jr., W. K. Walsh, W. M. Whaley; *Associate Professors:* C. M. Balik, P. Banks-Lee, T. G. Clapp, T. K. Ghosh, T. F. Gilmore, H. Hamouda, S. M. Hudson, S. A. Khan, W. Oxenham, J. W. Rucker, J. P. Rust, A. M. Seyam; *Associate Professors Emeriti:* T. H. Guion, T. G. Rochow; *Assistant Professors:* C. B. Gorman, H. H. A. Hergeth, W. J. Jasper, M. G. McCord, M. Srinivasarao, R. A. Venditti; *Adjunct Assistant Professors:* A. C. Bullerwell

Fiber and polymer science is a multidisciplinary program bringing together the disciplines of mathematics, chemistry and physics and the application of engineering principles for the development of independent scholars versed in all aspects of fiber materials science. Thus, fiber and polymer science is concerned with the formation of and the mechanical, physical and chemical properties of polymeric materials, fibers produced from them, fiber assemblies in one-, two- and three-dimensional forms, and fiber reinforced composites, as well as the utilization thereof.

*Admission Requirements:* Students majoring in the physical sciences, engineering, mathematics, textiles and having a master's degree will normally qualify for admission.

For exceptionally qualified students, the master's degree requirement may be waived, and the student can be admitted directly into the Ph.D. program.

**Doctoral Degree Requirements:** There are no fixed credit-hour requirements for the Doctor of Philosophy degree. Students are admitted to candidacy for the Ph.D. degree after passing a series of written cumulative examinations, completing a scholarly critique of existing knowledge in the field of specialization, and orally defending a research proposal. A written examination in a minor field may be accepted in place of the scholarly critique. They must also have passed an English technical writing course during their college career.

**Student Financial Support:** Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

**Other Relevant Information:** In 1991, the College of Textiles moved to its new 298,000 square foot complex, now valued at over \$50 million, which houses exceptional teaching, research, computer, and library facilities. With a graduate faculty of 45 and over \$7,000,000 spent on research in 1993, opportunities abound ranging from preserving the local environment (research sponsored by EPA) to exploring outer space (Mars Mission Research Center sponsored by NASA).

**COURSE OFFERINGS** (Extensive use may be made of graduate course offerings in other colleges on campus when developing the minor field.)

### **GENERAL COURSES**

TC 504 FIBER FORMATION—THEORY AND PRACTICE.  
TC(CH,MAT) 562 PHYSICAL CHEMISTRY OF HIGH POLYMERS—BULK PROPERTIES.  
TES 500 FIBER AND POLYMER MICROSCOPY.  
TES 505 TEXTILE INSTRUMENTATION AND CONTROL SYSTEMS.  
TES 561 MECHANICAL AND RHEOLOGICAL PROPERTIES OF FIBROUS MATERIAL.  
TES(MAT) 563 CHARACTERIZATION OF STRUCTURE OF FIBER FORMING POLYMERS.  
TC 591 SPECIAL TOPICS IN TEXTILE SCIENCE.  
TES(TC) 691 SPECIAL TOPICS IN FIBER SCIENCE.

### **COURSES IN AREAS OF SPECIALIZATION**

#### *Polymer Chemistry and Synthesis*

TC 520 CHEMISTRY OF DYES AND COLOR.  
TC 521 DYE SYNTHESIS LABORATORY.  
TC 525 DYEING CELLULOSE.  
TC 530 THE CHEMISTRY OF TEXTILE AUXILIARIES.  
TC 561 ORGANIC CHEMISTRY OF POLYMERS.  
TC(CHE) 671 SPECIAL TOPICS IN POLYMER SCIENCE.

#### *Polymer Physics and Physical Chemistry*

TES 500 FIBER AND POLYMER MICROSCOPY.

TC 504 FIBER FORMATION—THEORY AND PRACTICE.

TC 505 THEORY OF DYEING.

TC(CH,MAT) 562 PHYSICAL CHEMISTRY OF HIGH POLYMERS—BULK PROPERTIES.

TC(CH,MAT) 662 PHYSICAL CHEMISTRY OF HIGH POLYMERS—SOLUTION PROPERTIES.

TC(CHE) 569 POLYMERS, SURFACTANTS AND COLLOIDAL MATERIALS.

TC(CHE) 669 DIFFUSION IN POLYMERS.

TES 562 PHYSICAL PROPERTIES OF FIBER FORMING POLYMERS, FIBERS AND FIBROUS STRUCTURES.

TES(TC) 691 SPECIAL TOPICS IN FIBER SCIENCE.

### *Mechanics of Textile Materials and Processes*

TAM 610 YARN PRODUCTION PROPERTIES.

TES(TAM) 520 YARN PROCESSING DYNAMICS.

TES 549 WARP KNIT ENGINEERING AND STRUCTURAL DESIGN.

TES(TAM) 555 PRODUCTION MECHANICS AND PROPERTIES OF WOVEN FABRICS.

TES 565 TEXTILE COMPOSITES.

TES(TAM) 640 PHYSICAL AND MECHANICAL PROPERTIES OF KNITTED FABRICS.

TES(TAM) 651, 652 FABRIC DEVELOPMENT AND CONSTRUCTION.

TES(TAM) 663 MECHANICS OF TWISTED STRUCTURES.

TES(TAM) 664 MECHANICS OF FABRIC STRUCTURES.

## Food Science

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*William Neal Reynolds Professor* K. R. Swartzel, *Head of the Department*

*Professor* D. K. Larick, *Director of Graduate Programs*

Box 7624, (919) 515-2971, [duane\\_larick@ncsu.edu](mailto:duane_larick@ncsu.edu)

*Graduate Alumni Distinguished Professor and William Neal Reynolds Professor:* T.

R. Klaenhammer

*William Neal Reynolds Professor:* H. E. Swaisgood

*Professors:* D. E. Carroll, Jr., G. L. Catignani, E. A. Foegeding, P. M. Foegeding,

D. D. Hamann, A. P. Hansen, T. C. Lanier, J. L. Oblinger, D. H. Pilkington, J.

E. Rushing, B. W. Sheldon, L. G. Turner, D. R. Ward, C. T. Young; *Professors*

*(USDA):* H. P. Fleming, R. F. McFeeters, T. H. Sanders, W. M. Walter Jr.; *Adjunct*

*Professor:* J. P. Adams; *Professors Emeriti:* L. W. Aurand, H. R. Ball, Jr., T. A. Bell,

T. N. Blumer, R. E. Carawan, E. S. Cofer, M. E. Gregory, M. W. Hoover, I. D.

Jones, V. A. Jones, W. M. Roberts, S. J. Schwartz, M. L. Speck, F. R. Tarver, Jr.,

F. B. Thomas, F. G. Warren; *Associate Professors:* J. C. Allen, L. C. Boyd, P. A.

Curtis; *Assistant Professors:* B. E. Farkas, D. P. Green, L.-A. Jaykus



## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* H. M. Hassan, F. T. Jones, C. J. Lackey; *Professor (USDA):* H. E. Pattee; *Associate Professor:* T. J. Hoban; *Assistant Professor:* S. A. Hale

The department's professional activities include teaching, research, and extension functions. The program provides an educational, research, and informational center in food science for North Carolina and the nation. The department also houses three research centers, the Southeastern Dairy Foods Research Center, the Center for Aseptic Processing and Packaging Studies and the Michael Foods Single Sponsored Laboratory. Course offerings and research facilities are available in the following areas: chemistry-biochemistry, engineering, microbiology, nutrition and processing technology.

*Admissions Requirements:* To be admitted, a student should be a graduate of an accredited program in food science or the equivalent. Graduates of other majors can be admitted but will be required to make up certain undergraduate deficiencies without graduate credit. The best qualified applicants will be accepted up to the number of spaces that are available or new students.

*Master's Degree Requirements:* A master's program must include courses from at least 2 of the following categories: chemistry-biochemistry, engineering, microbiology, nutrition and processing technology. No fewer than 6 credits must be at the 600 level. A minor is required. Credits for the minor are variable depending upon the requirements of the minor department or program.

*Doctoral Degree Requirements:* A doctoral program must include courses from at least 3 of the categories listed above (or equivalent courses at another university). Courses must be selected from groups embracing one principal subject of concentration, the major, and from a cognate field, the minor. Total credits and credits for the minor are not specified and will vary depending on the needs of the student. All doctoral students are required to pass a departmental administered written preliminary exam, designed to evaluate a Ph.D. student's general knowledge and comprehension of food science.

*Student Financial Support:* Graduate assistantships and other forms of student aid available to students in this program are described elsewhere in the Graduate Catalog.

*Other Relevant Information:* Students are encouraged to make personal contact with individual faculty whose research program is of interest to them. The department provides a *Graduate Studies in Food Science* brochure describing each faculty member's program for this purpose.

## GRADUATE COURSES

FS 504 FOOD PROTEINS AND ENZYMES.  
FS 509 FOOD LIPIDS.  
FS 522 MICROBIAL FOOD SAFETY.  
FS(MB) 525 FERMENTATION MICROBIOLOGY.  
FS(NTR) 530 HUMAN NUTRITION.  
FS 551 FOOD INGREDIENT TECHNOLOGY IN PRODUCT DEVELOPMENT.  
FS 552 PRINCIPLES OF SENSORY EVALUATION.  
FS(BAE) 585 FOOD RHEOLOGY.  
FS 591 SPECIAL PROBLEMS IN FOOD SCIENCE.  
FS 605 PHYSICAL AND CHEMICAL PROPERTIES OF MUSCLE FOODS.  
FS(NTR) 606 VITAMIN METABOLISM.  
FS 680 SEMINAR IN FOOD SCIENCE.  
FS 691 SPECIAL RESEARCH PROBLEMS IN FOOD SCIENCE.  
FS 699 RESEARCH IN FOOD SCIENCE.

## Forestry

Degrees Offered: Ph.D., M.S., Master of Forestry, Master of Wildlife Biology,  
Master of Natural Resources Administration

### GRADUATE FACULTY

*Professor F. W. Cabbage, Head of the Department*  
*Professor D. L. Holley Jr., Director of Graduate Programs*  
Box 8002, (919) 515-7560, holley@cfr.cfr.ncsu.edu

*Distinguished University Professor: E. B. Cowling*  
*William Neal Reynolds Professor and Graduate Alumni Distinguished Professor: S. W. Buol*  
*Edwin F. Conger Professor: R. R. Sederoff*

*Professors: H. L. Allen, Jr., R. I. Bruck, A. W. Cooper, H. A. Devine, P. D. Doerr, E. C. Franklin, D. J. Frederick, L. F. Grand, F. P. Hain, A. E. Hassan, J. B. Jett, Jr., S. Khorram, J. G. Laarman, R. A. Lancia, R. Lea, J. R. McGraw, S. E. McKeand, R. L. Noble, J. D. Wellman, A. G. Wollum II; Professors (USDA): F. E. Bridgwater Jr., D. E. Moreland; Research Professor: W. S. Dvorak; Adjunct Professors: G. L. DeBarr, G. F. Dutrow, P. Farnum, J. D. Hair, J. R. Jorgensen, S. Linder, R. W. Stonecypher; Professors Emeriti: D. A. Adams, C. B. Davey, J. W. Duffield, W. L. Hafley, W. T. Huxster Jr., R. C. Kellison, W. D. Miller, L. A. Nelson, T. O. Perry, R. J. Preston, P. A. Sanchez, L. C. Saylor, B. J. Zobel; Associate Professors: R. C. Abt, H. V. Amerson, R. R. Braham, J. D. Gregory, G. R. Hodge, E. J. Jones, C. R. McKinley, J. P. Roise, A. M. Stomp, R. J. Weir; Associate Professors (USDA): M. A. Buford, J. E. deSteiguer, P. M. Dougherty; Visiting Associate Professor: G. R. Hodge; Adjunct Associate Professors: D. L. Bramlett, R.*

G. Campbell, C. C. Lambeth, D. L. Loftis, J. N. Woodman; *Assistant Professors:* G. B. Blank, B. Gokfarb; *Research Assistant Professors:* B.-H. Liu, D. M. O'Malley, R. W. Whetten; *Assistant Professor (USDA):* W. D. Smith; *Assistant Professor (USDI):* J. A. Collazo; *Visiting Assistant Professors:* B. A. Bergmann, M. M. Campbell, B. Li, S. C. McKelvey, T. H. Shear; *Adjunct Assistant Professors:* M. C. Conner, L. J. Frampton Jr., T. P. Holmes, W. E. Ladrach, R. B. McCullough, D. E. Mercer, R. C. Purnell, K. R. Roeder, M. M. Schoeneberger, D. N. Wear

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* P. T. Bromley, L. E. Hinesley, E. A. Wheeler; *Associate Professors:* R. A. Powell, B. E. Wilson; *Assistant Professor (USDI):* T. R. Simons

The department offers training in all of the major sub-disciplines of forest-related science and management. Considerable flexibility is allowed in developing graduate programs tailored to the student's objectives.

*Admission Requirements:* All parts of the application, including the GRE general test, are considered in making decisions. Admission is competitive and depends on the willingness of at least one member of the faculty to serve as major professor. An undergraduate degree in forestry is not required.

*Master's Degree Requirements:* Course work requirements range from 30 to 36 credits depending on the specific master's option. Students without an appropriate background will require additional preparatory work.

### *Doctoral Degree Requirements:*

As a rule, students must complete a master's degree before entering the Ph.D. program. However, exceptionally well-prepared students may petition to have their degree objective changed to Ph.D. before completing the master's degree. In addition to the dissertation, Ph.D. programs typically require 30 credits of course work beyond the master's degree.

*Student Financial Support:* Merit-based research assistantships are available every year in most fields of specialization. Stipend levels allow students to graduate without incurring significant debt. Those who begin without an assistantship are considered for funding as projects become available.

*Other Relevant Information:* Every graduate student must meet the following three requirements: (1) register for a 1-credit research methodology course, FOR 689, in the first semester, (2) meet a one-time teaching requirement by assisting a faculty member teach an undergraduate forestry course and (3) begin the final oral exam with a seminar to the department based on work accomplished during the graduate program.

## GRADUATE COURSES

- FOR 510 QUANTITATIVE FOREST GENETICS METHODS.  
FOR 511 TREE IMPROVEMENT RESEARCH TECHNIQUES.  
FOR 512 FOREST ECONOMICS.  
FOR 534 ADVANCED FOREST MANAGEMENT PLANNING.  
FOR 540 ADVANCED DENDROLOGY.  
FOR 553 ENVIRONMENTAL REMOTE SENSING.  
FOR(ENT) 565 ADVANCED FOREST ENTOMOLOGY.  
FOR 572A,B FOREST MANAGEMENT POLICIES ON THE PUBLIC LANDS.  
FOR 574 TOPICS IN FOREST MODELING.  
FOR(SSC) 577 CONSERVATION AND SUSTAINABLE DEVELOPMENT I: CONCEPTS AND METHODS.  
FOR(SSC) 578 CONSERVATION AND SUSTAINABLE DEVELOPMENT II: INTEGRATED PROBLEM SOLVING.  
FOR(SSC) 581 AGROFORESTRY.  
FOR 582 SILVICULTURE AND MANAGEMENT OF FOREST PLANTATIONS IN THE TROPICS.  
FOR 583 TROPICAL FORESTRY.  
FOR 584 THE PRACTICE OF ENVIRONMENTAL IMPACT ASSESSMENT.  
FOR(FW) 585 ADVANCED WILDLIFE HABITAT MANAGEMENT.  
FOR 592 SPECIAL TOPICS IN FORESTRY.  
FOR(FW) 594 SEMINAR IN WILDLIFE MANAGEMENT.  
FOR 601 ADVANCED HYDROLOGY.  
FOR(GN) 611 FOREST GENETICS.  
FOR(GN) 612 ADVANCED TOPICS IN QUANTITATIVE GENETICS.  
FOR 613 ADVANCED TOPICS IN SILVICULTURE.  
FOR 672 CURRENT ISSUES IN NATURAL RESOURCE POLICY.  
FOR 673 ECOPHYSIOLOGY OF FOREST PRODUCTION.  
FOR 689 SEMINAR IN FOREST RESEARCH.  
FOR 691 GRADUATE SEMINAR.  
FOR 692 ADVANCED TOPICS IN FORESTRY.  
FOR 699 RESEARCH IN FORESTRY.

## Genetics

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor S. E. Curtis, Head of the Department*  
*William Neal Reynolds Professor W. R. Atchley, Director of Graduate Programs*  
Box 7614, (919) 515-2291, atchley@ncsu.edu

*Distinguished University Professor and William Neal Reynolds Professor: C. S. Levings III*

*Distinguished University Professor: J. G. Scandalios*

*Professors: W. E. Kloos, T. F. Mackay, W. H. McKenzie, H. E. Schaffer, S. L. Spiker; Professor (USDA): C. W. Stuber; Adjunct Professor: M.-D. Chilton;*



*Professors Emeriti:* J. L. Apple, C. H. Bostian, C. C. Cockerham, W. D. Hanson, T. J. Mann, D. F. Matzinger, L. E. Mettler, R. H. Moll, A. C. Triantaphyllo; *Associate Professors:* M. T. Andrews, M. A. Conkling, T. H. Emigh, J. W. Mahaffey; *Assistant Professors:* M. D. Purugganan, J. C. Swaffield

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* E. J. Eisen, M. M. Goodman, B. T. McDaniel, R. M. Petters, O. W. Robison, R. R. Sederoff, W. F. Thompson, B. S. Weir, E. A. Wernsman; *Professors Emeriti:* J. L. Apple, J. F. Chaplin, F. L. Haynes Jr., C. L. Markert, L. L. Phillips, J. O. Rawlings; *Associate Professors:* R. S. Boston, L. K. Hanley-Bowdoin, C. H. Opperman; *Research Associate Professor:* S. Zeng

The department provides a well-balanced program of graduate course work and research training. The faculty conducts research in genetics of animals, plants, and bacteria. The student has a choice of research projects in the broad areas of molecular, biochemical, developmental, quantitative and population genetics.

*Admission Requirements:* Applicants may come from a number of undergraduate programs that include biological, agricultural, physical and mathematical science training. All applications are screened by a departmental committee and the best qualified applicants will be accepted up to the number of spaces that are available for new students.

*Master's Degree Requirements:* A 6-hour sequence of 6 minicourses is required of all majors and minors. A minimum of 2 additional graduate genetics courses are required.

*Doctoral Degree Requirements:* A 6-hour sequence of 6 minicourses is required of all majors and minors. A minimum of 4 additional graduate genetics courses are required. A minor may be interdisciplinary or in a specific department.

*Student Financial Support:* Graduate assistantships and fellowships are available to the students from a number of sources. Information will be provided at the time of application.

*Other Relevant Information:* New students will rotate through 3 laboratories during their first semester. At the end of the semester, they will choose a laboratory for their research activities consistent with their interests and available research projects. Provisions are available for a co-major and cooperative research in more than one laboratory.

## GRADUATE COURSES

- GN 501 GENETICS I: MOLECULAR GENETICS.  
GN 502 GENETICS I: BIOCHEMICAL GENETICS.  
GN 503 GENETICS I: DEVELOPMENTAL GENETICS.  
GN 504 HUMAN GENETICS.  
GN(ANS) 508 GENETICS OF ANIMAL IMPROVEMENT.  
GN 509 GENETICS II: POPULATION GENETICS.  
GN 510 GENETICS II: QUANTITATIVE GENETICS.  
GN 511 GENETICS II: CYTOGENETICS.  
GN(ZO) 540 EVOLUTION.  
GN(CS,HS) 541 PLANT BREEDING METHODS.  
GN(CS,HS) 542 PLANT BREEDING LABORATORY.  
GN(CS,HS) 543 PLANT BREEDING LABORATORY.  
GN 555 POPULATION GENETICS.  
GN(MB) 558 PROKARYOTIC MOLECULAR GENETICS.  
GN 560 MOLECULAR GENETICS.  
GN(ST) 565 GENETIC DATA ANALYSIS.  
GN(ANS) 603 QUANTITATIVE GENETICS AND BREEDING.  
GN(FOR) 611 FOREST GENETICS.  
GN(FOR) 612 ADVANCED TOPICS IN QUANTITATIVE GENETICS.  
GN(CS,HS) 615 QUANTITATIVE GENETICS IN PLANT BREEDING.  
GN(CS,HS) 616 BREEDING METHODS.  
GN(CS,HS,PP) 618 BREEDING FOR PEST RESISTANCE.  
GN(CS) 619 ORIGIN AND EVOLUTION OF CULTIVATED PLANTS.  
GN(CS,HS) 620 MOLECULAR BIOLOGY IN PLANT BREEDING.  
GN(ST) 626 STATISTICAL CONCEPTS IN GENETICS.  
GN(BO,MB,PP) 627 FUNGAL GENETICS AND PHYSIOLOGY.  
GN 641 COLLOQUIUM IN GENETICS.  
GN 650 DEVELOPMENTAL GENETICS.  
GN(BCH) 658 NUCLEIC ACIDS: STRUCTURE AND FUNCTION.  
GN(MB) 660 EXPERIMENTAL MICROBIAL GENETICS.  
GN(BCH) 661 ADVANCED MOLECULAR BIOLOGY OF THE CELL.  
GN 691 SEMINAR.  
GN 693 SPECIAL TOPICS IN GENETICS.  
GN 695 SPECIAL PROBLEMS IN GENETICS.  
GN 699 RESEARCH.

## Graphic Design

Degree Offered: Master of Graphic Design

## GRADUATE FACULTY

*Professor M. Davis, Head of the Department*

Box 7701, (919) 515-2202, meredith\_davis@ncsu.edu

*Professors:* A. S. Lowrey, M. Scotford; *Associate Professor:* A. K. Blauvelt; *Assistant Professors:* K. L. Bailey, J. Spadaro, S. Townsend

Recognizing that graphic design is both a social activity and a form of cultural production, faculty and students in the Department of Graphic Design define the study of the discipline as necessarily contextual; graduate research examines the creation, reproduction, distribution, and reception of design from a multidisciplinary perspective. The Master of Graphic Design Program also emphasizes the importance of understanding design as the creation of cognitive and cultural artifacts; study focuses on the construction of messages, the reproduction of such artifacts, the systems for their distribution, and their reception within various cultures of society.

Graduate students in graphic design learn through their own search for problems within critical content frameworks presented by the faculty. The program places primary importance on the ability of students to be critical agents; to seek problems and to pose questions. Faculty evaluate graduate students on their capacity to define individual investigations and to support their decision-making with an independent program of reading and research; on their ability to critically evaluate and articulate discoveries; and on their skills in synthesizing ideas through the creation of design artifacts.

The Master of Graphic Design Program provides focused study and research in the discipline that reflects concern for how designers will shape and respond to the changing technological and social communications environments of the future. The Program has the broad objective to educate socially responsible, intellectually curious, historically aware, and technologically adept communication design professionals.

In the Track III Program, students whose undergraduate preparation is in fields other than graphic design examine relationships between their previous study and graphic design. While acquiring design skills and knowledge in graphic design, they apply concepts and methods from their previous study to design research and innovation.

*Admissions Requirements:* Students must make application to the Department of Graphic Design by January 15. In addition to Graduate School requirements, the department requires department personal data forms and a slide portfolio of design and two-dimensional visual work.

*Master's Degree Requirements:* Studio credits presented for transfer must be accompanied by a portfolio of work from the courses under consideration.

*Student Financial Support:* The department has limited provisions for tuition remission and assistantships. Assistantships are awarded on the basis of student and departmental needs. Assistantship applications are available from the Department of Graphic Design and should be submitted with the application for admission (for incoming students) or by the advertised deadline (for continuing students).

## GRADUATE COURSES

- GD 501 GRADUATE GRAPHIC DESIGN STUDIO I.
- GD 502 GRADUATE GRAPHIC DESIGN STUDIO II.
- GD 517 ADVANCED TYPOGRAPHIC SYSTEMS.
- GD 518 ADVANCED TYPOGRAPHIC EXPRESSION.
- GD 570 THEORY IN PRACTICE: GRAPHIC DESIGN SINCE 1945.
- GD 571 GRAPHIC DESIGN AS COGNITIVE ARTIFACT.
- GD 572 GRAPHIC DESIGN AS CULTURAL ARTIFACT.
- GD 580 SPECIAL TOPICS IN GRAPHIC DESIGN HISTORY.
- GD 591 SPECIAL PROJECT IN GRAPHIC DESIGN.
- GD 592 SPECIAL TOPICS IN GRAPHIC DESIGN.
- GD 595 INDEPENDENT STUDY IN GRAPHIC DESIGN.
- GD 600 ADVANCED GRAPHIC DESIGN (SERIES).
- GD 601 GRADUATE GRAPHIC DESIGN STUDIO III.
- GD 671 GRAPHIC DESIGN AND NEW INFORMATION ENVIRONMENTS.
- GD 681 GRAPHIC DESIGN FINAL PROJECT RESEARCH.
- GD 688 FINAL PROJECT STUDIO IN GRAPHIC DESIGN.
- GD 691 SPECIAL TOPICS IN GRAPHIC DESIGN.

## Health Occupations Teacher Education

For a listing of graduate faculty and program information, see adult and community college education.

## Higher Education Administration

For a listing of graduate faculty and program information, see adult and community college education.

## History

Degree Offered: M.A.

### GRADUATE FACULTY

*Professor J. M. Riddle, Head of the Department*

*Professor G. W. O'Brien, Director of Graduate Programs*

Box 8108, (919) 515-2483, [gobrien@unity.ncsu.edu](mailto:gobrien@unity.ncsu.edu)

*Graduate Alumni Distinguished Professor J. D. Smith, Coordinator, Public History Program*

*Professors:* J. R. Banker, B. F. Beers, C. H. Carlton, A. J. De Grand, D. P. Gilmartin, W. C. Harris, J. P. Hobbs, A. J. LaVopa, L. O. McMurry, J. K. Ocko, S. T. Parker, R. H. Sack, R. W. Slatta, E. D. Sylla, K. S. Vincent; *Professors Emeriti:* M. L. Brown Jr., M. S. Downs, R. W. Greenlaw, D. E. King, M. E. Wheeler, B. W. Wishy;



*Associate Professors:* J. E. Crisp, W. A. Jackson III, O. J. Kalinga, W. C. Kimler, K. P. Luria, S. Middleton, J. A. Mulholland, S. L. Spencer, G. D. Surh, P. Tyler, K. P. Vickery, D. A. Zonderman; *Adjunct Associate Professors:* J. J. Crow, D. J. Olson; *Associate Professor Emeritus:* R. N. Elliott; *Assistant Professors:* H. Brewer, A. F. Khater, A. W. Mitchell; *Adjunct Assistant Professors:* V. L. Berger, J. W. Caddell, J. C. Cashion, H. E. Mattox, W. S. Price Jr., G. E. Southern

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professor:* A. Lumpkin; *Associate Professor:* R. B. Mullin; *Visiting Assistant Professor:* J. C. Bonham

*Admission Requirements:* In the required career goals statement, the major country, topic and historical period of interest should be included. Students admitted provisionally must complete at least 9 hours of graduate courses making grades of A or B to be considered for full graduate standing.

*Master's Degree Requirements:* **Master of Arts Degree in History:** This program requires at least twenty-four hours of course work and a thesis. Each student's program is tailored to enhance his or her career objectives. Social studies teachers, for example, are awarded a G certificate on completion of the M.A. in history with a minor in education. Similarly, students who plan to pursue a Ph.D. degree receive the requisite training and assistance. **Master of Arts Degree in Public History:** This non-thesis program requires thirty-six hours of course work. Half the hours fall in historical studies, the rest in applied history classes, including innovative courses in iconographic materials and archival conservation, documentary editing, and historic preservation. Students may select a practicum that places them under the direct supervision of the State Archivist of North Carolina. Students may select another practicum in their own special area of interest--including historic site administration, museology, historic preservation, or historical publications.

*Student Financial Support:* Graduate assistantships and fellowships are available to students in both programs and are awarded by open competition.

*Other Relevant Information:* Application deadline is January 15; students are admitted for the fall semester only. The general portion of the GRE is required for those seeking admission to both the history and public history programs. No subject test is required for either program.

## GRADUATE COURSES

HI 500 CIVILIZATIONS OF THE ANCIENT NEAR EAST.

HI 504 ROME TO 337 A.D.

HI 505 HISTORY AND ARCHAEOLOGY OF THE ROMAN EMPIRE.

HI 506 FROM ROMAN EMPIRE TO MIDDLE AGES.

- HI 507 ISLAMIC HISTORY TO 1798.
- HI 509 THE HIGH MIDDLE AGES.
- HI 510 ITALIAN RENAISSANCE.
- HI 511 THE PROTESTANT AND CATHOLIC REFORMATION OF THE 16TH CENTURY.
- HI 514 FRANCE IN THE OLD REGIME.
- HI 515 REVOLUTIONARY EUROPE.
- HI 517 EUROPE IN CRISIS: 1890-1917.
- HI 518 FASCISM-REVOLUTION-REACTION; EUROPE 1919-1939.
- HI 519 MODERN EUROPEAN IMPERIALISM.
- HI 520 EUROPEAN DIPLOMATIC HISTORY.
- HI 521 EUROPEAN INTELLECTUAL HISTORY: THE EIGHTEENTH CENTURY.
- HI 522 EUROPEAN INTELLECTUAL HISTORY: THE 19TH CENTURY.
- HI 525 TUDOR AND STUART ENGLAND.
- HI 529 20TH CENTURY BRITAIN.
- HI 530 MODERN FRANCE.
- HI 531 GERMANY: LUTHER TO BISMARCK 1500-1871.
- HI 532 HISTORY OF GERMANY SINCE 1871.
- HI 538 THE RUSSIAN EMPIRE TO 1917.
- HI 539 HISTORY OF THE SOVIET UNION AND AFTER.
- HI 541 COLONIAL AND REVOLUTIONARY U. S.
- HI 543 U. S. CONSTITUTIONAL HISTORY.
- HI 546 CIVIL WAR AND RECONSTRUCTION.
- HI 548 AMERICAN WOMEN IN THE TWENTIETH CENTURY.
- HI 549 U. S. LABOR TO 1900.
- HI 550 U. S. LABOR SINCE 1900.
- HI 552 RECENT AMERICA.
- HI 553 U. S.-LATIN AMERICAN RELATIONS SINCE 1823.
- HI 554 HISTORY OF U. S. FOREIGN RELATIONS, 1900-PRESENT.
- HI 555 HISTORY OF THE CIVIL RIGHTS MOVEMENT.
- HI 556 EARLY AMERICAN THOUGHT.
- HI 557 TWENTIETH-CENTURY U. S. INTELLECTUAL HISTORY.
- HI 558 MODERN AMERICAN HISTORICAL BIOGRAPHY.
- HI 561 CIVILIZATION OF THE OLD SOUTH.
- HI 562 SOCIAL HISTORY OF THE NEW SOUTH.
- HI 564 TOPICS IN THE HISTORY OF NORTH CAROLINA.
- HI 569 LATIN AMERICAN REVOLUTIONS IN THE TWENTIETH CENTURY.
- HI 571 REVOLUTIONARY CHINA.
- HI 576 LEADERSHIP IN MODERN AFRICA.
- HI 580 SCIENTIFIC REVOLUTION: 1300-1700.
- HI 581 HISTORY OF LIFE SCIENCES.
- HI 582 DARWINISM IN SCIENCE AND SOCIETY.
- HI 585 INTRODUCTION TO PUBLIC HISTORY.
- HI 586 HISTORY AND PRINCIPLES OF THE ADMINISTRATION OF ARCHIVES AND MANUSCRIPTS.
- HI 587 APPLICATION OF PRINCIPLES OF ADMINISTRATION OF ARCHIVES AND MANUSCRIPTS.
- HI 588 RECORDS MANAGEMENT.
- HI 589 AUTOMATION AND PUBLIC HISTORY.
- HI 601 HISTORIOGRAPHY AND HISTORICAL METHOD.
- HI 602 HISTORICAL WRITING.
- HI 684 INTRODUCTION TO MUSEOLOGY.
- HI 685 INDEPENDENT STUDY.
- HI 686 ADVANCED MUSEOLOGY.
- HI 688 CONSERVATION OF ARCHIVAL AND LIBRARY MATERIALS.
- HI 689 DOCUMENTARY EDITING.
- HI 691 PRACTICUM IN PUBLIC HISTORY.
- HI 699 RESEARCH IN HISTORY.

# Horticultural Science

Degrees Offered: Ph.D., M.S., Master of Agriculture

## GRADUATE FACULTY

*Professor* T.J. Monaco, *Head of the Department*

*Professor* D. J. Werner, *Director of Graduate Programs*

Box 7609, (919) 515-1226, dennis\_werner@ncsu.edu

*Professors:* J. R. Ballington, Jr., T. E. Bilderback, S. M. Blankenship, F. A. Blazich, W. W. Collins, A. A. De Hertogh, P. R. Fantz, W. C. Fonteno, II, R. G. Gardner, L. E. Hinesley, W. E. Hooker, R. A. Larson, P. V. Nelson, M. M. Peet, K. B. Perry, D. M. Pharr, E. B. Poling, M. A. Powell, Jr., J. C. Raulston, D. C. Sanders, C. R. Unrath, S. L. Warren, T. C. Wehner, L. G. Wilson; *Adjunct Professor:* D. T. Patterson; *Professors Emeriti:* W. E. Ballinger, F. D. Cochran, F. L. Haynes Jr., W. R. Hendrson, J. M. Jenkins, T. R. Konsler, J. W. Love, C. H. Miller, D. T. Pope; *Associate Professors:* D. A. Bailey, J. D. Burton, S. D. Clouse, J. M. Davis, D. W. Monks, M. L. Parker, T. G. Ranney, J. R. Schultheis; *Adjunct Associate Professor:* P. S. Zomer; *Associate Professors Emeriti:* T. F. Cannon, D. C. Zeiger; *Assistant Professor:* N. G. Creamer, A. R. Okigbo; *Adjunct Assistant Professor:* F. C. Wise; *Lecturer:* M. E. Traer

## ASSOCIATE MEMBER OF THE PROGRAM

*Professor:* D. E. Carroll Jr.

Course offerings or research facilities are available in the following areas: plant physiology, breeding and genetics, herbicide physiology, nutrition, propagation, tissue culture, biotechnology, growth regulators, postharvest physiology, control of environment, agricultural meteorology, Christmas tree research, landscape horticulture and biochemistry of varietal differences.

*Admission Requirements:* At the discretion of a graduate program, a student may be admitted provisionally for graduate study in a program without the GRE scores. To be admitted, a student should have completed course work in physics, mathematics, chemistry, soils, plant pathology, genetics, entomology and several courses in horticulture. An applicant deficient in course work may be admitted on a provisional basis until the deficiency is made up.

*Master's Degree Requirements:* For the Master of Science degree, the program must include 4 credit hours of the horticultural science core courses, seminar preparation, and presentation of one seminar, and teaching and outreach experiences.

**Doctoral Degree Requirements:** The program must include three credit hours of the horticultural science core courses, seminar preparation, presentation of two seminars, and teaching and outreach experiences. The preliminary comprehensive examination consists of written and oral examinations. The Ph.D. requires research and a thesis which is defended orally during the final examination.

**Student Financial Support:** The department has a number of graduate teaching and research assistantships available for promising students; these include Agricultural Foundation and Experiment Station assistantships. Those interested should apply at least 9 months prior to their anticipated enrollment date.

### GRADUATE COURSES

- HS(PP,CS) 502 PLANT DISEASE: METHODS AND DIAGNOSIS.
- HS(CS) 515 WEED SCIENCE RESEARCH TECHNIQUES.
- HS(CS) 516 WEED BIOLOGY.
- HS(CS) 517 WEED MANAGEMENT SYSTEMS.
- HS(CS) 518 BIOLOGICAL CONTROL OF WEEDS.
- HS 531 PHYSIOLOGY OF LANDSCAPE PLANTS.
- HS 532 VEGETABLE CROP PHYSIOLOGY.
- HS 534 VEGETABLE CROPS PRACTICUM.
- HS(CS,GN) 541 PLANT BREEDING METHODS.
- HS(CS,GN) 542 PLANT BREEDING LABORATORY.
- HS(CS,GN) 543 PLANT BREEDING LABORATORY.
- HS 595 SPECIAL TOPICS IN HORTICULTURAL SCIENCE.
- HS 599 RESEARCH PRINCIPLES.
- HS 601 CARBOHYDRATE METABOLISM AND TRANSPORT.
- HS 602 ENVIRONMENTAL STRESS PHYSIOLOGY.
- HS 603 BREEDING ASEXUALLY PROPAGATED CROPS.
- HS 604 PLANT NOMENCLATURE.
- HS 605 PHYSIOLOGY OF FLOWERING.
- HS 606 FRUIT DEVELOPMENT AND POSTHARVEST PHYSIOLOGY.
- HS(CS,GN) 615 QUANTITATIVE GENETICS IN PLANT BREEDING.
- HS(CS,GN) 616 BREEDING METHODS.
- HS(CS,GN,PP) 618 BREEDING FOR PEST RESISTANCE.
- HG(CS,GN) 620 MOLECULAR BIOLOGY IN PLANT BREEDING.
- HS 622 MINERAL NUTRITION IN PLANTS.
- HS(CS,SSC) 625 HERBICIDE CHEMISTRY.
- HS(CS,SSC) 627 HERBICIDE BEHAVIOR IN SOIL AND WATER.
- HS(CS) 629 HERBICIDE BEHAVIOR IN PLANTS.
- HS 691 SEMINAR.
- HS 695 GRADUATE TOPICS IN HORTICULTURAL SCIENCE.
- HS 699 RESEARCH.



# Immunology

Degrees Offered: Ph.D., M.S.

## GRADUATE FACULTY

*Professor* W. A. Tompkins, *Director*  
Box 8401, (919) 515-7394, wayne\_tompkins@ncsu.edu

*Professors:* P. F. Agris, E. B. Breitschwerdt, T. T. Brown Jr., P. B. Carter, E. V. De Buysscher, F. W. Edens, B. Hammerberg, M. G. Levy, E. J. Noga, L. Perryman, M. A. Qureshi; *Professors Emeriti:* L. Coggins, J. G. Lecce; *Associate Professors:* G. W. Almond, S. M. Laster, M. B. Tompkins, S. L. Tonkonogy; *Research Associate Professor:* B. A. Weeks-Perkins; *Visiting Research Associate Professor:* S. Kennedy-Stoskopf; *Assistant Professors:* T. B. Kepler, T. Olivry; *Visiting Assistant Professor:* R. V. English

Course offerings or research facilities are available in the following areas: immunogenetics, immunopathology, immunotoxicology, immunoparasitology, mucosal immunology, molecular and infectious disease immunology, molecular genetics, aquatic immunology and environmental immunology.

*Admission Requirements:* Students will be accepted into the immunology program based on their academic records (GPA) as undergraduates and/or as veterinary or medical students, results of the GRE, letters of recommendation and expression of interest in immunology. For the Ph.D. program, special consideration will be given to students who have had research experience (either an M.S. degree or other laboratory experience), especially in immunology, microbiology, biochemistry, or genetics or students are completing strong clinical residency programs. Completed applications should be received by December 15 for fall admission.

To be admitted, a student should be a graduate of a major accredited biological science or medical science program. Students lacking appropriate courses may be considered for admission but will be required to make up certain undergraduate deficiencies without graduate credit.

*Master's Degree Requirements:* Courses must include at least two 500-600-level immunology courses and one 500-600-level core biochemistry course.

*Doctoral Degree Requirements:* Generally, Ph.D. students should take 22 credit hours to satisfy the course requirements of the program. These include at least two 500-600-level immunology courses, one 500-600-level biochemistry course and the core course

in biotechnology (BIT 660). Additional courses in the biotechnology series are recommended. The remaining credit hours (8-10) should include journal club (IMM 691), seminar (IMM 695A) and research credits.

**Student Financial Support:** Graduate assistantships are available to students in the immunology program through the affiliated departments and graduate training grants. In addition, there are graduate research assistantships provided by individual faculty of the program.

**Other Relevant Information:** The immunology program is an interdepartmental graduate program with faculty drawn from the College of Veterinary Medicine and the College of Agriculture and Life Sciences' Departments of Biochemistry, Microbiology and Poultry Science. For administrative purposes, all students accepted into the program will also have to be student members of one of the participating departments.

### GRADUATE COURSES

IMM(MB) 551 IMMUNOLOGY.

IMM(VMS) 555 IMMUNOPARASITOLOGY.

IMM(MB,PHY,PO,VMS) 556 IMMUNOGENETICS.

IMM(PO) 557 AVIAN IMMUNOLOGY.

IMM(TOX) 605 IMMUNOTOXICOLOGY.

IMM(MB,VMS) 653 ADVANCED IMMUNOLOGY.

IMM(VMS) 691 ADVANCED TOPICS IN IMMUNOLOGY AND BIOTECHNOLOGY.

IMM(VMS) 695A SEMINAR IN VETERINARY MICROBIOLOGY/ IMMUNOLOGY.

## Industrial Design

Degree Offered: Master of Industrial Design

### GRADUATE FACULTY

*Professor G. E. Lewis, Head of the Department*

*Professor H. Khachatoorian, Director of Graduate Programs*

Box 7701, (919) 515-8322

*Professors:* V. M. Foote, C. E. Joyner, M. Pause, S. D. Wilchins; *Associate Professors:* A. V. Cooke, C. D. Cox, L. M. Diaz, D. G. Raymond, S. M. Toplikar;

*Assistant Professors:* P. R. Hooper, B. W. Laffitte

Industrial Design is the professional service of creating and developing concepts and specifications that optimize the value, function and appearance of products and product systems to the mutual benefit of both user and manufacturer. This service is often provided in the context of a cooperative working relationship with other members of a development group.

Typical groups include management, marketing, engineering and manufacturing specialists. Industrial designers place special emphasis on human characteristics, needs and interests. These require particular understanding of visual, tactile, safety and convenience criteria. Industrial designers combine these considerations with practical concern for technical processes and requirements for manufacture; marketing opportunities and economic constraints; and distribution, sales and servicing arrangements. Industrial designers are guided by the awareness of their obligations to protect and promote public safety and well being; to respect the environment; and to observe ethical business practices.

Graduates with a Master of Industrial Design have career opportunities in four general areas; corporate design offices in manufacturing companies, independent design consulting firms, governmental agencies and educational institutions.

*Admissions Requirements:* Applicants will be considered for admission on an individual basis and plans of study will be developed to take into account previous academic and professional experiences. In addition to other forms, applications must include a departmental personal data forms and a portfolio (required of students with design backgrounds).

*Student Financial Support:* Priority is given to students in the major science, social science and technology areas.

### GRADUATE COURSES

- ID 511 INDUSTRIAL DESIGN MATERIALS AND PROCESSES I.
- ID 512 INDUSTRIAL DESIGN MATERIALS AND PROCESSES II.
- ID 541, 542 ADVANCED GRAPHIC DESIGN I, II.
- ID 582 SPECIAL TOPICS IN INDUSTRIAL DESIGN.
- ID 591 SPECIAL PROJECT IN INDUSTRIAL DESIGN.
- ID 595 INDEPENDENT STUDY IN INDUSTRIAL DESIGN.
- ID 600 ADVANCED INDUSTRIAL DESIGN (SERIES).
- ID 632 ADVANCED CONCEPTS IN PRODUCT ENGINEERING.
- ID 670 ADVANCED INDUSTRIAL DESIGN-TEXTILES (SERIES).
- ID 681 INDUSTRIAL DESIGN PROJECT PREPARATION.
- ID 688 FINAL PROJECT STUDIO IN INDUSTRIAL DESIGN.
- ID 691 SPECIAL SEMINAR IN INDUSTRIAL DESIGN..

# Industrial Engineering

Degrees Offered: Ph.D, M.S., Master of Industrial Engineering

## GRADUATE FACULTY

*Professor S. D. Roberts, Head of the Department*  
*Professor J. R. Wilson, Director of Graduate Programs*  
Box 7906, (919) 515-6415, [jwilson@eos.ncsu.edu](mailto:jwilson@eos.ncsu.edu)

*University Professor: S. E. Elmaghraby*

*Professors: M. A. Ayoub, R. H. Bernhard, S.-C. Fang, T. J. Hodgson, W. L. Meier Jr., H. L. Nuttle, R. G. Pearson, W. A. Smith Jr.; Professors Emeriti: R. Alvarez, C. A. Anderson, J. R. Canada, R. W. Llewellyn, A. L. Prak; Associate Professors: C. T. Culbreth Jr., Y. Fathi, R. E. King, E. T. Sani, R. E. Young; Assistant Professors: D. R. Cormier, H. Damerджи, M. G. Kay, Y. Lee, G. A. Mirka, C. M. Sommerich, J. B. Taylor*

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors: T. Johnson, R. Luo, W. J. Rasdorf; Associate Professors: S. A. Converse, T. L. Honeycutt, R. D. Rodman*

The graduate faculty in industrial engineering supports academic and research interests in four areas: manufacturing systems (manufacturing processes, CAM, CIM, robotics, automation, and concurrent engineering); production systems (planning, scheduling, routing, inventory control, materials handling, facility design, and quality control); systems analysis and optimization (stochastic processes, simulation, and modeling); and ergonomics (human performance, occupational safety, and biomechanics). The department faculty actively supports independent graduate degree programs in operations research, integrated manufacturing systems engineering and management.

*Admission Requirements:* Applications are accepted from undergraduate majors in engineering and in the behavioral, physical, and mathematical sciences who meet prerequisites in calculus and matrix/linear algebra, computer science, and statistics.

*Master's Degree Requirements:* The M.S. degree involves depth of study in a specified area of concentration, nine hours in a minor and six hours of research credit. The Master of Industrial Engineering (M.IE.) degree may be obtained by course work only; project work is optional. A minimum of 33 hours is required for the M.IE.



**Doctoral Degree Requirements:** This degree requires 60 hours of course work beyond the bachelor's degree. Undergraduate students with superior credentials may apply directly to the doctoral program and bypass the master's degree. For students who have completed the master's degree, typically 30 to 36 hours of additional course work are required. A departmental written qualifying examination in two areas is required.

**Student Financial Support:** Research and teaching assistantships are available on a competitive basis to early applicants. Fellowships of \$3,000 and \$6,000 which supplement assistantship stipends, are available to U.S. applicants with superior credentials. Award priority is given to Ph.D., then M.S. applicants. The department does not make assistantship or tuition waiver awards to foreign applicants.

### GRADUATE COURSES

- IE(MA,OR) 505 LINEAR PROGRAMMING.
- IE 506 DESIGN OF FLEXIBLE MANUFACTURING SYSTEMS.
- IE 507 REAL-TIME CONTROL OF AUTOMATED MANUFACTURING.
- IE(OR) 509 DYNAMIC PROGRAMMING.
- IE 510 APPLIED ENGINEERING ECONOMY.
- IE 511 CAPITAL INVESTMENT ECONOMIC ANALYSIS.
- IE 512 BAYESIAN DECISION ANALYSIS FOR ENGINEERS AND MANAGERS.
- IE 516 COMPUTER-AIDED MANUFACTURING.
- IE 519 CIM SYSTEM DESIGN.
- IE(MAE) 520 INDUSTRIAL ROBOTICS.
- IE 523 PRODUCTION PLANNING, SCHEDULING AND INVENTORY CONTROL.
- IE 525 ORGANIZATIONAL PLANNING AND CONTROL.
- IE(PSY) 540 HUMAN FACTORS IN SYSTEMS DESIGN.
- IE 541 OCCUPATIONAL SAFETY ENGINEERING.
- IE 543 MUSCULOSKELETAL MECHANICS.
- IE 544 OCCUPATIONAL BIOMECHANICS.
- IE(PSY) 545 HUMAN PERFORMANCE.
- IE(CSC) 546 MANAGEMENT DECISION AND CONTROL SYSTEMS.
- IE 548 QUALITY ENGINEERING.
- IE 550 CONCURRENT ENGINEERING.
- IE 553 MATERIAL HANDLING SYSTEMS.
- IE 554 FACILITY LAYOUT AND LOCATION.
- IE 555 THE JUST-IN-TIME PRODUCTION SYSTEM.
- IE 560 APPLIED STOCHASTIC MODELS IN INDUSTRIAL ENGINEERING.
- IE(OR) 561 QUEUES AND STOCHASTIC SERVICE SYSTEMS.
- IE(CSC,OR) 562 COMPUTER SIMULATION TECHNIQUES.
- IE(CSC) 575 VOICE INPUT/OUTPUT COMMUNICATION SYSTEMS.
- IE(MA,OR) 586 NETWORK FLOWS.
- IE 588 DIRECTED STUDY IN INDUSTRIAL ENGINEERING.
- IE 589 SPECIAL TOPICS IN INDUSTRIAL ENGINEERING.
- IE 591 INDUSTRIAL ENGINEERING PROJECTS.
- IE(PSY) 593 AREA SEMINAR IN ERGONOMICS.
- IE 594 SEMINAR IN PRODUCT SAFETY AND LIABILITY.
- IE 611 THE DESIGN OF PRODUCTION SYSTEMS.
- IE(OR) 612 ADVANCED SCHEDULING AND ROUTING.
- IE 616 COMPUTER INTEGRATION OF MANUFACTURING SYSTEMS.
- IE 617 COMPUTERIZED PROCESS PLANNING.
- IE 619 CONSTRAINT MODELING OF MANUFACTURING SYSTEMS.
- IE 621 ADVANCED PROBLEMS IN MANAGEMENT SYSTEMS ENGINEERING.

IE 631 MULTI-ATTRIBUTE DECISION ANALYSIS.  
 IE 641 ENVIRONMENTAL STRESS, PHYSIOLOGY AND PERFORMANCE.  
 IE 644 UPPER EXTREMITY BIOMECHANICS.  
 IE 645 SPINE BIOMECHANICS.  
 IE 646 HUMAN FACTORS IN VISUAL DISPLAY SYSTEMS.  
 IE(OR) 662 STOCHASTIC SIMULATION DESIGN AND ANALYSIS.  
 IE(CSC,ECE) 675 ADVANCES IN VOICE INPUT/OUTPUT COMMUNICATIONS SYSTEMS.  
 IE 688 ADVANCED DIRECTED STUDY IN INDUSTRIAL ENGINEERING.  
 IE 689 ADVANCED SPECIAL TOPICS IN INDUSTRIAL ENGINEERING.  
 IE(OR,MA) 692 SPECIAL TOPICS IN MATHEMATICAL PROGRAMMING.  
 IE 693 SEMINAR IN APPLIED ERGONOMICS.  
 IE 694 ADVANCED PROBLEMS IN ERGONOMICS.  
 IE 695 SEMINAR.  
 IE 696 RESEARCH PRACTICUM IN OCCUPATIONAL BIOMECHANICS.  
 IE 699 INDUSTRIAL ENGINEERING RESEARCH.

## Instructional Technology - Computers

For a listing of graduate faculty and program information, see curriculum and instruction.

## Integrated Manufacturing Systems Engineering

Degree Offered: Master of Integrated Manufacturing System Engineering

### GRADUATE FACULTY

*Associate Professor* E. T. Sanii, *Associate Director for Academic Programs*  
 Box 7915, (919) 515-3808, Fax: (919) 515-1675, sanii@eos.ncsu.edu

IMSE World-Wide Web Home Page: <http://www.eos.ncsu.edu/coe/departments/imse>

*Professors:* R. L. Barker, R. M. Felder, P. L. Grady, T. J. Hodgson, T. Johnson, R. Luo, C. J. Maday, W. L. Meier Jr., H. L. Nuttle, S. D. Roberts, W. A. Smith Jr., K. Tai, J. R. Wilson, S. C. Winchester, C. F. Zorowski; *Professor Emeritus:* R. E. Carawan; *Associate Professors:* D. R. Bahler, P. Banks-Lee, Y. A. Chen, T. G. Clapp, C. T. Culbreth Jr., D. Gyurcsik, Y. Fathi, T. K. Ghosh, R. E. King, J. W. Leach, J.-C. Lu, R. D. Rodman, J. P. Roise, A. M. Seyam, R. E. Young; *Assistant Professors:* D. R. Cormier, H. Damerджи, G. L. Hodge, W. J. Jasper, M. G. Kay, Y.-S. Lee, M. K. Ramasubramanian, J. B. Taylor; *Adjunct Assistant Professor:* J. C. Sutton III

The Integrated Manufacturing Systems Engineering Institute (IMSEI), established in 1984, provides multidisciplinary graduate level education and practical training opportunities in the theory and practice of integrated manufacturing systems engineering at the master's degree level. IMSEI 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 take a student with traditional discipline background in engineering or the physical sciences and broaden the student's understanding of the multidisciplinary area of manufacturing systems. Particular emphasis is placed on computer integration and application in manufacturing.

**Admission Requirements:** Admission to the IMSE master's program requires a B.S. degree from an accredited institution preferably in engineering or in physics, mathematics or computer science.

**Master's Degree Requirements:** This degree requires a minimum of 27 hours of graduate course work and 6 hours of research project. Five core courses, required of all students, present a multidisciplinary overview of subject materials basic to manufacturing systems. Specialization is provided in the student's plan of graduate work through the selection of a minimum of four electives in a specified area of concentration. The six hours of required individual or team research project are intended to complement and reinforce the area of concentration.

**Student Financial Support:** Assistantships, fellowships and internships are available to qualified students. Out-of-state U. S. citizens with graduate assistantships qualify for in-state tuition rates.

**Fellowship/Internship:** The IMSEI internship program has been established to provide a cooperative industrial and academic experience for some IMSEI students and industrial sponsors. Several Fellowship/Internships awards are made available every year for special training in IMSEI member companies. Students who are selected to participate in the internship program will receive financial support for four semesters and one summer. Typically, the student will attend classes for two semesters (fall and spring), work at the sponsor company for the following summer and fall semester, and complete the IMSEI program the following spring semester. The student will use some aspect of the experience at the sponsor company as the basis of the required IMSEI project.

**Other Relevant Information:** The Institute is supported by an industrial affiliates group of member companies. They include ABB, CP&L, GE, IBM, Northern Telecom and Westinghouse. The Institute interacts with member companies through an Industry Advisory Board and a Technical Monitors Group.

**Core Courses (15 credit hours)**

CSC 510 SOFTWARE ENGINEERING

Or

CSC 542 DATABASE MANAGEMENT

Or

IE(CSC) 562 COMPUTER SIMULATION TECHNIQUES

*One of the following:*

IE 511 CAPITAL INVESTMENT ECONOMIC ANALYSIS

Or

BUS 520, 521 MANAGERIAL FINANCE: THEORY AND APPLICATION

*And:*

IE 516 COMPUTER-AIDED MANUFACTURING

IE 523 PRODUCTION PLANNING, SCHEDULING AND INVENTORY CONTROL

MAE 542, MECHANICAL DESIGN FOR AUTOMATED ASSEMBLY

**GRADUATE COURSE**

IMS 698 MANUFACTURING SYSTEMS ENGINEERING PROJECT.

## International Development

Degree Offered: Master of Technology for International Development

### GRADUATE FACULTY

*Professor* E. W. Erickson, *Director of Graduate Programs*

Box 7112, (919) 515-3201, Fax (919) 515-6835, ed\_erickson@ncsu.edu

*Professors:* M. K. Beute, R. I. Bruck, S. W. Buol, C. H. Carlton, D. K. Cassel, J. G. Laarman, M. H. M. Mohamed, R. L. Moxley, J. K. Ocko, C. H. Proctor, M. D. Schulman, J. C. H. Shih, R. W. Slatta, M. S. Soroos, D. W. Stewart; *Professors Emeriti:* J. L. Apple, A.J. Coutu, C. B. Davey, H. D. Gross, R. A. King; *Associate Professors:* J. C. Beghin, R. H. Dorff, T. N. Hammond, H. G. Kebschull, A. C. Malinowski, S. E. Simonsen, T. J., Smyth, G. D. Surh, J. M. Wallace III

*Admission Requirements:* See the general requirements for admission to the Graduate School.

*Degree Requirements:* The program of work requires:

1. 36 semester credits, half in the relevant professional area and the remainder in internationalizing areas. The MTID colloquium (TID 501) is required.
2. a work experience of a minimum of 12 weeks in a foreign country and a substantial report on that field experience.



3. conversational facility in one foreign language as determined by an oral examination.
4. a comprehensive written examination, which may be required at the discretion of the advisory committee.

The MTID program has curricular flexibility. The professional specialization may be done in any of the 72 departments in the 10 substantive NCSU colleges and schools. The internationalizing courses may be drawn from a wide variety of applicable courses offered throughout NCSU. The internationalizing courses may focus on a particular area such as Latin America or Europe; the international applications of principles of law, economics, management or administration; or a combination of the foregoing. The professional courses may be drawn from more than one department. The plan of graduate work for an MTID student must be a coherent intellectual whole with the requisite disciplinary integrity to satisfy the student's committee and the MTID coordinator, but it may be drawn from the whole breadth of NCSU.

The program of study is tailored to the student's individual needs rather than following a prescribed course; therefore, the student is expected to be able to demonstrate maturity and assume initiative in planning his/her own course of study. The relevant department assists in choosing a set of courses which provide grounding in the professional area, and the Office of International Programs assists in identifying appropriate "internationalizing" courses which satisfy the student's particular needs and interests.

### GRADUATE COURSES

TID 501 COLLOQUIUM IN INTERNATIONAL DEVELOPMENT.

TID 598 TOPICAL PROBLEMS IN INTERNATIONAL DEVELOPMENT.

TID 599 INTERNSHIP IN INTERNATIONAL DEVELOPMENT.

## Landscape Architecture

**Degree Offered: Master of Landscape Architecture**

### GRADUATE FACULTY

*Professor A. R. Rice, Head of the Department*

*Assistant Professor F. H. Magallanes, Director of Graduate Programs*

Box 7701, (919) 515-8340

*Professors: A. R. Abbate, R. C. Moore, R. R. Wilkinson, D. Wood; Professors Emeriti: R. E. Stipe, E. G. Thurlow; Research Associate Professor: J. E. Fels; Adjunct Associate Professor: C. E. Roe; Assistant Professor: S. R. Raval; Adjunct Assistant Professor: D. A. Bartelt*

## ASSOCIATE MEMBER OF THE PROGRAM

*Professor:* W. E. Hooker, J. C. Raulston; *Lecturer:* M. E. Traer

Course offerings or research facilities are available in the following areas: site planning, landscape architecture, community design, regional planning and design, and resource management.

*Admission Requirements:* The best-qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum 3.00 GPA may be made for students with special backgrounds, abilities and interests.

*Master's Degree Requirements:* A minimum of 36 course credits is required with a minimum of nine 500- or 600-series landscape architecture courses taken at the university. Students without previous professional degrees in landscape architecture are required to take additional hours of instruction up to 72 course credit hours. Programs of study are developed by the department's Director of Graduate Programs for all incoming graduate students. These programs outline a general course of study and state the number of course credits required for graduation. A final project is required.

*Other Relevant Information:* Students have the option of including a graduate minor in their course of studies. Minors can be in any other graduate program offered at NCSU. Some examples of graduate minors are: architecture, education, horticultural science, civil engineering, and parks, recreation and tourism management. Special programs and labs in the Department of Landscape Architecture and the School of Design include the Coalition for Community Conservation, the Design Research Laboratory and their program in environment visualization and simulation and in international summer programs.

### GRADUATE COURSES

- LAR 510 GRAPHICS FOR LANDSCAPE ARCHITECTS.
- LAR 511 COMMUNITY DESIGN POLICY.
- LAR 512 LANDSCAPE RESOURCE MANAGEMENT.
- LAR 521 VALUES, THEORY AND METHODS OF LANDSCAPE ARCHITECTURE.
- LAR 530 ADVANCED SITE PLANNING.
- LAR 533 PLANTS AND DESIGN.
- LAR 551 ETHICS OF PROFESSIONAL PRACTICE IN LANDSCAPE ARCHITECTURE.
- LAR 564 MANAGEMENT AND MARKETING TECHNIQUES IN COMMUNITY DESIGN.
- LAR 573 HISTORIC PRESERVATION.
- LAR 574 LANDSCAPE AND TOWNSCAPE CONSERVATION.
- LAR 575 DEVELOPMENT PLANNING.
- LAR 576 MASTER PLANNING AND DESIGN MANAGEMENT.
- LAR 582 SPECIAL TOPICS IN LANDSCAPE ARCHITECTURE.
- LAR 595 INDEPENDENT STUDY.
- LAR 600 LANDSCAPE DESIGN STUDIO.
- LAR 611 ADVANCED COMMUNITY DESIGN AND DEVELOPMENT CONTROL.
- LAR 612 SOCIAL FACTORS ANALYSIS IN SITE PLANNING.

## Liberal Studies

Degree Offered: M.A.

### GRADUATE FACULTY

*Professor C. D. Korte, Director of Graduate Programs*  
Box 7107, (919) 515-2479

The Master of Arts in Liberal Studies (MALS) program is an interdisciplinary graduate program which is administered by the Division of Multidisciplinary Studies and offered by the College of Humanities and Social Sciences. This is a broad, interdisciplinary program of part-time graduate study that integrates and expands awareness and that is geared to the student's personal interests. Each student, in consultation with an academic advisor, designs an individual program of study around an interdisciplinary theme or topic that is of intrinsic interest to the student or that relates to the student's professional or vocational interests. Students take graduate courses across a range of NC State departments as well as MALS seminars designed specifically for the program.

*Admissions Requirements:* Students entering the master's program in liberal studies must have an undergraduate degree. In addition to the material required by the Graduate School, students applying are asked to submit a statement describing their objectives in doing a degree in liberal studies and a writing sample. GRE scores are not required. All applicants are interviewed.

*Master's Degree Requirements:* Thirty hours of course work made up of (1) a minimum of three MALS seminars, (2) eighteen hours representing the student's interdisciplinary theme or concentration, and (3) a three-hour culminating project. Examples of concentrations that are well supported by graduate courses in the NC State curriculum are: science, technology and society; the American experience; and leadership

### GRADUATE COURSES

MLS 601 SEMINAR IN LIBERAL STUDIES.  
MLS 696 INDEPENDENT STUDY IN LIBERAL STUDIES.  
MLS 697 INDEPENDENT PROJECT IN LIBERAL STUDIES.

## Life Sciences

Several departments in the College of Agriculture and Life Sciences offer programs leading to the Master of Agriculture and/or the Master of Life Sciences. These are non-

thesis degrees that are designed for students who wish to emphasize course work in a graduate program. As such they require a total of 36 semester hours. A minimum of four semester hours in special problems is required and not more than six semester hours will be allowed. A minimum of 20 credit hours of 500- or 600-level course work is required.

## Management

Degree Offered: M.S.

### GRADUATE FACULTY

*Professor S. G. Allen, Director of Graduate Programs*  
Box 7229, (919) 515-5584, [msm@ncsu.edu](mailto:msm@ncsu.edu)

*Professors:* R. P. Burns, R. L. Clark, G. Dickson, C. P. Jones, S. E. Margolis, S. G. Pantula, D. Pearce, S. D. Roberts, J. W. Wilson, S. C. Winchester; *Associate Professors:* R. C. Abt, A. Agrawal, S. Barr, D. L. Baumer, S. Chapman, Y. A. Chen, J. C. Dutton Jr., E. A. McDermid, M. B. McElroy, K. Mitchell, A. Padilla, J. C. Poindexter Jr., G. J. Zuckerman; *Assistant Professors:* C. C. Bozarth, K. S. Davis, S. K. Markham, A. Massey, M. Montoya-Weiss, P. Mulvey, K. Schenk, G. Voss, G. S. Young

Since its inception in 1976, the Master of Science in Management (MSM) program has taken a distinctive, innovative approach to management education. The MSM focuses on aspects of management that have traditionally been neglected in business schools, especially the management of information, production and technology. A new integrative curriculum introduced in fall 1995 emphasizes business processes, such as new product development, rather than traditional organizational functions, such as marketing or finance.

Students begin the program with a course that provides an overview of critical business processes, an introduction to business strategy, and initial training in individual and group effectiveness. The integrated nature of the program is maintained through lab sessions that approach management problems using tools from a wide range of courses, along with capstone courses in strategy and implementation. In their last semester, all students must complete a practicum where they work on a management issue in a real organization.

Another distinctive aspect of the MSM program is the integration of advanced courses in technology and management-related topics in other colleges at NC State into its curriculum. MSM students take courses in industrial engineering, statistics, computer science and natural resources to give them skills and knowledge not generally available



in most business schools. In addition, many students in other colleges at NC State take minors in management.

**MSM Curriculum:** The MSM curriculum requires that every student complete the core curriculum listed below, along with courses in a technical concentration, for a total of 45 credit hours. Students also must complete a series of integrated management labs.

**Management Environment**

**BUS 501 LEGAL AND REGULATORY ENVIRONMENT OF MANAGEMENT**

**BUS 502 GLOBAL AND CULTURAL ENVIRONMENT OF MANAGEMENT**

**ECG 507 MICROECONOMICS AND THE BUSINESS ENVIRONMENT**

**ECG 508 MACROECONOMICS AND THE BUSINESS ENVIRONMENT**

**Management Skills in an Integrative Context**

**BUS 531 MANAGERIAL PROCESSES AND EFFECTIVENESS**

**BUS 533 LEADERSHIP IN MANAGEMENT**

**BUS 581 LONG-RANGE ANALYSIS AND STRATEGY**

**Management Functions**

**BUS 521 MANAGERIAL FINANCE**

**BUS 532 STRATEGIC HUMAN RESOURCE MANAGEMENT**

**BUS 541 MANAGEMENT INFORMATION SYSTEMS**

**BUS 561 MARKETING MANAGEMENT AND STRATEGY**

**BUS 571 PRODUCTION AND OPERATIONS MANAGEMENT**

**Analytical Techniques**

**ACC 581 SURVEY OF FINANCIAL ACCOUNTING**

**ACC 582 SURVEY OF MANAGEMENT ACCOUNTING**

**ST 513 STATISTICS FOR MANAGEMENT**

**Technical Concentration**

**BUS 574 MANAGEMENT OF TECHNOLOGY**

**BUS 583 MANAGEMENT PRACTICUM**

Minimum of 9 hours of additional courses in the technical concentration. Technical concentrations include management of technology, management information systems and operations management.

**Admission Requirements:** Students must have previous courses in calculus, principles of economics (micro and macro) and statistics, as well as knowledge of personal computers including word processing and spreadsheet software. In addition to basic Graduate School admission requirements, applicants must submit recent GMAT scores. Admission decisions are based on academic performance and potential, GMAT scores, the applicant's essay indicating how the MSM degree will further his/her career and work experience, where appropriate. For further information, there is an MSM Home Page that can be accessed off the home page of the College of Management.

**Other Relevant Information:** Day and evening courses are available; students can attend on either a part-time or full-time basis.

**Minor in Management:** Students enrolled in master's and doctoral programs can complete the minor by taking courses that meet requirements for the MSM degree. Master's students must take nine hours, including both ACC 581 and BUS 531. Doctoral students must take 15 hours, including both ACC 581 and BUS 531. This is distinct from the departmental minor in business management which simply requires nine hours of course work at the 500 level or above for master's students.

### **GRADUATE COURSES**

BUS 501 LEGAL AND REGULATORY ENVIRONMENT IN MANAGEMENT.  
BUS 502 GLOBAL AND CULTURAL ENVIRONMENT IN MANAGEMENT.  
BUS 505 LEGAL ENVIRONMENT OF BUSINESS.  
BUS(ECG) 512 LAW AND ECONOMICS.  
BUS 520 MANAGERIAL FINANCE: THEORY AND APPLICATIONS.  
BUS 521 MANAGERIAL FINANCE.  
BUS 522 PORTFOLIO AND CAPITAL MARKET THEORY.  
BUS 524 FINANCIAL MARKETS.  
BUS 530 HUMAN RESOURCE MANAGEMENT.  
BUS 531 MANAGERIAL PROCESSES AND EFFECTIVENESS.  
BUS 532 STRATEGIC HUMAN RESOURCE MANAGEMENT.  
BUS 533 LEADERSHIP IN MANAGEMENT.  
BUS 541 MANAGEMENT INFORMATION SYSTEMS.  
BUS 546 INTERNATIONAL BUSINESS.  
BUS 555 MANAGERIAL ECONOMICS.  
BUS 560 MARKETING MANAGEMENT AND STRATEGY.  
BUS 561 MARKETING MANAGEMENT AND STRATEGY.  
BUS 562 RESEARCH METHODS IN MARKETING.  
BUS 571 PRODUCTION AND OPERATIONS MANAGEMENT.  
BUS 574 MANAGEMENT OF TECHNOLOGY.  
BUS 575 MANAGING FOR QUALITY.  
BUS 581 LONG RANGE ANALYSIS AND STRATEGY.  
BUS 583 MANAGEMENT PRACTICUM.  
BUS(TAM) 585 MARKET RESEARCH IN TEXTILES.  
BUS 590 SPECIAL TOPICS IN BUSINESS MANAGEMENT.  
BUS 598 INDEPENDENT STUDY IN BUSINESS MANAGEMENT.  
BUS 625 LONG RANGE PLANNING IN BUSINESS AND INDUSTRY.  
BUS(ECG) 650 ECONOMIC DECISION THEORY.

## **Marine, Earth and Atmospheric Sciences**

**Degrees Offered:** Ph.D., M.S.

### **GRADUATE FACULTY**

*Professor L. J. Pietrafesa, Head of the Department*  
*Professor G. S. Janowitz, Director of Graduate Programs*  
Box 8208, (919) 515-7776, janowitz@ncsu.edu

*Distinguished University Scholar:* T. F. Malone  
*Scholar in Residence:* R. R. Braham

*Professors:* S. P. S. Arya, V. V. Cavaroc Jr., J. M. Davis, D. J. DeMaster, R. V. Fodor, D. Kamykowski, S. Raman, V. K. Saxena, T. G. Wolcott; *Research Professor:* V. P. Aneja; *Visiting Professors:* T. F. Clark, T. S. Hopkins, H. G. Reichle Jr., D. A. Russell; *Adjunct Professors:* A. H. Hines, R. V. Madala, P. J. Minnett, J. M. Pelissier, S. R. Riggs, W. H. Snyder; *Professors Emeriti:* H. S. Brown, L. J. Langfelder, C. J. Leith, W. J. Saucier, C. W. Welby; *Associate Professors:* N. E. Blair, J. P. Hibbard, M. M. Kimberley, C. E. Knowles, S. E. Koch, E. L. Leithold, Y. Lin, J. M. Morrison, A. J. Riordan, F. H. M. Semazzi, P. Shaw, W. J. Showers, E. F. Stoddard, G. F. Watson; *Visiting Associate Professors:* M. L. Kaplan, D. L. Wolcott; *Adjunct Associate Professors:* M. G. Bevis, S. Businger, S. W. Chang, A. W. Hulbert, C. J. Nappo, R. W. Wiener; *Assistant Professors:* T. G. Drake, D. B. Eggleston, D. G. Evans, S. W. Snyder.; *Visiting Assistant Professors:* D. G. Schowalter, L. Xie; *Adjunct Assistant Professors:* T. B. Curtin, M. DeMaria, A. F. Hanna, G. J. Kirkpatrick, J. R. Pawlik, S. W. Ross, R. J. Wayland

#### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* B. J. Copeland, J. M. Miller, F. Y. Sorrell Jr., C. C. Tung; *Associate Professor:* J. M. Burkholder; *Visiting Assistant Professor:* L. L. Spence

#### INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

L. B. Cahoon, D. G. Lindquist, J. F. Parnell, M. H. Posey, R. D. Roer

Graduate majors in atmospheric science, geology, geophysics, and marine sciences are offered. Within marine sciences the subdisciplines of biological, chemical, geological and physical oceanography are recognized by the profession.

*Admission Requirements:* An M.S. degree is required for entry into the Ph.D. program. The GRE Test scores are required for applicants in geology and biological oceanography. A B.S. degree in a basic or applied science, mathematics or engineering is required for entry into the M.S. program in atmospheric science, geology or geophysics, biological oceanography, chemical oceanography, geological oceanography, or physical oceanography. Field camp is required of all applicants for the M.S. program in geology. An M.S. degree with a non-thesis option for students on leave for a fixed period from government positions is available and admission to this option must be requested at the time of application.

*Master's Degree Requirements:* Specific course requirements are determined by the advisory committee of each student. However, MEA 695 Seminar is required of all M.S. students no later than the third semester in residence. Marine science students are required to take core courses in two of the three subdisciplines other than their own.

**Doctoral Degree Requirements:** Specific courses are determined by the students advisory committee. Registration in seminar, MEA 695, is required of all Ph.D. students no later than the fourth semester in residence. Marine science students are required to take core courses in all three subdisciplines other than their own; this requirement may be fulfilled at the M.S. level.

**Student Financial Support:** Research and teaching assistantships are available.

**Other Relevant Information:** Students are assigned advisors upon admission, and thesis research should commence as soon as possible.

### GRADUATE COURSES IN COMMON TO ALL MEA STUDENTS

MEA 695 SEMINAR.  
MEA 699 RESEARCH.

### GRADUATE COURSES

#### *Atmospheric Science*

MEA 501 ENVIRONMENTAL FLUID MECHANICS.  
MEA 512 SATELLITE METEOROLOGY.  
MEA 514 ADVANCED PHYSICAL METEOROLOGY.  
MEA 524 DYNAMIC METEOROLOGY.  
MEA 525 NUMERICAL WEATHER PREDICTION.  
MEA 526 AIR-SEA INTERACTION.  
MEA 527 PLANETARY BOUNDARY LAYER.  
MEA 528 COASTAL METEOROLOGY.  
MEA 530 MESOSCALE MODELING.  
MEA 555 METEOROLOGY OF THE BIOSPHERE.  
MEA 556 AIR POLLUTION METEOROLOGY.  
MEA 557 ADVANCED CLOUD AND PRECIPITATION PHYSICS.  
MEA 558 ATMOSPHERIC AEROSOLS.  
MEA(MAE) 563 GEOPHYSICAL FLUID MECHANICS.  
MEA 593 SPECIAL TOPICS.  
MEA 627 ATMOSPHERIC TURBULENCE.  
MEA 635 ADVANCED WEATHER ANALYSIS.  
MEA 640 MESOSCALE DYNAMICS.  
MEA 656 ATMOSPHERIC DISPERSION.  
MEA(MAE) 663 ADVANCED GEOPHYSICAL FLUID MECHANICS.

#### *Earth Science*

MEA 500 REGIONAL GEOLOGY OF NORTH AMERICA.  
MEA 510 GEOLOGICAL OCEANOGRAPHY.  
MEA 515 TOPICS IN APPALACHIAN GEOLOGY.  
MEA 522 PETROLEUM GEOLOGY.  
MEA 523 INTRODUCTION TO SUBSURFACE WELL EVALUATION.  
MEA 545 ADVANCED IGNEOUS PETROLOGY.  
MEA 546 ADVANCED METAMORPHIC PETROLOGY.



MEA 551 ADVANCED STRUCTURAL GEOLOGY.  
 MEA 562 APPLIED SEDIMENTARY ANALYSIS.  
 MEA 564 DEPOSITIONAL ENVIRONMENTS AND LITHOSTRATIGRAPHY.  
 MEA 565 HYDROGEOLOGY.  
 MEA 566 HYDROGEOLOGY OF GROUNDWATER POLLUTION AND PROTECTION.  
 MEA 567 GEOCHEMISTRY.  
 MEA 570 EXPLORATION AND ENGINEERING GEOPHYSICS.  
 MEA 572 LABORATORY AND FIELD METHODS FOR INVESTIGATION OF THE SEABED.  
 MEA 573 ORGANIC GEOCHEMISTRY.  
 MEA 574 BIOGEOCHEMISTRY.  
 MEA 575 GEOPHYSICAL FIELD METHODS.  
 MEA 576 SEISMIC EXPLORTION FOR OIL.  
 MEA 577 SEDIMENTARY GEOCHEMISTRY.  
 MEA 583 PHOTOGEOLOGY AND REMOTE SENSING.  
 MEA 588 REGIONAL TECTONICS.  
 MEA 592 SPECIAL TOPICS.  
 MEA 610 MARINE SEDIMENTOLOGY.  
 MEA 630 GEOTECTONICS.  
 MEA 670 ADVANCED GEOPHYSICS I.  
 MEA 671 ADVANCED GEOPHYSICS II.

### *Marine Science*

MEA 501 ENVIRONMENTAL FLUID MECHANICS.  
 MEA 510 GEOLOGICAL OCEANOGRAPHY.  
 MEA 511 MARINE SEDIMENT TRANSPORT.  
 MEA 516 DYNAMICS OF SHELF CIRCULATION.  
 MEA(ZO) 520 PRINCIPLES OF BIOLOGICAL OCEANOGRAPHY.  
 MEA 526 AIR-SEA INTERACTION.  
 MEA (ZO) 534 MARINE BENTHIC ECOLOGY.  
 MEA 540 FOURIER ANALYSIS OF GEOPHYSICAL DATA.  
 MEA (CE) 541 GRAVITY WAVE THEORY I.  
 MEA 559 SYNOPTIC PHYSICAL OCEANOGRAPHY.  
 MEA 560 PRINCIPLES OF PHYSICAL OCEANOGRAPHY.  
 MEA 561 INTRODUCTION TO PHYSICAL OCEANOGRAPHY.  
 MEA(MAE) 563 GEOPHYSICAL FLUID MECHANICS.  
 MEA 568 OCEAN CIRCULATION.  
 MEA 569 THE PHYSICAL DYNAMICS OF ESTUARIES.  
 MEA 571 PRINCIPLES OF CHEMICAL OCEANOGRAPHY.  
 MEA 572 LABORATORY AND FIELD METHODS FOR INVESTIGATION OF THE SEABED.  
 MEA 573 ORGANIC GEOCHEMISTRY.  
 MEA 574 BIOGEOCHEMISTRY.  
 MEA 591 SPECIAL TOPICS.  
 MEA 613 CONTINENTAL MARGIN SEDIMENTATION.  
 MEA 622 MARINE PLANKTON ECOLOGY.  
 MEA(ZO) 623 ADVANCES IN MARINE COMMUNITY ECOLOGY.  
 MEA(ZO) 624 ECOLOGY OF FISHES.  
 MEA(MAE) 663 ADVANCED GEOPHYSICAL FLUID MECHANICS.  
 MEA(MAE) 664, 665 PERTURBATION METHOD IN FLUID MECHANICS I, II.  
 MEA 674 MARINE GEOCHEMISTRY.

## Master of Engineering

For program information, see engineering.

# Materials Science and Engineering

Degrees Offered: Ph.D., M.S., Master of Materials Science and Engineering

## GRADUATE FACULTY

*Professor J. J. Hren, Head of the Department*

*Professor C. C. Kock, Director of Graduate Programs*

Box 7907, (919) 515-3858, fahmy@mte.ncsu.edu

*Distinguished University Professor: J. Narayan*

*Distinguished University Research Professor: J. J. Cuomo*

*Graduate Alumni Distinguished Professor and Kobe Steel Distinguished University Professor: R. F. Davis*

*Professors: K. J. Bachmann, R. B. Benson Jr., A. A. Fahmy, A. I. Kingon, K. L. Murty, G. A. Rozgonyi, P. E. Russell, R. O. Scattergood; Research Professor: D. M. Maher; Adjunct Professors: O. Auciello, G. E. McGuire, J. L. Routbort, J. C. Russ, F. Shimura; Professors Emeriti: W. W. Austin Jr., H. Conrad, J. K. Magor, K. L. Moazed, H. I. Palmour, H. H. Stadelmaier, R. F. Stoops; Associate Professors: C. M. Balik, D. W. Brenner, N. A. El-Masry; Research Associate Professor: J. Kasichainula; Visiting Associate Professors: D. P. Griffis, J. C. Russ; Adjunct Associate Professors: K. Das, J. T. Glass, J. T. Prater, I. Turlik; Associate Professor Emeritus: J. V. Hammé; Assistant Professors: R. L. Porter, Z. Sitar, R. J. Spontak; Visiting Assistant Professor: H. A. West II*

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors: J. A. Bailey, S. M. Bedair, K. S. Havner, Y. Horie, G. Lucovsky, R. J. Nemanich, A. Reisman; Associate Professor: H. H. Lamb; Assistant Professor: G. N. Parsons*

Materials and materials limitations pervade all of the engineering and high technology fields that are an integral part of our society. Graduate programs in this department focus on understanding the structure, structure modification and properties of materials and the development of new or improved materials and advanced processing methods which are critical links between the design and the realization of new systems.

*Admission Requirements:* In addition to the general admission requirements as set by the Graduate School, the department requires submission of GRE scores or convincing evidence of the competence of the applicant and his/her ability to satisfy the require-

ments for the graduate degree for which he/she is seeking admission. In addition, for applicants whose native tongue is other than English, the minimum acceptable TOEFL score is 575.

**Master's Degrees Requirements:** The minimum requirements for the Master of Materials Science and Engineering degree are 33 credit hours not including seminar credit but including 3 credit hours for a project course and 9 to 12 hours in one or more supporting fields as approved by the director of graduate programs of which no more than 3 credit hours may be at the 400 level. The M.S. degree has the minimum requirement of 30 credit hours not including seminar credit but including six credit hours for research, a minimum of 3 credit hours at the 600 level, excluding research credit, and 9 credit hours in one or more supporting fields of which no more than 3 credit hours may be at the 400 level.

**Doctoral Degree Requirements:** The minimum requirements for the doctoral degree are 51 credit hours including 9 credit hours for research, a minimum of 9 credit hours at the 600 level, excluding research credit, and 12 credit hours in one or more supporting fields of which no more than 3 credit hours may be at the 400 level.

**Student Financial Support:** In recent years more than three quarters of students in the graduate program have received financial support in one form or another. The department offers a number of teaching and research assistantships on a competitive basis to qualified students. Also available are a number of federal-, state- and industry-funded fellowships and supplements which generally pay for the tuition in addition to a stipend.

**Other Relevant Information:** The department reflects the interdisciplinary nature of the field of materials science and engineering. A substantial number of current graduate students majored in fields other than but related to materials, and the department has a significant number of associated graduate faculty from other departments supervising thesis and dissertation research.

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- MAT 500 MODERN CONCEPTS IN MATERIALS SCIENCE.
- MAT 501 DIFFUSION AND MASS TRANSPORT PROCESSES IN SOLIDS.
- MAT 502 DEFECTS IN SOLIDS.
- MAT 504 ELECTRICAL, OPTICAL AND MAGNETIC PROPERTIES OF MATERIALS.
- MAT 505 MECHANICAL BEHAVIOR OF ENGINEERING MATERIALS.
- MAT 506 PHASE TRANSFORMATIONS AND KINETICS.
- MAT(CH) 507 CHEMICAL CONCEPTS IN MATERIALS SCIENCE AND ENGINEERING.
- MAT 508 THERMODYNAMICS OF MATERIALS.
- MAT(NE) 509 NUCLEAR MATERIALS.
- MAT 510 ELEMENTS OF CRYSTALLOGRAPHY AND DIFFRACTION.
- MAT 511 STEREOLOGY AND IMAGE ANALYSIS.
- MAT 512 SCANNING ELECTRON MICROSCOPY.
- MAT 515 FUNDAMENTALS OF TRANSMISSION ELECTRON MICROSCOPY.
- MAT(NE) 525 NUCLEAR MATERIALS.

MAT(MAE) 531 MATERIALS PROCESSING BY DEFORMATION.  
 MAT(MAE) 532 FUNDAMENTALS OF METAL MACHINING THEORY.  
 MAT 533 ADVANCED CERAMIC ENGINEERING DESIGN.  
 MAT 541 PRINCIPLES OF CORROSION.  
 MAT 556 COMPOSITE MATERIALS.  
 MAT 560 MATERIALS SCIENCE IN PROCESSING OF SEMICONDUCTOR DEVICES.  
 MAT(TC) 561 ORGANIC CHEMISTRY OF POLYMERS.  
 MAT(TC) 562 PHYSICAL CHEMISTRY OF HIGH POLYMERS—BULK PROPERTIES.  
 MAT(NE) 573 COMPUTER EXPERIMENTS IN MATERIALS AND NUCLEAR ENGINEERING.  
 MAT 575 STRUCTURE OF SEMICRYSTALLINE POLYMERS.  
 MAT 595 ADVANCED MATERIALS EXPERIMENTS.  
 MAT 610 ADVANCED CRYSTALLOGRAPHY AND DIFFRACTION.  
 MAT 612 ADVANCED SCANNING ELECTRON MICROSCOPY AND SURFACE ANALYSIS.  
 MAT 621 THEORY AND STRUCTURE OF AMORPHOUS MATERIALS.  
 MAT 623 THEORY AND STRUCTURE OF METALLIC MATERIALS.  
 MAT 631 THIN FILM AND COATING SCIENCE AND TECHNOLOGY I.  
 MAT 632 THIN FILM AND COATING SCIENCE AND TECHNOLOGY II.  
 MAT 633 ADVANCED MECHANICAL PROPERTIES OF MATERIALS.  
 MAT 660 DEFECTS, DIFFUSION AND ION IMPLANTATION IN SEMI-CONDUCTORS.  
 MAT(CH,TC) 662 PHYSICAL CHEMISTRY OF HIGH POLYMERS—SOLUTION PROPERTIES.  
 MAT 691, 692 ADVANCED TOPICS IN MATERIALS SCIENCE AND ENGINEERING.  
 MAT 695 MATERIALS SCIENCE AND ENGINEERING SEMINAR.  
 MAT 699 MATERIALS SCIENCE AND ENGINEERING RESEARCH.

## Mathematics

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor R. H. Martin Jr., Head of the Department*

*Professor S. Schecter, Director of Graduate Programs*

*Professor E. L. Stitzinger, Associate Director of Graduate Programs*

Box 8205, (919) 525-3964, [schecter@math.ncsu.edu](mailto:schecter@math.ncsu.edu), [stitz@math.ncsu.edu](mailto:stitz@math.ncsu.edu)

*Drexel Professor and University Professor: H. T. Banks*

*Professors:* J. W. Bishir, E. E. Burniston, S. L. Campbell, R. E. Chandler, M. T. Chu, E. N. Chukwu, L. O. Chung, J. D. Cohen, J. M. Danby, J. C. Dunn, A. C. Fauntleroy, R. O. Fulp, R. E. Hartwig, K. Ito, E. L. Kaltofen, C. T. Kelley, K. Koh, J. Luh, J. A. Marlin, C. D. Meyer Jr., K. C. Misra, C. Pao, E. L. Peterson, M. S. Putcha, J. F. Selgrade, M. Shearer, C. E. Siewert, J. W. Silverstein, M. F. Singer, R. E. White; *Professors Emeriti:* R. C. Bullock, J. M. Clarkson, W. J. Harrington, J. Levine, L. B. Martin Jr., P. A. Nickel, H. V. Park, N. J. Rose, H. Sagan, R. A. Struble; *Associate Professors:* G. D. Faulkner, B. G. Fitzpatrick, J. E. Franke, D. E. Garoutte, A. G. Helminck, I. Ipsen, A. Kheyfets, T. J. Lada, D. M. Latch, X. Lin, L. K. Norris, L. B. Page, R. T. Ramsay, J. Rodriguez, R. Silber, H. T. Tran; *Associate Professor Emeritus:* D. F. Ullrich; *Assistant Professors:*



H. J. Charlton, F. J. Garaizar, P. A. Gremaud, D. J. Hansen, P. Hitczenko, N. Jing, W. M. McEaney, W. R. McKinney, S. O. Paur, F. L. Reitich, J. S. Scroggs

## ASSOCIATE MEMBER OF THE PROGRAM

*Associate Professor:* L. V. Stiff

The Department of Mathematics offers programs leading to the degrees of Master of Science and Doctor of Philosophy in mathematics and in applied mathematics. Students may opt for the concentration in computational mathematics, which is attached to the program in applied mathematics. Through the Center for Research in Scientific Computation, which is housed in the Department of Mathematics, students may participate in the industrial applied mathematics program, a program of joint research endeavors with industrial and governmental partners.

*Admissions Requirements:* Applicants for admission should have an undergraduate or masters degree in mathematics or the equivalent. This should include courses in advanced calculus, modern algebra and linear algebra. Applicants with degrees in other subjects may be admitted but may be required to take certain undergraduate courses in mathematics without receiving graduate credit. It is recommended that applicants take the GRE Advanced Test in Mathematics.

*Master of Science Requirements:* In addition to course requirements, the M.S. degree requires a written master's project for 3 hours credit.

*Ph.D. Requirements:* A student will typically take 50-60 semester hours of course credits for the Ph.D. These courses include one semester of modern algebra and one semester of mathematical analysis. The written preliminary examination consists of examinations in three selected areas of mathematics. Prior to taking the preliminary oral examination, the student must demonstrate a working knowledge of a foreign language. The research dissertation should represent a substantial contribution to an area of mathematics or its applications.

*Student Financial Support:* Teaching assistantships and some research assistantships are available. Teaching assistants benefit from a structured program of training in university-level teaching.

*Other Information:* The Department of Mathematics has more than twenty workstations devoted exclusively to its graduate students. Students also have access to the high-performance computing and visualization equipment at the North Carolina Super-computer Center.

## GRADUATE COURSES

- MA 501 ADVANCED MATHEMATICS FOR ENGINEERS AND SCIENTISTS I.
- MA 502 ADVANCED MATHEMATICS FOR ENGINEERS AND SCIENTISTS II.
- MA(OR) 504 INTRODUCTION TO MATHEMATICAL PROGRAMMING.
- MA(IE,OR) 505 LINEAR PROGRAMMING.
- MA 507 ANALYSIS FOR SECONDARY TEACHERS.
- MA 508 GEOMETRY FOR SECONDARY TEACHERS.
- MA 509 ABSTRACT ALGEBRA FOR SECONDARY TEACHERS.
- MA 510 SELECTED TOPICS IN MATHEMATICS FOR SECONDARY TEACHERS.
- MA 511 ADVANCED CALCULUS I.
- MA 512 ADVANCED CALCULUS II.
- MA 513 INTRODUCTION TO COMPLEX VARIABLES.
- MA 515 ANALYSIS I.
- MA 517 INTRODUCTION TO TOPOLOGY.
- MA 518 INTRODUCTION TO MANIFOLD THEORY.
- MA 519 NONLINEAR DYNAMICS AND CHAOS.
- MA 520 LINEAR ALGEBRA.
- MA 521 ABSTRACT ALGEBRA I.
- MA 522 COMPUTER ALGEBRA.
- MA 524 MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES I.
- MA 525 MATHEMATICAL METHODS IN THE PHYSICAL SCIENCES II.
- MA(CSC) 529 NUMERICAL ANALYSIS I.
- MA(CSC) 530 NUMERICAL ANALYSIS II.
- MA(E,OR) 531 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL I.
- MA 532 ORDINARY DIFFERENTIAL EQUATIONS I.
- MA 534 INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS.
- MA 535 STABILITY AND TIME OPTIMAL CONTROL OF HEREDITARY SYSTEMS I.
- MA(ST) 541 THEORY OF PROBABILITY I.
- MA(ST) 542 INTRODUCTION TO STOCHASTIC PROCESSES.
- MA 544 COMPUTER EXPERIMENTS IN MATHEMATICAL PROBABILITY.
- MA 545 SET THEORY AND FOUNDATIONS OF MATHEMATICS.
- MA(PY) 555 MATHEMATICAL INTRODUCTION TO CELESTIAL MECHANICS.
- MA(PY) 556 ORBITAL MECHANICS.
- MA(BMA,ST) 571 BIOMATHEMATICS I.
- MA(BMA,ST) 572 BIOMATHEMATICS II.
- MA 581 SPECIAL TOPICS.
- MA 583 NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS.
- MA 584 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS—FINITE DIFFERENCE METHODS.
- MA(CSC,OR) 585 GRAPH THEORY.
- MA(IE,OR) 586 NETWORK FLOWS.
- MA 587 NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS—FINITE ELEMENT METHOD.
- MA 600 ORDINARY DIFFERENTIAL EQUATIONS II.
- MA 602 PARTIAL DIFFERENTIAL EQUATIONS.
- MA 604 TOPOLOGY.
- MA(ST,OR) 606 NONLINEAR PROGRAMMING.
- MA(NE) 607 EXACT AND APPROXIMATE SOLUTIONS IN PARTICLE TRANSPORT THEORY.
- MA 608 NUMERICAL NONLINEAR PARTIAL DIFFERENTIAL EQUATIONS.
- MA(BMA,OR,ST) 610 STOCHASTIC MODELING.
- MA 611 ANALYTIC FUNCTION THEORY I.
- MA 612 ANALYTIC FUNCTION THEORY II.
- MA 613 TECHNIQUES OF COMPLEX ANALYSIS.
- MA(OR) 614 INTEGER PROGRAMMING.

MA(ST) 617, 618 MEASURE THEORY AND ADVANCED PROBABILITY.  
 MA 620 ABSTRACT ALGEBRA II.  
 MA 622 LINEAR TRANSFORMATIONS AND MATRIX THEORY.  
 MA 623 THEORY OF MATRICES AND APPLICATIONS.  
 MA 625 LIE ALGEBRAS.  
 MA 626 ALGEBRAIC TOPOLOGY.  
 MA(OR) 629 VECTOR SPACE METHODS IN SYSTEM OPTIMIZATION.  
 MA(E,OR) 631 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL II.  
 MA 635 STABILITY AND TIME OPTIMAL CONTROL OF HEREDITARY SYSTEMS II.  
 MA 647 ANALYSIS II.  
 MA 648 ADVANCED FUNCTIONAL ANALYSIS.  
 MA 661 INTRODUCTION TO RIEMANNIAN GEOMETRY.  
 MA 662 GEOMETRICAL STRUCTURES ON FIBER BUNDLES.  
 MA 672 ADVANCED NUMERICAL LINEAR ALGEBRA.  
 MA(CSC) 673 PARALLEL ALGORITHMS AND SCIENTIFIC COMPUTATION.  
 MA 674 NONLINEAR EQUATIONS AND UNCONSTRAINED OPTIMIZATION.  
 (*The subject matter in the following special topics courses varies from year to year. The topics and instructors are announced well in advance by the department.*)  
 MA 681 SPECIAL TOPICS IN REAL ANALYSIS.  
 MA 682 SPECIAL TOPICS IN COMPLEX ANALYSIS.  
 MA 683 SPECIAL TOPICS IN ALGEBRA.  
 MA 684 SPECIAL TOPICS IN COMBINATORIAL ANALYSIS.  
 MA 685 SPECIAL TOPICS IN NUMERICAL ANALYSIS.  
 MA 686 SPECIAL TOPICS IN TOPOLOGY.  
 MA 687 SPECIAL TOPICS IN GEOMETRY.  
 MA 688 SPECIAL TOPICS IN DIFFERENTIAL EQUATIONS.  
 MA 689 SPECIAL TOPICS IN APPLIED MATHEMATICS.  
 MA(IE,OR) 692 SPECIAL TOPICS IN MATHEMATICAL PROGRAMMING.  
 MA 697 MASTER'S PROJECT.  
 MA 699 RESEARCH.

## Mathematics Education

For a listing of graduate faculty and program information, see mathematics and science education.

## Mathematics and Science Education

Degrees Offered: Ph.D., Ed.D., M.S., M.Ed.

### GRADUATE FACULTY

*Professor J. R. Kolb, Head of the Department*

*Associate Professor W. M. Waters Jr., Director of Graduate Programs, Mathematics Education, waters@poe.coe.ncsu.edu*

*Professor D. A. Adams, Director of Graduate Programs, Occupational Education, daadams@poe.coe.ncsu.edu*

*Assistant Professor S. L. Westbrook, Director of Graduate Programs, Science Education, westbrk@poe.coe.ncsu.edu*

*Associate Professor R. E. Wenig, Director of Graduate Programs, Technology Education*, [wenig@poe.coe.ncsu.edu](mailto:wenig@poe.coe.ncsu.edu)  
Box 7801, (919) 515-2239

*Professor: L. M. Clark; Professors Emeriti: N. D. Anderson, J. K. Coster, D. M. Hanson, J. T. Nerden, D. W. Olson, H. E. Speece; Associate Professors: S. B. Berenson, V. W. DeLuca, W. J. Haynie III, K. S. Norwood, J. C. Park, R. E. Peterson, L. V. Stiff, L. W. Watson, J. H. Wheatley; Research Associate Professor: H. S. Stubbs; Associate Professors Emeriti: C. D. Bryant, J. R. Clary, W. L. Cox, T. R. Miller, H. A. Shannon, T. B. Young; Assistant Professors: G. S. Carter, W. J. Vander Wall; Assistant Professor Emeriti: J. L. Crow, T. C. Shore Jr.*

The Department of Mathematics and Science Education offers graduate programs in occupational education and technology education that lead to the degrees of Master of Science, Master of Education and Doctor of Education. Students take courses in their educational specialty, in general professional education and in a social science cognate area. Graduate programs in mathematics education and science education lead to the degrees of Master of Science, Master of Education and Doctor of Philosophy. Students take courses in their educational specialty in one of the teaching specializations: biological sciences, chemistry, computer science, earth science, interdisciplinary science, mathematics, physics, statistics.

Master's programs are offered leading to graduate-level (G) certification as a teacher of mathematics, science, technology or occupational exploration at grades 6-9 or 9-12 for those who have initial (A) certification. Programs are also available for those seeking advanced graduate-level (AG) certification as a teacher or certification as a local vocational director. Students may choose a program to prepare for teaching careers in post-secondary education.

*Admission Requirements:* Applicants for all of the M.S. and M.Ed. degrees and Ed.D. in occupational education or technology education may submit recent scores from the GRE General Test or on the Miller's Analogy Test. Applicants for the Ph.D. in mathematics education or science education must submit recent scores from the GRE General Test. Academic and professional background necessary for admission differs by specific program.

*Master's Degree Requirements:* The master's degree programs require a minimum of 36 semester hours of graduate work. Students who elect the M.S. substitute up to 6 semester hours of thesis research for part of the course load.

*Doctoral Degree Requirements: (Ed.D.)* A minimum of 90 semester hours of graduate work beyond the baccalaureate degree is required including a minimum of 12 semester hours of dissertation research. *(Ph.D.)* A minimum of 45 semester hours of course work, a minimum of 12 semester hours of dissertation research and one foreign



language is required beyond the master's degree requirements. For both degrees, students may be required to supplement their course work with internships and/or other experiential activities to meet competencies.

### **Student Financial Support**

A small number of teaching and research assistantships are available and out-of-state tuition remission may be available for one year to students on assistantships.

### **GRADUATE COURSES**

- EMS 511 IMPLICATIONS OF MATHEMATICAL CONTENT, STRUCTURE, AND PROCESSES FOR THE TEACHING OF MATHEMATICS IN THE ELEMENTARY SCHOOL.
- EMS 512 TEACHING MATHEMATICS IN ELEMENTARY AND JUNIOR HIGH SCHOOL.
- EMS 526 TEACHING IN COLLEGE.
- EMS 570 FOUNDATIONS OF MATHEMATICS EDUCATION.
- EMS 575 FOUNDATIONS OF SCIENCE EDUCATION.
- EMS 577 IMPROVING CLASSROOM INSTRUCTION IN SCIENCE.
- EMS 592 SPECIAL PROBLEMS IN MATHEMATICS TEACHING.
- EMS 594 SPECIAL PROBLEMS IN SCIENCE TEACHING.
- EMS 599 RESEARCH PROJECTS IN MATHEMATICS AND SCIENCE EDUCATION.
- EMS 603 TEACHING MATHEMATICS AND SCIENCE IN HIGHER EDUCATION.
- EMS 604 CURRICULUM DEVELOPMENT AND EVALUATION IN SCIENCE AND MATHEMATICS.
- EMS 605 EDUCATION AND SUPERVISION OF TEACHERS OF MATHEMATICS AND SCIENCE.
- EMS 621 INTERNSHIP IN MATHEMATICS AND SCIENCE EDUCATION.
- EMS 641 PRACTICUM IN SCIENCE AND MATHEMATICS EDUCATION.
- EMS 690 SEMINAR IN MATHEMATICS EDUCATION.
- EMS 695 SEMINAR IN SCIENCE EDUCATION.
- EMS 699 THESIS AND DISSERTATION RESEARCH.
- EOE 501 PHILOSOPHY OF OCCUPATIONAL EDUCATION.
- EOE 503 CAREER/VOCATIONAL EDUCATION FOR THE HANDICAPPED.
- EOE 505 CURRICULUM MATERIALS DEVELOPMENT.
- EOE 506 COOPERATIVE OCCUPATIONAL EDUCATION.
- EOE 510 CAREER EXPLORATION.
- EOE 512 ANALYSIS OF OCCUPATIONAL INFORMATION, TRENDS AND LABOR MARKET.
- EOE 517 PRACTICUM IN OCCUPATIONAL EDUCATION.
- EOE 545 PROFESSIONAL DEVELOPMENT IN MARKETING EDUCATION.
- EOE 551 TECHNOLOGY EDUCATION: A DISCIPLINE.
- EOE 552 CURRICULA FOR EMERGING TECHNOLOGIES.
- EOE 555 DEVELOPING AND IMPLEMENTING TECHNOLOGY EDUCATION.
- EOE 558 TEACHING CREATIVE PROBLEM SOLVING.
- EOE 565 ADVANCED TRADE ANALYSIS AND COURSE CONSTRUCTION.
- EOE 597 SPECIAL PROBLEMS IN OCCUPATIONAL EDUCATION.
- EOE 598 SPECIAL PROBLEMS IN OCCUPATIONAL EDUCATION.
- EOE 599 RESEARCH PROJECTS IN OCCUPATIONAL EDUCATION.
- EOE 602 LAWS, REGULATIONS AND POLICIES AFFECTING OCCUPATIONAL EDUCATION.
- EOE 609 SEMINAR IN OCCUPATIONAL EDUCATION.
- EOE 612 FINANCE, ACCOUNTING AND MANAGEMENT OF OCCUPATIONAL EDUCATION PROGRAMS.
- EOE 621 INTERNSHIP IN OCCUPATIONAL EDUCATION.
- EOE 645 MARKETING EDUCATION PROGRAM MANAGEMENT.
- EOE 655 TECHNICAL EDUCATION CURRICULUM.

EOE 662 PLANNING AND ORGANIZING INDUSTRIAL AND TECHNICAL EDUCATION PROGRAMS.

EOE 679 RESEARCH APPLICATION IN OCCUPATIONAL EDUCATION.

EOE 698 ADVANCED SPECIAL PROBLEMS IN OCCUPATIONAL EDUCATION.

EOE 699 THESIS AND DISSERTATION RESEARCH.

## Mechanical Engineering

For a listing of graduate faculty and program information, see mechanical and aerospace engineering.

## Mechanical and Aerospace Engineering

Degrees Offered: Ph.D., M.S., Master of Mechanical Engineering

### GRADUATE FACULTY

*Graduate Alumni Distinguished Professor* F. R. DeJarnette, *Head of the Department*  
*Professor* G. K. F. Lee, *Director of Graduate Programs*

Box 7910, (919) 515-3026, glee@eos.ncsu.edu

*Graduate Alumni Distinguished Professors:* H. A. Hassan, M. N. Ozisik

*R. J. Reynolds Industries Professor:* C. F. Zorowski

*Professors:* E. M. Afify, J. A. Bailey, A. E. Bayoumi, T. A. Dow, H. M. Eckerlin, J. A. Edwards, T. H. Hodgson, R. F. Keltie, C. Kleinstreuer, C. J. Maday, D. S. McRae, J. C. Mulligan, R.T. Nagel, J. N. Perkins, L. H. Royster, L. M. Silverberg, F. Y. Sorrell Jr., J. S. Strenkowski, G. D. Walberg; *Visiting Professor:* M. M. Fikry; *Adjunct Professors:* J. P. Archie, Jr., D. P. DeWitt, W. D. Erickson, J. Juang, D. E. Klett, E. R. McClure, R. A. Whisnant; *Professors Emeriti:* R. A. Burton, M. H. Clayton, B. H. Garcia Jr., W. C. Griffith, F. J. Hale, F. D. Hart, M. N. Ozisik, F. O. Smetana, J. K. Whitfield, J. Woodburn; *Associate Professors:* M. A. Boles, N. Chokani, J. W. David, J. W. Eischen, R. D. Gould, R. R. Johnson, E. C. Klang, J. W. Leach, P. I. H. Ro, F. Yuan; *Research Associate Professor:* J. S. Stewart; *Adjunct Associate Professors:* G. V. Candler, J. G. Cleland, A. C. Eberhardt, J. H. Hebrank, K. R. Iyer, D. W. Lee, R. M. Potter, Jr., H. Singh; *Assistant Professors:* J. R. Edwards Jr., L. P. Franzoni, C. E. Hall Jr., K. M. Lyons, M. K. Ramasubramanian, W. L. Roberts IV, M. A. Zikry; *Adjunct Assistant Professors:* D. P. Colvin, J. A. Cooke, S. D. Holland, M. R. Jolly, M. A. Norris, M. T. Odman, D. J. Rossetti, Q. Shen, S. C. Southward, M. R. Spano, Sr., M. E. Tauber

### INTERINSTITUTIONAL ADJUNCT GRADUATE FACULTY

V. S. Avva, S. Chandra, P. H. DeHoff

Course offerings and research programs are available in the following areas: thermodynamics and energy conversion, heat and mass transfer, fluid mechanics, combustion, acoustics and noise control, machine design, vibration, gas dynamics and aerodynamics, aeroelasticity, CFD, finite elements, structures, controls, precision engineering, materials processing and tribology.

**Admission Requirements:** An applicant to the master's program must be a graduate of an accredited undergraduate program with a B.S. degree in either mechanical or aerospace engineering. Graduates of other accredited programs in engineering, physical sciences and mathematics may be considered but will be required to make up undergraduate deficiencies without graduate credit. Provisional admissions, as well as exceptions, are sometimes granted under special circumstances. The most qualified applicants are accepted first. Applicants to the Ph.D. program must have met the M.S. admission requirements, completed the M.S. degree in mechanical engineering or aerospace engineering and additionally must satisfy the Ph.D. qualifying requirements.

**Master's Degree Requirements:** The non-thesis Master of Mechanical Engineering degree requires 27 hours of course credit and a six-hour project.

**Ph.D. Degree Requirements:** A minimum of 24 hours of course credit beyond the master's program is required.

**Student Financial Support:** Various types of assistantships and fellowships are available. Awards are made to the most qualified applicants first and generally are not available for all students.

**Other Relevant Information:** Each new student chooses an area of specialty, selects an advisor and committee, customizes a program of study and begins research in the first semester of residence. The Director of Graduate Programs acts as a temporary advisor initially and should be contacted with questions.

### GRADUATE COURSES

- MAE 501 ADVANCED ENGINEERING THERMODYNAMICS.
- MAE 503 ADVANCED POWER PLANTS.
- MAE 504 FLUID DYNAMICS OF COMBUSTION I.
- MAE 505 HEAT TRANSFER THEORY AND APPLICATIONS.
- MAE 510 EFFECTS OF NOISE AND VIBRATION ON MAN.
- MAE 513 PRINCIPLES OF STRUCTURAL VIBRATION.
- MAE 514 NOISE AND VIBRATION CONTROL.
- MAE 517 INSTRUMENTATION IN SOUND AND VIBRATION ENGINEERING.
- MAE 518 ACOUSTIC RADIATION I.
- MAE 519 THEORY OF NOISE IN TRANSPORTATION SYSTEMS.
- MAE(IE) 520 INDUSTRIAL ROBOTICS.
- MAE 521 LINEAR CONTROL AND DESIGN FOR MIMO SYSTEMS.
- MAE 522 REAL TIME DIGITAL FILTERING AND CONTROL

MAE 524 PRINCIPLES OF STRUCTURAL CONTROL.  
 MAE 525 ADVANCED FLIGHT VEHICLE STABILITY AND CONTROL.  
 MAE 526 INERTIAL NAVIGATION ANALYSIS AND DESIGN.  
 MAE(MAT) 531 MATERIALS PROCESSING BY DEFORMATION.  
 MAE(MAT) 532 FUNDAMENTALS OF METAL MACHINING THEORY.  
 MAE 533 FINITE ELEMENT ANALYSIS I.  
 MAE 536 PHOTOELASTICITY.  
 MAE 537 MECHANICS OF COMPOSITE STRUCTURES.  
 MAE 538 ENGINEERING OPTICS.  
 MAE 540 ADVANCED AIR CONDITIONING DESIGN.  
 MAE 541 ADVANCED MACHINE DESIGN I.  
 MAE 542 MECHANICAL DESIGN FOR AUTOMATED ASSEMBLY.  
 MAE 543 FRACTURE MECHANICS.  
 MAE 544 REAL TIME ROBOTICS.  
 MAE 545 METROLOGY FOR PRECISION MANUFACTURING.  
 MAE 550 FOUNDATIONS OF FLUID DYNAMICS.  
 MAE 551 AIRFOIL THEORY.  
 MAE 552 TRANSONIC AERODYNAMICS.  
 MAE 553 COMPRESSIBLE FLUID FLOW.  
 MAE 554 HYPERSONIC AERODYNAMICS.  
 MAE 555 AERODYNAMIC HEATING.  
 MAE 556 MECHANICS OF IDEAL FLUIDS.  
 MAE 557 DYNAMICS OF INTERNAL FLUID FLOW.  
 MAE 558 PLASMAGASDYNAMICS I.  
 MAE 559 MOLECULAR GAS DYNAMICS I.  
 MAE 560 COMPUTATIONAL FLUID MECHANICS AND HEAT TRANSFER.  
 MAE 561 WING THEORY.  
 MAE 562 PHYSICAL GAS DYNAMICS.  
 MAE(MEA) 563 GEOPHYSICAL FLUID MECHANICS.  
 MAE(ECE) 565 GAS LASERS.  
 MAE 570 THEORY OF PARTICULATE COLLECTION IN AIR POLLUTION CONTROL.  
 MAE 586 PROJECT WORK IN MECHANICAL ENGINEERING.  
 MAE 589 SPECIAL TOPICS IN MECHANICAL ENGINEERING.  
 MAE 601 STATISTICAL THERMODYNAMICS.  
 MAE 604 FLUID DYNAMICS OF COMBUSTION II.  
 MAE 608 ADVANCED CONDUCTIVE HEAT TRANSFER.  
 MAE 609 ADVANCED CONVECTIVE HEAT TRANSFER.  
 MAE 610 ADVANCED RADIATIVE HEAT TRANSFER.  
 MAE 613 ANALYTICAL METHODS IN STRUCTURAL VIBRATION.  
 MAE 614 COMPUTATIONAL METHODS IN STRUCTURAL VIBRATION.  
 MAE 615 NONLINEAR VIBRATIONS.  
 MAE 618 ACOUSTIC RADIATION II.  
 MAE 619 RANDOM VIBRATION.  
 MAE 623 MECHANICS OF MACHINERY.  
 MAE 634 FINITE ELEMENT ANALYSIS II.  
 MAE 640 ADVANCED MACHINE DESIGN II.  
 MAE 642 MECHANICAL DESIGN ANALYSIS.  
 MAE 650 COMPUTATION OF REACTING FLOWS.  
 MAE 653 HYDRODYNAMIC STABILITY AND TRANSITION.  
 MAE 654 DYNAMICS OF REAL FLUIDS I.  
 MAE 655 DYNAMICS OF REAL FLUIDS II.  
 MAE 656 TURBULENCE.  
 MAE 658 PLASMAGASDYNAMICS II.  
 MAE 659 MOLECULAR GAS DYNAMICS II.  
 MAE 660 COMPUTATIONAL FLUID DYNAMICS.  
 MAE 661 INTRODUCTION TO ROCKET PROPULSION.  
 MAE(MEA) 663 ADVANCED GEOPHYSICAL FLUID MECHANICS.



MAE(MEA) 664, 665 PERTURBATION METHOD IN FLUID MECHANICS I, II.  
MAE 686 ADVANCED TOPICS IN MECHANICAL ENGINEERING.  
MAE 695 MECHANICAL ENGINEERING SEMINAR.  
MAE 699 MECHANICAL ENGINEERING RESEARCH.

## Microbiology

Degrees Offered: Ph.D., M.S., Master of Life Sciences

### GRADUATE FACULTY

*Professor* H. M. Hassan, *Head of the Department*

*Professor* T. Melton, *Director of Graduate Programs*

Box 7615, (919) 515-2391, Fax: (919) 515-7867, micro@mbio.ncsu.edu

*Professors:* W. J. Dobrogosz, G. H. Luginbuhl, J. M. Mackenzie Jr., L. W. Parks, J. J. Perry; *Professor (USDA):* P. E. Bishop; *Adjunct Professors:* R. E. Kanich, K. G. Tatchell, S. R. Tove; *Professor Emeritus:* G. H. Elkan; *Associate Professors:* S. M. Laster, E. S. Miller; *Adjunct Associate Professor:* K. T. Kleeman; *Assistant Professors:* J. W. Brown, I. T. D. Petty; *Adjunct Assistant Professors:* W. S. Dallas, S. H. Shore

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* P. M. Foegeding, F. J. Fuller, T. R. Klaenhammer, W. E. Kloos, P. E. Orndorff, J. C. H. Shih; *Associate Professor:* B. Sherry; *Associate Professor (USDA):* R. G. Upchurch

The Department of Microbiology is in the College of Agriculture and Life Sciences and has a unique blend of applied and basic research programs. The department offers courses of study and research leading to the Ph.D., M.S. and Master of Life Sciences degrees. The graduate program is designed to prepare individuals for careers in academic, industrial or research institute settings. Research in the department emphasizes study of fundamental biological processes, with several programs having important biotechnological, environmental and medical applications.

*Admission Requirements:* Applications are invited from individuals holding baccalaureate or M.S. degrees in the physical and life sciences. Applications should ideally be received in the department before January 15 to be considered for fall admission. A written statement should describe the applicant's academic and career goals as well as their area of interest.

*Master's Degree Requirements:* The M.S. is a research-oriented degree that requires 30 credit hours and a written thesis. For students wishing a more general educational

background in microbiology without the thesis requirement, the Master of Life Sciences degree is offered. A first-year core curriculum is required for all master's degree students.

**Doctoral Degree Requirements:** The Ph.D. program is designed for individuals desiring to pursue careers in research and teaching. Students enroll in a core curriculum consisting of courses in metabolic regulation/physiology, virology, immunology and molecular genetics. In addition, the student, in consultation with and approval by his/her advisory committee, may select elective courses offered by the Department of Microbiology and by other departments on campus. In conjunction with the advisor, the student establishes a four-member faculty advisory committee to guide the research and academic program. At least one semester of laboratory instructorship is required. The final examination also includes a seminar presented by the candidate that is open to the university community.

**Student Financial Support:** Financial support for study in the department is available in the form of teaching assistantships, research assistantships and competitive fellowships. All applications to the department are automatically considered for available assistantships. For highly qualified students, supplemental funds are frequently available.

**Other Relevant Information:** During the first semester, participation in the laboratory rotation program is encouraged so that students become acquainted with departmental research programs, faculty and other graduate students. A faculty thesis advisor and laboratory research program are usually selected in the first semester and no later than the second term.

## GRADUATE COURSES

- MB(BO,PP) 501 FUNGI AND THEIR INTERACTION WITH PLANTS.
- MB 503 MICROBIAL DIVERSITY.
- MB 514 MICROBIAL METABOLIC REGULATION.
- MB 518 INTRODUCTORY VIROLOGY.
- MB(PP) 519 BACTERIA AND THEIR INTERACTIONS WITH PLANTS.
- MB(FS) 525 FERMENTATION MICROBIOLOGY.
- MB(SSC) 532 SOIL MICROBIOLOGY.
- MB(IMM) 551 IMMUNOLOGY.
- MB(ZO) 555 PROTOZOOLOGY.
- MB(IMM,PIIY,PO,VMS) 556 IMMUNOGENETICS.
- MB(GN) 558 PROKARYOTIC MOLECULAR GENETICS.
- MB(BO) 574 PHYCOLOGY.
- MB(BO,PP) 575 THE FUNGI.
- MB(BO,PP) 576 THE FUNGI-LAB.
- MB 590 TOPICAL PROBLEMS.
- MB 592 LABORATORY RESEARCH METHODS.
- MB 593 TEACHING EXPERIENCE.
- MB 605 BIOLOGICAL SCANNING ELECTRON MICROSCOPY.
- MB 610 BIOLOGICAL TRANSMISSION ELECTRON MICROSCOPY.
- MB 611 ULTRAMICROTOMY FOR LIFE SCIENCES.
- MB(BO,GN,PP) 627 FUNGAL GENETICS AND PHYSIOLOGY.

MB(SSC) 632 ECOLOGY AND FUNCTIONS OF SOIL MICROORGANISMS.  
MB(VMS) 653 ADVANCED IMMUNOLOGY.  
MB(GN) 660 EXPERIMENTAL MICROBIAL GENETICS.  
MB 671 MOLECULAR VIROLOGY OF ANIMAL VIRUSES.  
MB 690 MICROBIOLOGY SEMINAR.  
MB 691 MICROBIOLOGY RESEARCH PRESENTATIONS.  
MB 692 SPECIAL PROBLEMS IN MICROBIOLOGY.  
MB 699 MICROBIOLOGY RESEARCH.

## Middle Grades Education

For a listing of graduate faculty and program information, see curriculum and instruction.

## Natural Resources Administration

Degrees Offered: M.S., Master of Natural Resources Administration

### GRADUATE FACULTY

*Professor D. L. Holley Jr., Director of Graduate Programs, Forestry*

Box 8002, (919) 515-2892

*Associate Professor L. D. Gustke, Director of Graduate Programs, Parks, Recreation and Tourism Management*

Box 8004, (919)515-3276

*Professor C. D. Raper, Director of Graduate Programs, Soil Science*

Box 7619, (919) 515-2643

*Professors: F. W. Cabbage, H. A. Devine, H. J. Kleiss, J. D. Wellman; Associate Professors: R. C. Abt, J. D. Gregory, B. E. Wilson; Associate Professor (USDA): J. E. deSteiguer; Assistant Professor: R. L. Moore*

The natural resources administration program is an interdepartmental program designed to prepare students for administrative positions in both private and public natural resource organizations. A core curriculum of 15 credit hours provides all NRA students with courses in administration, economics, policy, statistics and current natural resource issues. For the remaining 17 credits, students elect a technical option administered by one of the three participating departments. A total of five technical options are currently approved. Two are in the Department of Forestry (forest policy and management, hydrology); two are in the Department of Parks, Recreation and Tourism Management (outdoor recreation, spatial information systems) and one is in the Department of Soil Science (soil science). With one exception, each option is available as either the M.S. in NRA or as the non-thesis Master of NRA. The Soil Science Option is available only as the non-thesis degree.

**Admissions Requirements:** Students should have an undergraduate degree in natural resources or a related field. Experience in natural resources management and administration will be considered in lieu of an appropriate undergraduate degree. Admission is contingent upon acceptance by an advisor.

**Master's Requirements:** The M.S. degree requires a research thesis based on completion of a research project. The Master of NRA degree requires a practical project which develops and demonstrates problem-solving skills.

Core Courses (15 credit hours)

- ECG 515 ENVIRONMENTAL AND RESOURCE POLICY.
- or
- EC(ARE) 436 ENVIRONMENTAL ECONOMICS.
- FOR 672 CURRENT ISSUES IN NATURAL RESOURCE POLICY.
- PA 511 PUBLIC ADMINISTRATION.
- PA 520 ENVIRONMENTAL POLICY.
- FOR 691 or PRT 696 or SSC 690 SEMINAR.
- One graduate statistics course*

## Nuclear Engineering

Degrees Offered: Ph.D., M.S., Master of Nuclear Engineering

### GRADUATE FACULTY

*Professor D. J. Dudziak, Head of the Department*  
*Professor K. Verghese, Director of Graduate Programs*  
Box 7909, (919) 515-2301, verghese@ncsu.edu

*Professors:* R. P. Gardner, J. G. Gilligan, K. L. Murty, P. J. Turinsky; *Adjunct Professors:* R. A. Gerwin, M. S. Wechsler; *Professors Emeriti:* R. L. Murray, R. F. Saxe, E. Stam, L. R. Zumwalt; *Associate Professors:* M. A. Bourham, J. M. Doster, C. W. Mayo; *Adjunct Associate Professors:* Y. R. Azmy; *Assistant Professors:* O. E. Hankins, R. M. Mayo, M. Yim; *Adjunct Assistant Professors:* D. J. Kropaczek

The discipline of nuclear engineering is concerned with the development of nuclear processes for energy production and with the applications of radiation for the benefit of society. Representative topics of investigation include analytic, computational and experimental research in the neutronics, materials, thermal-hydraulics and control aspects of fission reactors; radiation detection and measurement of basic physics parameters; waste management and radiological assessment; applications of radioisotopes and radiation in industry, medicine and science; and plasma, plasma-material surface interactions and design aspects of fusion reactors.



**Admission Requirements:** Bachelor's degree graduates in any of the fields of engineering or physical sciences may be qualified for successful advanced study in nuclear engineering. Prior experience or course work in nuclear physics, partial differential equations and basic reactor analysis is helpful but may be gained during the first semester of graduate study. GRE scores (general test) are usually needed for financial aid.

**Master's Degree Requirements:** A project is required for the MNE degree. A minor (9 semester hours) must be selected for both the M.S. and MNE degrees.

**Doctoral Degree Requirements:** Typically about 60 semester hours are required beyond the B.S. degree for the Ph.D. (includes research hours). Students must pass a departmental qualifying exam that covers basic nuclear engineering material. Students must select a minor (typically 15-18 hours).

**Student Financial Support:** Teaching assistantships, research assistantships and fellowships are available for qualified applicants. Opportunities are also available for graduate traineeships with utility companies, reactor manufacturers and national laboratories providing a valuable combination of financial support and learning in the classroom, the research laboratory and on the job.

**Other Relevant Information:** The department has many excellent facilities including the one-megawatt PULSTAR fission reactor, the Scaled PWR Facility (SPWRF), neutron activation analysis laboratory, nuclear materials laboratory, plasma and fusion laboratories, instrumentation and controls equipment, radiation analyzers and tomography systems, and computers ranging from workstations to a supercomputer.

### GRADUATE COURSES

NE 504 RADIATION, SAFETY AND SHIELDING.

NE 505 REACTOR SYSTEMS.

NE 508 RADIATION SAFETY.

NE(MAT) 509 NUCLEAR MATERIALS.

NE(PY) 511 NUCLEAR PHYSICS FOR ENGINEERS.

NE 512 NUCLEAR FUEL CYCLES.

NE 520 RADIATION AND REACTOR FUNDAMENTALS.

NE 521 NUCLEAR LABORATORY FUNDAMENTALS.

NE 522 REACTOR DYNAMICS AND CONTROL.

NE 523 REACTOR ANALYSIS.

NE 524 REACTOR HEAT TRANSFER.

NE(MAT) 525 NUCLEAR MATERIALS.

NE 526 RADIOISOTOPE MEASUREMENT APPLICATIONS.

NE 527 NUCLEAR ENGINEERING ANALYSIS.

NE(PY) 528 INTRODUCTION TO PLASMA PHYSICS AND FUSION ENERGY.

NE 550 LABORATORY PROJECTS IN NUCLEAR ENGINEERING.

NE(MAT) 573 COMPUTER EXPERIMENTS IN MATERIALS AND NUCLEAR ENGINEERING.

NE 580 PLASMA GENERATION AND DIAGNOSTICS LABORATORY.

NE 581 FUSION ENERGY ENGINEERING.

NE 591, 592 SPECIAL TOPICS IN NUCLEAR ENGINEERING I, II.

NE 601 REACTOR THEORY AND ANALYSIS.

NE(MA) 607 EXACT AND APPROXIMATE SOLUTIONS IN PARTICLE TRANSPORT THEORY.

NE 610 NUCLEAR REACTOR DESIGN CALCULATIONS.

NE 611 RADIATION DETECTION.

NE 612 THERMAL HYDRAULIC DESIGN CALCULATIONS.

NE 620 NUCLEAR RADIATION ATTENUATION.

NE 621 RADIATION EFFECTS ON MATERIALS.

NE 631 REACTOR KINETICS AND CONTROL.

NE 641 RADIOISOTOPE APPLICATIONS.

NE 680 PLASMA ENGINEERING I.

NE 681 PLASMA ENGINEERING II.

NE 691, 692 ADVANCED TOPICS IN NUCLEAR ENGINEERING I, II.

NE 695 SEMINAR IN NUCLEAR ENGINEERING.

NE 699 RESEARCH IN NUCLEAR ENGINEERING.

## Nutrition

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Associate Professor* J. C. Allen, *Coordinator*

Box 7624, (919) 515-2968

*Professors:* L. S. Bull, G. L. Catignani, W. E. Donaldson, J. D. Garlich, W. M. Hagler Jr., R. W. Harvey, W. L. Johnson, E. E. Jones, C. J. Lackey, J. F. Ort, J. C. H. Shih, J. W. Spears, H. E. Swaisgood, L. W. Whitlow; *Professors Emeriti:* L. W. Aurand, E. R. Barrick, E. S. Cofer, C. H. Hill, J. R. Jones, R. D. Mochrie, A. H. Rakes, H. A. Ramsey, F. H. Smith, G. H. Wise; *Associate Professors:* B. P. Alston-Mills, K. E. Anderson, L. C. Boyd, J. H. Eisemann, J. L. Grimes, P. R. Ferket, J. W. McClelland, J. Odle, R. C. Smart; *Visiting Associate Professor:* G. G. Gomez; *Assistant Professors:* A. Fraser, B. A. Hopkins, M. H. Poore, M. R. Williams; *Visiting Assistant Professor:* S. L. Ash

The interdepartmental nutrition program consist of faculty from five departments (animal science, family and consumer sciences, food science, poultry science and toxicology). Students reside and conduct research in one of these departments under the direction of an appropriate advisor. Research in the nutrition program may be conducted with a variety of species and at levels ranging from the molecular to the whole animal. Research programs are primarily in the area of nutritional biochemistry or experimental animal nutrition.

*Admission Requirement:* To be considered for admission, a student should have a B.S. or M.S degree in a science-related area.

*Master's Degree Requirements:* A minimum of 24 course credit hours is required.

*Doctoral Degree Requirements:* A minimum of 18 course credit hours is required.

*Student Financial Support:* Assistantships and fellowships are available on a competitive basis from the departments in which the advisor resides.

### GRADUATE COURSES

NTR(ANS) 516A,B,C,D ANIMAL NUTRITION RESEARCH METHODS.

NTR(FS) 530 HUMAN NUTRITION.

NTR 590 TOPICAL PROBLEMS IN NUTRITION.

NTR 601 PROTEIN AND AMINO ACID METABOLISM.

NTR(ANS,PO) 605 MINERAL METABOLISM.

NTR(FS) 606 VITAMIN METABOLISM.

NTR 608 ENERGY METABOLISM.

NTR(ANS,PHY,VMS) 632 COMPARATIVE PHYSIOLOGY OF THE DIGESTIVE SYSTEM.

NTR 690 ADVANCED SPECIAL PROBLEMS IN NUTRITION.

NTR 699 RESEARCH IN NUTRITION.

## Occupational Education

For a listing of graduate faculty and program information, see mathematics and science education.

## Operations Research

Degrees Offered: Ph.D., M.S., Master of Operations Research

### GRADUATE FACULTY

*Professor* S. E. Elmaghraby, *Chair and Program Director*

Box 7913, (919) 515-2350, Fax: (919) 515-5281, [elmaghra@eos.ncsu.edu](mailto:elmaghra@eos.ncsu.edu)

*Professors:* B. B. Bhattacharyya, J. W. Bishir, J. C. Dunn, S. Fang, R. E. Hartwig, T. J. Hodgson, D. M. Holthausen Jr., C. T. Kelley, C. D. Meyer Jr., A. A. J. Nilsson, H. L. Nuttle, H. G. Perros, E. L. Peterson, S. D. Roberts, C. D. Savage, W. J. Stewart, M. W. Suh, J. R. Wilson; *Professor Emeritus:* H. J. Gold; *Associate Professors:* Y. Fathi, T. L. Honeycutt, R. E. King, T. W. Reiland, J. Rodriguez, J. P. Roise, C. E. Smith, M. F. M. Stallmann, H. T. Tran, I. Viniotis; *Adjunct Associate Professor:* H. J. Uyttenhove; *Assistant Professor:* H. Damerджи

### ASSOCIATE MEMBER OF THE PROGRAM

*Professor:* G. W. Dickson

Operations research is a graduate program of an interdisciplinary nature, governed by an administrative board and the program committee, and administered through the office of the program director.

**Admission Requirements:** Applications for a master's degree program are accepted normally from undergraduate majors in mathematical sciences and engineering. Applications for the doctoral degree program are accepted normally from holders of a master's degree from a recognized program (preferably an OR program or one of its allied fields) who show promise of success at the Ph.D. level, as indicated by previous academic performance and independent research.

A score on the GRE that is less than two years old is required if financial assistance is sought or if the student is transferring from another doctoral program.

**Master's Degree Requirements:** The Master of Operations Research degree is a terminal graduate degree for students who seek careers as OR practitioners in either the private or public sector. The M.S. degree is designed to prepare students for careers in research and development.

**Doctoral Degree Requirements:** The Ph.D. degree is intended for students to be research scientists in industry or teachers and researchers in academia. Please consult the OR brochure for more details of degree requirements.

**Student Financial Support:** Both teaching and research assistantships are available to qualified applicants. Outstanding students who are U.S. citizens and who shall be enrolled in the NC State Graduate School for the first time are eligible for the Engineering Dean's Graduate Fellowship Program.

### CENTRAL GRADUATE COURSES

- OR 501 INTRODUCTION TO OPERATIONS RESEARCH.
- OR 502 INTRODUCTION TO SYSTEMS THEORY.
- OR(MA) 504 INTRODUCTION TO MATHEMATICAL PROGRAMMING.
- OR(IE,MA) 505 LINEAR PROGRAMMING.
- OR 506 ALGORITHMIC METHODS IN NONLINEAR PROGRAMMING.
- OR(IE) 509 DYNAMIC PROGRAMMING.
- OR 520 THEORY OF ACTIVITY NETWORKS.
- OR(CHE) 527 OPTIMIZATION OF ENGINEERING PROCESSES.
- OR(E,MA) 531 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL I.
- OR(IE) 561 QUEUES AND STOCHASTIC SERVICE SYSTEMS.
- OR(CSC,ECE,IE) 562 COMPUTER SIMULATION TECHNIQUES.
- OR(BMA,ST) 575 DECISION ANALYTIC MODELING.
- OR(CSC,MA) 585 GRAPH THEORY.
- OR(IE,MA) 586 NETWORK FLOWS.
- OR 591 SPECIAL TOPICS IN OPERATIONS RESEARCH.
- OR 592 PRACTICUM IN OPERATIONS RESEARCH.
- OR 605 LARGE SCALE LINEAR PROGRAMMING SYSTEMS.
- OR(MA,ST) 606 NONLINEAR PROGRAMMING.



OR 609 ADVANCED DYNAMIC PROGRAMMING.  
 OR (BMA,MA,ST) 610 STOCHASTIC MODELING.  
 OR(BMA) 611 SYSTEM MODELING THEORY.  
 OR(IE) 612 ADVANCED SCHEDULING AND ROUTING.  
 OR(MA) 614 INTEGER PROGRAMMING.  
 OR(MA) 629 VECTOR SPACE METHODS IN SYSTEM OPTIMIZATION.  
 OR(E,MA) 631 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL II.  
 OR(IE) 662 STOCHASTIC SIMULATION DESIGN AND ANALYSIS.  
 OR 691 SPECIAL TOPICS IN OPERATIONS RESEARCH.  
 OR(IE,MA) 692 SPECIAL TOPICS IN MATHEMATICAL PROGRAMMING.  
 OR 695 SEMINAR IN OPERATIONS RESEARCH.  
 OR 699 PROJECT IN OPERATIONS RESEARCH.

### SUGGESTED COGNATE COURSES

Cognate courses are courses that are often included in OR programs of study, but which carry other departmental designations. They cover subject matter closely related to OR, and provide additional insight into the theory or application of OR methodology. Students may include cognate courses in their programs of study with the consent of their faculty advisor.

BMA(MA,ST) 571, 572 BIOMATHEMATICS I & II.  
 CHE 525 CHEMICAL PROCESS CONTROL.  
 CE 575 CIVIL ENGINEERING SYSTEMS.  
 CSC 505 DESIGN AND ANALYSIS OF ALGORITHMS.  
 CSC(MA) 529, 530 NUMERICAL ANALYSIS I & II.  
 CSC(ECE) 671 ADVANCED COMPUTER PERFORMANCE MODELLING.  
 ECG(BUS) 650 ECONOMIC DECISION THEORY.  
 ECG(ST) 651 ECONOMETRICS.  
 ECG(ST) 652 TOPICS IN ECONOMETRICS.  
 ECE 516 FEEDBACK CONTROL SYSTEMS.  
 ECE 521 DIGITAL COMPUTER TECHNOLOGY AND DESIGN.  
 ECE 691 SPECIAL STUDIES IN ELECTRICAL ENGINEERING.  
 IE 523 PRODUCTION PLANNING, SCHEDULING AND INVENTORY CONTROL.  
 IE 547 RELIABILITY ENGINEERING.  
 IE 548 QUALITY ENGINEERING.  
 IE 611 THE DESIGN OF PRODUCTION SYSTEMS.  
 MA(ST) 541 THEORY OF PROBABILITY.  
 MA(ST) 542 INTRODUCTION TO STOCHASTIC PROCESSES.  
 MA(ST) 617, 618 MEASURE THEORY AND ADVANCED PROBABILITY.  
 MA 622 LINEAR TRANSFORMATIONS AND MATRIX THEORY.  
 MA 623 THEORY OF MATRICES AND APPLICATIONS.  
 MA 647 FUNCTIONAL ANALYSIS I.  
 MA 685 SPECIAL TOPICS IN NUMERICAL ANALYSIS.  
 ST 518 APPLIED TIME SERIES ANALYSIS.  
 ST 583 INTRODUCTION TO STATISTICAL DECISION THEORY.  
 ST 613, 614 TIME SERIES ANALYSIS I & II.

# Parks, Recreation and Tourism Management

Degrees Offered: M.S., Master of Parks, Recreation and Tourism Management, Master of Natural Resources Administration

## GRADUATE FACULTY

*Professor P. S. Rea, Head of the Department*

*Associate Professor L. D. Gustke, Director of Graduate Programs*

Box 8004, (919) 515-3276, [gustke@cfr.cfr.ncsu.edu](mailto:gustke@cfr.cfr.ncsu.edu)

*Professors:* H. A. Devine, A. Lumpkin, C. D. Siderelis, M. R. Warren Jr., J. D. Wellman; *Professors Emeriti:* T. I. Hines, W. E. Smith, R. E. Sternloff; *Associate Professors:* S. L. Kirsch, C. S. Love, B. E. Wilson; *Adjunct Associate Professor:* H. K. Cordell; *Associate Professors Emeriti:* G. A. Hammon, L. L. Miller; *Assistant Professors:* G. L. Brothers, R. L. Moore

The master's degree provides students the opportunity to develop and enhance their critical understanding of both the conceptual foundations of parks, recreation and tourism management and the procedures of systematic inquiry and critical problem solving as applied to planning and management issues. The department offers educational opportunities and resources for the preparation of professionals concerned with planning, organizing, managing and directing parks, recreation and tourism programs, areas and facilities. The general emphasis areas at the master's level include: parks and recreation management, tourism development and management, geographic information systems, recreational sport management and natural resource recreation management.

*Admissions Requirements:* Scores from the GRE or from a comparable substitute examination are required for admission.

*Master's Degree Requirements:* The M.S. degree requires 30 hours of course work, of which 4 hours is a master's thesis. The M.PRT. requires a minimum of 36 hours of course work, of which 2 hours is a master's research project. For both degrees, the required core courses are limited to 11 hours for a student with a background in recreation and 17 for a student without such a background. A minor is optional with both degrees. The department offers a co-major with public administration which includes 39 hours of course work.

*Student Financial Support:* Graduate assistantships and internships are available to students in this program on a competitive basis.

## GRADUATE COURSES

- PRT 500 THEORIES OF LEISURE AND RECREATION.  
PRT 501 RESEARCH METHODS IN RECREATION.  
PRT (EBG) 503 ECONOMICS OF RECREATION.  
PRT 504 RECREATION AND PARK DATA SYSTEMS.  
PRT 505 QUANTITATIVE TECHNIQUES FOR RECREATION AND NATURAL RESOURCE MANAGEMENT.  
PRT 510 THEORIES OF SPORT AND FITNESS PROGRAM MANAGEMENT.  
PRT 511 FOUNDATIONS FOR SPORT, EXERCISE AND FITNESS PROGRAM MANAGEMENT.  
PRT 512 RECREATIONAL SPORT MANAGEMENT.  
PRT 520 CONCEPTS OF TRAVEL AND TOURISM.  
PRT 562 INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS.  
PRT 563 TECHNICAL ISSUES IN GEOGRAPHIC INFORMATION SYSTEMS.  
PRT 580 CURRENT ISSUES IN RECREATION RESOURCES.  
PRT 591 RECREATION RESOURCES PROBLEMS.  
PRT 595 SPECIAL TOPICS IN RECREATION RESOURCES.  
PRT 663 APPLICATION ISSUES IN GEOGRAPHIC INFORMATION SYSTEMS.  
PRT 664 ADVANCED STUDY IN GEOGRAPHIC INFORMATION SYSTEMS.  
PRT 675 FIELD STUDIES IN RECREATION.  
PRT 690 RECREATION MANAGEMENT SEMINAR I.  
PRT 691 RECREATION MANAGEMENT SEMINAR II.  
PRT 692 ADVANCED PROBLEMS IN RECREATION.  
PRT 696 SEMINAR IN RECREATION RESEARCH.  
PRT 699 RESEARCH IN RECREATION.

## Physics

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor C. R. Gould, Head of the Department*

*Graduate Alumni Distinguished Professor G. E. Mitchell, Director of Graduate Programs*

Box 8202, (919) 515-8706, gary\_mitchell@ncsu.edu

*University Professor: G. Lucovsky*

*Professors: D. E. Aspnes, J. Bernholc, K. T. Chung, J. W. Cook Jr., S. R. Cotanch, R. E. Fornes, D. G. Haase, C. E. Johnson, K. L. Johnston, G. H. Katzin, F. Lado Jr., J. D. Memory, J. R. Mowat, R. J. Nemanich, M. A. Paesler, J. Y. Park, R. R. Patty, S. P. Reynolds, J. S. Risley, D. E. Sayers, J. F. Schetzina, P. J. Stiles, D. R. Tilley; Adjunct Professors R. V. Janssens; Professors Emeriti: W. R. Davis, W. O. Doggett, G. L. Hall, A. W. Jenkins Jr., E. R. Manring, A. C. Menius Jr., L. W. Seagondollar; Associate Professors: G. C. Cobb, Jr., D. C. Ellison, C. Ji, M. A. Klenin, G. W. Parker III; Adjunct Associate Professors: J. F. Shriner Jr.;*

*Assistant Professors:* H. Ade, R. Beichner, J. M. Blondin, J. D. Brown, H. Hallen, E. F. Moore, C. M. Roland, E. S. Swanson; *Adjunct Assistant Professor:* L. S. Plano

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* J. M. Danby, R. M. Kolbas, J. Narayan, D. L. Ridgeway, E. C. Theil;  
*Associate Professor:* L. K. Norris

Research opportunities are available in the following areas: astrophysics, atomic and molecular physics, condensed matter physics, nuclear physics and physics education.

*Admission Requirements:* Bachelor's degree in Physics (or the equivalent) and the GRE Advanced test in physics.

*Doctoral Degree Requirements:* Six semesters beyond the baccalaureate; core physics courses PY 521, 581, 582, 583, 585, 586.

*Student Financial Support:* Graduate teaching assistantships are available for new and continuing students; research assistantships are normally available only to continuing students.

## GRADUATE COURSES

- PY 506 NUCLEAR AND SUBATOMIC PHYSICS.
- PY 507 ELEMENTARY PARTICLE PHYSICS.
- PY 508 ION AND ELECTRON PHYSICS.
- PY 509 PLASMA PHYSICS.
- PY(NE) 511 NUCLEAR PHYSICS FOR ENGINEERS.
- PY 516 PHYSICAL OPTICS.
- PY 517 ATOMIC AND MOLECULAR PHYSICS.
- PY 521 STATISTICAL PHYSICS I.
- PY 525 COMPUTATIONAL PHYSICS.
- PY 531 ADVANCED PLACEMENT PHYSICS FOR SECONDARY SCHOOL TEACHERS.
- PY 543 ASTROPHYSICS.
- PY(ECE) 552 INTRODUCTION TO THE STRUCTURE OF SOLIDS.
- PY 553 INTRODUCTION TO THE STRUCTURE OF SOLIDS II.
- PY 554 PROPERTIES OF SURFACES AND INTERFACES.
- PY(MA) 555 MATHEMATICAL INTRODUCTION TO CELESTIAL MECHANICS.
- PY(MA) 556 ORBITAL MECHANICS.
- PY 561 ELECTRONICS FOR PHYSICISTS.
- PY 581, 582 QUANTUM MECHANICS I, II.
- PY 583 ADVANCED CLASSICAL MECHANICS I.
- PY 585, 586 ADVANCED ELECTRICITY AND MAGNETISM I, II.
- PY 590 SPECIAL TOPICS IN PHYSICS.
- PY 611 ADVANCED QUANTUM MECHANICS I.
- PY 612 ADVANCED QUANTUM MECHANICS II.
- PY 622 STATISTICAL PHYSICS II.
- PY (ECE) 627 SEMICONDUCTOR THIN FILMS TECHNOLOGY.
- PY 630 NUCLEAR STRUCTURE PHYSICS I.



PY 690 ADVANCED SPECIAL TOPICS IN PHYSICS.  
PY 695 SEMINAR.  
PY 699 RESEARCH.

## Physiology

Degrees Offered: Ph.D., M.S., Master of Life Sciences

### GRADUATE FACULTY

*Professor* M. A. Qureshi, *Coordinator*  
Box 7621, (919) 515-4011

*Professors:* R. A. Argenzio, G. T. Barthalmus, J. T. Brake, J. H. Britt, E. V. Caruolo, V. L. Christensen, W. J. Croom, F. W. Edens, K. L. Esbenschade, H. F. Heatwole, T. E. LeVere, N. C. Olson, W. D. Oxender, R. M. Petters, J. F. Roberts, M. C. Roberts, T. D. Siopes, C. E. Stevens, C. Teng, H. A. Underwood Jr., T. G. Wolcott;  
*Professors Emeriti:* L. Goode, C. H. Hill, D. E. Smith, L. C. Ulberg; *Associate Professors:* G. W. Almond, B. Alston-Mills, J. D. Armstrong, H. M. Berschneider, B. L. Black, B. A. Breuhaus, W. L. Flowers, J. E. Gadsby, R. M. Grossfeld, S. L. Pardue, J. N. Petite, R. M. Roe, C. V. Sullivan, S. P. Washburn, M. D. Whitacre;  
*Adjunct Associate Professor:* M. S. Hand; *Assistant Professors:* C. E. Farin, S. L. Vivrette

The physiology faculty is an interdepartmental group drawn from the departments participating in the program. These departments include animal science, biochemistry, entomology, food animal and equine medicine, poultry science, psychology, veterinary anatomy, physiological sciences and radiology, and zoology. The program emphasizes the comparative approach implicit in this type of organization and is designed to prepare individuals for careers in research and teaching. Experimental animals available cover a wide range, from insects and other invertebrates to large mammals.

*Admission Requirements:* Students entering the graduate program in physiology should have a bachelor's degree in a related biological or physical science. Undergraduate courses should include physiology, biochemistry, organic chemistry, calculus and physics. The Aptitude Test of the Graduate Record Examination is required, and the Advanced Tests in biology and chemistry are desirable.

*Master's Degree Requirements:* On average, the M.S. degree requires two to three years.

*Doctoral Degree Requirements:* On average, completion of the Ph.D. degree requires five years.

**Student Financial Support:** Financial assistance for qualified students in the form of research assistantships, fellowships and traineeships is available through participating departments.

**Other Relevant Information:** The Physiology Program is jointly administered by the Colleges of Agriculture and Life Sciences and Veterinary Medicine. Graduate students enrolled as physiology majors are located in the department of their major professor and may participate in departmental activities.

### GRADUATE COURSES

PHY(ANS) 502 REPRODUCTIVE PHYSIOLOGY OF MAMMALS.  
PHY(ZO) 503 GENERAL PHYSIOLOGY I.  
PHY(ZO) 504 GENERAL PHYSIOLOGY II.  
PHY(ZO) 513 COMPARATIVE PHYSIOLOGY.  
PHY(PO,ZO) 524 COMPARATIVE ENDOCRINOLOGY.  
PHY(IMM,MB,PO,VMS) 556 IMMUNOGENETICS.  
PHY(ANS) 580 MAMMALIAN ENDOCRINOLOGY.  
PHY 590 SPECIAL PROBLEMS IN PHYSIOLOGY.  
PHY(ZO) 595 SEMINAR IN BIOLOGY OF REPRODUCTION.  
PHY(ANS,NTR) 632 COMPARATIVE PHYSIOLOGY OF THE DIGESTIVE SYSTEM.  
PHY 690 PHYSIOLOGY SEMINAR.  
PHY 695 SELECTED TOPICS IN PHYSIOLOGY.  
PHY 699 PHYSIOLOGICAL RESEARCH.

### OTHER SUPPORTING COURSES AVAILABLE

Other supporting course are available in biochemistry, biomathematics, biotechnology, cell biology, entomology, genetics, immunology, microbiology, nutrition, pharmacology, poultry science, psychology, statistics, toxicology, veterinary medical sciences and zoology. Certain courses on the interface between physiology and engineering may be taken after consultation with advisor and the instructors concerned.

## Plant Pathology

Degrees Offered: Ph.D., M.S., Master of Agriculture, Master of Life Sciences

### GRADUATE FACULTY

*Professor O. W. Barnett Jr., Head of the Department*

(919) 515-2730

*Professor D. M. Benson, Director of Graduate Programs*

(919) 515-3966, Box 7616, Fax: (919) 515-5657, mike\_benson@ncsu.edu

*Philip Morris Professor: T. A. Melton III*

*Professors:* J. E. Bailey, K. R. Barker, D. F. Bateman, M. K. Beute, R. I. Bruck, C. L. Campbell, M. E. Daub, L. F. Grand, J. Huang, R. K. Jones, S. A. Lommel, L. T. Lucas, C. E. Main, R. D. Milholland, G. A. Payne, D. F. Ritchie, R. C. Ruffy, H. D. Shew, P. B. Shoemaker, T. B. Sutton, C. G. Van Dyke; *Professors (USDA):* A. S. Heagle, R. A. Reinert; *Visiting Professor:* C. S. Hodges Jr.; *Professors Emeriti:* J. L. Apple, C. W. Averre III, J. R. Aycock, C. N. Clayton, C. B. Davey, H. E. Duncan, G. V. Gooding Jr., T. T. Hebert, G. B. Lucas, N. T. Powell, J. P. Ross, J. N. Sasser, H. W. Spurr Jr., D. L. Strider, H. H. Triantaphyllou, J. C. Wells, N. N. Winstead; *Associate Professors:* B. C. Haning, P. B. Lindgren, C. H. Opperman, J. B. Ristaino; *Associate Professors (USDA):* S. Leath, S. R. Shafer, R. G. Upchurch; *Assistant Professors:* M. Cubeta, E. L. Davis

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* E. B. Cowling, W. M. Hagler Jr.; *Associate Professor:* M. A. Conkling; *Assistant Professor:* C. L. Hemenway

Plant pathology has a major commitment to solving plant disease problems with research that focuses on plant-pathogen interactions at the genomic, cellular, organismal and ecological levels. Approaches include disease management, epidemiology, molecular biology and host-parasite interactions. Focus areas are bacteriology, mycology, nematology, virology, soil-borne pathogens and mechanisms of pathogenesis.

*Admission Requirements:* The general application procedures of the Graduate School noted at the beginning of this section are followed. Normally domestic, but not international, applicants are required to submit GRE results. A detailed statement of applicant interests and goals in plant pathology is most useful to the admissions committee.

*Master's Degree Requirements:* Required courses include: PP 501 Fungi and Their Interaction with Plants, PP 502 Plant Disease: Methods and Diagnosis, PP 515 Epidemiology and Plant Disease Control, PP 519 Bacteria and Their Interactions with Plants, PP 520 Plant Nematology and PP 521 Introductory Plant Virology. In addition, students take PP 690 Seminar and one advanced course. Students serve as a teaching assistant for one course.

*Doctoral Degree Requirements:* A diagnostic examination prior to enrollment is used as a guide to course selection and to measure competency in the M.S. courses listed above. In addition, students take PP 650 Colloquium, PP 690 Seminar and two advanced courses. Students serve as a teaching assistant for two courses.

*Student Financial Support:* A limited number of one-half time assistantships are available on a competitive basis. Stipend levels for each degree are equivalent to those at comparable institutions. Out-of-state tuition waiver is normally granted for the first year.

Applicants are considered for assistantship support at time of application. Special supplements to assistantships are available on a competitive basis for outstanding students.

*Other Relevant Information:* Fully equipped and staffed laboratories for research are available in addition to greenhouse facilities and environmental growth chambers in the phytotron. Special facilities for experimental work on diseases under field conditions are available at 16 locations throughout the state. Microcomputers, library, mycological herbarium, photography laboratory and interdepartmental electron microscopy center are additional features available in the department.

### FOR GRADUATES AND ADVANCED UNDERGRADUATES

- PP 501 FUNGI AND THEIR INTERACTION WITH PLANTS.
- PP(CS,HS) 502 PLANT DISEASE: METHODS AND DIAGNOSIS.
- PP 504 PLANT DISEASE: PRINCIPLES, DIAGNOSIS AND MANAGEMENT.
- PP 515 EPIDEMIOLOGY AND PLANT DISEASE CONTROL.
- PP(MB) 519 BACTERIA AND THEIR INTERACTIONS WITH PLANTS.
- PP 520 PLANT NEMATOLOGY.
- PP 521 INTRODUCTORY PLANT VIROLOGY.
- PP 522 PHYTOPATHOLOGY II--EPIDEMIOLOGY.
- PP(MB,BO) 575 THE FUNGI.
- PP(MB,BO) 576 THE FUNGI--LAB.
- PP 595 SPECIAL PROBLEMS IN PLANT PATHOLOGY.
- PP 604 MORPHOLOGY AND TAXONOMY OF NEMATODES.
- PP 605 MOLECULAR BIOLOGY OF PLANT VIRUSES.
- PP 608 HISTORY OF PHYTOPATHOLOGY.
- PP 611 ADVANCED PLANT NEMATOLOGY.
- PP 612 PLANT PATHOGENESIS.
- PP 615 BOTANICAL EPIDEMIOLOGY.
- PP(CS,GN,HS) 618 BREEDING FOR PEST RESISTANCE.
- PP (BO) 625 ADVANCED MYCOLOGY.
- PP (BO, GN, MB) 627 FUNGAL GENETICS AND PHYSIOLOGY.
- PP 628 SOILBORNE PLANT PATHOGENS.
- PP 649 GENETICS OF HOST-PARASITE INTERACTIONS.
- PP 650 COLLOQUIUM IN PLANT PATHOLOGY.
- PP 690 SEMINAR IN PLANT PATHOLOGY.
- PP 699 RESEARCH IN PLANT PATHOLOGY.

## Political Science

Degree Offered: M. A.

### GRADUATE FACULTY

*Associate Professor* H. G. Kebschull, *Director of Graduate Program*  
Box 8102, (919) 515-5072, kebschull@social.chass.ncsu.edu

*Professors:* C. K. Coe, G. D. Garson, M. S. Soroos, D. W. Stewart, J. H. Svara, J. O. William; *Professors Emeriti:* W. J. Block, A. Holtzman, E. R. Rubin; *Associate*



*Professors:* D. M. Daley, R. H. Dorff, J. H. Gilbert, S. H. Kessler, J. M. McClain, R. S. Moog, E. O'Sullivan, T. V. Reid, J. E. Swiss, M. L. Vasu; *Associate Professor Emeritus:* K. S. Petersen; *Assistant Professors:* C. E. Griffin, R. L. Korosec, A. J. Taylor; *Visiting Assistant Professors:* J. K. Davis, S. K. Straus

## ASSOCIATE MEMBER OF THE PROGRAM

*Associate Professor:* P. W. Hamlett

The program is designed for students interested in careers in government service, international organizations, education or the private business sector. A typical course of study draws from the fields of political science, history, sociology and anthropology, and economics.

*Admission Requirements:* Applicants should submit GRE scores and a writing sample; those not meeting the minimum requirements for full admission should consult with the Director of Graduate Programs.

*Master's Degree Requirements:* Two options are offered. The thesis option requires a minimum 30 hours of course work, including a thesis. The non-thesis option requires a minimum of 36 hours of course work. In either option, students choose two major fields from American politics, comparative politics, international relations and public administration. Also required: a core course on political science, a research methodology course, reading proficiency in a modern foreign language or competence in a research skill, and nine to twelve hours of work outside the department.

*Student Financial Support:* A limited number of fellowships are awarded on a competitive basis.

*Other Relevant Information:* The methodology requirement should be fulfilled as soon as possible. Students may take courses at Duke or UNC-Chapel Hill on topics not offered by NCSU.

## GRADUATE COURSES

- PS 502 THE LEGISLATIVE PROCESS.
- PS 506 UNITED STATES CONSTITUTIONAL LAW.
- PS 507 CIVIL LIBERTIES IN THE UNITED STATES.
- PS 531 INTERNATIONAL LAW.
- PS 533 GLOBAL PROBLEMS AND POLICY.
- PS 536 GLOBAL ENVIRONMENTAL LAW AND POLICY.
- PS 539 INTERNATIONAL POLITICAL ECONOMY.
- PS 541 MILITARY COUPS AND REGIMES IN THE THIRD WORLD.
- PS 542 WESTERN EUROPEAN POLITICS.
- PS 543 LATIN AMERICAN AND CARIBBEAN POLITICS.
- PS 544 ISSUES IN SOVIET POLITICS.
- PS 545 COMPARATIVE SYSTEMS OF LAW AND JUSTICE.

- PS 571 RESEARCH METHODS AND ANALYSIS.
- PS 590 READINGS AND RESEARCH.
- PS 598 SPECIAL TOPICS IN POLITICAL SCIENCE.
- PS 631 SEMINAR IN INTERNATIONAL RELATIONS.
- PS 641 SEMINAR IN COMPARATIVE POLITICS.
- PS 691 INTERNSHIP IN POLITICAL SCIENCE.
- PS 696 SEMINAR IN POLITICS.
- PS 699 RESEARCH IN POLITICS.

## Poultry Science

Degrees Offered: M.S., Master of Life Sciences

### GRADUATE FACULTY

*Professor* G. B. Havenstein, *Head of the Department*

(919) 515-5555

*Professor* T. D. Siopes, *Director of Graduate Programs*

Box 7608, (919) 515-5535, tom@poultry.poulsu.ncsu.edu

*William Neal Reynolds Professor:* W. E. Donaldson

*Professors:* J. T. Brake, T. A. Carter, V. L. Christensen, F. W. Edens, J. D. Garlich, W. M. Hagler Jr., F. T. Jones, J. F. Ort, C. R. Parkhurst, M. A. Qureshi, J. C. H. Shih, M. J. Wineland; *Adjunct Professors:* M. R. Bakst, W. L. Bryden, R. R. Dietert, K. K. Krueger; *Professors Emeriti:* R. E. Cook, E. W. Glazener, P. B. Hamilton, J. R. Harris, C. H. Hill; *Associate Professors:* K. E. Anderson, G. S. Davis, P. R. Ferket, S. L. Pardue, J. N. Petite; *Adjunct Associate Professor:* W. E. Brown; *Assistant Professors:* J. L. Grimes, C. M. Williams; *Adjunct Assistant Professor:* R. P. Gildersleeve

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* R. W. Bottcher, W. J. Croom Jr.; *Professor (USDA):* B. W. Sheldon; *Associate Professor Emeritus:* H. R. Ball Jr.; *Associate Professors:* P. A. Curtis, D. P. Wages

Course offerings and research programs are comprehensive in the areas of physiology, nutrition, microbiology, molecular biology, immunology, genetics, pathology and toxicology. The demand for men and women with advanced training in poultry science is far greater than the supply. Opportunities exist for graduates in research and teaching in universities, government and private industry.

*Admission Requirements:* Exceptions to the minimum 3.00 undergraduate grade point average may be made for students with special backgrounds, abilities and interests.

**Master's Degree Requirements:** While there are no specific course requirements for the master's degree in poultry science, most programs exceed the minimum 30 credit hours.

**Doctoral Degree Requirements:** Doctoral degrees are offered only through interdepartmental programs in the disciplines of physiology, nutrition, genetics, toxicology, microbiology and immunology. Associated research is done with domestic birds in the Department of Poultry Science. Requirements are as given in the Graduate Catalogue. Application should be made directly to the specific program.

**Student Financial Support:** Both research and teaching assistantships are available on a competitive basis within the department. General requirements for these assistantships are as described in the Graduate Catalogue. Other financial support may be available in the form of graduate stipend supplementation, out-of-state tuition waivers or research grant support.

**Other Relevant Information:** The Department of Poultry Science occupies new facilities in a three-story building adjacent to the main campus library. The department consists of about 25 faculty, a support staff of approximately 50, 20 to 30 graduate students and postdoctoral associates, and 50-100 undergraduate students.

### GRADUATE COURSES

PO 505 PHYSIOLOGICAL ASPECTS OF POULTRY MANAGEMENT.  
PO(PHY,ZO) 524 COMPARATIVE ENDOCRINOLOGY..  
PO(IMM,MB,PHY,VMS) 556 IMMUNOGENETICS.  
PO(IMM) 557 AVIAN IMMUNOLOGY.  
PO 590 GRADUATE SEMINAR IN POULTRY SCIENCE.  
PO(ANS,NTR) 605 MINERAL METABOLISM.  
PO 698 SPECIAL PROBLEMS IN POULTRY SCIENCE.  
PO 699 POULTRY RESEARCH.

## Psychology

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor* D. W. Martin, *Head of the Department*

*Associate Professor* S. S. Snyder Jr., *Director of Graduate Programs*

Box 7801, (919) 515-2251, sam\_snyder@ncsu.edu

*Professors:* J. W. Cunningham, D. W. Drewes, T. M. Hess, J. W. Kalat, T. E. LeVere, D. H. Mershon, J. J. Michael, S. E. Newman, F. J. Smith, B. W. Westbrook;  
*Adjunct Professors:* J. L. Howard, L. G. Tornatzky, W. W. Tornow; *Professors Emeriti:* K. L. Barkley, J. C. Johnson, H. G. Miller, P. W. Thayer; *Associate*

**Professors:** L. E. Baker-Ward, S. Converse, W. P. Erchul, D. O. Gray, A. G. Halberstadt, P. F. Horan, K. W. Klein, J. E. R. Luginbuhl, R. W. Nacoste, S. B. Pond III, A. C. Schulte, M. A. Wilson, M. S. Wogalter; **Adjunct Associate Professors:** B. B. Burrus, B. F. Corder, A. D. Hall **Associate Professors Emeriti:** J. L. Cole, M. H. Pitts, R. F. Rawls; **Assistant Professors:** C. C. Brookins, M. E. Haskett; **Clinical Assistant Professors:** M. Y. Bingham, P. W. Collins; **Adjunct Assistant Professors:** B. H. Beith, J. W. Fleenor, C. L. Kronberg, C. E. Lorenz, B. H. Rogers

## ASSOCIATE MEMBERS OF THE PROGRAM

**Professors:** C. D. Korte, R. G. Pearson, J. L. Wasik

The Department of Psychology offers seven courses of study leading to the Ph.D.: developmental psychology, ergonomics (human factors), experimental psychology, human resource development, industrial/organizational and vocational psychology, school psychology and social psychology.

**Admission Requirements:** Applicants should have satisfactory grades in all undergraduate work and at least a "B" average in undergraduate psychology courses, satisfactory scores on the GRE including the Advanced Test in psychology and three satisfactory letters of recommendation. Match of applicants' research interests with current faculty research is also considered.

**Master's Degree Requirements:** Specific course requirements can be found in the Department of Psychology Graduate Handbook.

**Doctoral Degree Requirements:** The graduate program for each doctoral student is determined in conjunction with the student's graduate advisory committee and tailored to the needs, interests, and accomplishments of the individual. Typically, students can expect to take 30 or more hours of credit beyond the master's degree.

**Student Financial Support:** Many graduate students receive financial support in the form of teaching or research assistantships or fellowships. Applicants should request such support when they apply to the program. Often students supported by assistantships are allowed to pay tuition at the in-state rate, irrespective of residence.

**Other Relevant Information:** The M.S. degree is available as part of work toward the doctorate, but students wishing to obtain a terminal M.S. are advised to consider other programs.



## GRADUATES COURSES

- PSY 500 VISUAL PERCEPTION.
- PSY 501 INTRODUCTION TO GRADUATE STUDY IN PSYCHOLOGY.
- PSY 502 PHYSIOLOGICAL PSYCHOLOGY.
- PSY 504 ADVANCED EDUCATIONAL PSYCHOLOGY.
- PSY 505 HISTORY AND SYSTEMS OF PSYCHOLOGY.
- PSY 508 PSYCHOLOGY AND THE AFRICAN EXPERIENCE.
- PSY 509 PRINCIPLES AND PRACTICE OF ECOLOGICAL/COMMUNITY PSYCHOLOGY.
- PSY 510 LEARNING AND MOTIVATION.
- PSY 511 ADVANCED SOCIAL PSYCHOLOGY.
- PSY 512 ACTION RESEARCH IN PSYCHOLOGY.
- PSY 513 PSYCHOLOGY AND LAW.
- PSY 520 COGNITIVE PROCESSES.
- PSY(PHI) 525 INTRODUCTION TO COGNITIVE SCIENCE.
- PSY 533 BIOLOGICAL FACTORS IN ABNORMAL BEHAVIOR.
- PSY 535 TESTS AND MEASUREMENTS.
- PSY(IE) 540 HUMAN FACTORS IN SYSTEMS DESIGN.
- PSY 543 ERGONOMIC PERFORMANCE ASSESSMENT.
- PSY(IE) 545 HUMAN PERFORMANCE
- PSY 546 HUMAN INFORMATION PROCESSING.
- PSY 560 PERSONNEL SELECTION RESEARCH.
- PSY 561 TRAINING RESEARCH.
- PSY 562 HUMAN RESOURCE PLANNING.
- PSY 563 CONSUMER RESEARCH.
- PSY 565 ORGANIZATIONAL PSYCHOLOGY.
- PSY 566 ORGANIZATION DEVELOPMENT AND CHANGE.
- PSY 567 INNOVATION AND TECHNOLOGY: A SOCIO-TECHNICAL PERSPECTIVE.
- PSY 571 INDIVIDUAL INTELLIGENCE MEASUREMENT.
- PSY 572 PSYCHOLOGICAL SURVEY OPERATIONS.
- PSY 573 THEORIES OF INTELLIGENCE.
- PSY 576 ADVANCED DEVELOPMENTAL PSYCHOLOGY.
- PSY 577 ADOLESCENT DEVELOPMENT.
- PSY 580 PSYCHOLOGICAL CONSULTATION.
- PSY 585 ADVANCED PROBLEMS IN PSYCHOLOGY.
- PSY 591 SPECIAL TOPICS IN PSYCHOLOGY.
- PSY(IE) 593 AREA SEMINAR IN ERGONOMICS.
- PSY 594 AREA SEMINAR IN HUMAN RESOURCES DEVELOPMENT.
- PSY 595 AREA SEMINAR IN SCHOOL PSYCHOLOGY.
- PSY 599 RESEARCH PROBLEMS IN PSYCHOLOGY.
- PSY 600 ADVANCED PROBLEMS IN PERCEPTION.
- PSY 611 SOCIAL PSYCHOLOGY: SMALL GROUPS RESEARCH.
- PSY 612 ATTITUDES.
- PSY 613 ATTRIBUTION.
- PSY 614 STRESS AND COPING.
- PSY 615 CROSS-CULTURAL RESEARCH AND DEVELOPMENT.
- PSY 620 ADVANCED PROBLEMS IN COGNITION.
- PSY 635 PSYCHOLOGICAL MEASUREMENT.
- PSY 650 VOCATIONAL PSYCHOLOGY.
- PSY 665 WORK MOTIVATION.
- PSY 671 PSYCHOLOGY OF FAMILIES AND PARENTING.
- PSY 672 PERSONALITY MEASUREMENT.
- PSY 674 PSYCHOLOGICAL INTERVENTION I.
- PSY 675 PSYCHOLOGICAL INTERVENTION II.
- PSY 676 COGNITIVE DEVELOPMENT.

- PSY 677 SOCIAL DEVELOPMENT.  
 PSY 680 SYSTEMS THEORY AND APPLICATIONS IN HUMAN RESOURCE DEVELOPMENT.  
 PSY 681 QUASI-EXPERIMENTAL EVALUATION DESIGN.  
 PSY 686 ADULTHOOD AND AGING; COGNITIVE AND INTELLECTUAL CHANGE.  
 PSY 691 SPECIAL TOPICS IN PSYCHOLOGY.  
 PSY 693 PSYCHOLOGICAL CLINIC PRACTICUM.  
 PSY 697 ADVANCED SEMINAR IN RESEARCH DESIGN.  
 PSY 698 INTERNSHIP IN PSYCHOLOGY.  
 PSY 699 THESIS AND DISSERTATION RESEARCH.

## Public Administration

Degree Offered: Master of Public Administration

### GRADUATE FACULTY

*Professor J. H. Svara, Program Director*

Box 8102, (919) 515-5159, svara@social.chass.ncsu.edu

*Professors: C. K. Coe, G. D. Garson, M. S. Soroos, D. W. Stewart; Associate*

*Professors: D. M. Daley, E. O'Sullivan, J. E. Swiss, M. L. Vasu; Assistant*

*Professor: R. L. Korosec; Visiting Assistant Professor: S. K. Straus*

Administrative specialties are available in the following areas: administration of justice, association/non-profit management, data management, environmental policy and management, financial management, human resource management and urban/local government management.

*Admission Requirements:* Since a limited number of pre-service students (*i.e.*, those without professional or managerial work positions) are admitted, these applicants are encouraged to submit all materials by May 15 in order to receive full consideration.

*Master's Degree Requirements:* The MPA degree is a 40-semester-hour program consisting of several overlapping tiers: (1) prerequisites to program admission including a course in economics and an intermediate-level course in statistics; (2) a core curriculum of 17 hours; (3) a choice of administrative specialties based on courses in public administration and other departments; and (4) an internship or field experience requirement for pre-service students. It is an option B with a one-person committee and no final oral examination.

*Student Financial Support:* A limited number of fellowships and graduate assistantships are offered by the department. Contact the department for more information. Other forms of student aid are described in the financial aid section of the Graduate Bulletin. Students interested in financial assistance should apply by April 1.

*Other Relevant Information:* The MPA program regularly conducts an Assessment Center to enhance students' skills in oral communication, technical writing and group dynamics. It is required for pre-service students. Activities include technical writing evaluations, evaluations of oral presentation skills and in-basket exercises to measure interpersonal, problem-solving and managerial skills. These exercises enable students to gain valuable training beyond their academic experience.

### GRADUATES COURSES

- PA 505 ADMINISTRATIVE LAW.
- PA 510 ETHICS AND PROFESSIONAL PRACTICE.
- PA 511 PUBLIC ADMINISTRATION.
- PA 513 FINANCIAL MANAGEMENT IN THE PUBLIC SECTOR.
- PA 515 ADMINISTRATION OF CRIMINAL JUSTICE.
- PA 516 PUBLIC POLICY ANALYSIS.
- PA 518 ORGANIZATION DESIGN.
- PA 520 ENVIRONMENTAL POLICY.
- PA 536 ASSOCIATION MANAGEMENT.
- PA 570 PUBLIC MANAGEMENT COMPUTING LAB.
- PA 571 RESEARCH METHODS AND ANALYSIS.
- PA 573 COMPUTER APPLICATIONS IN PUBLIC AFFAIRS.
- PA 574 DATA MANAGEMENT IN PUBLIC ADMINISTRATION.
- PA 580 INDEPENDENT STUDY.
- PA 590 READINGS AND RESEARCH.
- PA 598 SPECIAL TOPICS IN PUBLIC ADMINISTRATION.
- PA 601 POLITICS AND ETHICS OF PUBLIC ADMINISTRATION.
- PA 608 SEMINAR IN URBAN MANAGEMENT.
- PA 611 SEMINAR IN PUBLIC PERSONNEL MANAGEMENT.
- PA 612 THE BUDGETARY PROCESS.
- PA 613 GOVERNMENT AND PLANNING.
- PA 614 MANAGEMENT SYSTEMS.
- PA 616 SEMINAR IN PROGRAM EVALUATION.
- PA 617 SEMINAR IN ORGANIZATION THEORY.
- PA 618 TEAM BUILDING FOR PUBLIC MANAGERS.
- PA 619 INTERGOVERNMENTAL RELATIONS IN THE UNITED STATES.
- PA 620 ENVIRONMENTAL ADMINISTRATION.
- PA 621 COLLECTIVE NEGOTIATIONS IN THE PUBLIC SERVICE.
- PA 691 INTERNSHIP IN PUBLIC AFFAIRS. .

## Public History

For a listing of graduate faculty and program information, see history.

## Reading

For a listing of graduate faculty and program information, see curriculum and instruction.

## Rural Sociology

For a listing of graduate faculty and program information, see sociology.

## Science Education

For a listing of graduate faculty and program information, see mathematics and science education.

## Social Studies Education

For a listing of graduate faculty and program information, see curriculum and instruction.

## Sociology and Anthropology

Degrees Offered: Ph.D., M.S., Master of Sociology

### GRADUATE FACULTY

*Professor* W. B. Clifford II, *Head of the Department*

*Professor* M. D. Schulman, *Director of Graduate Programs*

Box 8017, (919) 515-2702, Fax (919) 515-2610, michael\_schulman@ncsu.edu

*Professors:* L. R. Della Fave, V. A. Hiday, J. C. Leiter, R. L. Moxley, L. B. Otto, M. M. Sawhney, D. Tomaskovic-Devey, R. C. Wimberley, E. M. Woodrum, M. A. Zahn, M. T. Zingraff; *Professors Emeriti:* E. M. Crawford, T. N. Hobgood Jr., C. P. Marsh, O. Uzzell, M. E. Volland, J. N. Young.; *Associate Professors:* M. P. Atkinson, R. F. Czaja, A. C. Davis, S. K. Garber, G. D. Hill, T. J. Hoban, S. C. Lilley, P. L. McCall, B. J. Risman, M. L. Schwalbe, M. Thomas, M. S. Thompson, R. J. Thomson, K. M. Troost, M. L. Walek, J. M. Wallace, III, C. R. Zimmer; *Associate Professors Emeriti:* R. C. Brisson, J. G. Peck; *Assistant Professors:* R. S. Ellovich, T. N. Greenstein, A. L. Schiller, W. R. Smith; *Assistant Professors Emeriti:* C. G. Dawson, T. M. Hyman

### ASSOCIATE MEMBER OF THE PROGRAM

*Professor:* R. D. Mustian

The department offers master's and doctoral programs in sociology designed to prepare students for academic, research, and applied careers. The programs are structured to



provide an intellectually stimulating and academically rigorous, yet supportive, environment that emphasizes developing research skills through course work and close collaboration with faculty.

**Admissions Requirements:** In addition to general Graduate School requirements, applicants are required to provide a writing sample. For fall admission, the completed application should be received no later than February 1 to ensure full consideration for assistantship support; final deadline for fall admission is April 15. Applications for spring admission are considered under special circumstances, but assistantship support is less likely; final deadline for spring admission is November 1.

**Master's Degree Requirements:** Applicants should have received/be receiving a bachelor's degree from an accredited institution with a major in sociology. Other majors are considered, but students may have to make up deficiencies without credit. The M.S. requires a thesis, whereas a Master of Sociology (M.SOC.) requires 6 semester credit hours of practicum (supervised field placement in an organization or agency) and a research paper. A minor for both degrees is optional.

**Doctoral Degree Requirements:** The Ph.D. normally requires a master's in sociology, at least 14 courses (including or after the master's). Doctoral students take core courses in theory and methods/ analysis and select courses in two areas of specialization. Some course work from the master's may be applied. A minor is optional.

**Student Financial Support:** Teaching and research assistantships and a limited number of out-of-state tuition waivers are available on a competitive basis.

## GRADUATES COURSES

- SOC 501 LEADERSHIP.
- SOC 502 SOCIOLOGICAL SOCIAL PSYCHOLOGY.
- SOC 505 MEDICAL SOCIOLOGY.
- SOC 508 SOCIAL ORGANIZATION.
- SOC 509 POPULATION PROBLEMS.
- SOC 510 WORK AND INDUSTRY.
- SOC 511 CLASSICAL SOCIOLOGICAL THEORY.
- SOC 512 SURVEY OF FAMILY SOCIOLOGY.
- SOC 513 COMMUNITY ORGANIZATION AND DEVELOPMENT.
- SOC 514 DEVELOPING SOCIETIES.
- SOC 515 DEVIANT BEHAVIOR.
- SOC 516 SOCIAL CONTROL.
- SOC 520 SOCIOLOGY OF RELIGION.
- SOC 523 SOCIOLOGICAL ANALYSIS OF AGRICULTURAL DEVELOPMENT.
- SOC 534 SOCIOLOGY OF U.S. AGRICULTURE.
- SOC 541 SOCIAL SYSTEMS AND PLANNED CHANGE.
- SOC 555 SOCIAL STRATIFICATION.
- SOC(EB) 574 THE ECONOMICS OF POPULATION.
- SOC 590 APPLIED RESEARCH.
- SOC 591 SPECIAL TOPICS IN SOCIOLOGY.

- SOC 595 PRACTICUM IN SOCIOLOGY.
- SOC 601 URBAN ECOLOGY.
- SOC 610 FORMAL ORGANIZATIONS.
- SOC 611 RESEARCH METHODS IN SOCIOLOGY I.
- SOC 612 RESEARCH METHODS IN SOCIOLOGY II.
- SOC 615 RESEARCH ON CRIME AND DEVIANCE.
- SOC 616 CRIME AND COLLECTIVE ACTION.
- SOC 621 SOCIAL PSYCHOLOGY.
- SOC 622 SOCIAL PSYCHOLOGY OF INEQUALITY.
- SOC 625 SOCIAL-PSYCHOLOGICAL PROCESSES IN HEALTH AND ILLNESS.
- SOC 628 SOCIOLOGY OF GENDER.
- SOC 632 CONTEMPORARY FAMILY THEORY AND RESEARCH.
- SOC 633 THE COMMUNITY.
- SOC 641 QUANTITATIVE SOCIOLOGICAL ANALYSIS.
- SOC 646 ADVANCED SOCIOLOGICAL ANALYSIS.
- SOC 650 CONTEMPORARY SOCIOLOGICAL THEORY.
- SOC 652 COMPARATIVE SOCIETIES.
- SOC 655 THEORY CONSTRUCTION.
- SOC 690 SEMINAR.
- SOC 699 RESEARCH IN SOCIOLOGY.

## Soil Science

Degrees Offered: Ph.D., M.S., Master of Agriculture, Master of Natural Resources Administration

### GRADUATE FACULTY

*William Neal Reynolds Professor* E. J. Kamprath, *Head of the Department*  
*Professor* C. D. Raper Jr., *Director of Graduate Programs*  
 Box 7619, (919) 515-2643, david\_raper@ncsu.edu

*William Neal Reynolds Professor and Graduate Alumni Distinguished Professor:* S. W. Buol

*Professors:* A. Amoozegar, S. W. Broome, D. K. Cassel, F. R. Cox, J. W. Gilliam, T. L. Grove, M. T. Hoover, L. D. King, H. J. Kleiss, G. S. Miner, M. J. Vepraskas, R. J. Volk, J. B. Weber, A. G. Wollum II, J. P. Zublena; *Professors (USDA):* D. W. Israel; *Adjunct Professor:* R. J. McCracken; *Professors Emeriti:* J. V. Baird, W. V. Bartholomew, M. G. Cook, G. A. Cummings, R. W. Cummings, R. B. Daniels, C. B. Davey, W. A. Jackson, C. B. McCants, R. E. McCollum, J. A. Phillips, P. A. Sanchez, E. D. Seneca, S. B. Weed; *Associate Professors:* S. C. Hodges, G. D. Hoyt, R. A. McLaughlin, G. C. Naderman, J. E. Shelton, T. J. Smyth, M. G. Waggoner; *Associate Professor Emeritus:* J. P. Lilly; *Assistant Professors:* C. R. Crozier, D. L. R. Hesterberg, D. L. Lindbo, R. L. Mikkelsen; *Assistant Professor Emeritus:* C. K. Martin; *Senior Researcher:* W. P. Robarge

## ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* H. L. Allen Jr., R. Lea, G. F. Peedin, R. W. Skaggs; *Associate Professor (USDA):* S. R. Shafer

Graduate students in soil science may specialize in the following subdisciplines: soil physics, soil chemistry; soil microbiology and biochemistry; soil fertility and plant nutrition; soil genesis, morphology and classification; soil and water management and conservation; forest soils, soil mineralogy; tropical soil management.

*Admissions Requirements:* Graduate students accepted in soil science must have a bachelor's or master's degree with a major in soil science or a closely related field and with a strong background in the biological and physical sciences.

*Master's Degree Requirements:* A minor is optional, although one-third of the credits should usually be in courses outside of the department.

*Doctoral Degree Requirements:* Normally students take 30 hours credit beyond the Master's degree. A minor is optional, although one-third of the credits should usually be in courses outside of the department.

*Student Financial Support:* The department has a number of assistantships available to students who have demonstrated a high level of academic aptitude or potential. Most of the graduate assistantships are half-time.

## GRADUATES COURSES

SSC 501 TROPICAL SOILS: CHARACTERISTICS AND MANAGEMENT.

SSC 511 SOIL PHYSICS.

SSC 520 SOIL AND PLANT ANALYSIS.

SSC 522 SOIL CHEMISTRY.

SSC(MB) 532 SOIL MICROBIOLOGY.

SSC 541 SOIL FERTILITY.

SSC 551 SOIL MORPHOLOGY, GENESIS AND CLASSIFICATION.

SSC 553 SOIL MINERALOGY.

SSC 560 ADVANCED SOIL MANAGEMENT.

SSC 562 ENVIRONMENTAL APPLICATIONS OF SOIL SCIENCE.

SSC(FOR) 577 CONSERVATION AND SUSTAINABLE DEVELOPMENT I: CONCEPTS AND METHODS.

SSC(FOR) 578 CONSERVATION AND SUSTAINABLE DEVELOPMENT II: INTEGRATED PROBLEM SOLVING.

SSC(FOR) 581 AGROFORESTRY.

SSC 590 SPECIAL PROBLEMS.

SSC 621 ADVANCED SOIL CHEMISTRY.

SSC(CS,HS) 625 HERBICIDE CHEMISTRY.

SSC(CS,HS) 627 HERBICIDE BEHAVIOR IN SOIL AND WATER.

SSC(BAE) 671 THEORY OF DRAINAGE—SATURATED FLOW.

SSC 672 SOIL PROPERTIES AND PLANT DEVELOPMENT.

SSC(FOR) 673 FOREST PRODUCTIVITY: EDAPHIC RELATIONSHIPS.  
SSC(BAE) 674 THEORY OF DRAINAGE—UNSATURATED FLOW.  
SSC(BAE) 680 TRANSPORT AND FATE OF CHEMICALS IN SOILS AND NATURAL WATERS.  
SSC 690 SEMINAR.  
SSC 693 COLLOQUIUM IN SOIL SCIENCE.  
SSC 699 RESEARCH.

## Special Education

For a listing of graduate faculty and program information, see curriculum and instruction.

## Statistics

Degrees Offered: Ph.D., M.S., Master of Statistics

### GRADUATE FACULTY

*Professor* T. M. Gerig, *Head of the Department*  
*Professor* S. G. Pantula, *Director of Graduate Programs*  
Box 8203, (919) 515-2528, [dsgp@stat.ncsu.edu](mailto:dsgp@stat.ncsu.edu)

*Graduate Alumni Distinguished Professor:* B. B. Bhattacharyya  
*William Neal Reynolds Professor:* B. S. Weir

*Professors:* R. L. Berger, P. Bloomfield, D. D. Boos, C. Brownie, D. A. Dickey, E. J. Dietz, S. P. Ellner, F. G. Giesbrecht, T. Johnson, J. F. Monahan, D. W. Nychka, K. H. Pollock, C. H. Proctor, C. P. Quesenberry, D. L. Ridgeway, D. L. Solomon, L. A. Stefanski, W. H. Swallow, J. L. Wasik; *Adjunct Professors:* M. W. Anderson, J. R. Chromy, J. H. Goodnight, P. D. Haaland, N. L. Kaplan, P. H. Morgan, R. L. Obenchain; *Professors Emeriti:* C. C. Cockerham, H. J. Gold, A. H. Grandage, R. J. Hader, D. W. Hayne, D. D. Mason, R. J. Monroe, L. A. Nelson, J. O. Rawlings, J. A. Rigney, R. G. Steel, H. R. Van Der Vaart, O. Wesler; *Associate Professors:* M. L. Gumpertz, J. Lu, T. W. Reiland, C. E. Smith; *Research Associate Professor:* S. Zeng; *Adjunct Associate Professor:* T. K. Pierson; *Associate Professors Emeriti:* A. C. Linnerud; *Assistant Professors:* J. M. Hughes-Oliver, T. B. Kepler, J. L. Thorne, W. A. Wang; *Adjunct Assistant Professors:* P. M. Dixon, J. S. Kimbell, M. W. Lutz

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* W. R. Atchley, J. F. Gilliam, M. M. Goodman, A. R. Hall, J. F. Selgrade, M. W. Suh, G. G. Wilkerson; *Associate Professors:* T. H. Emigh, B. G. Fitzpatrick



**Admission Requirements:** The written statement should describe the applicant's academic and career goals as well as special interests in the area of statistics. GRE Subject Test scores in mathematics are not required but may be submitted.

The well-prepared applicant to the department's master's programs has good grades in a three-semester calculus sequence, a two-semester advanced calculus sequence, a semester of linear algebra and a two-semester sequence in probability and statistics. Some of these courses may be taken as part of the program, but this may result in lengthening the stay. Admission to the Ph.D. program is granted to those who have been admitted to the master's program and have passed the basic comprehensive (qualifying) examination at the Ph.D. level. Individuals applying for fall enrollment and who wish to be considered for financial aid should have their completed applications in by no later than March 1 for fall enrollment or October 15 for spring. Applications arriving after that will be considered but may be assigned lower priority.

**Master's Degree Requirements:** All master's programs in statistics require a minimum of 34 credit hours, of which 12 are first-year core (ST 512, ST 521, 522 and ST 681), one is supervised consulting (ST 595), and at least nine are statistics and/or supporting electives. The remaining 12 hours are program dependent.

**Doctoral Degree Requirements:** The Ph.D. program in statistics requires 22 credit hours beyond the master's, of which 12 are Ph.D. core (ST(MA) 617, 618, ST 636 and ST 637), one is supervised consulting (ST 595), six are Ph.D.-level statistics electives, and three are supporting electives. Requirements for co-majors are individually tailored.

**Student Financial Support:** Departmental assistantships and fellowships are awarded each year on a competitive basis. Fellowships and supplements are provided through the department's Gertrude M. Cox Fellowship Fund. Approximately 30 teaching assistantships and 30 research assistantships and traineeships are available along with 10 graduate industrial traineeships supported by local industries.

**Other Relevant Information:** With a large graduate faculty representing virtually all major statistical specializations, the department is recognized as a world leader in graduate education and research in statistics. Its applied orientation sets it apart from most other departments in the country, offering education to those wishing to pursue careers as consulting statisticians in industry and government, as well as to those seeking careers in research and teaching.

Areas of research specialization of the faculty and advanced graduate students include time series, econometrics, statistical genetics and ecology, experiment design and analysis, sampling, environmental applications, statistical process and quality control, biostatistics, statistical computing, nonparametric regression, robust and nonparametric

inference, mathematical programming, Bayesian inference, multivariate analysis, decision theory and stochastic processes.

## GRADUATES COURSES

- ST 505 APPLIED NONPARAMETRIC STATISTICS.
- ST(ZO) 506 SAMPLING ANIMAL POPULATIONS.
- ST 507 STATISTICS FOR THE BEHAVIORAL SCIENCES I.
- ST 508 STATISTICS FOR THE BEHAVIORAL SCIENCES II.
- ST 511 EXPERIMENTAL STATISTICS FOR BIOLOGICAL SCIENCES I.
- ST 512 EXPERIMENTAL STATISTICS FOR BIOLOGICAL SCIENCES II.
- ST 513 STATISTICS FOR MANAGEMENT I
- ST 514 STATISTICS FOR MANAGEMENT AND SOCIAL SCIENCES II.
- ST 515, 516 EXPERIMENTAL STATISTICS FOR ENGINEERS.
- ST 517 APPLIED LEAST SQUARES.
- ST 518 APPLIED TIME SERIES ANALYSIS.
- ST 519 APPLIED MULTIVARIATE STATISTICAL ANALYSIS.
- ST 521 STATISTICAL THEORY I.
- ST 522 STATISTICAL THEORY II.
- ST 531 DESIGN OF EXPERIMENTS.
- ST 535 STATISTICAL PROCESS CONTROL.
- ST 536 OFF-LINE QUALITY CONTROL.
- ST 537 LIFE-TESTING AND RELIABILITY.
- ST(MA) 541 THEORY OF PROBABILITY I.
- ST(MA) 542 INTRODUCTION TO STOCHASTIC PROCESSES.
- ST 550 CATEGORICAL AND CENSORED DATA ANALYSIS.
- ST(ECG) 561 INTERMEDIATE ECONOMETRICS.
- ST(TOX) 563 STATISTICAL PROBLEMS IN TOXICOLOGY.
- ST 564 APPLIED SPATIAL STATISTICS.
- ST (GN) 565 GENETIC DATA ANALYSIS.
- ST(BMA,MA) 571 BIOMATHEMATICS I.
- ST(BMA,MA) 572 BIOMATHEMATICS II.
- ST(BMA,OR) 575 DECISION ANALYTIC MODELING.
- ST 581 ROBUST AND NONPARAMETRIC STATISTICS.
- ST 583 INTRODUCTION TO STATISTICAL DECISION THEORY.
- ST 591 SPECIAL PROBLEMS.
- ST 595 STATISTICAL CONSULTING.
- ST(MA,OR) 606 NONLINEAR PROGRAMMING.
- ST(BMA,MA,OR) 610 STOCHASTIC MODELING.
- ST 613 TIME SERIES ANALYSIS: TIME DOMAIN.
- ST 614 TIME SERIES ANALYSIS: FREQUENCY DOMAIN.
- ST(MA) 617, 618 MEASURE THEORY AND ADVANCED PROBABILITY.
- ST 623 STATISTICS IN PLANT SCIENCE.
- ST(GN) 626 STATISTICAL CONCEPTS IN GENETICS.
- ST 631 THEORY OF SAMPLING APPLIED TO SURVEY DESIGN.
- ST 636 ADVANCED STATISTICAL INFERENCE I.
- ST 637 ADVANCED STATISTICAL INFERENCE II.
- ST 645 STATISTICAL COMPUTING.
- ST(ECG) 651 ECONOMETRICS.
- ST(ECG) 652 TOPICS IN ECONOMETRICS.
- ST 671 ADVANCED ANALYSIS OF VARIANCE AND VARIANCE COMPONENTS.
- ST 674 ADVANCED TOPICS IN CONSTRUCTION AND ANALYSIS OF EXPERIMENTAL DESIGNS.
- ST 681 LINEAR MODELS AND VARIANCE COMPONENTS.

ST 682 MULTIVARIATE LINEAR MODELS AND NONLINEAR MODELS.  
ST 683 MULTIVARIATE ANALYSIS.  
ST 691 ADVANCED SPECIAL PROBLEMS.  
ST 694 SEMINAR.  
ST 699 RESEARCH.

## Technical Communications

For a listing of graduate faculty and program information, see English.

## Technology Education

For a listing of graduate faculty and program information, see mathematics and science education.

## Textile and Apparel, Technology and Management

Degrees Offered: M.S., Master of Textiles

### GRADUATE FACULTY

*Professor T. J. Little, Head of the Department*

*Associate Professor W. Oxenham, Director of Graduate Programs*

Box 8301, (919) 515-6573, [william\\_oxenham@ncsu.edu](mailto:william_oxenham@ncsu.edu)

*Klopman Distinguished Professor: S. C. Winchester Jr.*

*Professors: R. A. Barnhardt, S. K. Batra, G. A. Berkstresser III, R. A. Donaldson, A. H. El-Shiekh, M. W. Suh; Visiting Professors: E. M. McPherson; Adjunct Professor: D. S. Brookstein; Professors Emeriti: A. B. Moss, W. C. Stuckey Jr.; Associate Professors: P. Banks-Lee, T. K. Ghosh, T. F. Gilmore, M.L. Robinson Jr., A. M. Seyam, G. W. Smith; Associate Professor Emeritus: P. B. Hudson; Visiting Research Associate Professor: H. A. Davis; Adjunct Associate Professors: R. W. Dent, N. A. Hunter, D. M. Powell, P. E. Sasser; Assistant Professors: H. H. A. Hergeth, G. L. Hodge*

The Department of Textile and Apparel, Technology and Management offers the degree of Master of Science in Textiles with specialization in textile management and technology and the professional degree of Master of Textiles. The department specializes in the disciplines of textile management, apparel management, textile technology, textile design, integrated manufacturing systems, textile marketing, quality control and modeling of the textile and apparel pipeline. Fundamental research in yarn and fabric

mechanics, machine monitoring and material properties is also conducted in the department.

**Admission Requirements:** Students applying to this department should have or be able to develop strong quantitative skills. Students interested in management areas should have background in market analysis, quantitative management and quality management. Students should have a minimum of 24 course hours in advanced mathematics and sciences in their undergraduate degree.

**Master's Degree Requirements:** Completion of the professional degree, Master of Textiles, requires a minimum of 33 course hours.

**Student Financial Support:** Financial aid in the form of assistantships is normally available for all full-time Master of Science students.

**Other Relevant Information:** The Department of Textile and Apparel Technology and Management currently houses the National Science Foundation's Center for Nonwoven Technology. This Centers allows students to conduct research in new technologies for nonwoven fabric manufacture. Participation in the National Textile Center allows students to conduct research in a variety of management, manufacturing, technology and engineering applications.

### GRADUATES COURSES

TAM(TEs) 520 YARN PROCESSING DYNAMICS.

TAM 530 TEXTILE QUALITY CONTROL.

TAM 541 THEORY AND PRACTICE OF KNITTED FABRIC PRODUCTION AND CONTROL.

TAM 549 WARP KNIT ENGINEERING AND STRUCTURAL DESIGN.

TAM(TEs) 555 PRODUCTION MECHANICS AND PROPERTIES OF WOVEN FABRICS.

TAM(BUS) 585 MARKET RESEARCH IN TEXTILES.

TAM 589 SPECIAL STUDIES IN TEXTILE MANAGEMENT AND TECH-NOLOGY.

TAM 590 SPECIAL PROJECTS IN TEXTILE MANAGEMENT AND TECH-NOLOGY.

TAM(TEs) 620 YARN PRODUCTION/PROPERTIES: ADVANCED TOPICS.

TAM 621 ADVANCED TEXTILE TESTING.

TAM(TEs) 640 PHYSICAL AND MECHANICAL PROPERTIES OF KNITTED FABRIC.

TAM(TEs) 651, 652 FABRIC DEVELOPMENT AND CONSTRUCTION.

TAM(TEs) 663 MECHANICS OF TWISTED STRUCTURES.

TAM(TEs) 664 MECHANICS OF FABRIC STRUCTURES.

TAM 680 SPECIAL PROJECTS IN TEXTILE MANAGEMENT.

TAM 686 ADVANCED TEXTILE LABOR MANAGEMENT SEMINAR.

TAM 687 COMPETITIVE STRATEGY AND PLANNING FOR THE TEXTILE FIRM.

TAM 697 INDEPENDENT STUDY IN TEXTILES.

TAM 698 SEMINAR.

TAM 699 TEXTILE THESIS OR DISSERTATION RESEARCH.



## Textile Chemistry

For a listing of graduate faculty and program information, see textile engineering, chemistry and science.

## Textile Engineering

For a listing of graduate faculty and program information, see textile engineering, chemistry and science.

## Textile Engineering, Chemistry and Science

**Degrees Offered:** M.S. in Textile Chemistry, M. S. in Textile Engineering, M.S. in Textile Materials Science, Master of Textiles

### GRADUATE FACULTY

*Burlington Professor* M. H. M. Mohamed, *Head of the Department*

*Ciba-Geigy Professor:* H. S. Freeman, *Associate Head and Director of Graduate Programs*

Box 8301, (919) 515-6636, harold\_freeman@ncsu.edu

*Cone Mills Professor:* R. McGregor

*Professors:* R. L. Barker, K. R. Beck, D. R. Buchanan, P. L. Grady, B. S. Gupta, C. D. Livengood, G. N. Mock, C. B. Smith, M. H. Theil, C. Tomasino, A. E. Tonelli, P. A. Tucker Jr.; *Adjunct Professors:* R. F. Goldman, T. Iijima, J. Preston, T. Y. Tam; *Professors Emeriti:* K. S. Campbell, D. M. Cates, J. A. Cuculo, P. D. Emerson, R. D. Gilbert, D. S. Hamby, S. P. Hersh, P. R. Lord, H. A. Rutherford, W. K. Walsh, W. M. Whaley, R. W. Work; *Associate Professors:* T. G. Clapp, H. Hamouda, S. M. Hudson, J. W. Rucker, J. P. Rust; *Research Associate Professor:* M. B. Gunner; *Visiting Associate Professor:* I. Shalev; *Adjunct Associate Professors:* W. P. Behnke, L. D. Claxton, W. D. Hunter, T. Montgomery; *Associate Professors Emeriti:* T. H. Guion, A. C. Hayes, T. G. Rochow; *Assistant Professors:* W. J. Jasper, M. G. McCord, M. Srinivasarao; *Visiting Assistant Professor:* K. G. Titus; *Adjunct Assistant Professors:* A. C. Bullerwell, Y. Wang

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* S. K. Batra, R. E. Fornes

**Master of Science in Textile Chemistry (MS/TC):** The M.S. in textile chemistry program offers unique educational and research opportunities in textile and polymer chemistry. Fundamentals of chemistry, physics, and mathematical sciences are applied to solve polymer and textile wet processing problems. **M.S. in Textiles with Specialization in Textile Materials Science (MS/TEM):** The M.S. in textiles with a specialization in textile materials science program offers unique educational and research opportunities in fiber science. Fundamentals of physics, engineering, and mathematical sciences are applied to textile-related problems.

**Admission Requirements: (MS/TC):** Applicants must have a physical science or engineering background, including physical chemistry and differential equations. Formal education in textile or polymer chemistry is desired but not required. **(MS/T):** Applicants must have a physical science or engineering background and differential equations. Some background in textiles is desired but not required.

**Degree Requirements: (MS/TC):** This degree requires 15 credit hours in textile chemistry, nine credit hours in a minor, six credit hours of research, and two semester audits of the College Seminar (TC 698). **(MS/T):** This degree requires nine credit hours from a core of fiber science and mechanics courses, nine credit hours in a minor, six credit hours of research, six hours of electives, and two semester audits of the College Seminar (TES 698).

**Student Financial Support:** Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

**Other Relevant Information:** The department either houses or has access to all major analytical tools necessary to effect a quality research program covering a wide range of topics. It also houses state-of-the-art facilities for conducting research in fiber science and textile engineering. Close cooperation between College faculty and the fiber/textile and allied industries provides students with opportunities for learning and employment.

### GRADUATES COURSES

- TC 504 FIBER FORMATION—THEORY AND PRACTICE.
- TC 505 THEORY OF DYEING.
- TC 506 COLOR SCIENCE.
- TC 507 COLOR LABORATORY.
- TC 520 CHEMISTRY OF DYES AND COLOR.
- TC 521 DYE SYNTHESIS LABORATORY.
- TC 525 DYEING CELLULOSE.
- TC 530 THE CHEMISTRY OF TEXTILE AUXILIARIES.
- TC(MAT) 561 ORGANIC CHEMISTRY OF POLYMERS.
- TC(CH,MAT) 562 PHYSICAL CHEMISTRY OF HIGH POLYMERS—BULK PROPERTIES.
- TC 565 POLYMER APPLICATIONS AND TECHNOLOGY.
- TC(CHE) 569 POLYMERS, SURFACTANTS AND COLLOIDAL MATERIALS.
- TC 591 SPECIAL TOPICS IN TEXTILE SCIENCE.

TES 500 FIBER AND POLYMER MICROSCOPY.  
 TES 505 TEXTILE INSTRUMENTATION AND CONTROL SYSTEMS.  
 TES(TAM) 520 YARN PROCESSING DYNAMICS.  
 TES(TAM) 555 PRODUCTION MECHANICS AND PROPERTIES OF WOVEN FABRICS.  
 TES 561 MECHANICAL AND RHEOLOGICAL PROPERTIES OF FIBROUS MATERIAL.  
 TES 562 PHYSICAL PROPERTIES OF FIBER FORMING POLYMERS, FIBERS AND FIBROUS STRUCTURES.  
 TES(MAT) 563 CHARACTERIZATION OF STRUCTURE OF FIBER FORMING POLYMERS.  
 TES 565 TEXTILE COMPOSITES.  
 TES 589 SPECIAL STUDIES IN TEXTILE ENGINEERING AND SCIENCE.  
 TES 590 SPECIAL PROJECTS IN TEXTILE ENGINEERING AND SCIENCE.  
 TC(CH,MAT) 662 PHYSICAL CHEMISTRY OF HIGH POLYMERS—SOLUTION PROPERTIES.  
 TC(CHE) 669 DIFFUSION IN POLYMERS. 2(2-0)  
 TC(CHE) 671 SPECIAL TOPICS IN POLYMER SCIENCE.  
 TC(TES) 691 SPECIAL TOPICS IN FIBER SCIENCE.  
 TC 698 SEMINAR FOR TEXTILE CHEMISTRY.  
 TC 699 TEXTILE RESEARCH FOR TEXTILE CHEMISTRY.  
 TES(TAM) 640 PHYSICAL AND MECHANICAL PROPERTIES OF KNITTED FABRIC.  
 TES(TAM) 651, 652 FABRIC DEVELOPMENT AND CONSTRUCTION.  
 TES(TAM) 663 MECHANICS OF TWISTED STRUCTURES.  
 TES(TAM) 664 MECHANICS OF FABRIC STRUCTURES.  
 TES(TC) 691 SPECIAL TOPICS IN FIBER SCIENCE.  
 TES 697 INDEPENDENT STUDY IN TEXTILES.  
 TES 698 SEMINAR.  
 TES 699 TEXTILE THESIS OR DISSERTATION RESEARCH.

## Textile Management and Technology

For a listing of graduate faculty and program information, see textile and apparel management.

## Textile Materials Science

For a listing of graduate faculty and program information, see textile engineering, chemistry and science.

## Textile Technology Management

Degree Offered: Ph.D.

### GRADUATE FACULTY

*Professor C. D. Livengood, Program Director*

Box 8301, (919) 515-6643, [charles\\_livengood@ncsu.edu](mailto:charles_livengood@ncsu.edu)

*Professors:* R. A. Barnhardt, S. K. Batra, K. R. Beck, G. A. Berkstresser III, R. A. Donaldson, S. E. Elmaghraby, A. H. El-Shiekh, S.-C. Fang, P. L. Grady, B. S. Gupta,

D. M. Holthausen Jr., T. J. Little, S. E. Margolis, M. H. M. Mohamed, C. B. Smith, C. Tomasino, S. C. Winchester; *Professors Emeriti*: J. R. Canada, A. B. Moss; *Associate Professors*: P. Banks-Lee, J. C. Beghin, T. F. Gilmore, S. M. Hudson, M. W. Suh, W. Oxenham, J. P. Rust, A. M. Seyam; *Associate Professor Emeritus*: P. B. Hudson; *Assistant Professors*: T. K. Ghosh, H. H. A. Hergeth, G. L. Hodge, J. W. Rucker

Textile technology management is a multidisciplinary program designed to educate students for research careers in the management of technology in the fiber, textile, apparel and related industries complex. The program is designed to give the students a breadth of knowledge of the materials and technologies employed in the industries as well as the quantitative and analytical tools of management.

**Admission Requirements:** Students majoring in textiles; industrial, systems and manufacturing engineering; statistics; operations research; computer science; economics; consumer economics; marketing; and business administration, and having at least a 3.0/4.0 average in their undergraduate studies and a master's degree will normally qualify for admission. Exceptionally qualified students may be admitted directly without a master's degree.

**Doctoral Degree Requirements:** Students are admitted to candidacy for the Ph.D. degree after passing two preliminary written and oral examinations (the first covering manufacturing technology and the second the management of technology) and orally defending a research proposal. They must also have passed an English technical writing course during their college career and, depending on the nature of their research interests, may also be required to demonstrate a reading knowledge of one foreign language.

**Student Financial Support:** Financial aid in the form of assistantships and fellowships is normally available for all full-time students.

**Other Relevant Information:** In 1991, the College of Textiles moved to its new 298,000 square-foot complex, now valued at over \$50 million, which houses exceptional teaching, research, computer and library facilities. With a graduate faculty of 45 and research expenditures exceeding \$6,000,000 in fiscal year 1992/93, opportunities abound. Facilities available to textile technology management students include: the Model Manufacturing Facility which contains over \$10,000,000 of textile processing equipment from fiber formation to end products; the IBM Computer Integrated Manufacturing (CIM) Facility which contains PS/2's, AS/400 and RS/6000 computers running plant floor, supervisory monitoring and control, and manufacturing resource planning software packages; and the Textile Design Laboratory which contains several design packages which can communicate with plant floor devices providing CAD/CAM integration.



**COURSE OFFERINGS** (Extensive use may be made of graduate course offerings in other colleges on campus when developing the minor field. See departmental listing for descriptions)

## **GRADUATE COURSES IN AREAS OF SPECIALIZATION**

TAM(TEs) 520 YARN PROCESSING DYNAMICS  
TAM 530 TEXTILE QUALITY CONTROL  
TAM(TEs) 541 THEORY AND PRACTICE OF KNITTED FABRIC PRODUCTION AND CONTROL  
TAM 549 WARP KNIIT ENGINEERING AND STRUCTURAL DESIGN  
TAM(TEs) 555 PRODUCTION MECHANICS AND PROPERTIES OF WOVEN FABRICS  
TES 565 TEXTILE COMPOSITES  
TAM(BUS) 585 MARKET RESEARCH IN TEXTILES  
TAM 589 SPECIAL STUDIES IN TEXTILE MANAGEMENT AND TECHNOLOGY  
TAM 590 SPECIAL PROJECTS IN TEXTILE MANAGEMENT AND TECHNOLOGY  
TAM 610 YARN PRODUCTION PROPERTIES  
TAM 621 ADVANCED TEXTILE TESTING  
TES 631 SYNTHETIC FIBERS  
TAM(TEs) 640 PHYSICAL AND MECHANICAL PROPERTIES OF KNITTED FABRIC  
TAM(TEs) 651, 652 FABRIC DEVELOPMENT AND CONSTRUCTION  
TAM(TEs) 663 MECHANICS OF TWISTED STRUCTURES  
TAM(TEs) 664 MECHANICS OF FABRIC STRUCTURES  
TAM 680 SPECIAL PROJECTS IN TEXTILE MANAGEMENT  
TAM 686 ADVANCED TEXTILE LABOR MANAGEMENT SEMINAR  
TAM 687 COMPETITIVE STRATEGY AND PLANNING FOR THE TEXTILE FIRM  
TAM 697 INDEPENDENT STUDY IN TEXTILES

## **Toxicology**

Degrees Offered: Ph.D., M.S., Master of Toxicology

### **GRADUATE FACULTY**

*William Neal Reynolds and Graduate Alumni Distinguished Professor* E. Hodgson,  
*Head of the Department*

(919) 515-2595

*Professor* R. B. Leidy, *Director of Graduate Programs*

Box 7633, (919) 515-2090

*Adjunct Professors:* J. A. Bond, J. A. Goldstein, R. J. Langenbach, R. M. Philpot, R. J. Preston; *Professor Emeritus:* T. J. Sheets; *Associate Professors:* G. A. LeBlanc, R. C. Smart; *Research Associate Professor:* P. E. Levi; *Adjunct Associate Professor:* A. E. Chalmer, N. Chernoff, K. M. Crofton, H. B. Matthews Jr.; *Assistant Professors:* S. Branch, D. Shea; *Research Assistant Professor:* S. A. Meyer; *Visiting Assistant Professor:* R. L. Rose

## ASSOCIATE MEMBERS OF THE PROGRAM

**Professors:** K. B. Adler, A. L. Aronson, C. Brownie, C. F. Brownie, J. M. Cullen, W. E. Donaldson, H. M. Hassan, R. J. Kuhr, R. J. Linderman, W. H. McKenzie, N. A. Monteiro-Riveiere, M. A. Qureshi, J. E. Riviere, R. M. Roe; **Professor (USDA):** D. E. Moreland; **Associate Professor:** C. L. Robinette

**Admission Requirements:** Prospective students should have a strong background in the biological and physical sciences with a minimum undergraduate grade point average of 3.0 (on a 4.0 scale) in the biological and physical sciences.

**Master of Science Degree Requirements:** Students pursuing an M.S. degree specializing in environmental toxicology must enroll in TOX 515 Environmental Toxicology.

**Master of Toxicology Degree Requirements:** A minimum of 14 credit hours in TOX courses are required. While a thesis is not required, at the discretion of the student's advisory committee, a review paper focusing on the student's interest in some aspect of toxicology might be required as a special problem (TOX 590). The requirements, in all other respects, are the same as for the M.TOX and M.S. degrees.

**Doctoral Degree Requirements:** A minimum of 37 credit hours is required for the Ph.D. degree. At least 20 hours must come from 500- and 600-level courses.

**Student Financial Support:** Financial assistance is available for qualified applicants through traineeships, fellowships, teaching assistantships and research assistantships with participating faculty members. Approximately 90 percent of the students pursuing master's and doctoral degrees on campus currently receive financial assistance.

**Other Relevant Information:** Students pursuing either the M.S. or Ph.D. degree may elect to specialize in environmental toxicology. Students who choose this option are required to enroll in TOX 515, Environmental Toxicology (3 credits), TOX 590E Special Problems in Toxicology: Environmental Fate of Chemicals (3 credits) and TOX 590W Special Problems in Toxicology: Wildlife Toxicology (1 credit). At least 6 credit hours of course work is required in related disciplines (*i.e.*, ecology, forestry, zoology).

## GRADUATES COURSES

TOX 501 GENERAL TOXICOLOGY.

TOX 510 BIOCHEMICAL TOXICOLOGY.

TOX 515 ENVIRONMENTAL TOXICOLOGY.

TOX(ST) 563 STATISTICAL PROBLEMS IN TOXICOLOGY.

TOX 590 SPECIAL PROBLEMS IN TOXICOLOGY.

TOX 601 CHEMICAL CARCINOGENESIS.

TOX 604 CHEMICAL RISK ASSESSMENT.

TOX(IMM) 605 IMMUNOTOXICOLOGY.

TOX(BCH) 606 FREE RADICALS IN TOXICOLOGY.

TOX 690 TOXICOLOGY SEMINAR.  
TOX 699 RESEARCH.

### COURSES FROM ASSOCIATED DEPARTMENTS

BCH 553 METABOLISM AND MOLECULAR BIOLOGY.  
BCH 601 MACROMOLECULAR STRUCTURE.  
BCH 603 MACROMOLECULAR SYNTHESIS AND REGULATION.  
BCH 605 MOLECULAR BIOLOGY OF THE CELL.  
BCH 661 ADVANCED MOLECULAR BIOLOGY OF THE CELL  
GN 560 MOLECULAR GENETICS.  
ST 511 EXPERIMENTAL STATISTICS FOR BIOLOGICAL SCIENCES I.  
VMS 554 PRINCIPLES OF EPIDEMIOLOGY.  
VMS 562 SYSTEMIC PHARMACOLOGY AND TOXICOLOGY.  
VMS 570 CELL BIOLOGY.  
VMS 590 SPECIAL TOPICS IN VETERINARY MEDICAL SCIENCES.  
VMS 661 PHARMACOKINETICS.  
ZO 513 COMPARATIVE PHYSIOLOGY.  
ZO 560 PRINCIPLES OF ECOLOGY.

## Training and Development

For a listing of graduate faculty and program information, see adult and community college education.

## Veterinary Medical Sciences

Degrees Offered: Ph.D., M.S.

### GRADUATE FACULTY

*Professor* J. H. Britt, *Coordinator*

Box 8401, (919) 829-4262, jack\_britt@ncsu.edu

*Burroughs Wellcome Distinguished Professor:* J. E. Riviere

*Professors:* C. F. Abrams Jr., K. B. Adler, K. L. Anderson, R. A. Argenzio, A. L. Aronson, C. E. Atkins, H. J. Barnes, E. B. Breitschwerdt, T. T. Brown Jr., C. F. Brownie, P. B. Carter, W. J. Croom Jr., J. M. Cullen, T. M. Curtin, E. V. DeBuysscher, D. J. DeYoung, L. N. Fleisher, O. J. Fletcher Jr., R. B. Ford, F. J. Fuller, T. E. Hamm Jr., B. Hammerberg, B. D. Harrington, M. G. Levy, D. J. Meuten, N. A. Monteiro-Riviere, E. J. Noga, N. C. Olson, P. E. Orndorff, W. D. Oxender, R. L. Page, L. E. Perryman, M. C. Roberts, P. L. Sannes, J. E. Smallwood, C. E. Stevens, E. A. Stone, M. K. Stoskopf, L. P. Tate Jr., C. Teng, D. E. Thrall, W. A. F. Tompkins; *Adjunct Professors:* J. J. Arends, R. L. Cooper, S. W. Crane, M. W. Dewhirst, J. P. Fetrow, J. Fine, R. R. Maronpot, J. A. Popp, F. Welsch; *Professors*

**Emeriti:** W. M. Adams, E. G. Batte, P. J. Bentley, H. A. Berkhoff, L. Coggins, D. R. Howard, R. C. Dillman, D. M. Hanson, J. K. Magor, D. J. Moncol; **Associate Professors:** G. W. Almond, S. A. Bai, H. M. Berschneider, K. F. Bowman, B. A. Breuhaus, D. G. Bristol, S. E. Bunch, P. Cowen, M. G. Davidson, W. M. Duckett, K. Flammer, J. E. Gadsby, B. C. Gilger, C. B. Grindem, J. S. Guy, E. M. Hardie, E. C. Hawkins, J. M. Hinshaw, L. C. Hudson, E. Hunt, B. W. Keene, J. F. Levine, D. H. Ley, M. B. McCaw, R. E. Meyer, B. P. Peters, M. A. Qureshi, D. V. Rives, C. L. Robinette, B. Sherry, B. D. Slenning, K. A. Spaulding, C. R. Swanson, M. B. Tompkins, S. L. Tonkonogy, S. D. Van Camp, D. P. Wages, M. D. Whitacre; **Research Associate Professors:** M. C. McGahan, B. A. Weeks-Perkins; **Visiting Research Associate Professor:** S. Kennedy-Stoskopf; **Adjunct Associate Professors:** G. A. Boorman, R. C. Cattley, K. L. Dreher, T. L. Goldsworthy, J. J. Heindel, M. R. Loomis, E. E. McConnell, R. L. Peiffer Jr., J. A. Raleigh, D. C. Richardson, C. T. Teng, P. L. Williams; **Assistant Professors:** C. R. Berry, D. E. Bevier, M. T. Correa, P. R. Davies, J. Deen, N. E. Love, D. J. Marcellin, K. R. Munana, T. Olivry, S. C. Roe, G. M. Rogers, D. C. Sellon, I. W. Smoak, G. J. Spodnick, S. L. Vaden, S. L. Vivrette, B. J. Weigler; **Visiting Assistant Professors:** R. V. English, B. D. Hansen; **Adjunct Assistant Professor:** J. Everitt; **Electron Microscopy Director:** M. J. Dykstra

Course offerings and research topics currently include, but are not limited to: immunology, cardiology, pharmacokinetics, oncology, toxicology, gastroenterology, neurophysiology, reproductive physiology, biotechnology, microbiology, aquatic/wildlife biology, biomedical engineering, endocrinology, molecular biology, pulmonary biology, epidemiology, population medicine, health systems monitoring, transplantation and radiology.

**Admission Requirements:** All applications are reviewed by the Graduate Student Admissions Committee of the College, composed of faculty members representing each area of the graduate program. Scores from the GRE are required for admission by all applicants. Candidates who do not have a DVM degree must have a baccalaureate degree or advanced degree from a college or university recognized as standard by a regional or general accrediting agency. Students with a 3.0 (on a 4.0 scale) undergraduate or DVM curriculum with appropriate course background will be considered for admission.

**Doctoral Degree Requirements:** Credit hour requirements for the Ph.D. degree are determined by the graduate student's committee with approval of the Director of Graduate Programs and the Graduate School.

**Student Financial Support:** Research assistantships are awarded to qualified candidates on the competitive basis by the College. These are for 12-month periods, and stipends are competitive with those of other programs. These positions are funded by the grants of individual faculty members and the state appropriations to the College and departments.



*Other Relevant Information:* The program is organized across traditional departmental lines as areas of concentration which include: cell biology/morphology, epidemiology/population medicine, microbiology, pathology and pharmacology. These provide extensive interdisciplinary training and maintain a highly effective liaison with graduate programs in other schools of the university, as well as those of nearby Duke University and the University of North Carolina at Chapel Hill.

### GRADUATES COURSES

- VMS(BAE) 522 MECHANICS OF BIOLOGICAL MATERIALS.
- VMS 530 VETERINARY HISTOLOGY.
- VMS 532 ELECTRON MICROSCOPY IN VETERINARY MEDICINE.
- VMS 540 RESEARCH ANIMAL CARE AND USE.
- VMS 550 VETERINARY MEDICAL VIROLOGY I.
- VMS 551 PATHOGENIC BACTERIOLOGY AND MYCOLOGY.
- VMS 552 DIAGNOSTIC BACTERIOLOGY AND MYCOLOGY.
- VMS 553 VETERINARY IMMUNOLOGY.
- VMS 554 PRINCIPLES OF EPIDEMIOLOGY.
- VMS(IMM) 555 IMMUNOPARASITOLOGY.
- VMS(IMM,MB,PHY,PO) 556 IMMUNOGENETICS.
- VMS 560 INTRODUCTORY PHARMACOLOGY.
- VMS 561 INSTRUMENTATION IN PHARMACOLOGICAL RESEARCH.
- VMS 562 SYSTEMIC PHARMACOLOGY AND TOXICOLOGY.
- VMS 570 CELL BIOLOGY.
- VMS 580 VETERINARY PRODUCTION EPIDEMIOLOGY.
- VMS 582 MARINE MAMMAL MEDICINE.
- VMS 590 SPECIAL TOPICS IN VETERINARY MEDICAL SCIENCES.
- VMS 631 APPLIED VETERINARY ANATOMY I.
- VMS(ANS,NTR,PHY) 632 COMPARATIVE PHYSIOLOGY OF THE DIGESTIVE SYSTEM.
- VMS 642 ADVANCED SYSTEMIC HISTOPATHOLOGY.
- VMS 643 TOXICOLOGIC PATHOLOGY I.
- VMS 650 BACTERIAL PATHOGENIC MECHANISMS.
- VMS 651 VETERINARY MEDICAL VIROLOGY II.
- VMS(MB) 653 ADVANCED IMMUNOLOGY.
- VMS 654 EPIDEMIOLOGY OF INFECTIOUS DISEASES OF INTERNATIONAL IMPORTANCE.
- VMS 660 ADVANCED PHARMACOLOGY.
- VMS 661 PHARMACOKINETICS.
- VMS 690A SPECIAL TOPICS IN VETERINARY MICROBIOLOGY.
- VMS 690B SPECIAL TOPICS IN PATHOLOGY.
- VMS 690C SPECIAL TOPICS IN LABORATORY PHARMACOLOGY.
- VMS 690D SPECIAL TOPICS IN CLINICAL PATHOLOGY.
- VMS(IMM) 691 ADVANCED TOPICS IN IMMUNOLOGY AND BIOTECHNOLOGY.
- VMS 692 ADVANCED TOPICS IN ZOOLOGICAL MEDICINE I.
- VMS 693 ADVANCED TOPICS IN ZOOLOGICAL MEDICINE II.
- VMS 694A SEMINAR IN NECROPSY PATHOLOGY.
- VMS 694B SEMINAR IN SURGICAL PATHOLOGY.
- VMS(IMM) 695A SEMINAR IN VETERINARY MICROBIOLOGY/ IMMUNOLOGY.
- VMS 696A SEMINAR IN PHARMACOLOGY.
- VMS 697 SEMINAR IN CELL BIOLOGY.
- VMS 699 RESEARCH IN VETERINARY MEDICAL SCIENCES.

# Wildlife Biology

Degrees Offered: M.S., Master of Wildlife Biology

## GRADUATE FACULTY

*Professor R. L. Noble, Coordinator*

*Professor D. L. Holley Jr., Director of Graduate Programs, Forestry*

Box 8002, (919) 515-2892

*Professor J. F. Gilliam, Director of Graduate Programs, Zoology*

Box 7617, (919) 515-2587

*Professors:* G. T. Barthalmus, P. T. Bromley, B. J. Copeland, P. D. Doerr, J. E. Easley Jr., E. C. Franklin, R. A. Lancia, J. M. Miller, K. H. Pollock; *Professors Emeriti:* D. A. Adams, D. W. Hayne; *Associate Professors:* J. M. Hinshaw, R. G. Hodson, E. J. Jones, T. M. Losordo, S. C. Mozley, R. A. Powell, J. A. Rice, C. V. Sullivan; *Assistant Professors:* H. V. Daniels, M. J. Groom; *Assistant Professors (USDI):* J. A. Collazo, J. E. Hightower

The wildlife biology degrees are offered through the fisheries and wildlife science program, an inter-college program administered by the Departments of Forestry and Zoology. The degrees emphasize assessment, biology, ecology and management of fish and wildlife species and their habitats.

*Admissions Requirements:* Application for admission is made through the Departments of Forestry or Zoology. Minimum requirements include a graduate record examination score of 1000 on the verbal and quantitative sections. Admission is contingent upon acceptance by an advisor. Exceptions to minimum requirements may be made for students with special backgrounds.

*Master's Degree Requirements:* The Master of Wildlife Biology degree consists of a minimum of 36 credits, which may include up to eight hours of special problems and seminars. A professional paper is required. Further requirements may be imposed by the advisory committee and/or department. The M.S. degree program may include up to eight hours of re-search and seminars. A research-based thesis is required.

*Student Financial Support:* Graduate research and teaching assistantships are offered for qualified students through participating departments. Commitments for assistantships are normally made at the time of admission to graduate study.

*Other Relevant Information:* Research facilities near campus include the Aquatic Research Laboratory, Wildlife Research Laboratory, Biology Field Laboratory, Schenck Forest, Harris Lands natural area and several university farm units. Off-campus re-

search is conducted at the Pamlico Aquaculture Center, research and extension centers in the east and west, and at facilities of state and federal agencies and private organizations.

### GRADUATES COURSES

FW(ZO) 515 FISH PHYSIOLOGY.

FW(ZO) 553 PRINCIPLES OF WILDLIFE SCIENCE.

FW(ZO) 554 WILDLIFE FIELD STUDIES.

FW(FOR) 585 ADVANCED WILDLIFE HABITAT MANAGEMENT.

FW(ZO) 586 AQUACULTURE I.

FW(ZO) 587 AQUACULTURE I LABORATORY.

FW(FOR) 594 SEMINAR IN WILDLIFE MANAGEMENT.

### COURSES FROM ASSOCIATED DEPARTMENTS

ZO 501 ORNITHOLOGY.

ZO(ST) 506 SAMPLING ANIMAL POPULATIONS.

ZO(ENT) 509 ECOLOGY OF STREAM INVERTEBRATES

ZO 519 LIMNOLOGY.

ZO(MEA) 520 PRINCIPLES OF BIOLOGICAL OCEANOGRAPHY.

ZO 542 HERPETOLOGY.

ZO 544 MAMMALOLOGY.

ZO 593 AQUATIC ECOLOGY SEMINAR.

ZO 619 ADVANCED LIMNOLOGY.

ZO 621 FISHERY SCIENCE.

ZO(MEA) 624 ECOLOGY OF FISHES.

ZO 626 QUANTITATIVE FISHERIES MANAGEMENT.

ZO 644 ADVANCED TOPICS IN THE STUDY OF MAMMALS.

## Wood and Paper Science

Degrees Conferred: Ph.D., M.S., Master of Wood and Paper Science

### THE GRADUATE FACULTY

*Professor R. J. Thomas, Interim Head of the Department*

*Professor Emeritus R. D. Gilbert, Director of Graduate Programs*

Box 8005, (919) 515-5321

*Elis and Signe Olsson Professor and Graduate Alumni Distinguished Professor: J. S. Gratzl*

*Reuben B. Robertson Professor: H.-m. Chang*

*Professors: J. Denig, J. A. Heitmann Jr., H. Jameel, T. W. Joyce, M. W. Kelly, H. G. Olf, E. A. Wheeler; Adjunct Professors: L. L. Edwards, T. K. Kirk; Professors Emeriti: A. C. Barefoot Jr., E. L. Deal Jr., E. L. Ellwood, C. A. Hart, I. S. Goldstein, R. G. Pearson; Associate Professor: J. P. Roise; Research Associate*

*Professors:* J. S. Stewart; *Adjunct Associate Professor:* R. B. Phillips; *Assistant Professors:* B. Kasal, R. A. Venditti; *Research Associate:* C. L. Chen

Course offerings and research facilities are available in the following areas: Wood chemistry, lignin and carbohydrate chemistry, pulping chemistry, pollution abatement processes, polymer chemistry, fiber and paper properties, secondary fiber studies, wood physics (especially wood liquid relations), wood anatomy, wood biology, wood mechanics and engineering, wood machining, manufacturing processes, wood-based industry economics and marketing.

*Admission Requirements:* Requirements listed here are in addition to graduate school requirements stated elsewhere. To be admitted, a student should have earned a B.S. degree with a major in wood and paper science or the equivalent. Graduates with other physical science or engineering baccalaureate degrees can be admitted but may be required to make up certain undergraduate deficiencies. Students with a 3.0 GPA and with appropriate course backgrounds will be considered for admission.

*Master of Science Degree Requirements:* In addition to Graduate School requirements, a minor is required.

*Master of Wood and Paper Science Degree Requirements:* The Master of Wood and Paper Science is a non-thesis, professional degree for students not interested in research. A minimum of 36 course credits is required. The regulations regarding credits are the same as for the M.S. degree except that up to 6 credits of 400-level courses in the major field may be included. A technical report which demonstrates the student's ability to gather, analyze and report information is required.

*Doctoral Degree Requirements:* In addition to Graduate School requirements, Ph.D. candidates must present two seminars before their final oral examination will be arranged.

*Student Financial Support:* A limited number of research assistantships are available.

*Other Relevant Information:* Graduate students should select a chairman and other advisory committee members and submit a plan of graduate work by the end of their first semester of residence. They are also urged to take the qualifying examinations within one year of residence. The department believes M.S. and Ph.D. students should select a research topic and begin their thesis research as early as possible.

As the field of wood and paper science is a derived science, considerable emphasis is placed upon developing a strong minor in the graduate program in any one or more of the supporting disciplines such as organic chemistry, polymer chemistry, chemical engineering, mathematics, statistics, biology, engineering mechanics, mechanical engineering, physics, and economics or business administration.



Students in wood chemistry and pulp and paper programs must pass certain qualifying examinations.

### GRADUATES COURSES

WPS 513 TROPICAL WOODS.  
WPS 515 SURFACE AND COLLOID CHEMISTRY OF PAPERMAKING.  
WPS 521 CHEMISTRY OF WOOD POLYSACCHARIDES.  
WPS 522 CHEMISTRY OF LIGNIN AND EXTRACTIVES.  
WPS 525 POLLUTION ABATEMENT IN FOREST PRODUCTS INDUSTRIES.  
WPS 533 ADVANCED WOOD ANATOMY.  
WPS 540 WOOD COMPOSITES.  
WPS 560 ADVANCED PULP AND PAPER PROCESS ANALYSIS.  
WPS 591 WOOD AND PAPER SCIENCE PROBLEMS.  
WPS 599 METHODS OF RESEARCH IN WOOD AND PAPER SCIENCE.  
WPS 604 TIMBER PHYSICS.  
WPS 625 WASTEWATER TREATMENT IN THE PAPER INDUSTRY.  
WPS 691 GRADUATE SEMINAR.  
WPS 693 ADVANCED WOOD AND PAPER SCIENCE PROBLEMS.  
WPS 699 PROBLEMS AND RESEARCH.

## Zoology

Degrees Offered: Ph.D., M.S., Master of Life Sciences, Master of Wildlife Biology

### GRADUATE FACULTY

*Professor* T. L. Grove, *Interim Head of the Department*,  
*Professor* J. F. Gilliam, *Director of Graduate Programs*  
Box 7617, (919) 515-2587, andrea\_powell@ncsu.edu

*Professors:* G. T. Barthalmus, P. C. Bradbury, P. T. Bromley, B. J. Copeland, P. D. Doerr, W. C. Grant, H. F. Heatwole, C. F. Lytle, J. M. Miller, R. L. Noble, J. F. Roberts, H. A. Underwood Jr., J. G. Vandenberg, T. G. Wolcott.; *Adjunct Professors:* F. A. Cross, L. B. Crowder, J. D. Hair, D. E. Hoss, G. R. Huntsman, J. A. McLachlan, G. W. Thayer, J. R. Walters; *Professors Emeriti:* D. E. Davis, W. W. Hassler, D. W. Hayne, M. T. Huish, G. C. Miller, T. L. Quay, D. E. Smith; *Associate Professors:* B. L. Black, R. M. Grossfeld, J. M. Hinshaw, R. G. Hodson, T. M. Losordo, S. C. Mozley, M. N. Niedzlek-Feaver, R. A. Powell, J. A. Rice, C. V. Sullivan; *Adjunct Associate Professor:* C. S. Manooch III; *Assistant Professors:* R. J. Borski, H. V. Daniels, M. J. Groom; *Assistant Professors (USDI):* J. A. Collazo, J. E. Hightower, T. R. Simons

### ASSOCIATE MEMBERS OF THE PROGRAM

*Professors:* R. A. Lancia, K. H. Pollock; *Associate Professor:* E. J. Jones

Areas of study include: cell biology and physiology, ecology and behavior, and fisheries and wildlife biology. Specializations within these areas include developmental biology, invertebrate biology, animal reproduction, biorhythms, behavioral ecology, population ecology, conservation biology, wildlife field studies, aquaculture and many others.

**Admission Requirements:** GRE scores (general and biology) are required for admission. Regular admission requires an undergraduate grade point average of 3.0 in an appropriate biological discipline. Some research experience is highly recommended.

**Master's Degree Requirements:** No more than 6 hours of temporary courses (ZO 592, ZO 692) or 2 hours of departmental seminar can be included in the 30-hour requirement for the M.S. Six hours of research credits (ZO 699) are required. A minor (usually 9-10 hours) is required.

**Doctoral Degree Requirements:** A student's advisory committee recommends appropriate courses which will provide a strong foundation in the student's area of interest. This typically includes 21-27 credit hours plus a minimum requirement of 10 hours of research (ZO 699). A minor (usually 9-10 hours) is required.

**Student Financial Support:** Graduate teaching and research assistantships are available to well-qualified students.

**Other Relevant Information:** Students may also pursue degrees in interdepartmental programs in physiology and ecology. Excellent research facilities, equipment and computers are available. Field work can be conducted at nearby natural areas and laboratory work at various state and federal laboratories associated with the department.

## GRADUATE COURSES

ZO 501 ORNITHOLOGY.

ZO(PHY) 503 GENERAL PHYSIOLOGY I.

ZO(PHY) 504 GENERAL PHYSIOLOGY II.

ZO(ST) 506 SAMPLING ANIMAL POPULATIONS.

ZO(ENT) 509 ECOLOGY OF STREAM INVERTEBRATES.

ZO 512 ANIMAL SYMBIOSIS.

ZO(PHY) 513 COMPARATIVE PHYSIOLOGY.

ZO(FW) 515 FISH PHYSIOLOGY.

ZO 517 POPULATION ECOLOGY.

ZO 519 LIMNOLOGY.

ZO(MEA) 520 PRINCIPLES OF BIOLOGICAL OCEANOGRAPHY.

ZO 522 BIOLOGICAL CLOCKS.

ZO(PHY,PO) 524 COMPARATIVE ENDOCRINOLOGY

ZO(MEA) 534 MARINE BENTHIC ECOLOGY.

ZO(GN) 540 EVOLUTION.

ZO 542 HERPETOLOGY.

ZO 544 MAMMALOLOGY.

ZO(FW) 553 PRINCIPLES OF WILDLIFE SCIENCE.

ZO(FW) 554 WILDLIFE FIELD STUDIES.

ZO(MB) 555 PROTOZOOLOGY.  
ZO(BO) 560 PRINCIPLES OF ECOLOGY.  
ZO 581 HELMINTHOLOGY.  
ZO(ENT) 582 MEDICAL AND VETERINARY ENTOMOLOGY.  
ZO(FW) 586 AQUACULTURE I.  
ZO(FW) 587 AQUACULTURE I LABORATORY.  
ZO 590 SPECIAL STUDIES.  
ZO 592 TOPICAL PROBLEMS.  
ZO 593 AQUATIC ECOLOGY SEMINAR.  
ZO(PHY) 595 SEMINAR IN BIOLOGY OF REPRODUCTION.  
ZO 614 ADVANCED CELL BIOLOGY.  
ZO 618 COMMUNITY ECOLOGY.  
ZO 619 ADVANCED LIMNOLOGY.  
ZO 621 FISHERY SCIENCE.  
ZO(MEA) 623 ADVANCES IN MARINE COMMUNITY ECOLOGY.  
ZO(MEA) 624 ECOLOGY OF FISHES.  
ZO 626 QUANTITATIVE FISHERIES MANAGEMENT.  
ZO 644 ADVANCED TOPICS IN THE STUDY OF MAMMALS.  
ZO(BO) 660 ADVANCED TOPICS IN ECOLOGY I.  
ZO 690 SEMINAR.  
ZO 691 TOPICS IN ANIMAL BEHAVIOR.  
ZO 692 SEMINAR IN EVOLUTIONARY BIOLOGY.  
ZO 699 RESEARCH IN ZOOLOGY.

# MINOR AND OTHER ORGANIZED PROGRAMS OF STUDY

## Anthropology

### GRADUATE COURSES

- ANT 508 CULTURE AND PERSONALITY.
- ANT 511 ANTHROPOLOGICAL THEORY.
- ANT 512 APPLIED ANTHROPOLOGY.
- ANT 591 SPECIAL TOPICS IN ANTHROPOLOGY.

## Artificial Intelligence (Minor Program)

### GRADUATE FACULTY

*Professors:* R. C. Luo, W. J. Rasdorf, H. E. Schaffer, A. L. Tharp; *Associate Professors:* D. R. Bahler, H. D. Levin,, R. D. Rodman, E. T. Sanii; *Adjunct Assistant Professor:* J. C. Sutton III

Artificial intelligence is the branch of computer science concerned with designing computer systems which exhibit the characteristics normally associated with intelligence in human behavior, such as understanding language, learning, reasoning, solving problems, and so on. At NC State, artificial intelligence is an interdisciplinary field, with faculty from several departments engaged in fundamental research and applications.

The university offers courses of study leading to a minor in artificial intelligence as part of the M. S. and Ph.D. degrees. This option is available to all graduate students except those in computer science, who can choose artificial intelligence as an interest area.

To fulfill the academic requirements for a minor in artificial intelligence, each master's student must successfully complete at least three, and each doctoral student at least six, of the courses in the artificial intelligence curriculum. Two of the courses must be CSC 511, Artificial Intelligence I and CSC 611, Artificial Intelligence II. Other courses offered as part of the artificial intelligence curriculum include: CSC 502 Computational Linguistics; CSC 602 Computational Semantics; ECE 659 Computer Vision; CSC (ECE,IE) 575 Voice Communication Systems; CSC(ECE,IE) 675 Advances in Voice Input/Output Communication Systems. Also, from time to time special topics courses are offered covering subjects such as knowledge engineering, fuzzy reasoning, knowledge representation, artificial intelligence applications to CAD, and artificial intelligence in manufacturing.



Graduate students in computer science who select artificial intelligence as an interest area are subject to the same academic requirements that define other interest areas within computer science.

## Biological Sciences

There is no separate graduate major in the biological sciences, but both M.S. and Ph.D. degrees are offered in several life science departments and programs of the College of Agriculture and Life Sciences. Also, non-thesis Master of Life Sciences degrees are offered by several departments and programs for students who wish to emphasize course work in a graduate program. Master of Life Sciences degrees may be appropriate for students who are already working or plan to work in a professional capacity in business, industry or government agencies rather than to continue to the doctorate. These degrees are not necessarily terminal, however, and successful students may be able to proceed to other advanced degrees. Interdisciplinary courses applicable to several graduate programs are offered by the Biological Sciences Interdepartmental Program.

### GRADUATE COURSES

BIO 510 ADVANCED BIOLOGY FOR SECONDARY TEACHERS.

## Biomedical Engineering (Minor Program)

### GRADUATE FACULTY

*Professors:* C. F. Abrams, M. A. Ayoub, R. G. Carbonell, B. S. Gupta, J. J. Hren, C. Kleinstreuer, J. M. Mackenzie, T. K. Miller III, H. T. Nagle Jr., A. A. Nilsson, D. F. Ollis, H. G. Perros, S. A. Rajala, J. E. Smallwood, W. E. Snyder, L. Stikeleather, E. A. Stone, M. K. Stoskopf, D. E. Thrall, H. J. Trussell, T. G. Wolcott; *Adjunct Professor:* J. P. Archie; *Professors Emeriti:* F. M. Richardson, C. W. Suggs; *Associate Professors:* S. M. Blanchard, D. G. Bristol, R. D. Gould, L. C. Hudson, S. M. Hudson, R. E. Meyer, R. A. Powell, C. E. Smith, K. A. Spaulding; *Assistant Professor:* S. C. Roe; *Adjunct Assistant Professor:* P. Santiago II

The biomedical engineering program provides graduate minors under the direction of faculty from fourteen departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, Textiles and Veterinary Medicine at NC State. Faculty from the Biomedical Engineering Departments at Duke University and the University of North Carolina at Chapel Hill are also actively involved. Graduate students from all departments may elect a biomedical engineering minor. To fulfill the minor requirements, a student must take three courses in one of four specialty tracks: biomechanics, biofluids and biomaterials; biomedical

modeling and signal processing; instrumentation, sensors and telemetry; medical imaging and communications systems.

The graduate faculty maintain lists of courses from which the students may make their selections. The particular choice of courses is left to the student and the student's advisory committee. A student may choose a minor outside one of the four tracks with the approval of the Biomedical Engineering Academic Affairs Committee. The courses for all biomedical engineering graduate minors must be distinctly different from the student's major field of study.

Students who elect the biomedical engineering graduate minor are encouraged to engage in research activities that involve interactions with faculty and students in other departments and/or colleges.

## **Biotechnology (Minor Program)**

### **GRADUATE FACULTY**

*Associate Professor* M. A. Conkling, *Director*

Box 7512, (919) 515-4230, Fax (919) 151-4231, [biotech@ncsu.edu](mailto:biotech@ncsu.edu)

*Professors:* K. B. Adler, P. F. Agris, W. F. Boss, R. G. Carbonell, P. B. Carter, H.-m. Chang, S. E. Curtis, M. E. Daub, V. L. DeBuysscher, W. J. Dobrogosz, E. J. Eisen, F. J. Fuller, C. K. Hall, B. B. Hammerberg, H. M. Hassan, T. W. Joyce, R. M. Kelly, T. R. Klaenhammer, C. S. Levings III, P. K. Kilpatrick, R. J. Linderman, S. A. Lommel, T. Melton, W. L. Miller, D. F. Ollis, P. E. Orndorff, R. M. Petters, M. A. Qureshi, J. F. Roberts, R. M. Roe, P. L. Sannes, J. G. Scandalios, R. R. Sederoff, J. C. H. Shih, S. L. Spiker, H. T. Stalker, H. E. Swaisgood, C. S. Teng, E. C. Theil, W. F. Thompson, W. A. F. Tompkins, B. S. Weir; *Professor (USDA):* P. E. Bishop; *Associate Professors:* B. Alston-Mills, H. V. Amerson, M. T. Andrews, R. S. Boston, E. F. Bowden, T. J. Hoban IV, L. K. Hanley-Bowdoin, P. B. Lindgren, E. S. Maxwell, E. S. Miller, C. H. Opperman, S. M. Peretti, B. Sherry, R. C. Smart, A.-M. Stomp, M. B. Tompkins, S. L. Tonkonogy, A. K. Weissinger; *Associate Professor (USDA):* P. H. Sisco; *Assistant Professors:* R. E. Dewey, C. E. Farin,, C. L. Hemenway, J. N. Petite, I. T. D. Petty, D. Robertson

The Biotechnology Program includes faculty from twenty departments in the Colleges of Agriculture and Life Sciences, Engineering, Forest Resources, Physical and Mathematical Sciences, and Veterinary Medicine. Graduate study leading to a Ph.D. minor in biotechnology may be taken by students who reside and conduct their research in one of the participating departments. To obtain a minor in biotechnology, the student must successfully complete at least six credit hours in the laboratory core

courses selected from the list below and must conduct graduate thesis research in an area of biotechnology.

Research in biotechnology is focused in three main areas: recombinant DNA technology, bioprocessing/bioanalytical techniques, and *in vitro* culture techniques. The multidisciplinary nature of biotechnology means that a wide range of research topics and techniques are applicable, such as molecular level genetics and associated research in molecular biology, enzyme technology and protein engineering, bioprocessing using cells or enzymes, development of biosensors, hybridoma technology, cell culture techniques and embryo manipulation.

### GRADUATE COURSES

BIT 660 CORE TECHNOLOGIES IN MOLECULAR AND CELLULAR BIOLOGY.  
BIT 697 ADVANCED TOPICS IN BIOTECHNOLOGY.

### COURSES FROM ASSOCIATE DEPARTMENTS

ANS 606 ANIMAL BIOTECHNOLOGY: EMBRYO MANIPULATION.  
BCH 552 EXPERIMENTAL BIOCHEMISTRY.  
CS(BO,GN,HS) 547 CELL AND TISSUE TECHNIQUES IN PLANT BREEDING.  
FS 504 FOOD PROTEINS AND ENZYMES.  
GN 666 LABORATORY IN MOLECULAR GENETICS.  
MB 660 EXPERIMENTAL MICROBIAL GENETICS.

## **Business Management (Minor Program)**

### **GRADUATE FACULTY**

*Professor J. W. Wilson, Head*

*Professor S. G. Allen, Director of Graduate Programs*

*Professors:* R. L. Clark, G. W. Dickson, C. P. Jones, D. K. Pearce; *Associate Professors:* A. Agrawal, D. L. Baumer, S. N. Chapman, J. C. Dutton Jr., E. A. McDermid, K. Mitchell, A. Padilla, J. C. Poindexter Jr.; *Assistant Professors:* C. C. Bozarth, K. S. Davis, S. K. Markham, M. Montoya-Weiss, P. Mulvey, K. Schenk, G. B. Voss, G. S. Young

The department offers a graduate minor in business management. Students enrolled in master's programs other than the Master of Science in Management may earn a minor by successfully completing nine hours of courses in the department at the 500 or 600 level. For a listing of courses in business management, see management.

# Communication

## GRADUATE COURSES

- COM 552 HUMAN COMMUNICATION THEORY.
- COM 556 SEMINAR IN ORGANIZATIONAL COMMUNICATION.
- COM 566 SEMINAR IN CRISIS COMMUNICATION.
- COM 598 INDEPENDENT STUDY IN COMMUNICATION.
- COM(ENG) 622 THE RHETORIC OF WRITTEN DISCOURSE.
- COM(ENG) 623 RHETORICAL CRITICISM: THEORY AND PRACTICE.
- COM 698 SPECIAL TOPICS IN COMMUNICATION.

# Computational Engineering and Sciences (Minor Program)

## GRADUATE FACULTY

*Professor P. J. Turinsky, Program Coordinator*

*Professors:* D. P. Agrawal, W. E. Alexander, H. T. Banks, J. Bernholc, S. R. Cotanch, R. E. Funderlic, C. K. Hall, C. Kleinstreuer, D. F. McAllister, D. S. McRae, T. K. Miller III, G. E. Mitchell, J. F. Monahan, H. G. Perros, R. O. Scattergood, W. J. Stewart, M. H. Whangbo, R. E. White, J. L. Whitten; *Associate Professors:* J. W. Baugh, D. W. Brenner, J. M. Doster, J. E. Franke, E. F. Gehringer, C. R. Ji, S. E. Koch, Y.-L. Lin, M. A. Vouk

The Computational Engineering and Sciences Program includes faculty from twelve departments in the College of Engineering and College of Physical and Mathematical Sciences. Graduate students pursuing graduate study toward a master's or Ph.D. degree in one of the participating science or engineering departments may elect this program in place of the traditional minor. [Note that students wishing to earn a graduate degree in mathematics or computer science should reference these departments' sections of the Graduate Catalog for details on options available in computational mathematics and scientific computing.] To complete the program requirements, a student must successfully complete a sequence of graduate-level applied mathematics and computer science courses and, if a research dissertation is required, utilize advanced computational techniques in the course of conducting the research.

The Computational Engineering and Sciences Program is designed to efficiently prepare graduate students to undertake research utilizing scientific computing by combining course work in applied mathematics and computer science in addition to course work in the traditional major. The program recognizes that a new area of scientific pursuit, numerical simulation, has emerged as a new paradigm for scientific inquiry complementing theory and laboratory experiment. Typical areas of research include, but are not limited to, computational fluid dynamics, quantum chemistry and atmospheric



modelling. Admission to the program is gained after enrollment in the Graduate School and the graduate program is underway. Program course requirements are selected from applied mathematics and computer science courses listed elsewhere in this Graduate Catalog. To facilitate the satisfaction of prerequisite requirements for graduate-level computer science courses, CSC 489 is offered for graduate credit, combining the key contents of several undergraduate courses. Typical courses that may be selected to satisfy this program's requirements include advanced calculus, numerical analysis, numerical linear algebra for parallel architectures, stochastic simulation, computer operating systems, digital systems architecture, computer graphics, compiler construction, software engineering, and design and analysis of algorithms.

## Design

For a listing of graduate faculty and program information, see architecture, graphic design, industrial design and landscape architecture.

### GRADUATE COURSE

DN 611 ADVANCED VISUAL LABORATORY.

## Ecology

### GRADUATE COURSES

ECO 690 ECOLOGY SEMINAR.

ECO 693 SPECIAL PROBLEMS IN ECOLOGY.

## Education [General Courses]

### GRADUATE COURSE

ED 597 SPECIAL PROBLEMS IN EDUCATION.

**Engineering [General Courses]** (Designed for use by graduate students in any department in the College of Engineering.)

### GRADUATE COURSES

E(MA,OR) 531 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL I.

E(MA,OR) 631 DYNAMIC SYSTEMS AND MULTIVARIABLE CONTROL II.

# Foreign Languages and Literatures

## GRADUATE FACULTY

*Professor J. H. Stewart, Head of the Department*

*Professors:* G. F. Gonzalez, J. R. Kelly, G. G. Smith, M. A. F. Witt; *Professors Emeriti:* A. A. Gonzalez, M. Paschal, G. W. Poland, E. M. Stack; *Associate Professors:* R. M. A. Alder, S. G.-Q. Alonso, W. M. Holler, M. M. Magill, A. C. Malinowski, L. Mykyta, M. L. Salstad, S. E. Simonsen, M. L. Sosower; *Associate Professor Emeritus:* H. Tucker Jr.; *Assistant Professors:* V. Bilenkin, H. G. Braunbeck, G. A. Dawes, D. M. Marchi, J. P. Mertz, G. Williams

The Department of Foreign Languages and Literatures offers courses to assist graduate students in preparing to use modern foreign languages in research and advanced study. These courses are not open to undergraduates. With special permission of the Graduate School, certification may be obtained in languages not normally taught by the department.

The following courses are designed to be audited, and credits do not apply toward advanced degrees.

- FLF 401 FRENCH FOR GRADUATE STUDENTS.
- FLG 401 GERMAN FOR GRADUATE STUDENTS.
- FLS 401 SPANISH FOR GRADUATE STUDENTS.

## Graduate School

The following registration categories may be used, when appropriate, by students in all graduate programs. Students registered in one of these categories are not permitted to register for any other courses during the same semester.

- GR 596S MASTER'S SUMMER RESEARCH.
- GR 597 MASTER'S EXAMINATION ONLY.
- GR 598 MASTER'S THESIS PREPARATION ONLY.
- GR 695 DOCTORAL PRELIMINARY EXAMINATION ONLY.
- GR 696S DOCTORAL SUMMER RESEARCH.
- GR 697 DOCTORAL DISSERTATION RESEARCH.
- GR 698 DOCTORAL DISSERTATION PREPARATION.

# Pest Management

## GRADUATE FACULTY

*Professors:* J. T. Ambrose, C. S. Apperson, R. C. Axtell, J. S. Bacheler, J. E. Bailey, M. K. Beute, J. R. Bradley Jr., R. L. Brandenburg, W. M. Brooks, R. I. Bruck, G. A. Carlson, H. D. Coble, F. T. Corbin, J. M. Davis, E. J. Dunphy, F. Gould, F. P. Hain, G. G. Kennedy, W. M. Lewis, H. M. Linker, L. D. King, J. R. Meyer, T. J. Monaco, M. M. Peet, D. P. Schmitt, W. A. Skroch, P. S. Southern, R. E. Stinner, T. B. Sutton, J. W. Van Duyn; *Professor (USDA):* R. A. Reinert; *Adjunct Professor:* J. J. Arends

The concept of integrated pest management (IPM) combines the theoretical and practical aspects of cultural, biological and chemical control into effective systems that maintain pest populations at levels that minimize economic and environmental damage. This approach and its implementation are opening new career opportunities for broadly informed individuals who understand the basic biology and ecology of pests and the systems with which they are associated.

Graduate study in integrated pest management draws upon faculty from several departments, especially plant pathology, entomology, crop science and horticultural Science. Each student's advisory committee must include a member of the IPM graduate faculty. Additional information may be obtained by contacting a member of the IPM Graduate Faculty or the Director, Office of Academic Programs, 115 Patterson Hall, Box 7642, North Carolina State University, Raleigh, North Carolina 27695-7642.

Students are advised to review course listings in such relevant departments as animal science, crop science, economics and business, entomology, horticultural science, plant pathology, soil science, the biomathematics program and the College of Forest Resources.

## Philosophy

### GRADUATE COURSES

- PHI(PSY) 525 INTRODUCTION TO COGNITIVE SCIENCE.
- PHI 588 ADVANCED TOPICS IN PHILOSOPHY.
- PHI 691 ADVANCED INDEPENDENT STUDY IN PHILOSOPHY.

# Plant Physiology

## GRADUATE FACULTY

*Visiting Professor* T. W. Rufty Jr., *Coordinator*

Box 7619, (919) 515-2644

*Professors:* W. F. Boss, R. S. Boston, W. S. Chilton, M. A. Conkling, F. T. Corbin, R. C. Fites, J. S. Huang, C. S. Levings III, M. M. Peet, D. M. Pharr, C. D. Raper Jr., E. C. Sisler, S. L. Spiker, W. F. Thompson, R. J. Volk; *Professors (USDA):* E. L. Fiscuc, S. C. Huber, D. W. Israel, R. F. Wilson; *Associate Professors:* H. V. Amerson, D. C. Bowman, S. D. Clouse, R. Wells; *Associate Professors (USDA):* K. O. Burkey, D. P. Livingston III, M. G. Redinbaugh *Assistant Professors:* G. P. Fenner, D. Robertson

The plant physiology program is an interdepartmental offering. Although not a formal degree program, students may elect to major or minor in the plant physiology program at both the M. S. and Ph.D. levels. Students entering the program should have appropriate knowledge in plant biology, chemistry, mathematics and physics. Some formal training in genetics, physical chemistry and statistics is normally expected.

When majoring in plant physiology, students will be closely affiliated with the same department as their major professor. As such, they will be required to meet respective departmental requirements for teaching, written and oral examinations, and seminar attendance. Departments currently participating in this program are: biochemistry, botany, crop science, forestry, genetics, horticultural science, plant pathology and soil science. The chair or co-chair of the student's advisory committee must be a member of the Plant Physiology Faculty.

The program is administered by the Plant Physiology Executive Committee. Additional information about the program may be obtained by writing to one of the listed faculty members or to the coordinator.

The purpose of the plant physiology curriculum is to ensure that students obtain substantive understanding of the physiological processes controlling plant behavior. The curriculum is composed of two groups of courses listed below. Requirements are subject to modification as the plant physiology discipline evolves and as new courses are developed.

### Group I (Required)

- BO 551 ADVANCED PLANT PHYSIOLOGY I
- BO 552 ADVANCED PLANT PHYSIOLOGY II
- BO 580 PLANT MOLECULAR BIOLOGY



**Group II** (At least two are required)

BO 590C TOPICAL PROBLEMS: PLANT CELL BIOLOGY  
BCH 553 METABOLISM AND MOLECULAR BIOLOGY  
BCH 601 MACROMOLECULAR STRUCTURE  
BCH 603 MACROMOLECULAR SYNTHESIS AND REGULATION  
BCH 605 MOLECULAR BIOLOGY OF THE CELL

## Political Science and Public Administration

*Professor M. S. Soroos, Head of the Department*

For listings of graduate faculty and information about the two programs, see the political science section and the public administration section.

## Solid State Sciences (Minor Program)

### GRADUATE FACULTY

*University Professor G. Lucovsky, Chair*

*Professors:* K. J. Bachmann, S. M. Bedair, J. Bernholc, R. F. Davis, R. E. Fornes, J. R. Hauser, J. J. Hren, M. A. Littlejohn, R. M. Kolbas, J. Narayan, R. J. Nemanich, M. A. Paesler, G. Rozgonyi, P. E. Russell, D. E. Sayers, J. F. Schetzina, A. F. Schreiner, E. O. Stejskal, M. H. Whangbo, J. J. Wortman

The university offers courses of study leading to a minor in solid state sciences as part of the M.S. and the Ph.D. degrees. This option is available to all graduate students pursuing research in the broad area of solid state science and requires that a member of the solid state sciences faculty serve on the student's research committee.

Solid state sciences is an interdisciplinary area of research that applies and extends concepts from the traditional academic disciplines of chemistry, electrical and computer engineering, materials science and engineering, and physics to basic and applied problems with a primary focus on solid state materials. At NC State, there are a significant number of such research programs that involve faculty and students in more than one of the academic departments listed above. This minor program can be customized to provide a course complement for these ongoing programs, as well as for any additional solid state materials research programs as they are initiated, developed and implemented.

To fulfill the academic requirements for a minor in solid state sciences, each master's student must successfully complete at least three, and each doctoral student, four of the courses in the solid states sciences curriculum. A partial listing of courses in this program includes: CH 501, 503 Advanced Inorganic Chemistry I, II; CH 531, 631

Chemical Thermodynamics I, II; CH 533 Chemical Kinetics; CH 537 Quantum Chemistry; ECE 530 Physical Electronics; ECE 539 Integrated Circuit Technology and Fabrication; ECE 623 Optical Properties of Semiconductors; ECE 624 Electronic Properties of Solid State Devices; ECE (PY) 627 Semiconductor Thin Films Technology; MAT 512 Scanning Electron Microscopy; MAT 515 Fundamentals of Transmission Electron Microscopy; MAT 560 Materials Science and Processing of Semiconductor Devices; MAT 595 Advanced Materials Experiments; MAT 612 Advanced Scanning Electron Microscopy and Surface Analysis; MAT 660 Defects, Diffusion and Ion Implantation in Semiconductors; MAT 692 Advanced Topics in Materials Science and Engineering; PY (ECE) 552, 553 Introduction to the Structure of Solids I, II. In addition, other courses (for example, special topics courses in any one of the participating departments) may also be substituted into an individual student's designated solid state sciences minor program at the discretion of his/her committee.

## Water Resources

### Minor Program

#### WATER RESOURCES COMMITTEE

J. D. Gregory, *Chair*

Box 8002, (919) 515-7567, E-mail: jim\_gregory@ncsu.edu

J. E. Parsons (Biological and Agricultural Engineering), J. M. Burkholder (Botany), M. R. Overcash (Chemical Engineering), W. S. Galler (Civil Engineering), J. B. Weber (Crop Science), R. B. Palmquist (Economics), F. P. Hain (Entomology), R. E. Carawan (Food Science), S. R. Raval (Landscape Architecture), D. G. Evans (Marine, Earth and Atmospheric Sciences), J. W. Gilliam (Soil Science), C. B. Smith (Textile Engineering, Chemistry and Science), T. W. Joyce (Wood and Paper Science), S. C. Mozley (Zoology)

The graduate minor in water resources is an interdisciplinary, interdepartmental minor that is designed to provide a specialization in water resources for students who are majoring in the many disciplines of natural resources, engineering, technology and social sciences that are related to or involve water management. The ever-increasing demands of good water management in all elements of our society continue the need for well-trained professionals in water resources. Such professionals should have a strong grounding in a major discipline coupled with a broad understanding of and appreciation for the complex physical, biological, and social aspects of water resources management. The graduate minor in water resources will expose students to several different courses and faculty members in water resources that are outside his/her major field of study.

A graduate student may enroll in the water resources minor by including it on the plan of graduate work. A graduate faculty member from outside the student's major department or program must be appointed to serve as the minor representative on his/her advisory committee. The minor representative may be a member of the Water Resources Committee or another faculty member from a department represented on the Water Resources Committee who is active in teaching/research related to water resources. The minimum course requirements for a graduate minor in water resources are described below.

*Master's Degree* --Three courses (minimum of eight credit hours) from water resources areas outside the student's major field of study approved by the student's minor representative. *Doctor of Philosophy Degree* --Three courses (minimum of eight credit hours) from water resources areas outside the student's major field of study approved by the student's minor representative. These courses shall be in addition to those previously taken at the master's level when that degree included a water resources minor. Recommended Course--A course in the legal, institutional, or economic aspects of water resources recommended for each minor program.

A water resources minor will normally be composed of courses from the list below. The student may select one or more courses from several subject areas or concentrate all courses in one area. Other courses that are water resources-oriented may be included when approved by the student's minor representative. Such courses may be: (1) Other NC State University courses; (2) Transfer courses from other institutions; (3) Courses taken through Interinstitutional Registration at Duke University and the University of North Carolina at Chapel Hill. Additional information on appropriate courses may be obtained from any member of the Water Resources Committee.

Requests for information on water resources-oriented graduate programs should be directed to the departments represented on the Water Resources Committee. For additional information on the water resources minor, contact the chair of the committee.

## WATER RESOURCES COURSES

### *Legal, Institutional and Economic Aspects of Water Resources*

FOR 472 RENEWABLE RESOURCE POLICY AND MANAGEMENT  
EC 436 ENVIRONMENTAL ECONOMICS  
ECG 515 ENVIRONMENTAL AND RESOURCE POLICY  
PA 520 ENVIRONMENTAL POLICY

### *Planning of Water Resources and Related Systems*

CE 504 WATER TRANSPORTATION  
CE 575 MODELING & ANALYSIS OF ENVIRONMENTAL SYSTEMS  
FOR 584 THE PRACTICE OF ENVIRONMENTAL IMPACT ASSESSMENT  
LAR 512 LANDSCAPE RESOURCE MANAGEMENT  
LAR 530 ADVANCED SITE PLANNING

*Municipal and Industrial Water Management*

CE 484 WATER SUPPLY AND WASTEWATER SYSTEMS  
CE 571 THEORY OF WATER AND WASTE TREATMENT  
CE 572 DESIGN OF WATER AND WASTEWATER FACILITIES  
CHE 598 WASTE MINIMIZATION  
T(TC,TAM) 401 ENVIRONMENTAL ASPECTS OF THE TEXTILE INDUSTRY  
WPS 460 ENVIRONMENTAL ISSUES IN THE PAPER INDUSTRY  
WPS 525 POLLUTION ABATEMENT IN FOREST PRODUCTS INDUSTRIES  
WPS 625 WASTEWATER TREAT. PAPER INDUSTRY

*Agricultural and Forest Water Management*

BAE 471 LAND RESOURCES ENVIRON. ENGINEERING  
BAE 472/572 IRRIGATION AND DRAINAGE  
BAE 578 AGRICULTURAL WASTE MANAGEMENT  
FOR 401 WATERSHED AND WETLANDS HYDROLOGY  
SSC 461 SOIL PHYSICAL PROPERTIES AND PLANT GROWTH  
SSC 511 SOIL PHYSICS  
SSC 562 ENVIRONMENTAL APPLICATION OF SOIL SCIENCE

*Biological and Ecological Aspects of Water Resources*

BO(ZO) 560 PRINCIPLES OF ECOLOGY  
BO 574 PHYCOLOGY  
BO 590F THE ECOLOGY OF FRESHWATER PLANTS  
MEA(ZO) 520 PRINCIPLES OF BIOLOGICAL OCEANOGRAPHY  
ZO 441 BIOLOGY OF FISHES  
ZO(FW) 420 FISHERY SCIENCE  
ZO 460 AQUATIC NATURAL HISTORY LABORATORY  
ZO (ENT) 509 ECOLOGY OF STREAM INVERTEBRATES  
ZO 519 LIMNOLOGY  
ZO (FW) 586 AQUACULTURE I  
ZO (FW) 587 AQUACULTURE I LABORATORY  
ZO 593 AQUATIC ECOLOGY SEMINAR

*Hydrologic, Meteorologic, Oceanographic, and Water Quality Aspects of Water Resources*

BAE 473 INTRODUCTION TO SURFACE/WATER QUALITY MODEL  
BAE(SSC) 671 THEORY OF DRAINAGE--SATURATED FLOW  
BAE(SSC) 674 THEORY OF DRAINAGE--UNSATURATED FLOW  
CE 574 CHEMISTRY AND MICROBIOLOGY FOR ENGINEERS I  
CE 580 FLOW IN OPEN CHANNELS  
CE 582 COASTAL HYDRODYNAMICS  
CE 583 ENGINEERING ASPECTS OF COASTAL PROCESSES  
CE 584 HYDRAULICS OF GROUNDWATER  
CE 585 URBAN STORMWATER MANAGEMENT  
CE 586 ENGINEERING HYDROLOGY  
CE 644 GROUND WATER CONTAMINANT TRANSPORT  
FOR 501 WATERSHED HYDROLOGY  
MEA 455 MICROMETEOROLOGY  
MEA 481 PRINCIPLES OF GEOMORPHOLOGY  
MEA 555 METEOROLOGY OF THE BIOSPHERE  
MEA 560 PRINCIPLES OF PHYSICAL OCEANOGRAPHY  
MEA 561 INTRODUCTION TO PHYSICAL OCEANOGRAPHY  
MEA 565 HYDROGEOLOGY  
MEA 566 HYDROGEOLOGY OF GROUNDWATER POLLUTION AND PROTECTION  
MEA 569 THE PHYSICAL DYNAMICS OF ESTUARIES  
MEA 571 PRINCIPLES OF CHEMICAL OCEANOGRAPHY  
MEA 574 BIOGEOCHEMISTRY



# GRADUATE FACULTY\*

- Abbate, Angelo Rudy, M.L.A., Professor of Landscape Architecture.  
Abrams, Charlie Frank, Jr., Ph.D., Professor of Biological and Agricultural Engineering.  
Abt, Robert C., Ph.D., Associate Professor of Forestry.  
Adams, David Arthur, Ph.D., Professor Emeritus of Forestry.  
Adams, Dewey Allen, Ed.D., Professor of Mathematics and Science Education.  
Adams, John Peter, Ph.D., Adjunct Professor of Food Science.  
Adams, William M., V.M.D., Professor Emeritus of Veterinary Medicine.  
Ade, Harald, Ph.D., Assistant Professor of Physics.  
Adler, Kenneth B., Ph.D., Professor of Anatomy, Physiological Sciences and Radiology and Toxicology.  
Afify, Elsayed M., Ph.D., Professor of Mechanical and Aerospace Engineering.  
Agrawal, Anup, Ph.D., Associate Professor of Business Management.  
Agrawal, Dharma Prakash, D.Sc., Professor of Electrical and Computer Engineering.  
Agris, Paul F., Ph.D., Professor of Biochemistry.  
Ahmad, Shuaib Haroon, Ph.D., Professor of Civil Engineering.  
Akroyd, H. Duane, Ph.D., Associate Professor of Adult and Community College Education.  
Alder, Ruth M. Ayend, Ph.D., Associate Professor of Foreign Languages and Literatures.  
Alexander, Samuel Thomas, Ph.D., Associate Professor of Electrical and Computer Engineering.  
Alexander, Winser E., Ph.D., Professor of Electrical and Computer Engineering.  
Allen, Howard Lee, Jr., Ph.D., Professor of Forestry.  
Allen, Janice Benson, Ph.D., Visiting Assistant Professor of Anatomy, Physiology, and Radiology.  
Allen, Jonathan C., Ph.D., Associate Professor of Food Science.  
Allen, Nina Stromgren, Ph.D., Professor of Botany.  
Allen, Steven G., Ph.D., Professor of Business Management.  
Almond, Glen W., Ph.D., Associate Professor of Food Animal and Equine Medicine.  
Alonso, Silvia Gonzalez-Quevedo, Ph.D., Associate Professor of Foreign Languages and Literatures.  
Alston-Mills, Brenda P., Ph.D., Associate Professor of Animal Science.  
Alvarez, Raul, Professor Emeritus of Industrial Engineering.  
Ambrose, John Thomas, Ph.D., Professor of Entomology.  
Amein, Michael, Professor Emeritus of Civil Engineering.  
Amerson, Henry Van, Ph.D., Associate Professor of Forestry.  
Amiran, Eyal Yosef, Ph.D., Assistant Professor of English.  
Amoozegar, Aziz, Ph.D., Professor of Soil Science.  
Anderson, Charles Eugene, Ph.D., Professor Emeritus of Botany.  
Anderson, Clifton A., Ph.D., Professor Emeritus of Industrial Engineering.  
Anderson, James Alan, Ph.D., Professor of Counselor Education.  
Anderson, John R., Jr., Ph.D., Professor of Crop Science.  
Anderson, Kenneth E., Ph.D., Assistant Professor of Poultry Science.  
Anderson, Kevin Lindsay, Ph.D., Professor of Food Animal and Equine Medicine.  
Anderson, Marshall W., Ph.D., Adjunct Professor of Statistics.  
Anderson, Norman Dean, Ph.D., Professor Emeritus of Mathematics and Science Education.  
Anderson, Ruth D., Ph.D., Associate Professor of Communication.  
Andrews, Matthew T., Ph.D., Associate Professor of Genetics.  
Aneja, Viney P., Ph.D., Research Professor of Marine, Earth and Atmospheric Sciences.

\* Membership in the Graduate Faculty may be in either of two categories: (1) full status or (2) associate status. Full status permits a faculty member to engage in any and all phases of the graduate programs of the University. Associate members may teach courses at the graduate level and serve as chair of master's advisory committees.

Anholt, Robert Rene Henri, Ph.D., Research Associate Professor of Zoology.

Apperson, Charles Smith, Ph.D., Professor of Entomology.

Apple, Jay Lawrence, Ph.D., Professor Emeritus of Plant Pathology

Arasu, Prema, Ph.D., Assistant Professor of Microbiology, Pathology, and Parasitology.

Archie, Joseph Patrick, Jr., Ph.D., Adjunct Professor of Mechanical and Aerospace Engineering.

Arends, James Jay, Ph.D., Adjunct Professor of Entomology.

Argenzio, Robert Alan, Ph.D., Professor of Anatomy, Physiology, and Radiology.

Armstrong, Frank Bradley, Ph.D., Professor Emeritus of Biochemistry.

Armstrong, Jeffrey Dyer, Ph.D., Associate Professor of Animal Science.

Arnold, John F., Ph.D., Associate Professor of Curriculum and Instruction.

Aronson, Arthur L., Ph.D., Professor of Anatomy, Physiology, and Radiology.

Arya, Satya Pal Singh, Ph.D., Professor of Marine, Earth and Atmospheric Sciences.

Ash, Sarah Liberman, Ph.D., Visiting Assistant Professor of Animal Science.

Aspnes, David E., Ph.D., Professor of Physics.

Atchley, William R., Ph.D., William Neal Reynolds Professor of Genetics.

Atkins, Clarke E., D.V.M., Associate Professor of Companion Animal and Special Species Medicine.

Atkinson, Maxine P., Ph.D., Associate Professor of Sociology and Anthropology.

Attarian, Aram, Ph.D., Associate Professor of Parks, Recreation and Tourism Management.

Aubrecht, Lyn G., Ph.D., Visiting Assistant Professor of Curriculum and Instruction.

Auciello, Orlando, Adjunct Professor of Materials Science and Engineering.

Aurand, Leonard William, Ph.D., Professor Emeritus of Food Science.

Austin, David F., Ph.D., Associate Professor of Philosophy and Religion.

Austin, William Wyatt, Jr., Ph.D., Professor Emeritus of Materials Science and Engineering.

Averre, Charles Wilson, III, Ph.D., Professor Emeritus of Plant Pathology.

Avva, Vishnu S., Ph.D., Interinstitutional Adjunct Graduate Faculty in Mechanical and Aerospace Engineering.

Axtell, Richard Charles, Ph.D., Professor of Entomology.

Aycock, Robert, Ph.D., Professor Emeritus of Plant Pathology.

Ayoub, Mahmoud Amin, Ph.D., Professor of Industrial Engineering.

Azmy, Yousry R., Ph.D., Adjunct Associate Professor of Nuclear Engineering.

Bacheler, Jack S., Ph.D., Professor of Entomology.

Bachmann, Klaus Jurgen, Ph.D., Professor of Materials Science and Engineering.

Bahler, Dennis R., Ph.D., Associate Professor of Computer Science.

Bai, Stephen A., Ph.D., Associate Professor of Anatomy, Physiology, and Radiology.

Bailey, Douglas A., Ph.D., Associate Professor of Horticultural Science.

Bailey, Jack Eugene, Ph.D., Professor of Plant Pathology.

Bailey, John Albert, Ph.D., Professor of Mechanical and Aerospace Engineering.

Bailey, Kermit Lavon, M.P.D., Assistant Professor of Graphic Design.

Baines, Barbara Joan, Ph.D., Professor of English.

Baird, Jack Vernon, Ph.D., Professor Emeritus of Soil Science.

Baker, George A., III, Ed.D., Joseph D. Moore Distinguished Professor of Adult and Community College Education.

Baker, James Robert, Ph.D., Professor of Entomology.

Baker, Stanley B., Ph.D., Professor of Counselor Education.

Baker-Ward, Lynne Elizabeth, Ph.D., Associate Professor of Psychology.

Bakst, Murray R., Ph.D., Adjunct Professor of Poultry Science.

Baliga, B. Jayant, Ph.D., Professor of Electrical and Computer Engineering.

Balik, Charles Maurice, Ph.D., Associate Professor of Materials Science and Engineering.

Ball, David Stafford, Ph.D., Associate Professor of Business Management.

Ball, Hershell Ray, Jr., Ph.D., Professor Emeritus of Food Science.

Ballinger, Walter Elmer, Ph.D., Professor Emeritus of Horticultural Science.

Ballington, James Ralph, Jr., Ph.D., Professor of Horticultural Science.  
 Banker, James Roderick, Ph.D., Professor of History.  
 Banks, Harvey Thomas, Ph.D., Drexel Professor and University Professor of Mathematics.  
 Banks-Lee, Pamela, Ph.D., Associate Professor of Textile and Apparel Management.  
 Baran, Mesut Ethem, Ph.D., Assistant Professor of Electrical and Computer Engineering.  
 Barbercheck, Mary E., Ph.D., Assistant Professor of Entomology.  
 Barclay, William John, Ph.D., Professor Emeritus of Electrical and Computer Engineering.  
 Barefoot, Aldos Cortez, Jr., D.F., Professor Emeritus of Liberal Studies.  
 Barker, James Cathey, Ph.D., Professor of Biological and Agricultural Engineering.  
 Barker, Kenneth Reece, Ph.D., Professor of Plant Pathology.  
 Barker, Roger Lee, Ph.D., Professor of Textile Engineering, Chemistry, and Science.  
 Barkley, Key Lee, Ph.D., Professor Emeritus of Psychology.  
 Barlaz, Morton A., Ph.D., Associate Professor of Civil Engineering.  
 Barnes, Donald Warren, Jr., Ph.D., Associate Professor Emeritus of Architecture.  
 Barnes, Harold John, Ph.D., Professor of Food Animal and Equine Medicine.  
 Barnett, Ortus Webb, Jr., Ph.D., Professor of Plant Pathology.  
 Barnhardt, Robert Alexander, Ed.D., Professor of Textile and Apparel Management.  
 Barr, Steve H., Ph.D., Associate Professor of Business Management.  
 Barrax, Gerald W., M.A., Professor of English.  
 Barrick, Elliott Ray, Ph.D., Professor Emeritus of Animal Science.  
 Bartelt, Dana A., M.P.D., Adjunct Assistant Professor of Landscape Architecture.  
 Barthalmus, George Timothy, Ph.D., Professor of Zoology.  
 Bartholomew, William Victor, Ph.D., Professor Emeritus of Soil Science.  
 Bartley, Jon W., Ph.D., Professor of Accounting.  
 Batchelor, Peter, M.C.P., Professor of Architecture.  
 Bateman, Durward F., Ph.D., Professor of Plant Pathology.  
 Batra, Subhash K., Ph.D., Professor of Textile Engineering, Chemistry, and Science.  
 Batte, Edward Guy, D.V.M., Professor Emeritus of Microbiology, Pathology, and Parasitology.  
 Baugh, John Wesley, Jr., Ph.D., Associate Professor of Civil Engineering.  
 Baughman, Gerald Robert, Ph.D., Associate Professor of Biological and Agricultural Engineering.  
 Baum, Gary A., Ph.D., Professor of Wood and Paper Science.  
 Baumer, David L., Ph.D., Associate Professor of Business Management.  
 Bayoumi, Abdel E., Ph.D., Professor of Mechanical and Aerospace Engineering.  
 Beasley, David Beach, Ph.D., Professor of Biological and Agricultural Engineering.  
 Beasley, Mark S., Ph.D., Assistant Professor of Accounting.  
 Beck, Keith R., Ph.D., Professor of Textile Engineering, Chemistry, and Science.  
 Beckmann, Robert L., Ph.D., Associate Professor of Botany.  
 Bedair, Salah Mohamed, Ph.D., Professor of Electrical and Computer Engineering.  
 Beers, Burton Floyd, Ph.D., Professor of History.  
 Beezer, Bruce Gerald, Ed.D., Professor of Educational Leadership and Program Evaluation.  
 Beghin, John Christopher, Ph.D., Associate Professor of Agricultural and Resource Economics.  
 Behlow, Robert Frank, D.V.M., Professor Emeritus of Animal Science.  
 Behnke, Wallace P., B.S., Adjunct Associate Professor of Textile Engineering, Chemistry, and Science.  
 Beichner, Robert, Ph.D., Assistant Professor of Physics.  
 Beith, Barry H., Ph.D., Adjunct Assistant Professor of Psychology.  
 Bell, Thomas Alexander, M.S., Professor Emeritus of Food Science.  
 Benson, David Michael, Ph.D., Professor of Plant Pathology.  
 Benson, Geoffrey Alan, Ph.D., Associate Professor of Agricultural and Resource Economics.  
 Benson, Ray Braman, Jr., Ph.D., Professor of Materials Science and Engineering.  
 Bentley, Peter John, Ph.D., Professor Emeritus of Anatomy, Physiology, and Radiology.  
 Bereman, Robert Deane, Ph.D., Professor of Chemistry.



Berenson, Sarah Burke, Ph.D., Associate Professor of Mathematics and Science Education.  
 Berger, Roger L., Ph.D., Professor of Statistica.  
 Berger, Vicki L., Ph.D., Adjunct Assistant Professor of History.  
 Bergmann, Ben A., Ph.D., Visiting Assistant Professor of Forestry.  
 Berkhoff, Herman A., Ph.D., Professor Emeritus of Microbiology, Pathology, and Parasitology.  
 Berkstresser, Gordon Abbott, III, Ph.D., Professor of Textile and Apparel Management.  
 Bernhard, Richard Harold, Ph.D., Professor of Industrial Engineering.  
 Bernholc, Jerzy, Ph.D., Professor of Physica.  
 Bernold, Leonhard E., Ph.D., Associate Professor of Civil Engineering.  
 Berry, Clifford R., D.V.M., Assistant Professor of Anatomy, Physiology, and Radiology.  
 Berschneider, Helen M., D.V.M., Associate Professor of Anatomy, Physiology, and Radiology.  
 Betts, Leonidas Judd, Jr., Ed.D., Associate Professor of English.  
 Beute, Marvin Kenneth, Ph.D., Professor of Plant Pathology.  
 Bevier, Diane E., D.V.M., Assistant Professor of Companion Animal and Special Species Medicine.  
 Bevis, Michael Graeme, Ph.D., Adjunct Associate Professor of Marine, Earth and Atmospheric Sciences.  
 Bhattacharyya, Bibhuti Bhushan, Ph.D., Graduate Alumni Distinguished Professor of Statistics.  
 Bilbro, Griff Luhrs, Ph.D., Associate Professor of Electrical and Computer Engineering.  
 Bilderback, Theodore Eugene, Ph.D., Professor of Horticultural Science.  
 Bilenkin, Vladimir, Ph.D., Assistant Professor of Foreign Languages and Literatures.  
 Bingham, Marcia Y., Ph.D., Assistant Professor of Psychology.  
 Bingham, William Louis, Ph.D., Associate Professor of Civil Engineering.  
 Bireline, George Lee, M.A., Professor Emeritus of Design.  
 Bishir, John William, Ph.D., Professor of Mathematics.  
 Bishop, Paul Edward, Ph.D., Professor (USDA) of Microbiology.  
 Bitting, Paul F., Ph.D., Assistant Professor of Adult and Community College Education.  
 Bitzer, Donald Lester, Ph.D., Distinguished University Research Professor of Computer Science.  
 Bizios, Georgia, M.Arch., Professor of Architecture.  
 Black, Betty Lynne, Ph.D., Associate Professor of Zoology.  
 Blair, Neal Edward, Ph.D., Associate Professor of Marine, Earth and Atmospheric Sciences.  
 Blake, Carl Thomas, Ph.D., Professor Emeritus of Crop Science.  
 Blanchard, Susan Manning, Ph.D., Associate Professor of Biological and Agricultural Engineering.  
 Bland, George F., M.S., Associate Professor Emeritus of Electrical and Computer Engineering.  
 Blank, Gary B., Ph.D., Assistant Professor of Forestry.  
 Blank, Philip Everett, Jr., Ph.D., Professor Emeritus of English.  
 Blankenship, Sylvia M., Ph.D., Professor of Horticultural Science.  
 Blauvelt, Andrew K., M.F.A., Associate Professor of Graphic Design.  
 Blazich, Frank Arthur, Ph.D., Professor of Horticultural Science.  
 Block, William Joseph, Ph.D., Professor Emeritus of Political Science and Public Administration.  
 Blondin, John M., Ph.D., Assistant Professor of Physica.  
 Bloomfield, Peter, Ph.D., Professor of Statistics.  
 Blum, Udo, Ph.D., Professor of Botany.  
 Blumer, Thomas Nelson, Ph.D., Professor Emeritus of Food Science.  
 Bogdan, John Francis, B.T., Professor Emeritus of Textile Engineering, Chemistry, and Science.  
 Boles, Michael A., Ph.D., Associate Professor of Mechanical and Aerospace Engineering.  
 Bond, James Anthony, Ph.D., Adjunct Professor of Toxicology.  
 Bonham, Julia C., Ph.D., Visiting Assistant Professor of History.  
 Boone, Edgar John, Ph.D., Professor of Adult and Community College Education.  
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Williams, Gareth, Ph.D., Assistant Professor of Foreign Languages and Literatures.

Williams, James Oliver, Ph.D., Professor of Political Science and Public Administration.

Williams, Joel Lawson, Ph.D., Adjunct Associate Professor of Chemical Engineering.

Williams, Mary Cameron, Ph.D., Professor Emeritus of English.

Williams, Paul F., Ph.D., Professor of Accounting.

Williams, Porter Jr., M.A., Professor Emeritus of English.

Williams, Robert T., Ed.D., Lecturer of Educational Leadership and Program Evaluation.

Williamson, James Claude, Jr., M.S., Professor Emeritus of Agricultural and Resource Economics.

Williamson, John D., Ph.D., Research Assistant Professor of Horticultural Science.

Williamson, Norman Francis, Ph.D., Assistant Professor Emeritus of Computer Science.

Willis, William Edward, Jr., Ph.D., Lecturer and Associate Provost for Academic Computing.

Willits, Daniel Hoover, Ph.D., Professor of Biological and Agricultural Engineering.

Wilson, Arthur L., Ed.D., Assistant Professor of Adult and Community College Education.

Wilson, Beth Evelyn, Ph.D., Associate Professor of Parks, Recreation and Tourism Management.

Wilson, Jack W., Ph.D., Professor of Liberal Studies.

Wilson, James Reed, Ph.D., Professor of Industrial Engineering.

Wilson, Lorenzo George, Ph.D., Professor of Horticultural Science.

Wilson, Mark Alan, Ph.D., Associate Professor of Psychology.

Wilson, Richard Ferrol, Ph.D., Professor (USDA) of Crop Science.

Wimberley, Ronald Coleman, Ph.D., Professor of Sociology and Anthropology.

Winchester, Samuel C., Jr., Ph.D., Klopman Distinguished Professor of Textile and Apparel Management.

Wineland, Michael J., Ph.D., Professor of Poultry Science.

Winstead, Nash Nicks, Ph.D., Professor Emeritus of Plant Pathology.

Winston, Hubert Melvin, Ph.D., Associate Professor of Chemical Engineering.

Wise, Farrell C., Ph.D., Adjunct Assistant Professor of Horticultural Science.

Wise, George Herman, Ph.D., Professor Emeritus of Animal Science.

Wiser, Edward Hempstead, Ph.D., Professor Emeritus of Biological and Agricultural Engineering.

Wishy, Bernard W., Ph.D., Professor Emeritus of History.

Witt, Mary Ann, Frese, Ph.D., Professor of Foreign Languages and Literatures.

Wogalter, Michael S., Ph.D., Associate Professor of Psychology.

Wohlgenant, Michael K., Ph.D., Professor of Agricultural and Resource Economics.

Wolcott, Donna Lee, Ph.D., Visiting Associate Professor of Marine, Earth and Atmospheric Sciences.

Wolcott, Thomas G., Ph.D., Professor of Marine, Earth and Atmospheric Sciences.

Wolfram, Walter Andrew, Ph.D., William C. Friday Distinguished Professor of English.

Wollenzien, Paul L., Ph.D., Associate Professor of Biochemistry.



Wollum, Arthur George, II, Ph.D., Professor of Soil Science.  
Wood, Denis, Ph.D., Professor of Landscape Architecture.  
Woodburn, James, D.Eng., Professor Emeritus of Mechanical and Aerospace Engineering.  
Woodman, James Nelson, Ph.D., Adjunct Associate Professor of Forestry.  
Woodrum, Eric M., Ph.D., Professor of Sociology and Anthropology.  
Worsham, Arch Douglas, Ph.D., Professor Emerita of Crop Science.  
Wortman, Jimmie Jack, Ph.D., Professor of Electrical and Computer Engineering.  
Wright, Charles Gerald, Ph.D., Professor Emeritus of Entomology.  
Wu, Jy S., Ph.D., Interinstitutional Adjunct Graduate Faculty Member in Civil Engineering .  
Wu, Shyhtsun Felix, Ph.D., Assistant Professor of Computer Science.  
Wynne, Johnny Calvin, Ph.D., Professor of Crop Science.  
Wyrick, Deborah Baker, Ph.D., Associate Professor of English.  
Xie, Lian, Ph.D., Visiting Assistant Professor of Marine, Earth and Atmospheric Sciences.  
Xu, Xiaoli, Ph.D., Visiting Assistant Professor of Electrical and Computer Engineering.  
Yelverton, Fred Hinnant, Ph.D., Assistant Professor of Crop Science.  
Yim, Man-Sung, Ph.D., Assistant Professor of Nuclear Engineering.  
York, Alan Clarence, Ph.D., Professor of Crop Science.  
Young, Clyde Thomas, Ph.D., Professor of Food Science.  
Young, Eric, Ph.D., Professor of Horticultural Science.  
Young, Gregory S., Ph.D., Assistant Professor of Business Management.  
Young, James Herbert, Ph.D., Professor of Biological and Agricultural Engineering.  
Young, James Neal, Ph.D., Professor Emeritus of Sociology and Anthropology.  
Young, Robert E., Ph.D., Associate Professor of Industrial Engineering.  
Young, Robert Vaughan, Jr., Ph.D., Professor of English.  
Yuan, Fuh-Gwo, Ph.D., Associate Professor of Mechanical and Aerospace Engineering.  
Zaghloul, Atef O., Ph.D., Adjunct Assistant Professor of Computer Science.  
Zahn, Margaret A., Ph.D., Professor of Sociology and Anthropology.  
Zeiger, Donald Carl, Ph.D., Associate Professor Emeritus of Horticultural Science.  
Zeng, Shaobang, Ph.D., Research Associate Professor of Statistics.  
Zering, Kelly Douglas, Ph.D., Associate Professor of Agricultural and Resource Economics.  
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Zikry, Mohammed A., Ph.D., Assistant Professor of Mechanical and Aerospace Engineering.  
Zimmer, Catherine Roberts, Ph.D., Associate Professor of Sociology and Anthropology.  
Zingraff, Matthew Thomas, Ph.D., Professor of Sociology and Anthropology.  
Zobel, Bruce John, Ph.D., Professor Emeritus of Forestry.  
Zondermann, David A., Ph.D., Associate Professor of History.  
Zorner, Paul Steffen, Ph.D., Adjunct Associate Professor of Horticultural Science.  
Zorowski, Carl Frank, Ph.D., R. J. Reynolds Industries Professor of Mechanical and Aerospace Engineering.  
Zublena, Joseph P., Ph.D., Professor of Soil Science.  
Zuckerman, Gilroy Joel, Ph.D., Associate Professor of Accounting.  
Zumwalt, Lloyd Robert, Ph.D., Professor Emeritus of Nuclear Engineering.

# The University of North Carolina

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# 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. North Carolina State University is one of 16 constituent institutions of 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 for 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.

## Historical Sketch of North Carolina State University

On March 7, 1887, the North Carolina General Assembly passed the act which authorized the establishment of the North Carolina College of Agriculture and Mechanic Arts. The Watauga Club of Raleigh and the statewide farmers' movement had convinced the legislature of the need to transfer the funds received by the state under the provisions of the Morrill Land-Grant Act of 1862 from the University of North Carolina in Chapel Hill to a new land-grant college in Raleigh. The cornerstone of A. and M. College was laid in August, 1888, and its doors were officially opened on October 3, 1889.

**Alexander Q. Holladay**, the college's first president (1889-1899), and a faculty of five offered courses in agriculture, horticulture, pure and agricultural chemistry, English, bookkeeping, history, mathematics, physics, practical mechanics and military science. The first freshman class numbered about fifty students. By the end of the institution's first decade the resident enrollment had reached 300.

During the administration of **George T. Winston** (1899-1908) a new curriculum in textiles was developed and normal courses were offered in the summer for public school teachers, both men and women. The Agricultural Extension Service was established during the administration of **Daniel H. Hill** (1908-1916) and enrollment grew to more than 700. In 1917, during the administration of **Wallace C. Riddick** (1916-1923), the institution's name was changed to North Carolina State College of Agriculture and Engineering. The introduction of the word engineering was intended to reflect the increasing emphasis on the professional and theoretical as well as the practical aspects of technical education.

In 1923 a major reorganization of the administration of the college was begun, and President Riddick resigned to become the first dean of the new School of Engineering. **Eugene Clyde Brooks** (1923-1934), the fifth president of State College, continued the reorganization with the creation of the School of Agriculture (later renamed the School of Agriculture and Forestry), the School of Science and Business, the School of Education, the School of Textiles and the Graduate School. Resident enrollment rose to nearly 2,000 in 1929 before the Depression caused a drop to approximately 1,500 in 1933. The first women graduates of State College received their degrees in 1927.

In the midst of the Depression, the General Assembly of 1931 attempted to promote economy and to prevent unnecessary duplication among the three leading state institutions of higher education by establishing a single consolidated administration for the University of North Carolina in Chapel Hill, North Carolina State College of Agriculture and Engineering, and North Carolina College for Women in Greensboro. Dr. Frank Porter Graham, president of the University of North Carolina, was elected president of the consolidated university, and Dr. Brooks, with the title of vice president, continued as chief administrative officer at State College. Among the consequences of consolidation were the phasing out of the School of



Engineering at Chapel Hill and the School of Science and Business at Raleigh. A general college, later called the Basic Division, was established to provide two years of basic courses in humanities, social sciences and natural sciences as a foundation for students in the various degree-granting technical and professional schools.

Colonel **John W. Harrelson** (1934-1953), Class of 1909, was the first alumnus to become administrative head of State College. Under the consolidated organization his title was Dean of Administration; later it was changed to Chancellor. During Harrelson's administration the institution experienced the beginning of extraordinary growth in the aftermath of World War II. Two new schools were established: the School of Design and the School of Forestry. A multi-million dollar expansion program was completed during the administration of **Carey H. Bostian** (1953-1959), and the program of student activities was greatly enlarged, as the enrollment passed 5,000.

The faculty and student population more than doubled during the administration of **John T. Caldwell** (1959-1975) and another new school was organized: the School of Physical Sciences and Applied Mathematics (now Physical and Mathematical Sciences). The School of General Studies, the successor to the Basic Division, was renamed the School of Liberal Arts and was authorized to offer a full range of bachelor's and master's degree programs in the humanities and social sciences. The name of the institution itself was changed in 1965 to North Carolina State University, signifying its new role as a comprehensive university.

NCSU's enrollment passed 20,000 during the administration of Chancellor **Joab L. Thomas** (1976-1981). The School of Veterinary Medicine was established, the name of the School of Liberal Arts was changed to School of Humanities and Social Sciences, and North Carolina State University was recognized as one of two major research universities within the statewide University of North Carolina.

**Bruce R. Poulton** (1982-1990) became chancellor in the fall of 1982. A major expansion of the University's research budget, the establishment of a substantial endowment to provide enlarged resources for research equipment and endowed professorships, and the addition of the 1,000-acre Centennial Campus occurred during this administration. All of the schools were renamed colleges except for the School of Design and The Graduate School. In addition, the School of Education became the College of Education and Psychology.

In 1990 **Larry K. Monteith**, an alumnus and former Dean of the College of Engineering, became chancellor and NCSU's eleventh chief administrative officer. Among his early initiatives were the creation of the Division of Undergraduate Studies and the First Year Experience Program. The College of Textiles and ABB (Asea Brown Boveri), NCSU's first corporate partner, moved to Centennial Campus in 1991. In 1992, the College of Management was established.

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## Mission of North Carolina State University

The unique mission of North Carolina State University is to serve the citizens of North Carolina as the State's only research university in the land-grant tradition. Since its founding in 1887, NCSU has been committed to science and technology as pathways to human betterment and has served as an innovative educational resource, providing leadership for positive intellectual, social, and technological change. Faithful to its founding mission, the University must now meet the challenges posed by the increasing complexity of our global society and the accelerated growth in knowledge and technology. At the same time, it must continually address the effects of these developments on the environment and on the social and economic well-being of the people of North Carolina, the nation, and the world. Spurred by these new challenges, NCSU will continue to fulfill its mission through the integrated functions of teaching, research, and extension, its unique form of public service.

Teaching, research, and public service will continue to be mutually enriching enterprises at NCSU. The activities of research and extension interact to provide students with an environment for learning that stresses creativity, problem solving, social responsibility, and respect for human diversity. The educational and extension functions join to apply, test, and disseminate the new knowledge generated by research.

During the University's first hundred years, its distinctive mandate has led to preeminence in science, technology, and engineering. This mandate will continue to shape future development, necessitating excellence in the full spectrum of disciplines that provide the intellectual and critical foundations for understanding, anticipating, and responding to public needs.

Undergraduate education is a major responsibility of North Carolina State University. Core education is provided in science and the humanities, with specializations offered in physical, social, and life sciences, in the humanities, and in professional and technical disciplines. The

atmosphere of a research university provides distinctive opportunities for undergraduates to benefit from the experience of research in the classroom, laboratory, and informal settings. Exposure to the discovery and synthesis of new information provides students with a basis for identifying and solving society's problems and builds a critical foundation for their personal growth, cultural enrichment, and professional development.

As a national center for doctoral studies, NCSU embraces the responsibility to maintain excellence in graduate research and education. Students work as partners with faculty in the creation, expansion, conservation, and transmission of knowledge. Graduate education will continue to evolve as the University builds on its traditional and preeminent strengths in science, technology, and engineering and as it develops further strengths in complementary disciplines.

Research and scholarly inquiry form the foundation for education and public service at NCSU. Faculty and students in all disciplines engage in the art and science of discovery in a climate of free inquiry and creativity, extending the boundaries of knowledge and horizons of human intellect. The research mandate of NCSU is signified in its national classification as a Research University I.

The University's land-grant philosophy is manifest in its commitment to active stewardship of the human and natural resources of the State. NCSU has been an integral part of significant economic and technological changes in North Carolina for the past one hundred years. This stewardship is expressed currently through public service activities in all the University's colleges and schools, whereby the expertise resident among the faculty and students is disseminated across the State through extension, technical assistance, professional development, lifelong education, and technology transfer programs. Loyal to the vision of its founders in the nineteenth century, NCSU will continue to strive through extension and public service to improve the quality of life for North Carolinians into the twenty-first century.

NCSU's dual designations as land-grant university and a Research University I form the basis for the unique role of NCSU in The University of North Carolina. North Carolina State University stands on the threshold of a new century with deep appreciation for the significance of these mandates and the commitment to excellence and change that they jointly require.

### **Accreditation by the Southern Association of Colleges and Schools**

NCSU is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees.

# Policy on Illegal Drugs

The following policy on illegal drugs was adopted by the North Carolina State University Board of Trustees on April 16, 1988:

## PURPOSE

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.

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 all due process protection rights.

## EDUCATION, COUNSELING AND REHABILITATION

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 or sale 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:

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. The latter publications include the official bulletin, the Student Handbook, the Faculty Handbook, the Advisers' Handbook, and the Human Resources newsletter.
2. Continuing and expanding the drug education program conducted by Student Health Service.
3. Continuing development of courses on drug education.
4. Continuing the drug education component of the employees' Wellness Program.
5. Increasing the awareness and utilization of the University's Employee Assistance Program (EAP).

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:



1. Continuing the evaluation and referral services of the Counseling Center for out-patient and in-patient rehabilitation.
2. Continuing the consultation and evaluation portions of the Student Health Service's drug education program.
3. Utilizing the Employee Assistance Program's referral to existing community-based counseling and rehabilitation services.

## ENFORCEMENT AND PENALTIES

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 will initiate its own disciplinary proceedings 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 502D (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 regulations 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.

### *Trafficking in Illegal Drugs*

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, methoqualine), any student shall be expelled and any faculty member, administrator or other employee shall be discharged.

2. For a first offense involving the illegal manufacture, sale or delivery, 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.

### *Illegal Possession of Drugs*

1. For a first offense involving the illegal possession of any controlled substance identified in Schedule I, N. C. General Statutes 90-89, or Schedule II, N.C. General Statutes 90-90, the minimum penalty shall be suspension from enrollment or from employment for a period of at least one semester or its equivalent.\* (See \* above.)

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. For second or other subsequent offenses involving the illegal possession of controlled substance, progressively more severe penalties shall be imposed, including expulsion of students and discharge of faculty members, administrators or other employees.

### **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, that if such a suspension is imposed, an appropriate hearing of the charges against the suspended person shall be held as promptly as possible thereafter.

### **COORDINATOR OF DRUG EDUCATION**

The University Counsel will serve as coordinator of drug education and, acting under the authority of the Chancellor, will be responsible for overseeing all action and programs relating to this institutional policy.

### **IMPLEMENTATION AND REPORTING**

This North Carolina State University policy on illegal drugs was effective on the beginning of the fall semester of 1988.

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; and (4) any proposed changes in the policy on illegal drugs. A copy of the report shall be provided to the President.

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# NORTH CAROLINA STATE UNIVERSITY

F

E

D

C

B

A


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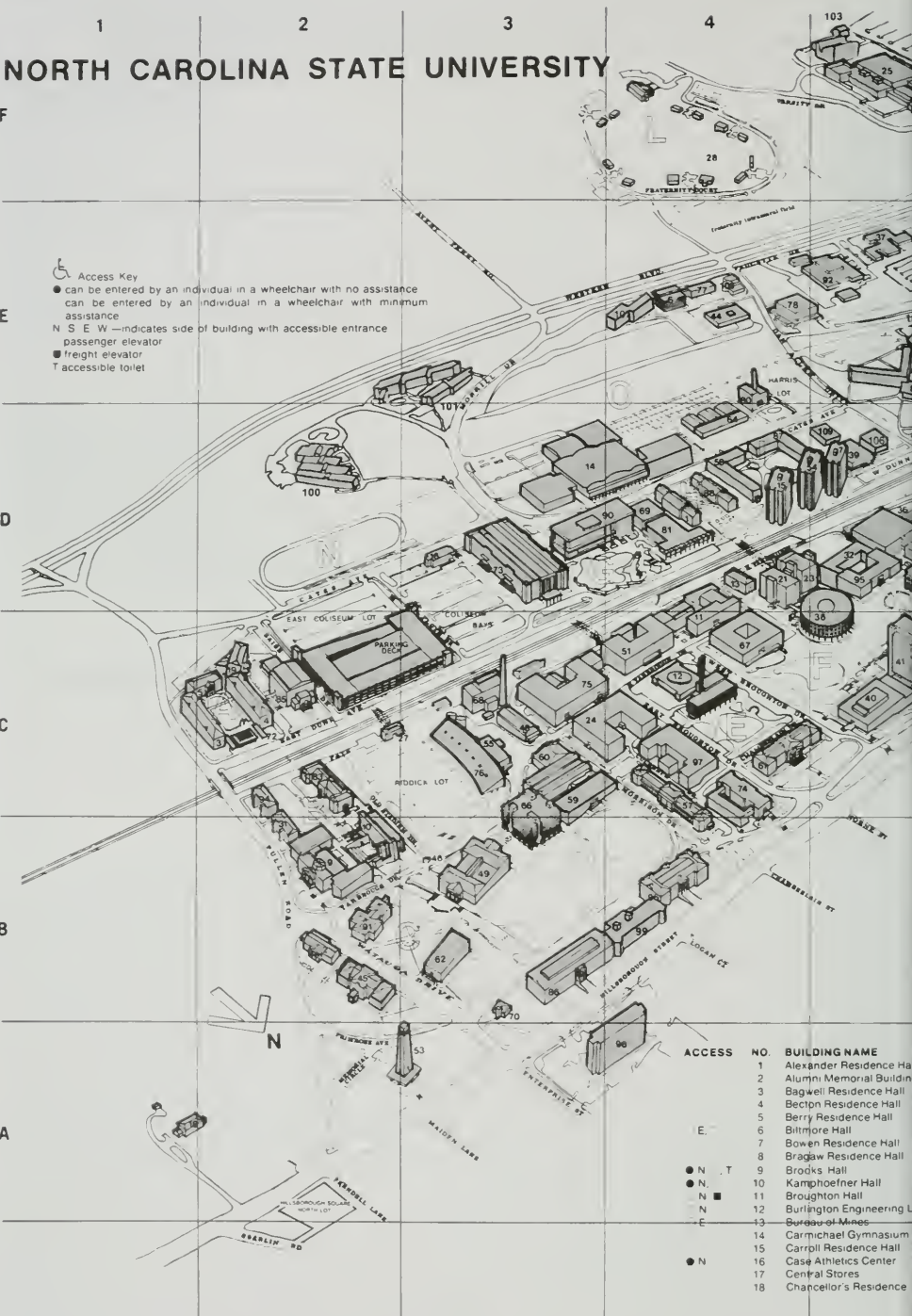
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103

-  Access Key
- can be entered by an individual in a wheelchair with no assistance
  - can be entered by an individual in a wheelchair with minimum assistance
  - N S E W — indicates side of building with accessible entrance
  - freight elevator
  - T accessible toilet



ACCESS	NO.	BUILDING NAME
	1	Alexander Residence Hall
	2	Alumni Memorial Building
	3	Bagwell Residence Hall
	4	Becton Residence Hall
	5	Berry Residence Hall
E	6	Blitmore Hall
	7	Bowen Residence Hall
	8	Bragaw Residence Hall
	9	Brooks Hall
● N T	10	Kamphoefner Hall
● N	11	Broughton Hall
■ N	12	Burlington Engineering L
— E	13	Burrows-Merrill
	14	Carmichael Gymnasium
	15	Carrll Residence Hall
● N	16	Case Athletics Center
	17	Central Stores
	18	Chancellor's Residence

1

2

3

4

5



ACCESS	NO.	BUILDING NAME	GRID	CODE
E	58	Owen Residence Hall	4-D	PA
W	59	Page Hall	3-C	PS
S	60	Park Shops	3-C	PT
E	62	Patterson Hall	4-C	
E	63	Peele Hall	3-B	
E	64	Physical Plant Maint. Center	7-E	
E	65	Physical Plant Shops (Armory)	4-D	
E	66	Phytotron	5-D	PHY
E	66	Poe Hall	3-C	POE
N	67	Polk Hall	4-C	PK
E	68	Power Plant	3-C	
W	69	Price Music Center	4-D	PMC
W T	70	Primrose Hall	3-B	
E	71	Print Shop/University Graphics	5-E	
E	72	Quad Snack Bar	2-C	
E T	73	Wm. Neal Reynolds Coliseum	3-D	
E	74	Ricks Hall	4-C	RI
N	75	Riddick Engineering Labs	3-C	RD
E	76	Riddick Stadium	3-C	
E	77	Robertson Wing, Biltmore Hall	4-E	
S	78	Schaub Food Science Building	4-E	SFS
S	79	Scott Hall	5-D	SC
E	80	Steam Plant	4-E	
E	81	NCSU Bookstores	4-D	
E	82	Sullivan Residence Hall	6-E	
E	83	Syme Residence Hall	2-C	
E	84	Television Center	6-F	TVS
E	85	Thompson Theater/Craft Center	2-C	TT
N S	86	Tompkins Hall	3-B	T
E	87	Tucker Residence Hall	4-D	
E	88	Turlington Residence Hall	4-D	
E	89	Turner House	6-C	
S T	90	University Student Center	3-D	USC
W	91	Waluga Hall	2-D	
E	92	Weaver Laboratories	5-E	DSW
E	93	Weed Control Laboratories	8-F	
E	94	Weich Residence Hall	2-C	
S	95	Williams Hall	5-D	WMS
N S	96	Winston Hall	4-B	WN
E	97	Withers Hall	4-C	WI
E	98	North Residence Hall	3-A	
S T	99	Caldwell Hall	4-B	
S T	100	Weisiger-Brown Building (GAF)	2-D	
E T	101	Wood Residence Hall	3-D	
E T	102	A. M. Fountain Dining Hall	5-E	
E T	103	Solar Demonstration House	5-F	
N T	104	Administrative Services Center	6-E	
E	105	Research Facility (on Centennial Campus) (Not Shown)		
E	106	Pullen Hall		
E	107	Jordan Hall		
E	108	Pulp & Paper Labs		
E	109	Student Center Annex		
A		<b>COURTS AND FIELDS</b>	<b>GRID</b>	
B		Bagwell-Becton-Berry Quad	2-C	
C		Gold-Weich-Syme-Brooks Court	2-C	
D		Mary E. Yarbrough Court	3-B	
E		Court of North Carolina	3-C	
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H		University Student Center Plaza	4-D	
I		Turlington-Alexander Court	4-D	
J		Tucker-Owen Court	4-D	
K		Lee-Sullivan-Bragaw Court	5-E	
L		Fraternity Court	4-F	
M		E. S. King Village Court	7-F	
N		Paul H. Derr Track	2-D	
O		Miller Fields	4-E	
P		Doak Field	6-E	
Q		McKimmon Center Court	4-D	
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		<b>PARKING LOTS</b>	<b>GRID</b>	
		Brooks Ave. Lot	6-C	
		Carmichael Lot	3-D	
		Coliseum Bays	3-D	
		East Coliseum Lot	2-C	
		Friendly Drive Lot	6-D	
		Harris Lot	4-E	
		Hillsborough Building Lots	6-C	
		Parking Deck	2-C	
		Riddick Lot	3-C	
		Sullivan Lots	6-E	
		West Lot	6-E	
		Additional West Lot Parking	5-E	
		Yarbrough Lot	3-C	
		Hillsborough Square North	2-A	

ACCESS	NO.	BUILDING NAME	GRID	CODE
W T	19	Clark Hall Infirmary	2-C	
S	20	Clark Laboratories	5-D	CL
N	21	Cox Hall	4-D	COX
N T	22	West-Dunn Building	5-D	
N	23	Dabney Hall	4-D	DAB
W	24	Daniels Hall	4-C	DAN
W T	25	McKimmon Extension Continuing Education Center	5-F	
E	26	Farm Unit 5	6-F	
N	27	Field House	2-C	
E	28	Fraternity Court	4-F	
S	29	Gardner Hall	5-D	GA
N T	30	Boshian Hall	5-D	
E	31	Gold Residence Hall	2-C	
E	32	Williams Hall Addition	5-D	AGH
E	33	Greenhouse—Biological Sciences	5-D	BSG
E	34	Greenhouse—Horticulture	5-D	HGH
E	35	Greenhouse—840 Method Rd	8-F	
E	36	Greenhouse—Plant Pathology	5-D	PPG
E	37	Grinnells Animal Health Lab	5-E	GHL
N T	38	Harrington Hall	5-D	HA
N T	39	Harris Hall	5-D	
W	40	D. H. Hill Library—Original Wing	5-C	DHL
W T	41	D. H. Hill Library—Book Stack Tower	5-C	
N S	42	D. H. Hill Library—Erdahl-Cloyd Wing	5-C	
E	43	North Campus Bookshop	5-C	
N T	44	Hillsborough Building	5-C	HLB
W	45	Hodges Wood Products Lab	5-E	HWP
E	46	Holladay Hall	2-B	
E	47	Information Center Visitor Parking	3-B	
S	48	Kingore Hall	6-D	KI
E	49	Laundry/Copy Center	3-C	LEZ
E	49	Leazer Hall	3-B	
E	50	Lee Residence Hall	5-E	
S	51	Maple Hall	4-C	MN
E	52	E. S. King Village (17 Apt Bldgs. A-Q)	7-F	
E	53	Memorial Tower	3-A	
E	54	Melcarr Residence Hall	4-D	
S	55	Morris Building	3-C	
E	56	Nelson Hall	6-D	N
E	57	1911 Building	4-C	

F

E

D

C

B

A



**Accreditation by the Southern Association of Colleges and Schools**

NCSU is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award the associate, baccalaureate, master's and doctoral degrees.



North Carolina State University Bulletin  
The Graduate School  
Box 7102  
Raleigh, North Carolina 27695-7102

# 1996 Spring Commencement

North Carolina State University



Saturday, May 11  
Nineteen Hundred and Ninety-Six  
Degrees Awarded 1996



# DEGREES TO BE CONFERRED

Saturday, May 11  
Nineteen Hundred and Ninety-Six

This program is prepared for informational purposes only. The appearance of an individual's name does not constitute the University's acknowledgement, certification, or representation that the individual has fulfilled the requirements for a degree.

Honors listed for May 1996 candidates for degree are tentative in that they are calculated without the final semester grades.





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# MUSICAL PROGRAM

## EXERCISES OF GRADUATION

May 11, 1996

Commencement Band Concert 8:30 a.m.  
Carter-Finley Stadium

The Thunderer . . . . .	John Philip Sousa
Chorale and Shaker Dance . . . . .	John Zdechlik
Chorale for Band . . . . .	Frank Erickson
Overture Jubiloso . . . . .	Frank Erickson
Suite . . . . .	George Frederick Handel, arr. by Osterling; Gordon
March	
Aria	
Sarabande	
Bourree	
Air	
Finale	

**Processional: 9:00 a.m.**

March Processional . . . . .	Clare Grundman
------------------------------	----------------

**Recessional:**

University Grand March . . . . .	Edwin Franko Goldman
----------------------------------	----------------------

N.C. STATE UNIVERSITY COMMENCEMENT BAND  
Dr. Robert B. Petters, *Conductor*

# EXERCISES OF GRADUATION

Carter-Finley Stadium  
Chancellor Larry K. Monteith  
Presiding  
May 11, 1996

PROCESSIONAL, 9:00 a.m. . . . . Dr. Robert Petters

Conductor, North Carolina State University Commencement Band.  
The audience is requested to remain seated during the Processional.

WELCOME . . . . . Chancellor Larry K. Monteith

INVOCATION . . . . . The Reverend Glenda Johnson  
St. Andrew's United Methodist Church, Garner, NC

NATIONAL ANTHEM . . . . . The Grains of Time

INTRODUCTIONS . . . . . Chancellor Monteith

ADDRESS . . . . . Mr. Fred McFeely Rogers  
Host, *Mister Rogers' Neighborhood* on PBS

CONFERRING OF HONORARY DEGREES . . . . . Chancellor Monteith

Fred McFeely Rogers                      Doctor of Humane Letters

CONFERRING OF DEGREES . . . . . Chancellor Monteith

Candidates for Doctor of Veterinary Medicine presented by Dean of College  
of Veterinary Medicine. Candidates for other advanced degrees presented by  
Dean of Graduate School. Candidates for baccalaureate degrees presented by  
Deans of Colleges.

ADDRESS TO FELLOW GRADUATES . . . . . Mr. Andrew Michael Crocker  
Class of 1996

RECOGNITIONS . . . . . Chancellor Monteith

VALEDICTORIANS . . . . . CLASS OF 1996

Bernard Philip Bowling	David Brian Hill
Eric Noboru Burcu	Stephanie Anja Manfredi
Mary Patricia Campbell	Henry Cooper McDade
Chris Louis Capps	John Caviness O'Quinn
Holly Ann Chandler	Nathan Phillip Sutton
Deborah Eva Citrin	Melanie Lynn Tew
Joseph Anthony Delgross	Teresa Ellen Valliere
William Arthur George	

TURNING OF THE TASSEL . . . . . Ms. Stacey Lynne Bolen  
President, Senior Class

ALMA MATER . . . . . The Grains of Time

RECESSIONAL (Platform Party only)

The audience is requested to be seated during the Recessional.



# THE ALMA MATER

*Words by:*

ALVIN M. FOUNTAIN, '23

*Music by:*

BONNIE F. NORRIS, JR., '23

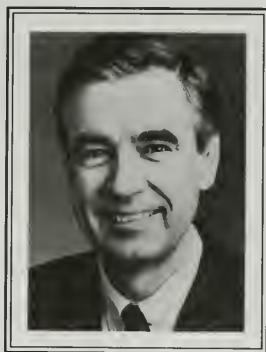
Where the winds of Dixie softly blow  
o'er the fields of Caroline,

There stands ever cherished N.C. State,  
as thy honored shrine.

So lift your voices; Loudly sing  
from hill to oceanside!

Our hearts ever hold you, N.C. State  
in the folds of our love and pride.

## FRED MCFEELY "MISTER" ROGERS



Fred McFeely Rogers is the longtime host of the *Mister Rogers' Neighborhood* television program, a child development expert, an ordained Presbyterian minister and a family advocate. Rogers was born in 1928 in Latrobe, Pa., a small town east of Pittsburgh, where he also was raised.

He attended Rollins College in Florida, where he majored in music composition. After graduation in 1951, he was hired by NBC in New York as an assistant producer. He later worked as floor director on several programs.

In 1953 he moved back to Pittsburgh at the request of WQED, the nation's first community-supported public television station. Rogers developed and began producing several programs there, including *The Children's Corner*. Some of Rogers' program regulars, including puppets Daniel Striped Tiger and King Friday XIII, began their long lives on the show.

It was during the seven-year run of *The Children's Corner* that Rogers began studying child development and attending the Pittsburgh Theological Seminary in his spare time. He was ordained by the Pittsburgh Presbytery in 1962 with a charge to continue his work with children and families through the media.

Rogers first appeared on camera in 1963, when he was hired by the Canadian Broadcasting Corporation to create a 15-minute children's series entitled *MISTEROGERS*.

In 1964 Rogers returned to Pittsburgh, where his show evolved into the half-hour *Mister Rogers' Neighborhood*. Rogers uses his own observations and training along with consultations with experts to write *Mr. Rogers' Neighborhood*, the longest running show on public television.

The program reaches almost eight million households and child-care settings each week. There are nearly 700 episodes in the series, and Rogers continues to write and produce several weeks of new programs each season.

*Mister Rogers' Neighborhood* is a slow-moving, quiet program aimed at teaching children to find within themselves the courage to grow.

Rogers' work has earned two George Foster Peabody Awards and several Emmys.

Rogers is president of Family Communications Inc., the nonprofit organization he founded in 1971 to produce materials that encourage the healthy emotional growth of children and their families.

He has received honorary degrees from more than 30 colleges and universities, including Yale, Carnegie Mellon and Boston universities and his alma mater, Rollins College.

Rogers and his wife, Joanne Byrd Rogers, have two married sons and two grandsons.

# TIME AND LOCATION FOR DISTRIBUTION OF DIPLOMAS

## College of Agriculture and Life Sciences - 1:30 p.m.

Agricultural Business Management and Agricultural Economics	1404 Williams Hall
Agricultural and Extension Education	NCSU Faculty Club
Agronomy, Conservation, Crop Science, and Soil Science	2215 Williams Hall
Animal Science	Room 2, McKimmon Center, Western Boulevard
Biochemistry	Room 6, McKimmon Center, Western Boulevard
Biological and Agricultural Engineering	158 D. S. Weaver Laboratories
Biological Sciences	3712 Bostian Hall
Botany, Ecology, Entomology, Genetics, Microbiology, Nutrition, Plant Pathology and Toxicology	2722 Bostian Hall
Environmental Sciences	Location of Major Faculty Advisor
Food Science	105 Schaub Hall
Horticultural Science	NCSU Arboretum, Beryl Road (In case of rain, 159 Kilgore Hall)
Natural Resources	Location of Major Faculty Advisor
Physiology Program	Location of Major Faculty Advisor
Poultry Science	106 Scott Hall
Applied Sociology	218 Withers Hall
Zoology, Fisheries and Wildlife Sciences, Medical Technology	Forest Hills Baptist Church, 3110 Clark Avenue

School of Design - 1:30 p.m.	Stewart Theatre, University Student Center
Reception - 2:30 p.m.	Brooks Hall Courtyard

## College of Education and Psychology - 1:30 p.m. except for those marked with an asterisk.

Adult and Community College Education, Administration and Supervision, Education General Studies and Health Occupations Education (Graduate Students)	Rooms 3 and 4, McKimmon Center, Western Boulevard
Counselor Education	216 Poe Hall
* Curriculum and Instruction, Special Education, Health Occupations Education (Undergraduate Students), Marketing Education and Middle Grades Education - 2:00 p.m.	Carmichael Gym
Mathematics, Science, Occupational and Technology Education.	Daniels Middle School Auditorium, 2816 Oberlin Road
* Psychology - 1:00 p.m.	Carmichael Gym

**College of Engineering - 1:30 p.m. except for those marked with an asterisk**

Aerospace Engineering	Ballroom, University Student Center
Biological and Agricultural Engineering	158 D. S. Weaver Laboratories
Chemical Engineering	Cinema, Witherspoon Student Center
Civil Engineering	240 Nelson Hall
Computer Science	Fairmont United Methodist Church, 2501 Clark Avenue
Electrical and Computer Engineering	Edenton Street United Methodist Church, 228 West Edenton Street
Industrial Engineering	Brooks Avenue Church of Christ, 700 Brooks Avenue
Integrated Manufacturing Systems	Walnut Room, University Student Center
Master of Engineering	Walnut Room, University Student Center
Materials Science and Engineering	McKimmon Center, Western Boulevard
* Mechanical Engineering (Undergraduate) 2:30 p.m.	Ballroom, University Student Center
Mechanical Engineering (Graduate)	Ballroom, University Student Center
Nuclear Engineering	North Portico, Burlington Engineering Laboratories

**College of Forest Resources - 1:30 p.m.** McKimmon Center, Western Boulevard

**College of Humanities and Social Sciences - 1:30 p.m. except for those marked with an asterisk**

Communication	Raleigh Civic Center
English	Court of the Carolinas (In case of rain, Carmichael Gym)
Foreign Languages and Literatures	Holy Trinity Lutheran Church Fellowship Hall, 2723 Clark Avenue
History	Brickyard at Harrelson Hall (In case of rain, 107 Harrelson Hall)
* Multidisciplinary Studies - 3:00 p.m.	Room 126, Witherspoon Student Center
Philosophy and Religion	Holy Trinity Lutheran Church Fellowship Hall, 2723 Clark Avenue
Political Science and Public Administration	Highland United Methodist Church, 1901 Ridge Road
Social Work	G107 Caldwell Hall
Sociology and Anthropology	218 Withers Hall

**College of Management - 1:30 p.m.**

Accounting	Main Floor, Reynolds Coliseum
Business Management	Main Floor, Reynolds Coliseum
Economics	Main Floor, Reynolds Coliseum

**College of Physical and Mathematical Sciences - 1:30 p.m.**

Chemistry	222 Dabney Hall
Mathematics	124 Dabney Hall
Physics	206 Cox Hall
Statistics	Ephesus Baptist Church, 6767 Hillsborough St.
Marine, Earth and Atmospheric Sciences	242 Riddick Hall

**College of Textiles - 1:30 p.m.** Courtyard, Centennial Textile Complex

**College of Veterinary Medicine - DVM Graduates**

Reception - 1:30 p.m.	Blue & Green Commons
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# ROTC COMMISSIONING CEREMONY

COLONEL ROBERT H. PENNY, USAF  
Presiding

Stewart Theatre  
University Student Center  
May 11, 1996

PROCESSIONAL MARCH, 5:00 p.m . . . . . Dr. Robert Petters  
*Conductor, North Carolina State University Commencement Band*

POSTING OF THE COLORS . . . . . Multi-Service Color Guard

NATIONAL ANTHEM

INVOCATION . . . . . Paster G. Riley Powell

WELCOME . . . . . Dr. Larry K. Monteith  
*Chancellor*

INTRODUCTIONS . . . . . Colonel Robert H. Penny  
*Professor of Aerospace Studies*

ADDRESS . . . . . The Honorable Sheila E. Widnall  
*Secretary of the Air Force*

ADMINISTRATION OF THE OATH  
OF OFFICE . . . . . Lieutenant Colonel John H. McInerney  
*Professor of Military Science*  
Captain Richard J. Field  
*Professor of Naval Science*  
Colonel Robert H. Penny  
*Professor of Aerospace Studies*

PRESENTATION OF CERTIFICATES . . . . . Secretary Widnall  
Dr. Larry K. Monteith

BENEDICTION . . . . . Pastor G. Riley Powell

RETIRING OF THE COLORS . . . . . Multi-Service Color Guard

RECESSIONAL . . . . . North Carolina State University Commencement Band  
The audience is requested to remain seated until the Recessional music is completed.

# COMMENCEMENT USHERS

## Air Force ROTC Ushers

Jonathon Albaugh  
Brian Bandy  
Rafael Carroll  
James Chambers  
April Ducote  
Jennifer Hehl  
Eric Lindquist  
Tammy Low  
Christine Sakaniwa  
Jason Smith  
Michael Stanifer  
Bruce Tellman  
Andrew White

## Navy ROTC Ushers

Derek Brady  
Kevin Crow  
Anthony Duttera  
Lemuel Fagan  
Edward Floyd  
Kelly Grissom  
John Grebeta  
Johnnie Jones  
Eric Kelly  
David Moore  
David Ramthun  
Douglas Shamlin

## Army ROTC Ushers

Matthew Bagley  
Christopher Culpepper  
Michael Ferralli  
Brian Henderson  
Steven Howard  
Theodore Kingsberry  
Sidney Linker  
Michael McCarson  
Jason Nicholson  
Mark Pickett  
Mark Sheets  
John Taylor  
Anthony Thacher  
Brian Winter

# COMMENCEMENT MARSHALS

J. Natasha Barnes  
Samuel T. Barron  
P. Brent Beamon  
Salam G. Bidwan  
Natasha G. Bolick  
Deirdre D. Catlett  
Sharon A. Chung  
Scott A. Clay  
R. Bryant Crisp  
Andrea M. Dailey  
Felton S. Dengler  
Marshal K. Eagle  
Daniel K. Edge  
Kyler A. England  
H. Joy El Faysal  
Alexia K. Fody  
David W. Frink  
Carol A. Fuller  
S. Michelle Garoutte

Levent E. Gokcen  
Alex David Groce  
J. Zachariah Hall II  
Rebecca E. Hawkins  
David R. Higgins  
Courtney L. High  
Melani Hix  
H. Jeanette Hughes  
Nathan S. Johnson  
Matteson Kinney  
Eiji Kunisawa  
Ilana Kurts  
Alexander B. LeGrand  
Stephanie C. Lovell  
Laurie A. Lyon  
Sybil L. MacDonald  
Kelly A. McAvoy  
William J. Mitchell  
Allison C. Modafferi

Rebecca D. Montgomery  
R. Chad Myers  
Mark A. Nippert  
Megan E. Osborne  
Emily N. O'Quinn  
Loretta Pesteanu-Somogyi  
M. Claire Pittman  
Kyle J. Rehder  
L. Taylor Roberts  
Jonathan C. Routh  
Karen R. Shigehara  
Aimee D. Smart  
Brent S. Sumerlin  
Holly N. Thomas  
Jacob G. Vanden Bosch  
Chaffee W. Viets  
Betsy L. Watson  
Tracey M. Westbrook  
Paul H. Zigas

# FACULTY RETIREMENTS, 1995-96

- Axtell, Richard C., College of Agriculture and Life Sciences, will retire June 30, 1996.
- Averre, Charles W., College of Agriculture and Life Sciences, retired January 1, 1996.
- Beezer, Bruce G., College of Education and Psychology, will retire June 30, 1996.
- Cooke, Armand V., School of Design, will retire May 15, 1996
- Edwards, John A., College of Engineering, will retire May 15, 1996.
- Fearn, Robert M., College of Management, will retire June 30, 1996.
- Fike, William T., College of Agriculture and Life Sciences, retired November 1, 1995.
- Hardin, James W., College of Agriculture and Life Sciences, will retire June 30, 1996.
- Harrington, Ben D., College of Veterinary Medicine, retired March 31, 1996.
- Holler, William M., College of Humanities and Social Sciences, will retire May 15, 1996.
- Hoover, Dale M., College of Agriculture and Life Sciences, retired October 1, 1995.
- Horton, H. Robert, College of Agriculture and Life Sciences, retired August 31, 1995.
- Houser, Gloria W., NCSU Libraries, will retire June 30, 1996.
- Kellison, Robert C., College of Forest Resources, retired January 1, 1996.
- Levi, Patricia E., College of Agriculture and Life Sciences, will retire May 31, 1996.
- Levings, Charles S., College of Agriculture and Life Sciences, will retire June 30, 1996.
- Martin, Charles, Division of Student Affairs, retired September 30, 1995.
- Milholland, Robert D., College of Agriculture and Life Sciences, will retire May 31, 1996.
- Moreland, Donald E., College of Agriculture and Life Sciences, retired November 3, 1995.
- Moseley, Robert, Staff Physician, Division of Student Affairs, retired July 31, 1995.
- Parramore, Barbara M., College of Education and Psychology, will retire on May 15, 1996.
- Rakes, Allen H., College of Agriculture and Life Sciences, retired October 1, 1995.
- Schwartz, Steven J., College of Agriculture and Life Sciences, retired January 1, 1996.
- Smith, Donald E., College of Agriculture and Life Sciences, retired January 1, 1996.
- Stevens, Charles E., College of Veterinary Medicine, retired December 31, 1995.
- Sullivan, Gene A., College of Agriculture and Life Sciences, retired November 1, 1995.
- Sylvester, John, NC Japan Center, retired December 31, 1995.
- Weedon, J. Frank, Division of Athletics, retired March 31, 1996.
- Zia, Paul Z., College of Engineering, retired January 1, 1996.

# ACADEMIC COSTUME

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc cut away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimming, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long, respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty in which the degree was awarded. For each faculty there is a corresponding color; so a glance at the trimming is all that is needed to identify the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.

# ACADEMIC HONORS

Honors participants benefit from a more individualized and rigorous approach to their desired degree through special classes, seminars and individual research.

Undergraduate degree honor designations are:

Cum Laude--for GPA 3.250 through 3.499 (white sash)

Magna Cum Laude--for GPA 3.500 through 3.749 (red sash)

Summa Cum Laude--for GPA 3.750 and above (gold sash)





# UNDERGRADUATE DEGREES

Degrees To Be Conferred May 11, 1996

## College of Agriculture and Life Sciences



### BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

***	Robert Bourke Christian	Chapel Hill
	Bryan Paul Clark	Newton
	Scott James Frederick	Raleigh
	Benjamin Scott Gresham	King And Queen C.H., VA
	Herbert Louis Hales II	Kenly
+	Jenifer Lynn Jordan	Pittsboro
	Gary Charles Miller	Cary
*	Benjamin Scott Mitchell	Gates
***	Christopher Thomas Mosley	Tarboro
	Robyn Jeanette Mullen	Raleigh
	Christopher Vance Norville	Ellenboro
**	Jeffrey Michael Parker	Albemarle
	Jan Marie Patterson	Jackson Springs
	Brian Matthew Simpson	Marshville
	David McKinley Stein, Jr.	Fayetteville
	Scott Avery Vinson	Maury
	Jason Herman Wilson	Henderson

### BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

Michael Thomas Prange	Salisbury
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### BACHELOR OF SCIENCE IN AGRICULTURAL BUSINESS MANAGEMENT

Amy Nicole Barefoot	Newton Grove
Frederick Brandon Beach	Hamilton
Dede Renee Bivins	Durham

	Michael Todd Blake	Raleigh
SH+***	Rosemary Dawn Bowen	Walnut Cove
	Douglas Scott Goodwin	Vale
	Kelli Lynn Haines	Belvidere
	Claudia Lee Hamill	Enfield
**	James William Kiser	Vale
	Michael Ryan Ledford	Raleigh
	Chad Nelson Matheson	Raleigh
	Angie Elaine Peters	Knightdale
+	Steven Wayne Pridgen	Whitakers
	Amy Lynn Winstead	Roxboro

#### BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION

	Karen Rae Bowlin	Newport
	Carol Lynn Hassell	Elizabeth City
*	Travis Wayne Hodge	Rutherfordton
*	Albert Dixon Jones	Chinquapin
	Kevin Israel Jones	Elk Park
	Douglas Michael Latta	Hillsborough
***	Lori Lynn Lucas	Mt Holly
	Joseph Bert Noble	Kinston
**	David Mitchel Overcash	Kannapolis
+*	Shane Roberts Parker	Hillsborough
**	Brian Glenn Parrish	Garner
***	Jennifer Lynn Roney	Mebane
	Michael Randolph Thomas	Rockingham
	Jason Keith Wynne	Bear Grass

#### BACHELOR OF SCIENCE IN AGRICULTURAL SYSTEMS TECHNOLOGY

	Jody Anison McPherson	Chadbourn
	Bryan Christopher Spell	Clinton

#### BACHELOR OF SCIENCE IN AGRONOMY

	Christopher Lee Buffalo	Wendell
	Christopher Paul Butcher	Raleigh
	Lloyd Shannon Orr	Chase City, VA
	Christian Austin Overton	Shiloh
+*	Shane Roberts Parker	Hillsborough
*	Robert Brian Roy	Kernersville
**	David James Tucker	Laurel Springs
SH*	Charles Odell Tulloch III	Ayden
	Jason Todd Wooten	Raleigh

#### BACHELOR OF SCIENCE IN ANIMAL SCIENCE

H*	Kimberly Dawn Ange	Belhaven
	Walter Henry Barrier	Mt Pleasant
	Michele Denise Basso	Springfield, VT
SH+***	Rosemary Dawn Bowen	Walnut Cove

H*	Felicia Dawn Brim	Greensboro
H**	Karen Elizabeth Burns	Chapel Hill
SH***	Holly Ann Chandler	Chapin, SC
***	Jeffrey Thomas Cole	Orlando, FL
	Thomas Allen Cook	Bakersville
	David Franklin Correll	Cleveland
	Anthony Wayne Crocker	Pine Level
H*	Adrienne Elizabeth Crosier	Camden, DE
***	Katherine Virginia Cutter	Asheville
	Sarah Ellen Davis	Troutville, VA
	Colleen Ann Eddy	Cary
	Andrea Nicole Emanuel	Kinston
H**	Jonathan Leonard Featherstone	Gold Hill
	Pattie Wilkins Ferrell	Wake Forest
	Robert Christian Ford	Wake Forest
	David Matthew Greene	Fairfax, VA
	Kimberly Ann Gruwell	Salisbury, MD
*	Nicole Lanae Hale	Durham
	Joel Steven Harrison, Jr.	Snow Hill
	Meredith Battley Jarman	Gastonia
**	Terri Ann King	Asheville
	Elizabeth Sara Lanning	Raleigh
***	Zane Ian Lapinskes	Garner
SH*	Barbara Anne Lawing	Raleigh
	Stacy Kim Lettsome	Tortola, Virgin Islands
*	Michael Earl Littell	Mebane
	Tanya Lynn Meads	Elizabeth City
*	Rebecca Lynn Meyer	Charlotte
	Tyler David Mitchell	Taylorsville
	Sondra Michele Moritz	Raleigh
	Amy Renee Nethery	Woodleaf
	Jennifer Elizabeth Norton	East Islip, NY
	Angie Lynn Parker	Nashville
	Jonathan Alan Pope	Coats
+	Steven Wayne Pridgen	Whitakers
	Kenneth Woodruff Redmond	Seneca, SC
	James Scott Sain	George Hildebran
	Jessica May Schell	Garner
*	Mary Grace Scott	Elizabeth City
	Eric William Sellers	Gastonia
	Jarrett Shane Smith	Norwood
***	Russell Lee Sprinkles	Belmont
H*	Chad Harmon Stahl	Cherry Hill, NJ
***	Matthew Blake Turner	Kinston
**	Archie Reid Tyson III	Zebulon
	Michelle Ann Walker	Raleigh
***	Michael Christian Ward	Cape May Court House, NJ
	Rebecca Gail Weaver	Hudson
*	Carri Amber Williams	Denton
	Leigh Ann Williams	Dallas



## BACHELOR OF SCIENCE IN APPLIED SOCIOLOGY

Mary Forrest Barker	Statesville
Larry Donnell Boyd	Monroe
Chris Alan Dickerson	Raleigh
Lisa Kay Harris	Roanoke Rapids
Michael Wayne Howell	Dudley
Sean Kent Loyd	Wendell
Marjorie MacDonald Morris	Pittsburgh, PA
Karen Michelle Odom	Fayetteville
Kristin Elizabeth Smith	Pinehurst
** Patti Jo West	Morganton

## BACHELOR OF SCIENCE IN BIOCHEMISTRY

Tracia Mignon Bailey	Charlotte
* Neil Rodney Bowman	King
S+** Erin Christine Caine	Raleigh
* Byron Keith Carter	Apex
+** Trisha Myers Castranio	Raleigh
+ Paul Lawrence Cianchetta	North Wilksboro
+** Alison Jane Cobb	Asheville
Delena Kay Coor	Goldsboro
+ Christopher Ray Delozier	Charlotte
*** John Paul Denny	Asheville
+ Michael Grant Dodds	Oxford
+* Matthew Walter Faino	Winston-Salem
+*** Jayne Keifer Goodman	Chicago, IL
Todd Mitchel Goodwin	Charlotte
S+*** Robin Lynne Grice	Raleigh
SH*** Kerry Lynn Hammond	Burlington
*** Jenny Rebecca Helton	Monroe
+* Charles David Hunter	Winston-Salem
* Daniel Matthew Johnson	North Wilkesboro
+** Shannon Elizabeth Jones	High Point
Gary John Matsey	Goldsboro
* Colette Cynthia Matthews	Covington, TN
Jonathan Brett Morgan	Wilmington
Jennifer Susanne Olgiate	Raleigh
** Steven Edward Parsons	Raleigh
Nicholas Edward Promin	Concord
* Carla Jean Randall	Morganton
Katherine Mary Rouse	Vienna, VA
Cassandra Denise Southern	Rowland
Catherine Nichole Sprouse	Raleigh
*** Melanie Lynn Tew	Stedman
SH+*** Christina Lea Thomas	Rockingham
** Timothy Khanh Tran	Greensboro
*** Susan Tsui	Chapel Hill
+ Karen Elizabeth Twiford	Rocky Mount
S** Malathi Viswanathan	Wilmington
* David Christian Vondle	Danbury, CT

+ Gary Scott Weaver	Fayetteville
+** Michelle DeeLeigh Wilkerson	Jacksonville

## BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES

	Ramona Sheanette Adams	Charlotte
H*	Rachel Lee Akins	Charlotte
	Teresa Gail Allison	Burlington
	Carol Ann Barclay	Geneva, IL
	Stephen Eugene Barreau	Charlotte
	Andrew Jeffrey Bashor	Chamberburg, PA
	Carol Anne Beam	Ellenboro
	Juli Marie Blitchington	Greensboro
	Timothy Michael Broderick	Cary
	Michael Lee Brooks	Winston-Salem
**	Jason Matthew Chester	Winston-Salem
	Charlotte Amalie Chiswell	Cary
SH***	Deborah Eva Citrin	Thomasville
	Michelle Leanne Coble	Raleigh
*	Jamie Scott Crowder	Maiden
S+*	Regina Heather Crowell	Albermarle
+***	Robert Kevin Harrell	Henderson
	Adam Scott Hedspeth	Raleigh
	Kristen Renee Holder	Browns Summit
*	Rachel Lee Hunt	Summerfield
S	Ellen Elizabeth Jurischk	Wilmington
	Michael Brian King, Jr.	Kinston
	Kristen Kohlmeir	King Of Prussia, PA
+	Kolleen Kay Kreul	Coral Springs, FL
	Marilyn Kristen Liner	Efland
SH**	Lori Rae Linger	Wilmington
SH***	Adam Edward Majewski	Winston-Salem
	Brian Lewis McCluney	Winston-Salem
	Cassie McEachern	Garner
*	Elizabeth Ann Melbourne	Cary
S**	Sean Christopher Moore	Cary
	Jennifer Lynn Morrison	Greensboro
+	Emily Lesesne Nelson	Columbia, SC
	Shirley Eve Owino	Raleigh
SH	Elizabeth Diane Phillips	Concord
SH***	Michelle Denise Prysby	Greensboro
	Aaron Oakley Robbins	East Bend
	Gretchen Anne Rohrbach	Raleigh
*	Jennifer Dawn Shugars	Charlotte Hall, MD
	Stacey Nichole Sweigard	Charlotte
	Keisha Levern Taylor	Wilmington
H+***	Christina Lea Thomas	Rockingham
*	Rebecca Marie Thompson	Marion
	Rolen Todd Thornton	Raleigh
**	Dana Michelle Timar	Cary
	Kenneth Scott Williams	Edenton

## BACHELOR OF SCIENCE IN BOTANY

S***	Laura Jeanne Grignon	Charlotte
	Mary Kellar Lambert	Charleston, SC

## BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES

	Stacie Leigh Edwards	Gastonia
	Brett Sinclair Martin	Colonial Heights, VA

## BACHELOR OF SCIENCE IN FISHERIES AND WILDLIFE SCIENCES

**	Daron Keith Barnes	Franklinton
*	Harrison Pendleton Bresee	Raleigh
+	Douglas Carter Burleson	Lumberton
	Ashley Dale Cannon	Roanoke Rapids
**	Robin Thomas Cheshire	Greensboro
*	Kevin Scott Dillistin	Apex
***	Major Walter Lane	New Bern
	Jason Douglas Letchworth	Wilson
	Beven Harold Love	Warrenton, VA
	Christopher Donald Manley	Clinton
	Michael Aaron McKendree	Burlington
	Naseem Ostovar	Asheville
+	Scott Hamilton Phillips	Halifax
***	Vann Franklin Stancil	Kenly
	Edward Oscar Stevenson	Henderson
	Katherine Bourg Tompkins	Grosse Pointe, MI
*	Brent Deleon Triplett	Wilkesboro
S***	Julie Marie Williams	Youngsville

## BACHELOR OF SCIENCE IN FOOD SCIENCE

	Kimberly Hansen Baker	Garner
	Wayne Derick Cunningham	Brooklyn, NY
	Natasha Jeaneen Ford	Concord
	Michael William Gould	Raleigh
	Janet Smith Hayes	Durham
	Priya Vikram Kamdar	Bombay, India
	Traci Lane Mantiply	Raleigh
	Michael Lawrence McMurtry	Raleigh
**	Christopher Warren Pernell	Cary
	Anna Kirsten Reich	Winston-Salem
	Dana Lee Schroeder	Gastonia
	Kara Cannatella Stivers	Raleigh
*	Meredith Regan Summerlin	Birmingham, AL
	Sherrie Lynne Thomas	Franklinton
	Amanda Claire Ulicny	Raleigh

## BACHELOR OF SCIENCE IN HORTICULTURAL SCIENCE

**	Leslie Brooks Booker	Manteo
----	----------------------	--------

	Curtis Robert Cahoon	Columbia
**	Beverly Anne Carroll	Concord
***	Leah Suzanne Cook	Durham
	Eugene Earl Foushee	Siler City
	John William Freeman	Winston-Salem
	John Terrell Harris	Weddington
**	Marvin Lewis Lassiter III	Roanoke Rapids
*	David Joseph Lisowski	Richmond, VA
*	Michelle Hope McCullough	Raleigh
	Carl Phillip Meyers, Jr.	Morganton
	Jeanette Carol Michaelson	Raleigh
	Jessica Nicole Millsaps	Terrel
	Jeffrey Carlyle Parrish, Jr.	Charlotte
	Scott Andrew Shapiro	Raleigh
	John Mark Swicegood	Apex
	Christina Leigh Turner	Winston-Salem
	Matthew Charles Warlick	Winston Salem
*	Natasha Elice Warren	New Albany, IN
	Neill Donnell Westerbeck	Clinton
	Todd Vincent Westra	Youngsville
	Robin Conley Yaun	Greensboro

#### BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY

	Cheryl Lynn Bowman	Taylorsville
	Jennifer Sanders Carlton	Shelby

#### BACHELOR OF SCIENCE IN MICROBIOLOGY

	Omead Ahdieh	Raleigh
	Chadwick Alan Church	Raleigh
SH**	Carol Sue Dombroski	Ronkonkoma, NY
+***	Robert Kevin Harrell	Henderson
***	Gregory William Knapp	Cary
	LaTasha Renea Mayberry	Tulsa, OK
	Thomas Harrison Midgette	Creedmoor
	Mary Ann Pate	Kinston
	Albert Michael Perez	Sanford
	Shelly Lynn Sawyer	Camden
	Robin Nicole Shepard	Silver Spring, MD
**	Erica Michelle Smith	Norwood
	Tiffany Joy Tompkins	Raleigh
*	Jennifer Ann Valashinas	Hillsborough
	Jorge Manuel Vargas	Lima, Peru
	Douglas Gregor Wright	Raleigh

#### BACHELOR OF SCIENCE IN NATURAL RESOURCES

	Jennifer Kathleen Egolf	Hendersonville
	Larry Dean Grantham, Jr.	Four Oaks
S***	Rhonda Josera Hunt	Clayton



** Jimmy Lee Poindexter	Sanford
Todd Eugene Shearin	Chesterfield, VA

## BACHELOR OF SCIENCE IN POULTRY SCIENCE

John Wayne Bane	Moncure
Rachel Elizabeth Doerfler	Raleigh
S*** Kimberly Rae Parks	Morganton

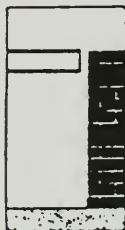
## BACHELOR OF SCIENCE IN ZOOLOGY

** George Liell Adams	Garner
** Teresa Michelle Bachelor	Apex
*** Jennifer Ross Balkcum	Cary
Danny Mack Barnes	Benson
SH*** Erin Michele Beebe	Seymour, TN
Mysty Leigh Blalock	Albermarle
Heather Marie Bowers	Charlotte
Shanda Javonne Bragg	Suitland, MD
** Sherry Elizabeth Briggs	Graham
Jack Dale Brown	Fayetteville
Joseph MacAdam Brown	Raleigh
Tamara Lenora Brown	Fayetteville
Tracey Avery Brown	Lakewood, CO
Alexander Bunich	Charlotte
** Laura-Jean Coelho Buskirk	Hartford, CT
** Anna Christine Callaway	Charlotte
Jason Allen Campbell	Greensboro
Harrell Mitchell Carpenter, Jr.	Clinton
Gretchen Brooke Caruana	Mt. Pleasant, SC
*** Sonya Marie Chauvin	Dudley, MA
Paul Lawrence Cianchetta	North Wilksboro
** Seth Ian Cohen	Marietta, GA
Tracy Kristen Combs	Southington, OH
** Alan Wilson Cooper	Winston-Salem
S+* Regina Heather Crowell	Albermarle
Shannon Leigh Daniels	Winston-Salem
Amy Denise Dillon	Winston-Salem
Allison Nicole Dorsey	Raleigh
Allen Joseph Dowdle	Asheville
* Deirdre Angelle Evans	Roanoke Rapids
+* Matthew Walter Faino	Winston-Salem
Monte Pierre Formy-Duval	Whiteville
* Michelle Lynette Foster	Winston Salem
*** Carol Nicole Friddle	Greensboro
Kuan Jamel Gethers	Bronx, NY
S** Kimberly Caroline Glennon	Wilmington
Rebecca Anne Haskett	McAdenville
+* Allison Suzanne Hertzler	High Point
Jennifer Kay Holshouser	Connelley Springs
S* Alice Marie Hunsucker	High Point
+* Charles David Hunter	Winston-Salem

* Jessica Suppa Iarocci	Kingwood, TX
* Terrence Shawn Ingram	Wilmington
Anthony Howard James	Raleigh
Gale Elizabeth Jancsics	Raleigh
Arthur Jones	Charleston, SC
Anil Francis Joy	Cary
Carla Anita Kelly	Salisbury
Ellen Lurenda King	Walnut Cove
Virginia Wellens King	Durham
+ Kolleen Kay Kreul	Coral Springs, FL
Mark Harold Landrum	Raleigh
Amy Alison Lawless	Durham
Nichole Ann Lehman	Red Lion, PA
Brian Robert Lyne	Richmond, VA
** Melissa Megan Marks	Charlotte
*** Henry Cooper McDade	Hillsborough
Tonya Shonelle McLeod	Laurinburg
Mary Cameron McNeill	High Point
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** Jason Daniel Forney	Greensboro
Gordon Malcolm Grisinger III	Charlotte
** Julianne Carroll Harrelson	Dublin
** David Bronson Hinchey	Ronda
*** Philippe Anton Jentsch	Monthey, Switzerland
** Todd Dean King	Hendersonville
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Aric L Margolis	Charleston, WV
* Joseph Booth McCoy	Concord
* Bryan Michael Moffitt	Greensboro
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** John Scott Shell	Hickory
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+****	James Frederick King III	Hillsborough
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	Ryan Christopher Lockett	Concord
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*	Scott Norman Phillips	Doylestown, PA
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	Jonathan Michael Gerler	Millville, PA
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***	Erin Street Hancock	Burlington
*	Catherine Bryant Harrell	Smithfield
S*	Sharon Elaine Horton	Kings Mountain



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** Teresa Lee	Elizabeth City
Daniela Maria Marx	Goldsboro
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* Traci Jane Shelton	Liberty
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*** Kathleen Ryan VanOrmer	Summerfield

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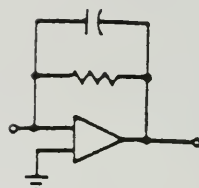
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*	David Clifford Revoir	Clarksburg, MD
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	Lisa Dawn Hudnall	Chapel Hill
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	George Jackson Liverman	Mufreesboro
	Jeffrey Boyd Malpass	Delco
	David Scott McIntyre, Jr.	Shelby
	David Gray Modlin	Raleigh
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	Antonio Wayne Cameron	Middlesex
	David Richard Castranio	Cary
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	* Justin Everett Pinnix	Apex
	James Michael Presto	Rougemont
	Phillip Allen Richardson	Raleigh
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	Earl Richardson Shannon	Fayetteville
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	David Kenneth Smith, Jr.	Germanton
	Nathan Phillip Stewart	Julian
	Saymai Thammavong	Raleigh
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	Paula Sexton Violet	Atkins, VA
	Daniel James Waller	Ahoskie
	Toni Genee Whitaker	Rocky Mount
	Madison Neal Whitten III	Raleigh
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	+ Darby Lee-Alan Owenby	Andrews
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	Christopher George Bohner	Treuorton, PA
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+*	Jonathan Michael Butzke	Cary
	Nathaniel Lee Chavis	Red Springs
S***	Michael Chou	Durham
	Edward James Coyne	Kernersville
	* William Michael Davis	Alloway, NJ
***	Roy Lee Draughn	Asheboro
	Barry Allen DuFresne	Almond
**	Brian Edward Durham	Asheboro
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	Chris Derek Formy-Duval	Durham
	John Clayton Foster	Greensboro
	Keith Matthew Gailey	Burlington
**	Kenny Gentile	Bahama
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# College of Forest Resources



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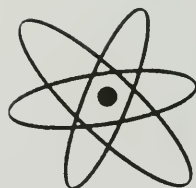
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## Master's Degrees

### MASTER OF ACCOUNTING

Nadia Munawar Ali . . . . .	Karachi, Pakistan
James Everidge Banner . . . . .	Mt. Airy
Kevin Don Bartholomew . . . . .	Milan, TN
Jennifer Marie Burbank . . . . .	Cary
Charles Hubert Cole, Jr. . . . .	Ocala, FL
James Ellis Colotta . . . . .	Indianola, MS
David Scott Compton . . . . .	Durham
Mary Alicia Currin . . . . .	Oxford
Brian Andrew Davis . . . . .	Newton
Pamela Pearson Dodge . . . . .	Raleigh
Wendy Torbitt Duncan . . . . .	Prattsburg, NY
James Walter Ennis . . . . .	Smithfield
Deborah Coltrain Fabian . . . . .	Wilson
Margaretha Kathleen Freiburger . . . . .	Charlotte
Marianne Elizabeth Gill . . . . .	Middletown, NJ
Stephen Bradley Glenn . . . . .	Rockingham
Leslie Suzanne Hager . . . . .	Conover
Deryle Keith Hammonds . . . . .	Kannapolis
Kimberly Marie Hansen . . . . .	Houston, TX
Frances M. Hern . . . . .	Holmdel, NJ
Brian Edward Jesinkey . . . . .	Simpsonville, SC
Penny Jones Kaffenberger . . . . .	Burlington
Robin Michelle Koonce . . . . .	Fayetteville
Suzan Rayfield Maddox . . . . .	Buies Creek
Robin Collins Mangum . . . . .	Dunn
William Melvin Martin, Jr. . . . .	Roanoke, VA
Sandra Ann Marie Massengill . . . . .	Benson
Dianna Renee Mulik . . . . .	Raleigh
Sharon Litteken Northcutt . . . . .	Palmyra, MO
Michael Henry Owenby . . . . .	Sevierville, TN
William Edwin Palmer . . . . .	Cheyney, PA
Edith Gayle Piner . . . . .	Sneads Ferry
Samuel Keith Pleasant . . . . .	Roxboro
Andre Romondo Plemmer . . . . .	Tarboro
Meri-Frances Rega . . . . .	Clemmons
Jennifer Leigh Seal . . . . .	Prospect Hill
Bradley Troy Shive . . . . .	Salisbury
Stanley Tyler Treece . . . . .	Asheville
Thurman Robert Ward III . . . . .	Pinehurst
Cheryl Ann Bjornson Yanik . . . . .	Humboldt, IA

## MASTER OF AGRICULTURE

Thomas Eli Harvey	Canton
Clifford Dean Ruth	Hendersonville
William Edward Vasser	Raleigh

## MASTER OF ARCHITECTURE

Ronald Jeffrey Agresta	Steubenville, OH
Amy Charlene Allen	Bear Creek
Jonathan Lucien Biron	Savannah, GA
Jonathan Martin Carr	Raleigh
Anna Katherine Dyer	Charlotte
Joseph Karl Folger	Webster, NY
Jason Sutherland Gable	Columbus, OH
Enzo Marfella	Rocky Hill, CT
Charles Eric Trunnell	Southport

## MASTER OF CHEMISTRY

Dalia Girgis Mikhael	Raleigh
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## MASTER OF CIVIL ENGINEERING

Terry Lee Albrecht	Raleigh
Steven Michael Click	Cookeville
Edward Monroe Curtis III	Beaumont, TX
Ufuk Dilek	Ismir, Turkey
John Stanley Wakelam Fargher III	Raleigh
Richard Wayne Fedora	Mechanicsburg, PA
Alan Rhett Fussell	Wilmington
Steven Glenn Haynie	Cary
Yu-Tsang Li	Kaohsiung, Taiwan, Republic Of China
Scott Allen Miles	Raleigh
James Clayton Neill	Hickory
Keith Mack Roberts	Elizabethtown

## MASTER OF COMPUTER SCIENCE

Burton Floyd Beers, Jr.	Raleigh
Kyle Lynn Croutwater	Raleigh
Martin Skippy Dulberg	Raleigh
Philip Dickson Hren	Durham
Laura Lynne Kold	Mooreville
Ann Blair Janak	Dallas, TX
Karen Purer McKenzie	Cary
Stephen Robert Morris	Raleigh
Bradford Wayne Mott	Harrells
Tai Woo Nam	Apex
Ernest Caleb Pasour III	Raleigh
Daniel Paul Sharpe	Richlands
Suxu Sun	Raleigh
Honglei Tu	Nanjing, People's Republic Of China

James Joseph Yuill . . . . . Raleigh  
 Zhaofeng Zhu . . . . . Suzhou, People's Republic Of China

## MASTER OF ECONOMICS

Magda Adriani . . . . . Jakarta, Indonesia  
 Oleg Petrovich Lekhtman . . . . . Simferopol, Ukraine  
 Scott Bradley Maher . . . . . Cary  
 Nikolai Vadimovich Maslov . . . . . Moscow, Russia  
 Michael John Paska . . . . . Rochester, MN

## MASTER OF EDUCATION

### Adult And Community College Education

Angela Rene Ballentine . . . . . Henderson  
 Manjusri Basu . . . . . Calcutta, India  
 Susan Jill Gibson-MacNeela . . . . . Hillsborough  
 Lisa Joy Hughet . . . . . Raleigh  
 Monica Terrell Leach . . . . . Pittsboro  
 Carey Matthews McMains . . . . . Apex  
 Laurie Holmes Mettam-Rude . . . . . St. Mary's City, MD  
 Theresa Leigh Sellers O'Driscoll . . . . . Raleigh

### Counselor Education

Cindy Evans Haeck . . . . . Raleigh  
 Jill McAllister Hartley . . . . . Grosse Ile, MI  
 Pinchas Mordechai Herman . . . . . Pittsburgh, PA  
 Elizabeth Douglas Morse . . . . . Wilson  
 Suzanne Locke Norfleet . . . . . Cary  
 John Carl Panepinto . . . . . Cary  
 Katherine Marie Wiles . . . . . Indianapolis, IN

### Curriculum And Instruction

Joyce Boykin Gardner . . . . . Wendell  
 Tracey Collette P. Greggs . . . . . Birmingham, AL  
 Edith Allison Hodges . . . . . Raleigh  
 Catherine Wallwork Horne . . . . . Raleigh  
 Megan McLaurin Poole . . . . . Apex  
 Kelly Sasser Smith . . . . . Princeton

### Educational Administration And Supervision

Janet Martin Allen . . . . . Oxford  
 Stephen Paul Alspaugh . . . . . Delaware, OH  
 Barbara Satterwhite Burns . . . . . Raleigh  
 + Daniel Bonaparte Cliffe IV . . . . . Burgaw  
 Dan John Greaven . . . . . Wesley Hills, NY  
 Charlotte Nash Hughes . . . . . Raleigh  
 David Scott Schwenker . . . . . Raleigh  
 Stacey Futch Weddle . . . . . Lafayette, LA



## Higher Education Administration

Crystal Lynn Bragg . . . . .	Berea, OH
Carrie Frederick McLean . . . . .	Warsaw

## Mathematics Education

Jacquelyn Ann Banks . . . . .	Cary
Kelly Ann Cochrane . . . . .	Matthews
Brian Robert DeLap . . . . .	Canton, OH
Kathy Griffin . . . . .	Atlanta, GA
Ashley Ann Richardson . . . . .	High Point
Wendy Kathleen Stocum . . . . .	Whitney Point, NY

## Occupational Education

William Lester Terrill, Jr. . . . .	Menomonic, WI
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## Science Education

Annette Elaine Rayley . . . . .	Wentzville, MO
Katherine Claire Richter . . . . .	Raleigh
Justyn Fleming Spencer . . . . .	Henderson

## Special Education

Linda Kay Abrams . . . . .	Mckeesport, PA
Michelle Christman Albert . . . . .	Chamblee, GA
Margaret McElroy Allen . . . . .	Raleigh
Karyn Egan Brelloch . . . . .	Cary
Sudakshina Ghosh . . . . .	Calcutta, India
Marshall Jackson . . . . .	Wilson
Sharon O'Dell Leaming . . . . .	Raleigh
Patricia Zboinski McCabe . . . . .	Sayville, NY
Heather Marie Meehan . . . . .	Chapel Hill
Billie Jeanne Satterwhite Thomas . . . . .	Raleigh
Lisa Gray Vick . . . . .	Wilson
Jacqueline Wheeland . . . . .	Elmira, NY
Jessica Dawn White . . . . .	Clayton

## Technology Education

+ Daniel Bonaparte Cliffe IV . . . . .	Burgaw
David Patrick Walker . . . . .	Durham

## Training And Development

Lesley Holland Downey . . . . .	Durham
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## MASTER OF ENGINEERING

Frank Hay Alexander . . . . .	Winterville
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Donald Wayne Bissette	Wilmington
Paul James Brentnell	Greensboro
Kirk Patton Bumgarner	Wilmington
Kathleen Connolly Flanagan	Havelock
John Francis Gogan, Jr.	West Seneca, NY
Richard Douglas Grady, Jr.	Goldsboro
Paul Andrew Guley III	Burlington
Clifton Thomas Jones	Durham
David Alan Koukol	Fayetteville
Ruth Ellen Mormino Lanni	Lenoir
Robert Joe Pollock	Durham
Michael Andrew Sutton	Cary
David Yanik	Asheville

## MASTER OF FORESTRY

Barry Dean New	Raleigh
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## MASTER OF GRAPHIC DESIGN

Hsing-Wen Chang	Taipei, Taiwan, Republic Of China
Elizabeth Crawford Throop	Atlanta, GA

## MASTER OF INDUSTRIAL DESIGN

Donald Charles Corey	Aiken, SC
Leslie Ray Frye	Raleigh
Yookyung Ha	Seoul, South Korea
Margaret Anne Jacobi	Wilmington
Sherri Michelle Koester	Dallas, TX
Valerie Anne McGaughey	Raleigh
Jennifer Anne McMillan	Chapel Hill
Anne Elizabeth Shaw	Concord
Tania Nina Sosiak	Raleigh
Krishnan G. Srirangam	Chicago, IL
Daniel McMichael Stipe	Easton, PA

## MASTER OF INDUSTRIAL ENGINEERING

Mark Edward Fitzpatrick	Charlotte
Alp Erkan Omur	Istanbul, Turkey

## MASTER OF INTEGRATED MANUFACTURING SYSTEMS ENGINEERING

Leonard Shawn Dockery	High Point
Pedro Resto	Mayaguez, Puerto Rico
Patrick Gordon Schmiedel	Raleigh
Craig Visser	South Portland, ME

## MASTER OF LANDSCAPE ARCHITECTURE

Alicia Louise Berry	Raleigh
Matthew Bernard Dube	New Bedford, MA

Joseph Paul Godfrey	Cary
Susan Elizabeth Kiesel	Milford, CT
Jeffrey Essex Kleaveland	Spokane, WA
Yvonne Gorman Maher	Raleigh
William Anthony McGee	Germanton
Alisandra Dolores Mora	Madrid, Spain
Patrick Graham Pleasants	Goldsboro
Anne Louise Valentine	Carrboro

## MASTER OF LIFE SCIENCES

Mark Fletcher Austin	Hickory
Alison Jameen Baldwin	Fairmount, IN

## MASTER OF MECHANICAL ENGINEERING

Bradley Scott Carter	Columbus
Alexander Grishin	Raleigh
Jason Warren Williamson	Anderson

## MASTER OF OPERATIONS RESEARCH

William Terry Fulkerson	Webster, NY
Jennifer Letitia Jancik	Buffalo, MN

## MASTER OF PARKS, RECREATION AND TOURISM MANAGEMENT

John Patrick Clougherty	Raleigh
Conchita Maria Greene	Lillington
Bridget LuOuida Height	Charlotte
Alberto Luis Roman	Mt. Holly
Junko Yumoto	Takarazuka City, Hyogo, Japan

## MASTER OF PUBLIC ADMINISTRATION

George Simpson Ake, Jr.	Raleigh
Nola Marie Allan	Garner
Mary Kathryn Deaton	Raleigh
Anna Young Evans	Bailey
Douglas Jerome Hewett	Shallotte
Gregg Edward Jarvies	Hillsborough
Rendell Lamont Jones	Charles City, VA
Shannon Lee Lasater	Burlington
Michael Ralph Longmire	Raleigh
Ngoc Boi Thi Nguyen	Greensboro
Gail Jean Paddock	Raleigh
Alitha Gail Palich	Louisburg
Clarence Mark Poole	Raleigh
Sandra McHugh Shanahan	Cary
Steven Elliott Smith	Apex

## MASTER OF STATISTICS

Michael John Mandac Arichea	Manila, Philippines
Erin Elyse Blankenship	Washington, MI
James Daniel Dockery	Harrisburg, PA
Mi-jeom Joe	Pusan, Korea
Bridget Gillian Mahoney	Poughkeepsie, NY
Stephanie Brumfield Monks	Fort Gibson, OK
Ronald Wayne Patten, Jr.	Matthews
Carol Joy Simpson	Springfield, PA
Eric Stuart Yow	North Wilkesboro
Wenlian Yu	Nanjing, People's Republic Of China

## MASTER OF TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

Laura Warren Lauffer	Fayetteville
Donna Ree Rainbow	Raleigh
Thomas Scott Sorrill	Liberty, IL

## MASTER OF TEXTILES

Antonio M. V. Francisco	New Bedford, MA
Jerry Michael King	Staley
Marcia Ellen Quinlan	Mansfield, MA

## MASTER OF WILDLIFE BIOLOGY

Selena Birgit Bauer	Humansville, MO
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## MASTER OF ARTS DEGREES

### English

Ryan Marcus Barbour	Willow Springs
Felecia Eileen Carr-Young	Raleigh
Philip Alan Collins	Burlington
Clare Jacobs Dannenberg	Garner
Richard Foster Harris IV	Charlotte
Cason Lynley Rent Helms	Charlotte
Edith Ferree Jeffreys	Raleigh
Jennifer Leigh Kiziah	Hudson
Michael Garrity Malouf	Newton, MA
Daphne Olivia McLawhorn	Grifton
Jason Paul Miller	Raleigh
Christopher Alan Perrius	Park Ridge, NJ
Patricia Ann Shore	State Road

### History

Kathryn Wates Crockett	Manassas, VA
Jonathan Edward Fair	Reading, PA

## Liberal Studies

William Holmes Burnette	Raleigh
Nancy Carole Doherty	Raleigh
James Oscar Duncan, Jr.	Silver Spring, MD
Landon Wood Fauber	Lynchburg, VA
Steven Harold Gillikin	Beaufort
Christie Knittel Mabry	Raleigh
Carolyn Carriker Noriega	Chapel Hill
Lynn Rosamond Norris	Raleigh
Joyce Evans Rodham	Raleigh

## Political Science

Mason Russell Harris	Southern Pines
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## Public History

Catherine Welborn Brown	Kernersville
Beth Lauren Calamia	Durham
Steven Greg Chudnick	Highland Park
Jennifer Pustz Kulikowski	Raleigh
Yvette Marie Stillwell	Winter Springs

## MASTER OF SCIENCE DEGREES

### Adult And Community College Education

Vickie Harrington Hall	Taylorsville
Shea Ann Henson	Atlanta, GA
Wei Ning	Shenyang, People's Republic Of China
Joyce Dale Trumbo Odom	Harrisonburg, VA
Barbara Jean Pairitz	Grand Rapids, MI

### Aerospace Engineering

Michael Howard Duncan	Ellenboro
Michael Dean Neaves	Lansing

### Agricultural And Extension Education

Linda Kay Becton	Harlowe
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### Animal Science

Sabrina Leigh Tuttle	High Point
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### Applied Mathematics

Rhett Davis Guthrie	Santa Anna, TX
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## Biochemistry

Stephanie Lorraine Pollard Foster . . . . . Miami, FL

## Botany

Marguerite Melissa Brake . . . . . Battleboro

## Chemical Engineering

Joseph Albert Miller, Jr. . . . . New Carrollton, MD

Stephanie Tolstedt Read . . . . . Columbus, OH

Santosh Srinivas Upadhyia . . . . . Bombay, India

## Chemistry

Debra Jeanne Driscoll . . . . . Gillette, NJ

## Civil Engineering

Pankaj Agarwal . . . . . Calcutta, India

Brenda Ann Bonner . . . . . Cookeville, TN

Shannon Carol Caldwell . . . . . Asheboro

Navaneet Dutt . . . . . Guwahati, Assam, India

Danial Grant Fisher . . . . . Dover, NH

Russell Todd Goin . . . . . Panama City, FL

Scott Matthew Ney . . . . . Cape Elizabeth, ME

Kimberly Whitsel Sackett . . . . . Buda, TX

Timothy Nathaniel Smith . . . . . Raleigh

Kasey Dawn Trimble . . . . . Washington, WV

Matthew Joseph Zenker . . . . . Springfield, VA

## Computer Engineering

Shahrooz Salehi Alavi . . . . . Tehran, Iran

Hayrettin Buyuktepe . . . . . Istanbul, Turkey

Vikas Chandra . . . . . Raleigh

Stephen Christopher DeMarco . . . . . Clinton

Drew Patrick Gugliotta . . . . . Raleigh

Perrin Jay Hirshman . . . . . East Brunswick, NJ

Matthew David Jennings . . . . . Rochester, MN

Michael Edward Murphy . . . . . Durham

Alexander Gist Phelps . . . . . Chapel Hill

John Perumalsamy Pushrarak . . . . . Madras, India

Dharmaraja Sivaramakr Rajan . . . . . Raleigh

Bryan Cole Staats . . . . . Ravenswood, WV

Jason Matthew Sullivan . . . . . Raleigh

Venkata R. M. Surapaneni . . . . . Chapel Hill

Han Zhu . . . . . Cary

## Computer Science

Antoine Larmanjat	Airvault, France
Muralidhar Narasimha	Raleigh

## Crop Science

Andrea Josefina Cardinal	Buenos Aires, Argentina
Alfred Stanley Culpepper	Woodland
Katherine Mary Jennings	Apex
Cassandra Edgar Webster	Mentor, OH
Anthony David White	Payson, IL

## Ecology

Keith Richard Markland	Columbia, SC
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## Electrical Engineering

Timothy Alan Brenneman	Raleigh
Alan Dennis Cannon	Schaumburg, IL
Mark Cameron Cassada	Clemmons
Colleen Patricia Crowley	Edison, NJ
Bruce Eliot Duewer	Oakton, VA
Matthew Holt Frantz	Greensboro
Matthew Burdet Harris	Greenville
Richard Mark LeGrand	Edmond, OK
Xiaofeng Lu	Shanghai, People's Republic Of China
Marcel Arrobio Lumaban	Cary
Stephen John Mann	Durham
Todd Frederick Miller	Cincinnati, OH
Lixin Nie	Hefei, People's Republic Of China
Melita Danyel Parker	Clinton
Shetal Natwarbhai Patel	Apex
Dhirendra Kumar Pathak	Dallas, TX
Nabil Hussein Rabbani	Saidu, Lebanon
William Edward Rader III	Cary
Barbara Ann Scarlette	Greensboro
Eric Arvidson Staton	Raleigh
Hemant Chandrakant Sura	Raleigh
Sherril Ann Taylor	Raleigh
Stephen Kent Taylor	Durham
Stephen Robert Taylor	Thomasville
Jason Tennant Teeter	Raleigh
Hon Ngoc Tran	Raleigh
Eric Matthew Vogel	Charleroi, PA
Lori Paull Wynkoop	Grand Junction, CO

## Entomology

Edward Douglas Karoly	Pickerington, OH
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## Food Science

Ellen Margaret Ciplinski	Newington, CT
Kay Lynn McNeill	College Station, TX
Meliati Simon	Medan, Indonesia
Ragip Unal	Adana, Turkey

## Forestry

Robert Patrick Crook	Litchfield, CT
Jennifer Leigh Jennings	Cary
Mary-Margaret Sykes McKinney	Wilson
Gregory Felix Rayo Meyer	Kigali, Rwanda
Cheryl Case Stewart	Kenneth City, FL

## Higher Education Administration

Jason Sloan Boyd	Erie, PA
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## Horticultural Science

Patrick John McGuigan	South Euclid, OH
John Njoroge Njenga	Lari Division, Kenya
Robert Joseph Rouse	Charlestown, RI
Hunter LaMar Stubbs	Gastonia

## Industrial Engineering

+ Leigh Ann Clarke Brain	Raleigh
Sharon Melissa Bennett Joines	Raleigh
Daniel Paul Kelaher	New Providence, NJ
+ Christopher John Petra	Franklin, KY
Steven Alexander Reynolds	Knoxville, TN
+ Andrew Zozom, Jr.	Raleigh

## Management

Sonali Agrawal	Raleigh
Robert Christian Brantley	Raleigh
Jacqueline Nina Brown	Raleigh
Jeffrey Jude Bulger	Cary
Amy Elizabeth Crossley	Cincinnati, OH
Laurie Newkirk Dunston	Raleigh
Steven Atwood Edwards	Pittsboro
Randall Scott Eichelberger	King Of Prussia, PA
Chung-Ren Fang	Taipei, Taiwan, Republic Of China
Helene Aline Flament	Campagne Les Wardrecques, France
Owe Lennart Forsberg	Stockholm, Sweden
Stefan Forster	Munich, Germany
Jason Mathieu Fryar	Raleigh
James Lester Hager, Jr.	Cary
Donald Hale, Jr.	Raleigh
Stephen Thomas Hamborg	Des Moines, IA

Todd Robert Hargnett	Raleigh
Richard Lee Ingle	Winston-Salem
Christopher Jones	Raleigh
Brian Richard Kelly	Brooklawn, NJ
William Denes Kovacs	Raleigh
David Lee Kurtz, Jr.	Raleigh
Jie Ma	Leshan, People's Republic Of China
Courtney LaTanya Mack	Raleigh
Steven Francis May	Cali, Colombia
William Patrick McCrorie	Floral Park, NY
Dirrek Deon Moore	Raleigh
Michael David Nelson	Apex
Kimberly Mitchell Neptune	Selma
David Cameron Parker, Jr.	Montgomery, AL
Robert John Pecoske	Kenosha, WI
John Charles Rinehart	Dunkirk, MD
John Irvin Ring	Dobson
Amy Teresa Ruggiero	Raleigh
Keith David Sabol	Cary
Zakhia Serhani	Roubaix, France
Renuka Kocherlakota Singh	Pune, India
Jun Song	Beijing, People's Republic Of China
Brent Eugene Taylor	Glen Alpine
Susan Elizabeth Taylor	Raleigh
Robert Scott VanKirk	Chambersberg, PA
Sripriya Vijayasekaran	Madras, India
Kenneth Lee Wood	Nashville, TN

### Marine, Earth And Atmospheric Sciences

Craig Brooks Lane	Raleigh
Glenn Shubert Shell, Jr.	Claremont
Fredrick Stratton de Pollok	Sedalia, CO
Guwei Zhu	Hangzhou, Zhejiang, People's Republic Of China

### Materials Science And Engineering

Kevin Lloyd Beaman	Raleigh
Konrad Fredrich Jarausch	Chapel Hill
Russell Warren Patterson	Tallassee, AL
Robert Joseph Ratway	Ann Arbor, MI
Keith Wayne Sharp	Arkadelphia, AR

### Mathematics

Robert Nelson Hunt	Raleigh
Hiroshi Ishikawa	Yonezawa, Japan
Maria Tourkodimitri	Raleigh

### Mechanical Engineering

Cory Allen Cataldo	Chesapeake, VA
Adam Brian Chmielewski	Salisbury

Paul Joseph Cromer	Raleigh
William Arthur Harris Jr.	Durham
Samit Ashok Khedekar	Bombay, India
Danielle Spinicci Labrozzi	China Grove
Quan Ma	Beijing, People's Republic Of China
James Paul McKay	Raleigh
Vittorio Carlo Orsini Jr.	High Point
Kazushige Yano	Kumamoto, Japan

### Nuclear Engineering

Richard Lonnie Altstatt	Tullahoma, TN
Savvas Victor Morris	Thessaloniki, Greece

### Operations Research

+ Leigh Ann Clarke Brain	Raleigh
+ Christopher John Petra	Franklin, KY
+ Andrew Zozom, Jr.	Raleigh

### Parks, Recreation And Tourism Management

Kelly Dean Barthlow	St. Albans, WV
Michael John Branigan	Delhi, NY
David Randall Dannenberg	Lilburn, GA
David Christopher Holder	Wingate

### Physiology

Christopher Douglas Hepler	High Point
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### Plant Pathology

Lisa Marie Ferguson	Raleigh
Joseph Edward Flaherty	Fayetteville
Dawn Elizabeth Fraser	Edinburgh, Scotland
Una Jean Harrison	Asheville
Herman Duardo Hidalgo	Heredia, Costa Rica
Scott Louis Walker	Raleigh

### Psychology

Mary Taylor Hartman	Raleigh
Karen Ann McGee	Raleigh
Heather Lee Osborne	Morehead City

### Rural Sociology

Michelle Renee Beck-Warden	Raleigh
Diane Coucoulas Calleson	Durham
Katherine Ann Hyde	Raleigh



## Technical Communication

Javier Edward Berkhoff	Raleigh
Christina Biliouris	Fayetteville
John Lee Bumgarner	Raleigh
Cindy Karen Haga	Winston-Salem
Joseph Laurence LaCroce	Raleigh
Michelle Corbins Nichols	Raleigh
Leesa Kaye Clark Payne	Burlington
Deborah Gay Walker	Roxboro
Stephanie Edwards Waters	Cary

## Technology Education

Craig Thomas Barber	Durham
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## Textile Chemistry

Cordula Christina Guerth	Ochsenfurt, Germany
Nilesh Harinarayan Rathi	Pune, India

## Textile Engineering

James Christopher Love	Statesville
Benjamin Robert Martin	Winston-Salem

## Textiles

Henderic Wilhelm Martin Aarnink	Charlotte
Ned Thaxton Beck	Charlotte
Howard Andrew Hardee	New Hill
Gregory Joseph Loughry	Raleigh
Fangning Sun	Weifang, People's Republic Of China
Mia Dawn Swann	Ellenboro

## Training And Development

Rinnette Minor Godwin	Raleigh
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## Veterinary Medical Sciences

Anita Ann Colbert	Rock Hill, SC
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## Wood And Paper Science

Douglas Frank Falls	Franklin, VA
Timothy George Smith	Clayton

## Zoology

Susan Mary Campbell	Raleigh
Janet Lee Dow	Kinston
Lori Ann Frear	Grahamsville, NY

Michael Joseph Guzy	Silex, MO
Leopoldo Miranda	Rio Piedras, PR
Todd Clifford Wenzel	West Allis, WI
Steven Gregory Williams	Fuquay-Varina

## DOCTOR OF EDUCATION DEGREES

Candy Lee Metz Beal, Curriculum And Instruction  
Raleigh, North Carolina

**Dissertation:** Case Study on the Use of Reading/Writing Workshop to Teach English Language Arts to At-risk Adolescents. (Under the direction of John F. Arnold.)

Anne Eleanor Doster, Adult And Community College Education  
Lancaster, South Carolina

**Dissertation:** A Qualitative Study of Adaptation to Job Loss of Managerial Males at Mid-life. (Under the direction of Barbara M. Kirby.)

Pamela Tipton Hilbert, Adult And Community College Education  
Harrisonburg, Virginia

**Dissertation:** Student Perceptions of Difficulties to Participation in the Focused Industrial Training Programs of a North Carolina Community College. (Under the direction of Rosemary Gillett-Karam.)

Joseph Milton Hodges, Sr., Adult And Community College Education  
Wallace, North Carolina

**Dissertation:** The Governor's Commission on Education beyond the High School The Carlyle Commission 1961-1963. (Under the direction of J. Conrad Glass, Jr. and Scipio A. J. Colin III.)

Cynthia Summerlin Jones, Adult And Community College Education  
Greenville, North Carolina

**Dissertation:** Factors Associated with Women Students' Curriculum Choice in North Carolina Community Colleges. (Under the direction of Ronald W. Shearon.)

Elizabeth Plyler Myers Lee, Educational Administration And Supervision  
Rich Square, North Carolina

**Dissertation:** The Sensitivity of Criterion-referenced Test Reliability to the Position of the Cutoff Score. (Under the direction of Raymond G. Taylor, Jr..)

Cathy Marie Lowery, Adult And Community College Education  
Pembroke, North Carolina

**Dissertation:** Leadership Behaviors and Job Performance of County Extension Directors in the North Carolina Cooperative Extension Service. (Under the direction of Ronald W. Shearon.)

Ruth Pwiti Mufandaedza, Adult And Community College Education  
Mutare, Zimbabwe

**Dissertation:** Psychosocial Factors That Influence College Students' Knowledge and Use of Condoms for HIV Prevention in Mutare, Zimbabwe. (Under the direction of Nancy E. Hagan and Edgar I. Farmer.)

Howard Stephen Paris, Adult And Community College Education  
Warsaw, North Carolina

**Dissertation:** Perceptions of Academic Deans in the North Carolina Community College System Regarding Current and Future Application of Total Quality Management (TQM) Principles in an Academic Setting. (Under the direction of Edgar I. Farmer.)

Lucille Cook Roth, Adult And Community College Education  
Beaufort, South Carolina

**Dissertation:** The Relationship Between Student Ratings and Faculty Responses in a Community College Setting. (Under the direction of George A. Baker III.)

Kathryn Baker Smith, Adult And Community College Education  
Jamestown, North Carolina

**Dissertation:** The Role of the North Carolina Community College System in the Economic Development of the State's Communities. (Under the direction of Edgar J. Boone.)

Sarah Wallace Somerville, Adult And Community College Education  
Fredericksburg, Virginia

**Dissertation:** An Examination of EEO-6 and IPEDS Reports to Determine the Status of Women and Minorities in Leadership Positions of Two-year Public Institutions of Higher Education in the United States. (Under the direction of Rosemary Gillett-Karam and George A. Baker III.)

Sharon Scarborough Waters, Adult And Community College Education  
Tarboro, North Carolina

**Dissertation:** Participation Patterns of Older Students in the North Carolina Community College System and Reasons Given for Their Participation. (Under the direction of J. Conrad Glass, Jr.)

LaVerne Robinson Weldon, Curriculum And Instruction  
Raleigh, North Carolina

**Dissertation:** Making Connections: Exploring the Effects of a Culturally Relevant Curriculum on Writing for Low-achieving Eighth-grade African-American Students. (Under the direction of John F. Arnold.)

## DOCTOR OF PHILOSOPHY DEGREES

Nitin Kumar Agarwal, Operations Research  
Indore, India

**Dissertation:** Percentile Goal as a Performance Criterion in a Multiclass GI/G/1 Queueing System. (Under the direction of Ioannis Viniotis.)

Robert Emerson Allison, Jr., Textile Technology Management  
Cleveland, North Carolina

**Dissertation:** Design and Utilization of the Textile and Apparel Business Information System (TABIS): A Data Warehouse for Econometric and Demographic Textile- and Apparel-related Data. (Under the direction of Trevor J. Little and Moon Won Suh.)

Christopher Arcona, Mechanical Engineering

Burke, Virginia

**Dissertation:** Tool Force, Chip Formation and Surface Finish in Diamond Turning. (Under the direction of Thomas A. Dow and John A. Bailey.)

Manpreet Singh Arora, Fiber And Polymer Science

New Delhi, India

**Dissertation:** Modeling and Control of the Dyeing of Nylon by Dye and Chemical Metering. (Under the direction of Ralph McGregor.)

Anita Rae Bahe, Forestry

Aurora, Nebraska

**Dissertation:** Science and Policy: The Biological, Environmental and Policy Implications of Organic Waste Reutilization in Urban Landscape Management (Under the direction of Ellis B. Cowling.)

Barbara Ann Bailey, Biomathematics

University Park, Maryland

**Dissertation:** Asymptotics and Applications of Local Lyapunov Exponents. (Under the direction of Stephen P. Ellner and Douglas W. Nychka.)

Cathleen Flake Barrows, Statistics

Cary, North Carolina

**Dissertation:** The Effect of Measurement Error on Two-sample Tests. (Under the direction of Leonard A. Stefanski.)

Robert Davey Belding, Horticultural Science

Raleigh, North Carolina

**Dissertation:** Epicuticular Wax of Apple and Its Relationship to Sooty Blotch Incidence and Captan Retention. (Under the direction of Eric Young and Sylvia M. Blankenship.)

Samir Mohamed Benmakhlof, Textile Technology Management

Fez, Morocco

**Dissertation:** Adaptive Loom Control for Yarn Defects. (Under the direction of Mansour H. M. Mohamed and Perry L. Grady.)

Carson Lee Bennett II, Physics

South Boston, Virginia

**Dissertation:** Steady-state Simulations of Parallel and Oblique Collisionless Shocks. (Under the direction of Donald C. Ellison.)

Bonita Louise Blake, Toxicology

Chadbourn, North Carolina

**Dissertation:** Flavin-containing Monooxygenases: Occurrence in Brain and Role in the Hepatic Microsomal Metabolism of a Phenothiazine Antipsychotic. (Under the direction of Ernest Hodgson.)

Karim Samy Mina Boutros, Electrical Engineering

Alexandria, Egypt

**Dissertation:** Low Temperature Vapor Phase Epitaxy of III-V Compounds for Optoelectronic Devices. (Under the direction of Salah M. Bedair.)

Gavin Richard Cato, Computer Engineering  
Seminole, Florida

**Dissertation:** Partitioning and Scheduling DSP Algorithms for Parallel Execution Using the Order Graph Method. (Under the direction of Winsler E. Alexander and Douglas S. Reeves.)

Harpreet Singh Chadha, Civil Engineering  
New Delhi, India

**Dissertation:** Formal Specification and Verification of Concurrent Systems. (Under the direction of John W. Baugh, Jr..)

Richard Allen Chassey, Counselor Education  
Louisburg, North Carolina

**Dissertation:** The Relationship of Moral Judgement, Dysfunctional Cognitive Attitudes and Perception of the Residence Hall Social Environment to Residence Hall Student Disciplinary Status. (Under the direction of Lawrence K. Jones.)

Xuzhou Chen, Applied Mathematics  
Raleigh, North Carolina

**Dissertation:** The Matrix Iterative Analysis. (Under the direction of Robert E. Hartwig.)

Kwanho Choi, Mechanical Engineering  
Taejon, South Korea

**Dissertation:** Composite Laminated Shells under Transverse End Load. (Under the direction of James C. Mulligan.)

Joseph Jerome Cione, Marine, Earth And Atmospheric Sciences  
Baldwin, New York

**Dissertation:** The Impact of Gulf Stream-induced Diabatic Forcing on Coastal Mid-Atlantic Surface Cyclogenesis. (Under the direction of Sethu Raman.)

Polly Kathleen Dinsmore, Food Science  
Dallas, Texas

**Dissertation:** Genetic and Mutational Studies of the *abiA* Phage Resistance Gene in *Lactococcus lactis* and Identification of a Phage Genomic Region Involved in Sensitivity to *AbiA*. (Under the direction of Todd R.Klaenhammer.)

Holly Joyce Dunham, Microbiology  
Elm City, North Carolina

**Dissertation:** The Role of *Lactobacillus reuteri* in Controlling Avian Growth Depression (AGD). (Under the direction of Walter J. Dobrogosz.)

Don Jayantha Ediriwickrema, Forestry  
Tangalle, Sri Lanka

**Dissertation:** Modeling and Analysis of AVHRR Data for Biogenic Emission Inventory System (BEIS). (Under the direction of Siamak Khorram.)

Yusef Fahmy, Materials Science And Engineering  
Raleigh, North Carolina

**Dissertation:** Modification of the Mechanical Behavior in Al5 Intermetallic Compounds by Structural Changes Induced by Interstitial Alloying. (Under the direction of Carl C. Koch.)



Mitra Fiuizat, Microbiology  
Abadan, Iran

**Dissertation:** Study of *Lactobacillus reuteri* *in vitro*, *in situ* and in the Gastrointestinal Tract of CD-1 Mice. (Under the direction of Walter J. Dobrogosz.)

Darren Louis Frechette, Economics  
Bristol, Connecticut

**Dissertation:** Three Essays Concerning Commodity Storage under Rational Expectations. (Under the direction of Walter N. Thurman.)

Debra Lynn Frederick, Genetics  
Shreveport, Louisiana

**Dissertation:** The Regulation of Protein Phosphatase Type 1 in the Yeast, *Saccharomyces cerevisiae*. (Under the direction of Kelly G. Tatchell and William R. Atchley.)

Miressa Duffera Garoma, Soil Science  
Addis Ababa, Ethiopia

**Dissertation:** Biogeochemistry of Phosphorus in the Highland Plateau Soils of Ethiopia. (Under the direction of Wayne P. Robarge and T. Jot Smyth.)

Zacharia George, Civil Engineering  
Kerala, India

**Dissertation:** Development and Evaluation of Methods for Coupled Seismic Analysis of Piping Systems. (Under the direction of Ajaya K. Gupta.)

Ashok Kumar Ghosh, Wood And Paper Science  
Lucknow, India

**Dissertation:** The Role of Ozone in Multistage TCF Bleaching Processes. (Under the direction of Rudra P. Singh and Josef S. Gratzl.)

Bertha Smith Gorham, Education Research And Policy Analysis  
Baltimore, Maryland

**Dissertation:** Changing Schools for Children: An Evaluation of a Preschool Intervention Program for At-risk Children. (Under the direction of Robert C. Serow and Elizabeth MacPhail-Wilcox.)

Geoffrey Ian Graham, Genetics  
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**Dissertation:** Mapping Quantitative Trait Loci Using Specialized Populations. (Under the direction of Charles W. Stuber.)

Donna Marie Grant, Toxicology  
Easton, Pennsylvania

**Dissertation:** A Comparison of the Distribution, Metabolism and Excretion of Two Benzoylphenylurea Pesticides, Diflubenzuron and Lufenuron in the Rat and Mouse. (Under the direction of Patricia E. Levi.)

David Herring Hardy, Soil Science  
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**Dissertation:** Laboratory, Greenhouse and Field Studies on Atrazine Dissipation with Emphasis on Volatilization. (Under the direction of Jerome B. Weber.)

Robert Thomas Harger, Jr., Mathematics

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**Dissertation:** Realization of Level Two Integrable Highest Weight Representations of the Affine Lie Algebra  $A_7^{(2)}$ . (Under the direction of Kailash C. Misra.)

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**Dissertation:** The Impact of Perceived Risk on Low Income, Rural, Postmenopausal Women's Decisions to Get Mammograms. (Under the direction of Donald W. Drewes.)

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**Dissertation:** The Effects of a Graphing Approach College Algebra Curriculum on Students' Understanding of the Function Concept. (Under the direction of Karen S. Norwood.)

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**Dissertation:** Development of Robotic Manipulator Learning Controls Using Artificial Neural Networks. (Under the direction of Gordon K. F. Lee and Leonhard E. Bernold.)

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**Dissertation:** Mathematical Modeling of Mass Transport of Inhaled Gases in the Upper Respiratory Tract. (Under the direction of Peter S. Fedkiw.)

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**Dissertation:** Linear Stability of Hypersonic Flows in Thermal and Chemical Nonequilibrium. (Under the direction of Ndaona Chokani and Graham V. Candler.)

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**Dissertation:** Near-field Optical Spectroscopy. (Under the direction Hans D. Hallen and Michael A. Paesler.)

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**Dissertation:** The Role of Natural Enemies in Ecology and Evolution of *Heliothis virescens* on Transgenic Plants. (Under the direction of Fred L. Gould.)

Elizabeth Bright Kegley, Nutrition

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Bombay, India

**Dissertation:** Modeling of Phase Separation in Aqueous Two-phase Systems Containing Salts. (Under the direction of Carol K. Hall.)

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**Dissertation:** On Using Artificial Neural Networks and Genetic Algorithms to Optimize Performance on an Electronic Nose. (Under the direction of H. Troy Nagle, Jr..)

Richard Scott Kern, Materials Science And Engineering  
Greensboro, North Carolina

**Dissertation:** Microstructural and Electrical Characterization of Silicon Carbide and Aluminum Nitride Thin Films Grown by Gas-source Molecular Beam Epitaxy. (Under the direction of Robert F. Davis.)

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Singapore

**Dissertation:** Callinectin, an Antibacterial Peptide from Blue Crab, *Callinectes sapidus* Rathbun (1896), Hemocytes. (Under the direction of Edward J. Noga.)

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**Dissertation:** Analysis of Axisymmetrically Loaded Filament Wound Composite Cylindrical Shells. (Under the direction of Fuh-Gwo Yuan.)

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**Dissertation:** Feasibility and Economic Studies of Novel Technologies in the Pulp and Paper Industry through Process Simulation. (Under the direction of Josef S. Gratzl.)

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**Dissertation:** Lead Disrupts Lipid Metabolism in Human, Rodent and Avian Species: Consequences for Immune Function and Disease Resistance. (Under the direction of William E. Donaldson.)

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Hyderabad, India

**Dissertation:** Incremental Analysis and Testing of Distributed Software Systems. (Under the direction of Kuo-Chung Tai.)

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**Dissertation:** Properties of  $\text{Si}_x\text{Ge}_{1-x}$  Alloy Surfaces and  $\text{Co}/\text{Si}_x\text{Ge}_{1-x}$  Interfaces. (Under the direction of Robert J. Nemanich.)

Andres Humberto La Rosa, Physics  
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**Dissertation:** Time-resolved Near-field Imaging of Carrier Dynamics in Silicon. (Under the direction of Michael A. Paesler.)

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**Dissertation:** Iron and Iron-Protein Relationships in *Heterodera glycines*-infected Soybean. (Under the direction of Kenneth R. Barker and Jeng-Sheng Huang.)

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Bangkok, Thailand

**Dissertation:** Federal Reserve Policy Reaction Functions: An Empirical Investigation. (Under the direction of Douglas K. Pearce.)

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Cheng-Ming Li, Veterinary Medical Sciences  
Chengdu, Sichuan, People's Republic Of China

**Dissertation:** Mucin Biosynthesis: A. Molecular Cloning and Expression of Bovine Mucin Core 2  $\beta$ 6-N-Acetyl-glucosaminyltransferase cDNA; B. Development of Monoclonal Antibodies and Immunoassay of Guinea Pig Tracheal Mucins. (Under the direction of Kenneth B. Adler.)

Xiang Lin, Nutrition  
Shenyang, Liaoning, People's Republic Of China

**Dissertation:** Bacterial Keratinase: Purification, Gene Structure and Cloning for Hyperexpression. (Under the direction of Jason C. H. Shih.)

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Johnson City, Tennessee

**Dissertation:** The Effects of a Peer Mediation Training Program on High School and Elementary School Students. (Under the direction of Edwin R. Gerler, Jr.)

Guoying Ma, Crop Science  
Jiangsu, People's Republic Of China

**Dissertation:** Differential Responses of Weed Species to Prosulfuron. (Under the direction of Harold D. Coble and Frederick T. Corbin.)

Wyatt Alexander Mangum, Genetics  
Richmond, Virginia

**Dissertation:** Modeling the Population Biology and Population Genetic Dynamics of the Parasite *Varroa jacobsoni* Oudemans on Its Host, *Apis mellifera* L., with Nonlinear Difference Equations. (Under the direction of Trudy F. Mackay.)

Vaidyanath Mani, Applied Mathematics  
Madras, India

**Dissertation:** On Black Box Interpolation over Arbitrary Fields. (Under the direction of Robert E. Hartwig.)

Pedro Manjarrez-Sandoval, Crop Science  
Culiacan, Sinaloa, Mexico

**Dissertation:** Genetic Variance Among Inbred Lines and  $F_2$  Heterosis as Predicted by Coefficient of Parentage and RFLP-based Genetic Similarity Estimates in Soybean. (Under the direction of Thomas E. Carter, Jr.)

Lauren Michaela McIntyre, Genetics  
New Brunswick, New Jersey

**Dissertation:** DNA Fingerprinting and Hardy-Weinberg Equilibrium: A Continuous Approach to the Analysis of VNTR Fragment Lengths. (Under the direction of Bruce S. Weir and Stephanie E. Curtis.)

Jian Meng, Fiber And Polymer Science  
Jiangxi, People's Republic Of China

**Dissertation:** Study of Carding Dynamics. (Under the direction of Abdelfattah M. Seyam.)

William Edward Milholen II, Aerospace Engineering  
Asheville, North Carolina

**Dissertation:** Computational Analysis of Semi-span Model Test Techniques. (Under the direction of Ndaona Chokani.)

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Rochester, New York

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Ramesh Murthy, Forestry  
Raleigh, North Carolina

**Dissertation:** Effect of CO<sub>2</sub>, Nutrients and Water on the Physiology of Loblolly Pine Trees, (*Pinus taeda* L.). (Under the direction of Phillip M. Dougherty and Howard L. Allen, Jr.)

Meltem Asli Narter, Fiber And Polymer Science  
Izmir, Turkey

**Dissertation:** Micromechanics of Three-dimensional Fiberweb Nonwovens: Constitutive Equations. (Under the direction of Subhash K. Batra and David R. Buchanan.)

Wendy Levin Newby, Psychology  
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**Dissertation:** Social Functioning Late Effects in Child and Adolescent Survivors of Cancer. (Under the direction of Patricia F. Horan and Cathy L. Crossland.)

Ines Josefina Pagan, Veterinary Medical Sciences  
Santo Domingo, Dominican Republic

**Dissertation:** Actions of Interleukin-1 and Prostaglandin E<sub>2</sub> on Rabbit Ciliary Epithelial Cells. (Under the direction of Lloyd N. Fleisher and Arthur L. Aronson.)

John Arvle Patten, Mechanical Engineering  
Kannapolis, North Carolina

**Dissertation:** Molecular Dynamics Modelling and Analysis of the Precision Machining of Germanium Including the High Pressure Phase Transformation. (Under the direction of John S. Strenkowski and Paul H. DeHoff.)



Mohan Dajirao Pawar, Fiber And Polymer Science  
Malegaon, India

**Dissertation:** Analyzing the Thermal Protective Performance of Single Layer Garment Materials in Bench Scale and Manikin Tests. (Under the direction of Roger L. Barker and Hechmi Hamouda.)

Dai Hung Peters, Forestry  
Kokomo, Indiana

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Lee Michael Prochaska, Crop Science  
San Antonio, Texas

**Dissertation:** The Role of Glyphosate for Weed Management in Glyphosate Tolerant Cotton. (Under the direction of Harold D. Coble.)

Narayan Bahadar Rajbhandari, Forestry  
Lalitpur, Nepal

**Dissertation:** The Use of Level Spreaders to Enhance Effectiveness of Forested Filter Zones by Dispersion of Agricultural Runoff. (Under the direction of James D. Gregory.)

Noah Nathan Ranells, Soil Science  
New York, New York

**Dissertation:** Winter Annual Grass-Legume Bicultures for Efficient Nitrogen Management in No-till Corn Production Systems. (Under the direction of Michael G. Wagger.)

Victoria Lee Reardin, Psychology  
Bloomsburg, Pennsylvania

**Dissertation:** Predicting Leadership Behaviors from Personality as Measured by the Myers-Briggs Personality Indicator. (Under the direction of Samuel B. Pond III.)

Jeffrey Andrew Royle, Statistics  
Manchester, Michigan

**Dissertation:** Statistical Inference for Heterogeneous Random Fields. (Under the direction of Douglas W. Nychka.)

Frank Harrison Ruggiero, Marine, Earth And Atmospheric Sciences  
Lyndhurst, New Jersey

**Dissertation:** Short-term Forecasting with a Mesoscale Model Using Four-dimensional Data Assimilation of Asynoptic Data. (Under the direction of Rangarao V. Madala and Seth Raman.)

Jeffrey Richard Ryan, Entomology  
Syracuse, New York

**Dissertation:** Host-associated Genomic and Antigenic Variance in Diverse Strains of *Borrelia burgdorferi*, the Etiologic Agent of Lyme Disease. (Under the direction of Charles S. Apperson and Jay F. Levine.)

James David Schuman, Food Science  
Mt. Pleasant, South Carolina

**Dissertation:** Thermal and Biological Inactivation in Bacterial Pathogens in Liquid Egg. (Under the direction of Brian W. Sheldon.)

Liang Shi, Nuclear Engineering  
Beijing, People's Republic Of China

**Dissertation:** Nuclear Reactor Loose Part Impact Activity and Damage Mechanisms. (Under the direction of Charles W. Mayo and J. Michael Doster.)

Steven John Smith, Microbiology  
Freeport, Illinois

**Dissertation:** Physiological Influence of Sterol on Gene Regulation and Respiration in the Yeast, *Saccharomyces cerevisiae*. (Under the direction of Leo W. Parks.)

Christopher Gordon Taylor, Genetics  
St. Charles, Missouri

**Dissertation:** Characterization of a Tobacco Promoter and Its Applications in Creating Nematode-resistant Transgenic Plants. (Under the direction of Mark A. Conkling and Charles S. Levings III.)

Carl Stephen Tennessee, Biological And Agricultural Engineering  
Ft. Walton Beach, Florida

**Dissertation:** Development of a Flowing Plasma Reactor for Surface Biodecontamination. (Under the direction of Larry F. Stikeleather and Roger P. Rohrbach.)

Stuart Marc Thomas, Chemical Engineering  
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**Dissertation:** Experimental and Theoretical Investigation of Nitrogen-substituted Aromatic Metabolism. (Under the direction of Steven W. Peretti and David F. Ollis.)

Jiunn-Yann Tsai, Electrical Engineering  
Taichung, Taiwan, Republic Of China

**Dissertation:** Drain Engineering for Deep Submicrometer MOSFET Devices. (Under the direction of Carlton M. Osburn.)

Kuenhi Tsai, Biomathematics and Statistics  
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**Dissertation:** Survival Analysis for Telemetry Data in Animal Studies. (Under the direction of Kenneth H. Pollock and Cavell Brownie.)

Setyo Dwi Utomo, Crop Science  
Bandar Lampung, Indonesia

**Dissertation:** Evaluation of Four Peanut *In vitro* Culture Methods and a Model Transgene Expression System Based on *Agrobacterium*-mediated Transformation of Mature Leaves. (Under the direction of Thomas G. Isleib.)

Mark Harold Van Horn, Electrical Engineering  
Raleigh, North Carolina

**Dissertation:** Three-dimensional Boundary Detection in Intracoronary Ultrasound Images. (Under the direction of Wesley E. Snyder.)

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**Dissertation:** Blocking Probabilities in ATM Traffic Management. (Under the direction of Arne A. J. Nilsson and Harry G. Perros.)

Charles Arthur Walker, Jr., Horticultural Science  
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**Dissertation:** The Cherokee Rose in the Southeastern United States: An Historical Perspective. (Under the direction of Dennis J. Werner and James C. Raulston.)

Theodore Michael Webster, Crop Science  
Mentor, Ohio

**Dissertation:** Purple Nutsedge (*Cyperus rotundus*) Population Dynamics and Interference in Corn (*Zea mays*) and Cotton (*Gossypium hirsutum*). (Under the direction of Harold D. Coble.)

Paul Steven Weinhold, Biological And Agricultural Engineering  
Milwaukee, Wisconsin

**Dissertation:** Nondestructive Vibrational Testing as a Means of Assessing the Directional Elastic Moduli of Vertebral Cancellous Bone of Ovariectomized Animals. (Under the direction of C. Frank Abrams, Jr. and Simon C. Roe.)

Jack Martin Weiss, Biomathematics  
Raleigh, North Carolina

**Dissertation:** The Cubic Ternary Complex Model: A Heuristic for Classifying Equilibrium Pharmacological Models and for Understanding Efficacy and Apparent Affinity in These Models. (Under the direction of Stephen P. Ellner and Paul H. Morgan.)

Kennedy Sirengo Wekesa, Zoology  
Nairobi, Kenya

**Dissertation:** Organizational and Activational Effects of Androgens in a Reflex Ovulator, the Pine Vole (*Microtus pinetorum*). (Under the direction of John G. Vandenberg.)

Mark Gordon Wensell, Physics  
Darlington, Maryland

**Dissertation:** Quantum Molecular Dynamics Simulation of Semiconductor Surfaces. (Under the direction of Jerzy Bernholc.)

Nancy Mason White, Forestry  
Cary, North Carolina

**Dissertation:** Spatial Analysis of Fecal Coliform Bacteria Fate and Transport. (Under the direction of Hugh A. Devine.)

Cheung (David) Wong, Computer Science  
Hong Kong

**Dissertation:** Performance Enhancement Techniques and Methodologies for Highly Parallel Processing Systems in Scientific Computational Applications. (Under the direction of Edward W. Davis, Jr. and Robert E. Funderlic.)

Joosung Yang, Immunology  
Seoul, South Korea

**Dissertation:** Pathogenic Molecular Clone of Feline Immunodeficiency Virus (FIV): Characterization of the FIV- NCSU1 Molecular Clone JSY3. (Under the direction of Wayne A. F. Tompkins.)

Ahmet Yigit, Industrial Engineering  
Erzurum, Turkey

**Dissertation:** A Cell Formation Methodology Based on Fuzzy Set Theory. (Under the direction of Jaime Trevino and Thom J. Hodgson.)

Zili Zhang, Toxicology

Shanghai, People's Republic Of China

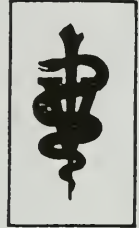
**Dissertation:** Potential Mechanisms of Bis(2-choloroethyl) Sulfide-induced Cutaneous Vesication. (Under the direction of Nancy A. Monteiro-Riviere.)

Xiaolong Zhang, Economics and Statistics

Changchun, People's Republic Of China

**Dissertation:** Integrating Resource Types, Access Conditions and Preference Differences into Models for Use and Nonuse Values: The Case of Marine Debris Control. (Under the direction of Thomas Johnson.)

# College of Veterinary Medicine



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Dr. Susan S. Osborne	Department of Curriculum & Instruction College of Education and Psychology
Dr. Samuel L. Pardue	Department of Poultry Science College of Agriculture and Life Sciences
Dr. J. Wayne Place	Department of Architecture School of Design
Mr. Herman A. Sampson	Department of Agricultural and Resource Economics College of Agriculture and Life Sciences
Dr. Elisabeth A. Wheeler	Department of Wood and Paper Science College of Forest Resources
Dr. James R. Wilson	Department of Industrial Engineering College of Engineering

## AWARDS FOR ACHIEVEMENT 1995-96

### COLLEGE OF AGRICULTURE AND LIFE SCIENCES

*Highest Ranking Scholars:* Holly A. Chandler, Chapin, SC; Deborah E. Citrin, Thomasville; Henry C. McDade, Hillsborough; Melanie L. Tew, Stedman, Christopher C. Wilms, Cary

*Agri-Life Council Outstanding Club Member Awards:*

*African American Science and Health Society:* Shirley E. Owino, Raleigh

*Agricultural & Extension Education Club:* Lori L. Lucas, Mt. Holly

*Agronomy:* Jonathan T. Linker, Mooresville

*Animal Science:* David F. Correll, Cleveland

*Biochemistry:* Kimberly L. Whitehead, Durham

*Biological and Agricultural Engineering: Science Curriculum -* Gary C. Miller, Cary

*Agri-Business:* Ronnie K. Hill, Temple, TX;

*Food Science:* Carla M. Shook, Conover

*Horticultural Science:* Carl P. Myers, Jr., Morganton

*Jeffersonians Club:* Scott H. Phillips, Halifax

*National Agri-Marketing Association:* Douglas S. Goodwin, Vale

*NCSU Collegiate 4-H Club:* Joseph S. Enroughty, Nashville

*Poultry Science:* Kevin I. Jones, Elk Park

*Pre-Medical and Pre-Dental:* John P. Fernald, Autryville

*Pre-Veterinary:* Jennifer L. Hasty, Roanoke Rapids; Kip W. Lopez, Morrisville; Angela K. Redinger, Fairmont; John D. Shevock, Dover, DE

*Wildlife Biology:* Brent N. Lineberger, Raleigh

*Agricultural and Extension Education*

*Outstanding Senior:* Jennifer Roney, Mebane

*Agricultural and Resource Economics*

*Outstanding Senior:* Rhonda J. Hunt, Clayton

*Scholastic Achievement:* Rosemary D. Bowen, Walnut Cove

*Wall Street Journal:* Rosemary D. Bowen, Walnut Cove

### *Agronomy*

*Senior Highest Scholastic Average in the Agronomy Club:* Jamie A. Boaz, Yanceyville

*American Society of Agronomy Award, Most Outstanding Senior:* Sheila J. Hughes, Durham

*Agronomy Club Leadership Award:* Jason F. Joyce, Winston Salem

*Crop & Soil Science Senior Highest Scholastic Average:* David J. Tucker, Laurel Spring

### *Animal Science*

*Most Outstanding Club Senior:* Jason H. Wilson, Kittrell

*Most Outstanding Club Member:* Lee A. Menius, Salisbury

*Most Outstanding New Club Member:* Robert S. Betka, Kernersville

*Outstanding Senior in Animal Science:* Holly A. Chandler, Chapin, SC

*American Society of Animal Science Undergraduate Awards:* Katherine E. Barger, Davidson;

Cortney C. Barkley, Belmont; Kara J. Bissett, Elizabeth City; Rosemary D. Bowen, Walnut Cove;

Holly A. Chandler, Chapin, SC; Jeffrey T. Cole, Orlando, FL; Katherine V. Cutter, Asheville; Heidi

H. Friedlein, Durham; Jonathan M. Gaddy, Zebulon; Christine E. Kistler, Raleigh; Kristine J. Lang,

Harkers Island; Zane I. Lapinskes, Raleigh; Regina C. Linville, Madison; Laurie A. Lyon, Sanford;

Wrenn W. Mathis, Clinton; Stephanie A. Moore, Asheville; Amy J. Poole, Manteo; Diane D. Porter,

Apex; Russell L. Sprinkles, Belmont; Matthew B. Turner, Kinston; Ashley E. Webb, Clinton; Lori K.

White, Raleigh.

### *Biochemistry*

*H. Robert Horton Award :* Christina L. Thomas, Rockingham

*The American Institute of Chemists Foundation Outstanding Biochemistry Student Award:* Jayne K. Goodman, Raleigh

### *Biological and Agricultural Engineering*

*American Society of Agricultural Engineers, Student Honors Awards - North Carolina Student*

*Engineering Branch of the American Society of Agricultural Engineers:* Jamie J. Lancaster, Rocky

Mount,

### *Botany*

*Outstanding Botany Senior:* Laura J. Grignon, Charlotte

### *Food Science*

*B. M. Newell Award:* Chris W. Pernell, Cary

*Forbes Leadership Award:* Carla M. Shook, Conover

*Ambrosia Chocolate Top Scholar Award:* Chris W. Pernell, Cary

*Leonard & Francis Crouch Scholastic Achievement Award:* Carla M. Shook, Conover

### *Horticultural Science*

*Outstanding Senior Horticulturist Award:* Leslie B. Booker, Manteo; Beverly A. Carroll, Concord

### *Microbiology*

*Most Outstanding Student:* Robert K. Harrell, Henderson; Gregory W. Knapp, Cary

### *Poultry Science*

*T.T. Brown Poultry Science Club Award:* Chad Larson, Sargeant, MN

### *Zoology*

*Zoology Senior Highest Scholastic Average:* Henry C. McDade, Hillsborough



## SCHOOL OF DESIGN

### *Architecture Awards*

*The American Institute of Architects Henry Adams Medal:* Criteria: scholastic achievement, character, and promise of professional ability. Joseph Booth McCoy, Clarksville, Tennessee.

*The American Institute of Architects Henry Adams Certificate of Merit:* Criteria: scholastic achievement, character, and promise of professional ability. Phillipe Anton Jentsch, Monthey, Switzerland.

*Richard Green Award for Design Achievement:* Criteria: greatest promise in design by a Bachelor of Architecture degree recipient. John Douglas Tucker, Springfield, VA.

*Architecture Faculty Award for Design Achievement:* Criteria: greatest promise in design by a Bachelor of Environmental Design/Architecture degree recipient. Ian Sherrod Gordon, Chapel Hill; Jamey Edward Glueck, Nashville.

*Alpha Rho Chi Medal:* Criteria: ability for leadership... willing service to his or her school and program...promise of real professional merit through attitude and personality. Kenneth H. Friedlein, Raleigh.

*Golden Section Award:* Criteria: appreciation for and creative application of technology in architecture. Amy Elizabeth DeDominicis, Durham.

*Academic Achievement Award:* Criteria: graduate student with the highest grade point average. Jay Richard Fulkerson, Chapel Hill.

*Academic Achievement Award:* Criteria: undergraduate student with the highest grade point average by a Bachelor of Architecture degree recipient. Phillipe Anton Jentsch, Monthey, Switzerland.

*Academic Achievement Award:* Criteria: undergraduate student with the highest grade point average by a Bachelor of Environmental Design/Architecture degree recipient. David Bryan Hill, Greensboro.

*Technology Award:* Criteria: professional level graduating student whose academic and design work best reflects an appreciation for and creative application of technology in architecture. James David Robertson, Raleigh.

*Urban Analysis Award:* Criteria: awarded for an exemplary study of urban form and space. Catlin Emmett Tyler III, Midlothian, VA.

### *Design and Technology Awards*

*Design and Technology Faculty Book Awards in Design:* Criteria: outstanding academic achievement in the Design curriculum with highest GPA and design excellence. Autumn Lee Stroupe, Monroe.

*Design and Technology Faculty Book Awards in Design:* Criteria: Great promise as a design professional. Benjamin Coble MacNeill, Raleigh.

*Design and Technology Graduate Faculty Book Award:* Criteria: outstanding academic achievement in the graduate Design curriculum with highest GPA and design excellence. Valerie McGaughey, Raleigh.

### *Graphic Design Awards*

*Graphic Design Faculty Book Award:* Criteria: academic and design excellence, contributions to the learning environment, and potential to engage the profession of graphic design by a graduate student. Elizabeth Crawford Throop, Raleigh.

*Graphic Design Faculty Book Award:* Criteria: academic and design excellence, contributions to the learning environment, and potential to engage the profession of graphic design by a recipient of the Bachelor of Environmental Design/Graphic Design recipient. Dianne Virginia Hall, Leicester.

### *Industrial Design Awards*

*Design and Technology Faculty Book Award in Industrial Design:* Criteria: outstanding academic achievement in the Industrial Design curriculum with highest GPA and design excellence. Justin Alan Chambers, Chapel Hill.

*Design and Technology Graduate Faculty Book Award:* Criteria: outstanding academic achievement in the graduate Industrial Design curriculum with highest GPA and design excellence. Daniel McMichael Stipe, Raleigh.

*Industrial Designers Society of America Student Merit Award:* Criteria: outstanding graduate in Industrial Design: Jonathan Tad Templeton, Greensboro.

### *Landscape Architecture Awards*

*The American Society of Landscape Architects Certificate of Honor:* Criteria: scholarship and accomplishment in skills related to the art and technology of Landscape Architecture. Alicia Louise Berry, Raleigh. Katherine Frances Dow, Raleigh. Anne Louise Valentine, Carrboro.

*The American Society of Landscape Architects Certificate of Merit:* Criteria: scholarship and accomplishment in skills related to the art and technology of Landscape Architecture. Rodney Todd Eason, Clayton; William Anthony McGee, Germanton; Patrick Graham Pleasants, Raleigh.

*The North Carolina American Society of Landscape Architects Book Award:* Criteria: total scholastic performance and professional promise. Michael Jeffrey Norris, Lenoir.

*Landscape Architecture Faculty Honor Award:* Criteria: outstanding academic performance and design excellence in Landscape Architecture. Anne Louise Valentine, Carrboro.

*Landscape Architecture Faculty Service Award:* Criteria: for dedicated service in support of faculty and students in the Department of Landscape Architecture. Yvonne Gorman Maher, Raleigh.

## **COLLEGE OF EDUCATION AND PSYCHOLOGY**

### *Education Council Outstanding Senior Awards:*

*Health Occupations Teacher Education:* Barry Dean Watkins, Bahama

*Mathematics Education (high school):* Dorothy Cummins Malpass, Turkey

*Mathematics Education (middle school):* Cherre Hope Simpson, Garner

*Middle Grades Language Arts and Social Studies:* Kathleen Ryan VanOrmer, Summerfield

*Psychology (outstanding graduating senior):* Kevin Archer Pelphrey, Raleigh

*Psychology (general option):* Kristopher Jason Preacher, Taylorsville

*Psychology (human resource development option):* Kristina Michelle Ringler, Raleigh

*Science Education (high school):* Heidi Chandler Willard, Raleigh

*Science Education (middle school):* Conrad Keith Streeter, Alamogordo, NM

*Technology Education:* Brian Thomas Smith, Raleigh

### *Departmental Awards:*

*Durwin M. Hanson Achievement Award (Occupational Education):* Lori Lynn Lucas, Raleigh

*Epsilon Pi Tau Leadership Award (Technology Education):* William Cecil Reece, Whitsett

*Outstanding Teaching Assistants:* Daniel Cliffe, Burgaw; Kathy Griffin, Atlanta, GA

*Mathematics Education Service Award to Outstanding Teacher:* Donald McGurrin, Wendell

*Psychology Department Award for Service to the Department:* Connie Lee Shelton, Raleigh

*Psychology Department Award for Academic Achievement:* Bernard Philip Bowling IV, Surf City; William Arthur George, Nags Head

*Psychology Department Award for Research:* Scott Andrew Wowra, Raeford

*Science Education Service Award to Outstanding Teacher:* Linda H. Hicks, Raleigh

## COLLEGE OF ENGINEERING

*Engineering Senior Award for Scholarly Achievement:* Stephanie Manfredi, Hickory (Chemical Engineering)

*Engineering Senior Award for Citizenship and Service:* Michael Chou, Durham (Electrical and Computer Engineering)

*Engineering Senior Award for Leadership:* Aaron P. Maurer, Knoxville, TN (Electrical and Computer Engineering)

*Engineering Senior Award for the Humanities:* Catherine M. Rose, Reidsville (Mechanical and Aerospace Engineering); Charles B. Parker, Cary (Materials Science & Engineering)

*Dean's Achievement Award - 1996:* John C. O'Quinn, Fuquay Varina (Chemical Engineering)

### BIOLOGICAL and AGRICULTURAL ENGINEERING

*Agri-Life Council Outstanding Club Member Award for Biological and Agricultural Engineering:* Engineering Curriculum: Gary C. Miller, Cary

*American Society of Agricultural Engineers Student Honor Award:* North Carolina Student Engineering Branch of ASAE: Jamie J. Lancaster, Rocky Mount

### CHEMICAL ENGINEERING

*Hoechst Celanese Award for Academic Excellence:* To Be Announced

*Hoechst Celanese Award for Excellence in Leadership:* To Be Announced

### CIVIL ENGINEERING

*Associated General Contractors Award to Outstanding Senior in Civil Engineering/Construction Option:* John T. Delzell, Greensboro

*Outstanding Teaching Assistant Awards:* Kasey D. Trimble, Washington, WV; Sean H. Anderson, Raleigh

*Stephan Safran/PCEA-Triangle Chapter Student Estimators Award:* Victor C. Smith, Wrightsville Beach

*Institute of Transportation Senior Award - Fall 1995:* Robert T. Burlington, Greenville

### COMPUTER SCIENCE

*Scholarly Achievement:* Joel Gray, Mt. Airy

*Humanities:* Toni G. Whitaker, Rocky Mount

*Citizenship and Service:* Carolyn Knott, Durham

### ELECTRICAL and COMPUTER ENGINEERING

*Outstanding Electrical Engineering Senior Award:* Sarah K. Soutt, Raleigh

*Outstanding Computer Engineering Senior Award:* Joseph A. Delgross, Cary

*Outstanding IEEE Student Award:* Roy L. Draughn, Asheboro

*College of Engineering Outstanding Senior Nominees:*

*Scholarly Achievement:* Joseph A. Delgross, Cary

*Leadership:* Roy L. Draughn, Asheboro

*Citizenship and Service:* Michael Chou, Durham

*Humanities:* Jan E. Vandemeer, Pleasant Valley, NY

### FURNITURE MANUFACTURING and MANAGEMENT

*Rudolph Willard Award, Outstanding Senior in Furniture Manufacturing and Management:* Luke D. Barger, Hickory

### INDUSTRIAL ENGINEERING

*Outstanding Senior in Industrial Engineering:* Paula L. Borden, Columbus, OH

## **MATERIALS SCIENCE AND ENGINEERING**

*Departmental Senior Award in Leadership:* Julie P. Martin, Charlotte

*Departmental Senior Award in Citizenship and Service:* Francis B. Neal, Jr., Rockingham

*Departmental Senior Award in Scholarly Achievement:* Corey J. Senowitz, Raleigh

*Josephus Daniels Scholarship 95-96:* Michelle D. Morse, Fuquay-Varina

*Dr. Charles R. Manning Accident Reconstruction Analysis, Inc. Scholarship for 95-96:* Corey J. Senowitz, Raleigh

*Mrs. L. P. Doshi Scholarship:* Charles B. Parker, Cary

*A. J. Fletcher Music Scholarship:* Michael T. Capps, Wilmington

*John A. Boren Merit Scholarship:* Kevin C. Cheek, Cary

## **MECHANICAL and AEROSPACE ENGINEERING**

*ASME Outstanding Student Member:* Catherine M. Rose, Reidsville

*Pi Tau Sigma Outstanding Senior Award:* Catherine M. Rose, Reidsville

*AIAA Southeast Regional Conference: Outstanding Student Paper Presentation:* Eric N. Burcus, Cary

## **NUCLEAR ENGINEERING**

*Outstanding Nuclear Engineering Senior Award:* Nathan Sutton, Charlotte

## **COLLEGE OF FOREST RESOURCES**

### **Forestry**

*Biltmore Forest Work Scholarship:* Daniel Carpenter, Kings Mountain; T. Matthew Grzebien, Cary; Charles D. Hines, Hillsborough; Everett C. Jenkins, Washington.

*James L. Goodwin Work Scholarship:* E. Brian Absher, Elkin; Andrew L. Baker, Cramerton; Jennifer Barnes, Duluth, GA; Thomas E. Huffman, Virginia Beach, VA; Danny R. Ledford, Siler City; M. Troy Lucas, Charlotte; Ryan Norris, Castle Hayne; John Nicosia, Raleigh; Kyle E. Parshall, Raleigh; Boice E. Triplett, Belmont.

*George K. Slocum Endowed Work Scholarship:* Jennifer M. Willoughby, Fuquay-Varina.

*Dan K. Spears Endowed Work Scholarship:* Jennifer M. Willoughby, Fuquay-Varina.

*John M. and Sally Blalock Beard Academic Scholarship:* Edward B. Cole, Highlands; Helen S. O'Donnell, Raleigh; Philip R. Whitfield, Hurdle Mills.

*Ralph C. Bryant Academic Scholarship:* Daniel Carpenter, Kings Mountain; Doug Burleson, Lumberton.

*Edwin F. Conger Academic Scholarship:* Cynthia D. Buster, Alexandria, VA; Wesley A. Ledford, Lawndale.

*James L. Goodwin Academic Scholarship:* Andrew L. Baker, Cramerton; Stephen P. Bennett, Candler; Thomas W. Bevier, Sanford; Tabatha G. Bledsoe, Creston; Cynthia Buster, Alexandria, VA; DeVela J. Clark, Raleigh; James Cooper, Arlington, VA; Jeffrey L. Correll, Hudson; Amy E. Gatlin, Raleigh; Karin Hess, Knightdale; Barry C. Jackson, Jr., Angier; Heather A. Kendall, Worthington, OH; Robert C. McClure, West Jefferson; Kathy Messerschmidt, Lynchburg, VA; Keith R. Money, Lexington; Susan Ritter, Greensboro; Jeffrey L. Wait, Candler.

*Jonathan Wainhouse Memorial Academic Scholarship:* Jennifer R. Miller, Charlotte.

*Hofmann Forest Academic Scholarship:* Christopher R. Blanton, Kings Mountain; Jeremy S. Brinkley, Lexington; Jennifer L. Buzzard, Raleigh; Kirk R. Chitla, Raleigh; DeVela J. Clark, Raleigh; Edward B. Cole, Highlands; Timothy M. Disclafani, Cary; Kelley M. Duffield, Cary; Kevin W. Gainey, Kannapolis; Theresa L. Galinski, Greensboro; Michael R. McCoy, Clarksville, TN; John A. Papalas, Greenville.

*Victor W. Herlevich Academic Scholarship:* Amy E. Gatlin, Raleigh.

*Maki-Gemmer-Johnson Summer Camp Academic Scholarship:* Kristofer C. Baker, Fuquay-Varina; Steven P. Bennett, Candler; Daniel R. Carpenter, Kings Mountain.

*U.S. Forest Service Science Award:* Kevin Wayne Gainey, Kannapolis, NC



*Parks, Recreation and Tourism Management*

*Outstanding New PRTM Student:* Adrienne Bailey, Lumberton

*Outstanding Underclassman:* Stephen Watson, Kenly

*Thomas I. Hines Award:* Elizabeth Griffith, Cary

*Outstanding Graduate Student:* Nancy Bell Edwards, Cary

*Outstanding Teacher:* Dr. Roger Moore

*Going the Extra Mile Teacher:* Annette Moore

*Going the Extra Mile Student:* Sue Yerkes, Raleigh

*Going the Extra Mile Staff Member:* Reggi Powell

*College of Forest Resources Outstanding African American Graduate Student:* Teri Whyte, Sanford, Florida

*N.C. Recreator's Foundation Scholarship:* Christy Mingis, Cary; Laura White, Fuquay-Varina

*Department of Parks, Recreation and Tourism Management Hoffman Forest Endowed Scholarship:* Jennifer E. Britt, Greensboro; Laura Bryson, Brevard; Isarel A. Fountain, Raleigh; Teresa Llerena, Raleigh

*Wood and Paper Science*

*Pulp and Paper Science*

*Alonzo Aldrich Scholarship:* Sherri Tennille Vollmer, Louisburg

*Asea Brown Bovier, Inc. Scholarship:* Elizabeth Ann Wones, Kettering, OH

*Betz Laboratories, Inc. Scholarship:* Erik Sean Edwards, Fernandina Bch., FL

*C. Cline Peters Scholarship:* Michael Alan Halstead, Pollocksville

*Caraustar Industries Scholarship:* Timothy Cornelius Jones, Hopkins, SC

*Carol & Carter Fox Scholarship:* Matthew David Campbell, Fernandina Bch., FL

*Cascade Industries Scholarship:* Eugene Anthony Foster, Greensboro

*Charles W. Coker, Sr. Scholarship:* Robert Chung-Hua Yang, Chesterfield, VA

*CIBA-GEIGY Corporation Scholarship:* William M. Ponton, Hertford

*Class of 1966 Scholarship:* Mr. Bradley Earle Lucas, Raleigh

*David Bossen Scholarship:* Kerri Gray Knight, Brown Summit

*Dietrich V. Asten Scholarship:* Glenn Jason Martin, Harrisburg, PA

*Dr. Fred B. Schelhor Scholarship:* Melissa Carol Ricks, Wilmington

*Drs. Li-S. & Lee-F. Chang Scholarship:* Christopher H. Alexander, Bronx, NY

*Dwight J. Thomson Scholarship:* William Ashley Sparks, Roanoke Rapids

*E. E. Ellis Scholarship:* Shannon Marie Bumgarner, Hickory

*E. J. & S. W. Brickhouse Scholarship:* Ryan David Hobbs, New Bern

*E. J. "Woody" Rice Family Scholarship:* Matthew Christian Quick, Arrington, VA

*Eric L. Ellwood Scholarship:* Karen Reiko Shigehara, Raleigh

*George E. Oakley, Jr. Scholarship:* Greg Bryan Gardner, New Bern

*Harry H. Saunders Scholarship:* Jason Allen Mayberry, Goose Creek, SC

*Hazard H. & Ada May Scholarship:* Angela Elizabeth Hylton, Washington

*Hercules, Inc. Scholarship:* Holly Elizabeth Crain, Tryon

*International Paper Co. Scholarship:* Jennifer Louise Hinson, Albemarle

*International Paper Scholarship (NCSU) Alumni #1:* Andrew Lee Weller, Washington

*International Paper Scholarship (NCSU) Alumni #2:* Michael A. Will, Matthews

*James River Corporation Scholarship:* Donna Lynn Cleaton, Dinwiddie, VA

*James M. Piette Scholarship:* Rebecca Ann Geiger, Albany, GA

*John A. Heitmann, III Scholarship:* E. Scott Tedder, Chadbourne

*John L. Moore Scholarship:* Steven Christopher Bacon, Dudley, LA

*John M. May, Jr. Scholarship:* Kendra Krystyna Batley, Wilmington

*Kamine Eng. & Mechan. Scholarship:* Andrew Haisten Linn, Lynchburg, VA

*Lawrence H. Camp Scholarship:* James Edwin Cawthorne, Jr., Lynchburg, VA

*M. Lebbly Boinest, Jr. Scholarship:* Marcus Wayne Barnes, Roanoke Rapids

*Mark J. Alexander Scholarship:* Michele K. Bennett, Greenville

*Michael I. Sherman Scholarship:* Christina Gay Buchanan, Spruce Pine



*Nalco Chemical Scholarship:* Christopher L. Swift, Dalton, MA  
*Nalco Chemical Company Scholarship:* Valerie Jean Vonnoh, Yulee, FL  
*Paper Chase Scholarship:* Lynette Dawn Griffin, Williamston  
*PIMA-Southeastern Division Scholarship:* Terri Dorinda Lail, Hildebran  
*PPF:* Derek Roy Morris, Elkin  
*PPF:* Daphne Jerrene Moses, Fayetteville  
*PPF:* Benjamin Dale Moore, Roanoke Rapids  
*PPF:* Cynthia Camille Winston, Wake Forest  
*PPF:* Lena Renee Williams, Richmond, VA  
*PPF:* James Christian Samp, Mechanicsville, VA  
*PPF:* Alicia Nhu Uyen Pham, Rock Hill, SC  
*PPF:* Ginger Ann Yockel, Williamston  
*PPF:* MyHa Thi Hoang, Rockhille, SC  
*PPF:* Brian Wells Jones, Columbia, SC  
*PPF:* Roger Jordan Laufer, Florence, SC  
*PPF:* Nathan William Jones, New Bern  
*PPF:* Mary Beth Harris, Pantego  
*PPF:* Keith Alan Donaldson, Canton  
*PPF:* Clayton Baylor Metcalfe, Roanoke Rapids  
*PPF:* April Elise Cassano, West Point, VA  
*PPF:* Miranda Renee Martin, Rock Hill, SC  
*PPF:* Cory Hall Knox, Williamston  
*Ray Smith Scholarship:* David Arthur Council, Williamston  
*Rector/Ashcraft Scholarship:* Harry Atkins Lawton, III, Kingsport, TN  
*Richard H. Owens Scholarship:* Spencer Frederick Adams, Laurinburg  
*Robert G. Hitchings Scholarship:* Valerie Ivy Pai, Raleigh  
*Robert L. Bentley Scholarship:* Phillip Todd Jordan, Rock Hill, SC  
*Ronald Estridge Family Scholarship:* George Brent Shorter, Roanoke, VA  
*Scapa Group, Inc. Scholarship:* Thomas Joseph Jenn, Raleigh  
*Sonoco (NCSSU) Alumni Scholarship:* Michele Leigh Parsons, Rock Hill, SC  
*Stone Container Corporation Scholarship:* Richard Busbee Phillips, Mobile, AL  
*Sture J. Olsson Scholarship:* Joseph Eliot Malak, Cumberland, MD  
*Sunds Defibrator, Inc. Scholarship:* Sue Ann Quick, Arrington, VA  
*Terry P. Charbonnier Scholarship:* Eric Steven Thompsen, Burgess, VA  
*The Showlin Family Scholarship:* Anthea Yen Chun Wu, Cary  
*Thiele Kaolin Scholarship:* Matthew James Morgan, Moon, VA  
*Tidewater Construction Scholarship:* Kevin William South, West Point, VA  
*Turner Family Scholarship:* Nathaniel M. Meacham, Chesterfield, VA  
*Union Camp Corporation Scholarship:* Matthew Aaron Turner, Suffolk, VA  
*Valmet Corporation Scholarship:* Wesley Boyd Petrea, Kannapolis  
*Vinings Industries Scholarship:* Chancey Boyce Washburn, Albany, GA  
*Westvaco Corporation Scholarship:* Jon Russell Jackson, Ashland, VA  
*Weyerhaeuser Company Scholarship:* Veronica Jill Huneycutt, Albemarle  
*Will P. Lovin Scholarship:* Timothy Lee Schleining, Pisgah Forest  
*Willamette Industries, Inc. Scholarship:* Britt Mills Haddock, Ayden  
*William M. Bailey Scholarship:* Paul Michael Jett, Raleigh  
*Wm. V. Cross Scholarship:* Christopher L. Swift, Dalton, MA

#### *Wood Products*

*Coastal Lumber Company Scholarship:* J. Collins Fitts, Roanoke Rapids  
*Cochrane Furniture Company Scholarship:* Pamela R. Wall, Casar  
*Eurodrawer Scholarship:* Billy W. Esra, Mocksville; Kendall C. Walker, Mocksville; Eric L. Wilness, Mocksville  
*Jerry G. Williams & Sons, Inc. Scholarship:* Sampson E. Neumann, Smithfield  
*Lampe & Malphrus Lumber Company Scholarship:* Laurie A. Pittman, Clayton

*Roy M. Carter Endowed Scholarship:* Bernard C. Harberts, Statesville  
*Thomas Forshaw, Jr. Endowed Scholarship:* Stephen M. LaFrance, Wilmington  
*Toney Lumber Company Scholarship:* James E. Bailey, Louisburg  
*Weyerhaeuser Company Scholarship:* Kyle D. Evans, Marion; David P. Laramée, Raleigh;  
 Robert M. Padulla, Jr., Matthews

## COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

*College of Humanities and Social Sciences:* William Arthur George, Nags Head; John Caviness O'Quinn, Fuquay-Varina; Teresa Ellen Valliere, Raleigh

*Department of Communication:* Misty Leann Hankins, Martinsville, VA

*Department of English:* Maureen Deborah Tinnesz, Raleigh

*Department of Foreign Languages and Literatures:* Catherine Michelle Rose, Reidsville

*Department of History:* Megan Lynn Fauls, Washington, DC

*Division of Multidisciplinary Studies:* John Caviness O'Quinn, Fuquay Varina

*Social Work:* Teresa Ellen Valliere, Raleigh

*Department of Philosophy and Religion:* Bobby-Joe Shepard, Jacksonville

*Department of Political Science and Public Administration:* Kathryn Lee Hunter, Dobson

*Department of Sociology and Anthropology:* William Arthur George, Nags Head

*CHASS Council Outstanding Senior Award:* Cole Lee Russing, Boone

## COLLEGE OF MANAGEMENT

*High Ranking Seniors:*

*College of Management:*

*Fall 1995*

Jette Buhelt Olsen, Raleigh

*Spring 1996*

Yijiang Joanna Shi, Raleigh

*Department of Accounting:*

*Fall 1995*

Nancy H. Johnson, Raleigh

*Spring 1996*

Lianne Lowell, Raleigh

*Department of Business:*

*Fall 1995*

Jette Buhelt Olsen, Raleigh

*Spring 1996*

Kristen Nicole Broadway, Wake Forest

*Department of Economics:*

*Fall 1995*

Daniel Patrick West, Garner

*Spring 1996*

Yijiang Joanna Shi, Raleigh

## COLLEGE OF PHYSICAL AND MATHEMATICAL SCIENCES

*College Awards to Outstanding Seniors:*

*Scholarly Achievement:*

*Fall 1995*

Tiffany Michelle Barnes, Greensboro

*Spring 1996*

Mary Patricia Campbell, Raleigh

*Leadership:*

Fall 1995

Spring 1996

Kristie Ann Cook, Mount Airy

Todd Douglas Fuller, Charlotte; Tonya Shea Coffey,  
Lenoir

*Research:*

Fall 1995

Spring 1996

John Michael Woodell, Morganton

Mary Patricia Campbell, Raleigh

*Chemistry Department*

*The Merck Index Awards for Scholastic Achievement:* Andrew Kiskadden Boal, Raleigh;  
Robert Timothy Mathers, Willow Springs

*The CRC Press Freshman Chemistry Achievement Award:* Jennifer Lea Catanzaro, Hickory;  
Reagan Josephine Greene, Ferguson

*AICF - American Institute of Chemists' Foundation:* Juliette Christine Bates, Raleigh

*1996 Undergraduate Award in Analytical Chemistry:* John Robert Kitchin, Cary

*Hypercube Scholar:* Craig Michael Micallef, Kitty Hawk

*Marine, Earth and Atmospheric Sciences Department:*

*Outstanding Graduating Senior in Marine Sciences:* Christopher Lee Hamblet, Raleigh

*Outstanding Graduating Senior in Earth Sciences:* Srinivas Krishnasami, Cary

*Outstanding Graduating Senior in Atmospheric Sciences:* Christian Winford Barnes,  
Salisbury; Darrell Bryan Ensley, Harrisburg

*Outstanding Teaching Assistant Awards:*

*Marine Sciences:* James McFall Epps, Salisbury

*Earth Sciences:* Adrienne Gaughan, Raleigh; Matthew James Heller, Raleigh

*Atmospheric Sciences:* Regi George Oommen, Raleigh

*Mathematics Department:*

*Outstanding Graduating Senior in Mathematics:* Mary Patricia Campbell, Raleigh

*John Cell Scholarship:* Elizabeth Kathryn Hunt, Durham

*Mary Alice and Hubert V. Park Scholarship:* Tamara Brooke Rosenbaum, Winston-Salem

*Jack Levine-Charles Anderson Award:* Mary Patricia Campbell, Raleigh; Christopher Ryan  
Vinroot, Charlotte

*Charles Anderson Scholarship:* Dustin Frederick Kapraun, Wilmington

*Charles F. Lewis Scholarship:* Karen Jean Johnson, Moravian Falls

*Mrs. Robert C. Bullock Scholarship:* Carolyn Elizabeth Hollack, Raleigh

*The Maltbie Award:* Peter Garth Hardy, Raleigh; Rebecca Jo Krakowski, Raleigh

*Lowell S. Winton/Nicholas I. Rose Scholarship:* Vaidyanath Mani, Raleigh

*Howard A. Petrea Scholarship:* Phoebe Allison Profit, Boone

*Carey Mumford Scholarship:* John Wesley Cain, Greenville

*Outstanding Teaching Assistant Awards:* Christopher Mark Lyerly, Raleigh; John Vivian  
(Matt) Matthews III, Raleigh; Amanda Buffington Matthews, Raleigh; John Robert Peach, Durham;  
Jeffrey David Schroeter, McLean, VA

*Physics Department:*

*Outstanding Graduating Seniors in Physics:* Mary Patricia Campbell, Raleigh; William Seth  
Hartley, Lexington; Tonya Shea Coffey, Lenoir

*Nancy Chung Freshman Scholarship:* Christopher Lynn Hinkle, Cumberland, MD

*Statistics Department:*

*Outstanding Graduating Seniors in Statistics:*

Fall 1995 -

Tiffany Marie Morgan, Raleigh

Spring 1996 -

Carol Lynn Smith Dukes, Fuquay-Varina; Tara Lynn Knowles, Autryville

*F. E. McVay Scholarship:* Leslie Meredith Stroupe, Mount Airy

*SAS Institute Scholarship:* Sarah Jane Holshouser, Newton

*Outstanding Teaching Assistant Awards:* Erin Elyse Blankenship, Raleigh; Alan Hughes Hartford, Raleigh; Bridget Gillian Mahoney, Raleigh

*Paige Plagge Graduate Award for Citizenship:* Russell Alpizar, Raleigh

*Mendenhall Teaching Scholars:*

Summer 1995 -

Scott Alan Langfeldt, Cary

Summer 1996 -

Lei Zhu, Raleigh

*1995-96 Gertrude Mary Cox Fellowship Award:* Lorraine Marie Vorburger, Raleigh

*Academic Achievement Award Fellows:*

*Gertrude Mary Cox Academic Achievement Award Fellows:*

*Outstanding Ph.D Candidate -* Seongyeon Kim, Raleigh

*Outstanding M.S. Candidate -* Stephanie Brumfield Monks, Raleigh

*Outstanding Ph.D Qualifier -* Alan Hughes Hartford, Raleigh

## COLLEGE OF TEXTILES

*Joseph D. Moore Honor Award:* Julie Renee Hayes, Rural Hall

*Lawrence Jason Honor Award:* Bradley Mark McLawhorn, Fayetteville

*Chester H. Roth Honor Award:* Emily Caroline Paul, Aurora

*John M. Reeves Scholarship:* Mindy Estelle Lowder, Norwood

*John E. Reeves Award:* Stacey Lynne Bolen, Washington

*Donald F. McCullough Award:* Adam David Dunefsky, Raleigh

*American Association of Textile Chemists and Colorists Award:* Andrea Rene Howington, Cameron

*The American Institute of Chemists Foundation Award:* Jonathan Michael Thomas, Garner

*Phi Psi Textile Fraternity Award:* Suzannah Lynn Poteat, Salisbury

*American Association for Textile Technology Award:* Edie Renn Parish, Aberdeen

*Kappa Tau Beta Student Leadership Award:* Julie Renee Hayes, Rural Hall

*Delta Kappa Phi Textile Fraternity:* Andrea Rene Howington, Cameron

*AAMA - Apparel Student of the Year:* Caroline Berry Bolt, Greenville

*Henry A. Rutherford Honorary Award:* Kelly Michelle Tinga, Wilmington

*Peter R. Lord Textile Engineering Design Leadership Award:* Monroe Keith Spillman, Jr., Salisbury

*Hoechst Celanese Excellence Award for Leadership:* Michelle Leigh Uren, Shelby

*Hoechst Celanese Excellence Award in Academics:* To Be Announced

*Hoechst Celanese Excellence Award in Graduate Studies:* To Be Announced

## ALUMNI ATHLETIC AWARD

Todd Douglas Fuller, Charlotte

THE HONOR SOCIETY OF  
PHI BETA KAPPA

INITIATED - SPRING 1996

John Michael Angelo  
Jennifer Lee Autry  
Stewart Campbell Aycock  
Laura Minwer Badwan  
Marcus Wayne Barnes  
Burton Kyle Batten  
Ethan Victor Brown  
Rebecca Jean Brown  
John Wesley Cain  
Keith Kaz Contre  
Colleen Anne Coyle  
Laura Camille Daughtry  
Jay Lawrence Dunbar  
Jo Beth Eakin  
Sharon Monk Elledge  
Laura Erin England  
Peter James Erikson  
Daniel Ali Ettefagh  
Megan Fauls  
Amy Michelle Finger  
Donna Diane Floyd

Carol Anne Fuller  
Jeffrey Andrew Gage  
Shirley Michelle Garoutte  
Tiffany Rachelle Goins  
Stephanie Kay Gregory  
Laura Jeanne Grignon  
Robert Daniel Hancock  
Joel Michael Hartman  
Jennifer Marie Howard  
Amy Marie Jackson  
Jennifer Maureen Kilgore  
Tara Lynn Knowles  
Patrick Lerome Leary  
Thomas Aaron Ledford  
Alexander Benton Legrand  
Regina Carol Linville  
John Paul Morgan Longphre  
Michael David Madritch  
Elizabeth Hope Maguire  
Kristen Lynn Neuharth  
Chad Derek Norman

Pamela Thompson Offner  
Dana Louise Pearce  
Kristina Michelle Ringler  
Jason Owen Rose  
Tamara Brooke Rosenbaum  
Jonathan Charles Routh  
Lynn Jamie Rubin  
Carmen LeAnne Sanders  
Elizabeth Anne Smith  
Leslie Elizabeth Smith  
Steven Carl Spruill  
Elizabeth Marie Sutton  
Susan Jordan Turner  
Lavanya Prabhakar Vaidya  
Christopher Ryan Vinroot  
Lawrence Lee Wentz  
Gillian Norton Will  
Patrick Cecil Winstead  
April Ann Wood  
Erica Claire Yaeger  
Heather Marie Yandle

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Hunter Lynn Blanton  
Rebecca Susan Bookout  
Anita Jeanne Borton  
Ryan Patrick Boyles  
Jason Patrick Burton  
Samantha Margaret Clark  
Steven Wayne Craft  
Damon Russell Dellafave  
Frank Ethan Dickey  
Emili Rachele Duke  
Marissa Lee Earles  
Erika Leigh Farr  
Katherine Ellen Fielden  
Carol Nicole Friddle  
Michael Hart Glasheen

Kerry Lynn Hammond  
Misty Leann Hankins  
Jenny Rebecca Helton  
Joan Rlee Henderson  
Courtney Lynne High  
Heidi Jeanette Hughes  
Kathryn Lee Hunter  
Meja Trienne Johnson  
Alberta Olivia Burkett Keel  
John Robert Kitchin  
Christopher Keith Lannon  
Tammy Karrie-Cheng Low  
Michael S Luhrs  
William Joseph Lyerly  
Deborah Ware Mettler  
Michelle Callahan Nielsen  
Christopher Allen Parham

Akash Arvind Patel  
Phoebe Alison Proffitt  
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Emily Itara Richardson  
Jeannie Gail Sifford  
Kelly Anne Sigmon  
Joseph Andrew Simmons  
Erin Mary Simons  
Christian Suzanne Spruill  
Scott Robin Starin  
Domenic John Tiani  
Chaffee William Viets  
Nanditha Vivekananthan  
John William Wilson  
Scott Andrew Wowra

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Aaron James Green  
Robin Lynne Grice  
Leyla Suzan Gunduz

John Caviness O'Quinn  
Denise Lynette Overcash  
Kimberly Rae Parks  
Laura Ann Pate



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Tiffany Michelle Barnes  
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Bernard Philip Bowling  
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John Paul Denny  
Joby Edward Dixon  
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Karyn Lois Dumas  
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Ray Devouse Hayes  
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Paulette Hotte Martin  
Robert Franklin Martin  
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Lori Renee McDowell  
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Bridget Temwa McNamara  
Craig Michael Micallef  
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Amy Jeanette Nail  
Scott David Nash  
Christopher Todd Nixon

Amy Louise Patterson  
Amy Elizabeth Paul  
Lisa Malaika Perantoni  
Christopher Britt Peterson  
Heather Lynn Peterson  
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Heather Angela Philp  
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Matthew John Smith  
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Chaffee W. Viets  
Valerie J. Vonnoh  
Michael B. Wallace  
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**PHI KAPPA PHI ACHIEVEMENT AWARDS**  
**(4.0 and 100 NCSU Hours)**

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 Muqsit Ashraf  
 Steven P. Bailey  
 Anita J. Borton  
 Eric N. Burcus  
 Chris L. Capps  
 Holly A. Chandler

Deborah E. Citrin  
 Joseph A. Delgross  
 Jason L. Elliott  
 Katherine E. Fielden  
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 Stephanie A. Manfredi  
 John C. O'Quinn

Christopher A. Parham  
 Akash A. Patel  
 Nathan P. Sutton  
 Melanie L. Tew  
 Valerie J. Vonnoh  
 Andrew M. Woods

**NATIONAL PHI KAPPA PHI FELLOWSHIP**

Nominee: John C. O'Quinn  
 Honorable Mention: Erin M. Beebe

**GOLDEN CHAIN HONOR SOCIETY**  
**SENIORS**

Erin Michele Beebe  
 James Robert Clagett  
 Eileen Frances Duley

Megan Elizabeth Jones  
 Todd Douglas Fuller  
 John Caviness O'Quinn

Laura Marie Pottmyer  
 Lee Taylor Roberts  
 Catherine Michelle Rose  
 Amy Joy Wazenegger

**ARMY ROTC COMMISSIONEES**

**DECEMBER 1995**

Katina D. Geiger ..... Fort Washington, MD  
 Michael T. Parrish ..... Durham  
 Matthew G. Sayre ..... Oveido, FL  
 Robert C. Stokes ..... South Vienna, OH

**MAY 1996**

Tracy K. Combs ..... Southington, OH  
 Dorothy L. Gay-Lord ..... Greenville  
 Christopher Kurinec ..... Weare, NH  
 Michael Moore ..... Cary  
 Wayne O. Nitzschner ..... Kingston, NY  
 Mills T. Pruden ..... Roxobel  
 Joseph A. Simmons ..... Ocean City, NJ

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### DECEMBER 1995

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Ladd W. Shepard	Coventry, U.K.

### MAY 1996

Ellis C. Brewer	Warsaw
Jonathan M. Butzke	Cary
Douglas A. Denney	New Port
Angela A. Fulton	Holland, OH
David T. Hart	Morehead City
McClellan B. Plihcik	Greensboro
Paul Rizzo	Myrtle Beach, SC
Richard E. Sessoms	Durham
Frederick C. Whitney	New Bern
Thomas A. Zdunczyk	Akron, OH

## AIR FORCE ROTC COMMISSIONEES

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Bryan D. Kerns	Spruce Pine

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Laura A. Kelly	Sanford
Timothy J. Moore	Ellerbe
Kristie L. Oxford	Spotsylvania, VA
Stacey N. Sweigard	Charlotte
Keely L. Taylor	Morehead City
Patrick C. Winstead	Winterville

# 1996 GRADUATION ACKNOWLEDGEMENTS

The following non-University organizations have contributed significantly to the success of our graduation exercises.

Design and Implementation  
of Stage Backdrop:

Mr. Frank Greathouse, Owner  
Realizations, Inc., Wilmington, NC

Sound Systems:

Mr. Wade C. Miller, Jr., Owner  
Sound Engineering, Greensboro, NC

Floral Designs:

Johnson-Paschal Floral Co., Inc.  
Raleigh, NC







# Agricultural Institute

*College of Agriculture  
and Life Sciences*



*University Student Center  
North Carolina State University  
May 10, 1996*



**AGRICULTURAL INSTITUTE  
GRADUATION EXERCISES**

**May 10, 1996**

**COLLEGE OF AGRICULTURE  
AND LIFE SCIENCES**

**NORTH CAROLINA STATE UNIVERSITY**

**Durward F. Bateman, Dean**  
*Presiding*

\*PROCESSIONAL

\*INVOCATION ..... Dr. James F. Ferry, Jr.  
Pastor, The First Presbyterian Church  
Garner, NC

ADDRESS ..... Charles Thomas Wood  
Vice President, Retail Division I  
Southern States Cooperative

AWARDING OF DIPLOMAS ..... Durward F. Bateman, Dean  
  
James L. Oblinger  
Associate Dean and Director  
Academic Programs

Jeffrey D. Armstrong  
Assistant Director of Academic Programs and  
Director of the Agricultural Institute

CONFERRING OF DEGREES ..... Larry K. Monteith  
Chancellor  
North Carolina State University

MOVING OF THE TASSELS ..... Class Valedictorians

REMARKS ..... Larry K. Monteith

STUDENT COMMENCEMENT SPEAKER ..... Josh Edward Allen

\*BENEDICTION

\*RECESSIONAL

*Reception Immediately Following the Graduation Exercises.*

*\*Please Stand.*



# AGRICULTURAL INSTITUTE GRADUATES

## ASSOCIATE IN APPLIED SCIENCE IN AGRIBUSINESS MANAGEMENT

December 20, 1995

- † Charles Jody Britt . . . . . Mt. Olive
- Christopher Dale Carroll . . . . . Clayton
- † Donald Scott Deans . . . . . Middlesex
- †H Mikell Blair Eddins . . . . . Zebulon
- Jason Charles Schlappich . . . . . Monroe
- HH Charles Nathan Veasey . . . . . Durham

May 10, 1996

- †H Josh Edward Allen . . . . . Plymouth
- †HH Gregory Lee Batton . . . . . Wilmington
- †H Judy Sanders Bridges . . . . . Fuquay Varina
- H Roy Jennings Brown IV . . . . . Clinton
- Tabatha Paulette Cox . . . . . Kannapolis
- Ryan Scott King . . . . . Princeton
- † Kevin Rene' Stinnett . . . . . Durham
- H Jonathan Daniel Ward . . . . . Hobbsville

## ASSOCIATE IN APPLIED SCIENCE IN AGRICULTURAL PEST CONTROL

December 20, 1995

- †H John Michael Clanton . . . . . Liberty
- ‡ Carl Graham Lamb II . . . . . Ingold

- † Co-major
- ‡ Agribusiness Concentration
- H Honors
- HH High Honors

May 10, 1996

William Jason Corbett . . . . . Newton Grove  
Harry Kelton King . . . . . Ash  
Brandon Oneal Richardson . . . . . Williamston

## **ASSOCIATE IN APPLIED SCIENCE IN FIELD CROPS TECHNOLOGY**

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† Charles Jody Britt . . . . . Mt. Olive  
†H John Michael Clanton . . . . . Liberty  
†H Mikell Blair Eddins . . . . . Zebulon  
Brian Keith Johnson . . . . . Newton Grove  
Charles Bryan Kirk . . . . . Knightdale  
† Thaddeus Pender Sharp IV . . . . . Sims  
Alvin Randolph Shearin, Jr. . . . . Wise

May 10, 1996

†H Josh Edward Allen . . . . . Plymouth  
Preston Britt Alligood . . . . . Washington  
Jeremy Bryan Darden . . . . . Newton Grove  
Andrew Garrett Herring . . . . . Dunn  
Brandon Lee Wilson . . . . . Tarboro

## **ASSOCIATE IN APPLIED SCIENCE IN FOOD PROCESSING, DISTRIBUTION, AND SERVICE**

December 20, 1995

‡ Melanie Hartis . . . . . Laurinburg  
†H Lela May Thornton . . . . . Newton Grove

† Co-major

‡ Agribusiness Concentration

H Honors

HH High Honors

May 10, 1996

†H Judy Sanders Bridges . . . . . Fuquay Varina  
‡ Wanda Michelle Harvey . . . . . Apex

**ASSOCIATE IN APPLIED SCIENCE  
IN GENERAL AGRICULTURE**

December 20, 1995

† Donald Scott Deans . . . . . Middlesex  
‡ Jason Wayland Gardner . . . . . Lillington  
Clarence Lorne Wiggins . . . . . Corapeake

May 10, 1996

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Robert Thomas Wyant . . . . . Vale

**ASSOCIATE IN APPLIED SCIENCE  
IN LIVESTOCK MANAGEMENT AND TECHNOLOGY -  
DAIRY OPTION**

May 10, 1996

† Robert Charles Davis . . . . . Stony Point  
† Tina Yvonne Dixon . . . . . Graham

† Co-major  
‡ Agribusiness Concentration

H Honors  
HH High Honors

## ASSOCIATE IN APPLIED SCIENCE IN LIVESTOCK MANAGEMENT AND TECHNOLOGY - GENERAL LIVESTOCK OPTION

December 20, 1995

Brett Alan Matthews . . . . .	Bunnlevel
Roland Mack Phillips, Jr. . . . .	Bear Creek
Ira LeRoy Witt . . . . .	Middlesex

May 10, 1996

‡ Benjamin Vaughan Coleman . . . . .	Sedalia, VA
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† Robert Charles Davis . . . . .	Stony Point
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December 20, 1995

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‡ Martin Allen Loflin . . . . .	Bear Creek

† Co-major

H Honors

‡ Agribusiness Concentration

HH High Honors

May 10, 1996

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	Chris Brian Goforth	Statesville
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†‡H	Niles Neville Lucas	Faison
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IN LIVESTOCK MANAGEMENT AND TECHNOLOGY -  
SWINE OPTION**

December 20, 1995

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‡	Allison Elizabeth Stallings	Elizabethtown

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	Chad Lentz Lowder	Albemarle
†‡H	Niles Neville Lucas	Faison
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	Steven Lewis Rouse	Seven Springs
H	Stuart Eugene Rouse	Rose Hill
H	Olga Nicole Ruiz	Mt. Olive
	Daniel Keith Waller	Seven Springs

†	Co-major	H	Honors
‡	Agribusiness Concentration	HH	High Honors



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†‡	Sean Wayne Cox . . . . .	Winston-Salem
†‡	Matthew Stewart Fairfield . . . . .	Plymouth
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†	Kevin Robert Lytle . . . . .	Indian Trail
†	Joseph Glen Magers . . . . .	Raleigh
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	James Ronald Robinson . . . . .	Greensboro
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May 10, 1996

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	Franklin Knute Snider . . . . .	Lexington
	Joshua Steven Sorrells . . . . .	Canton

† Co-major

H Honors

‡ Agribusiness Concentration

HH High Honors

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December 20, 1995

HH	Michael Garrett Adams	...	Newport News, VA
†‡	Burton Edward Ange, Jr.	.....	Plymouth
HH	Anthony Conway Cheek	.....	Burlington
	Michael James Claybrook	.....	Stoneville
†‡	Sean Wayne Cox	.....	Winston-Salem
	Philip Orrin Crabtree	.....	Durham
‡HH	Ronald Brad Edens	.....	Kenansville
	Billy Dean Evans, Jr.	.....	Stoneville
†‡	Matthew Stewart Fairfield	.....	Plymouth
‡	David John Fetsko	.....	Raleigh
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HH	Jed Michael Hemenway	.....	Boonville, IN
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	Jasen Kenneth Jenkins	.....	Winston-Salem
‡H	Kristopher Layne Kees	.....	Nashville, TN
HH	Anthony Randall Kemp	.....	Boonville, IN
	Ryan Winfred Kimbro	.....	Durham
HH	Walter Dewayne Krege	.....	Banner Elk
‡	Joseph Brent Leggett	.....	Nashville
†	Ethan Brian Lester	.....	Waynesville
	Brandon Leon Liles	.....	Garner
‡	Jeffrey Kent Liles	.....	Raleigh
†	Kevin Robert Lytle	.....	Indian Trail
†	Joseph Glen Magers	.....	Raleigh
†	Chris Allen Martin	.....	Arcadia
HH	Derek Lawrence Porter	...	Newport News, VA
H	Joseph Niram Ramsey	.....	Burnsville
†‡H	James Forrest Scruggs	.....	Clemmons
†HH	Richard Wayne Seagroves	.....	Wake Forest
	Robert Michael Terry	.....	Jacksonville
	Joseph Brent Thomasee	.....	Kannapolis

† Co-major

H Honors

‡ Agribusines Concentration

HH High Honors

May 10, 1996

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HH Anthony Vito Angelichio . . . . . Vass  
‡HH Paul Michael Brandenburg . . . . . Greenville  
HH Keith Dwayne Burnell . . . . . Greensboro  
Randall Jason Case . . . . . Hendersonville  
HH Michael Collin Cavins . . . . . Moline, IL  
HH James Daniel Chudy . . . . . Raleigh  
H Harry Wayne Coble II . . . . . Raleigh  
Mark Christopher Conlin . . . . . Cullowhee  
H Phillip Dean Farlow . . . . . Sophia  
Mark Jaison Godfrey . . . . . Rockingham  
†‡HH Michael Stephen Hartsell, Jr. . . . . Concord  
†‡ Michael Shawn Hawkins . . . . . Clemmons  
Stephen Noel Johnson . . . . . Gastonia  
Thomas Wayne Jordan . . . . . Erwin  
†H Charles Ryan Kearns . . . . . Lexington  
Mitchell Lee Mann . . . . . Burlington  
‡HH Raymond Kenneth Mann, Jr. . . . . Jacksonville  
Lewis Preston Mills . . . . . Monroe  
H Jason Patrick Myers . . . . . Philipsburg, PA  
‡ Vance Moore Newlin . . . . . Haw River  
‡HH Andrew Winston Ninnemann . . . . . Gambrills, MD  
Steven Barrett Overton . . . . . Shiloh  
HH Mark Odell Owen . . . . . Lexington  
Timothy Allen Patterson . . . . . Lakeview  
Joseph Lynn Powell . . . . . Cerro Gordo  
Brian Evert Ramsey . . . . . Franklin  
Brad Landon Satterfield . . . . . Burlington  
‡HH Marc Edward Smith . . . . . Williamsburg  
Robert Bryan Steed . . . . . Greensboro  
† Kevin Rene' Stinnett . . . . . Durham  
H Brently Aaron Ward . . . . . Bakersville  
H Shannon Sanders Wheeler . . . . . Raleigh  
Daniel Matthew Willis . . . . . Bakersville  
Jason Daniel Wingate . . . . . Sylva  
H Craig Alan Zeigler . . . . . Durham

† Co-major

H Honors

‡ Agribusiness Concentration

HH High Honors

## **Academic Honors**

Students with a grade point average of 3.00-3.49 graduate with **Honors**. Students with a grade point average of 3.50-4.00 graduate with **High Honors**.

## **Honor Sashes**

Students graduating with **Honors** are recognized with white sashes. Students graduating with **High Honors** are recognized with red sashes.

## Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc away in front; doctor--bell shaped.

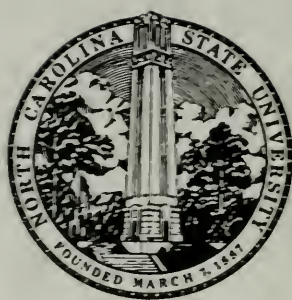
Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods. The color of the tassels for bachelor's degrees indicates the curriculum of the graduate: Agriculture, maize; Design, brown; Education, light blue; Engineering, orange; Forest Resource, russet; Liberal Arts, white; Physical and Mathematical Sciences, yellow; Textiles, wine red.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimmings, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.









CORRECTED COPY

# 1996 Fall Graduation Exercises

North Carolina State University



Wednesday, December 18  
Nineteen Hundred and Ninety-Six





# **DEGREES CONFERRED**

Wednesday, December 18  
Nineteen Hundred and Ninety-Six

This program is prepared for informational purposes only. The appearance of an individual's name does not constitute the University's acknowledgement, certification, or representation that the individual has fulfilled the requirements for a degree.

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# Musical Program

## EXERCISES OF GRADUATION

December 18, 1996

British Brass Band Concert 8:30 a.m.

English Folk Songs Suite . . . . . Ralph Vaughan-Williams, arr. Wright  
Patterns (for Brass Band) . . . . . Edward Gregson  
West Side Story Selections . . . . . Leonard Bernstein, arr. Wright

PROCESSIONAL: 9:00 a.m.

Grand March . . . . . Clare Grundman

RECESSIONAL (Platform Party Only):

Grand March . . . . . Clare Grundman

NORTH CAROLINA STATE UNIVERSITY  
BRITISH BRASS BAND  
Dr. Robert B. Petters, Director

# Exercises of Graduation

Reynolds Coliseum

Chancellor Larry K. Monteith  
Presiding

December 18, 1996

PROCESSIONAL, 9:00 a.m. . . . . Dr. Robert B. Petters

*Director, North Carolina State University British Brass Band.*

The audience is requested to remain seated during the Processional

WELCOME . . . . . Chancellor Larry K. Monteith

INVOCATION . . . . . Rabbi Lucy Dinner  
Temple Beth Or

NATIONAL ANTHEM . . . . . Ms. Wanda Ramm

INTRODUCTIONS . . . . . Chancellor Monteith

ADDRESS . . . . . Dr. Jerry Punch

CONFERRING OF HONORARY DEGREES . . . . . Chancellor Monteith

Dr. Prezell Russell Robinson

Doctor of Humane Letters

CONFERRING OF DEGREES . . . . . Chancellor Monteith

Candidates for advanced degrees presented by Dean of Graduate School. Candidates for  
baccalaureate degrees presented by Deans of Colleges/Schools

ADDRESS TO FELLOW GRADUATES . . . . . Ms. Ghazale Sharifi-Mehr  
Class of 1996

RECOGNITIONS . . . . . Chancellor Monteith

VALEDICTORIANS . . . . . CLASS OF 1996

Lori Nicole Adams  
Muqsit Ashraf  
Gavin Douglas Blosser  
Debra Renee Burch  
Christopher Louis Capps  
Crystal Noel Carter  
Angela Marie Cheyunski

Amy Cheryl Langdon  
Christopher Lochmuller  
Philip Worth Longest, Jr.  
Deborah Ware Mettler  
Askash Arvind Patel  
Steven Carl Spruill

TURNING OF THE TASSEL . . . . . Ms. Ghazale Sharifi-Mehr

ALMA MATER . . . . . The Grains of Time

RECESSIONAL (Platform Party only)

## Dr. Jerry Punch



There are television sports reporters. And there are doctors. Dr. Jerry Punch is both.

Until recently, Punch navigated between two hectic careers as a sports reporter for ESPN and ABC and as chief of staff of a Florida hospital and director of an emergency room. Occasionally, his dual interests merged: he sometimes stopped covering auto races so he could rush to help badly injured drivers such as Rusty Wallace and Don Marmor.

Punch, 43, now concentrates on reporting full time. After 15 years in trauma medicine, he sold the emergency medicine group he used to run in Florida and works solely for ESPN and ABC, which are both Disney affiliates.

Success has come steadily for Punch. He graduated magna cum laude from NC State University in 1975 before finishing at Bowman Gray Medical School at Wake Forest University in 1979. He credits NC State with instilling in him the “relentless preparation” that shapes his work. Punch said his two best decisions in life were to marry his wife, Joni Fields Punch, and to attend NC State.

A native of Newton, Punch brings a lifetime of loving sports to his profession. He was a mechanic and race car driver in high school and was a walk-on, back-up quarterback at NC State for Coach Lou Holtz. He got his start in the business announcing auto races on the weekends in medical school and eventually landed assignments with ESPN when he was a resident at a Daytona Beach hospital.

He has been a pit reporter covering NASCAR Winston Cup races for ESPN since 1984 and has worked as a college football sideline reporter since 1989. He also hosts other motorsports events and has called play-by-play for college football, basketball and gymnastics.

At the same time, Punch held down a demanding schedule as a doctor. Most recently, he was director of emergency room services at Memorial Hospital-Flagler in Bunnell, Fla.

In recognition of his accomplishments, NC State named him Outstanding Young Alumnus in 1989. The annual award honors graduates who are 35 or younger and have made the most contributions to their profession, community and university.

He also was awarded the United States Air Force Outstanding Performance Award, which is given for exemplary service in the auto racing community, in 1989; was named NASCAR’s Team Player of the Year in 1990; and was given the ARCA Motorsports Media Award in 1995. That award is presented to individuals or groups whose extra efforts have benefitted that motorsport series.

Punch has four sons. He and his wife live in Cornelius with their 2 1/2 year-old daughter.



## Dr. Prezell Russell Robinson



Dr. Prezell Russell Robinson is president emeritus of Saint Augustine's College where he is also Charles A. Mott Endowed Distinguished Professor of the Social Sciences. But Robinson's influence extends far beyond the Raleigh campus where he spent 28 years as the top administrator. He also has made an international imprint during his career.

Robinson is serving for the second time as a U.S. Alternate Representative to the United Nations. He was first appointed by President Bush in 1992 and was appointed again by President Clinton this year. He also was selected by the Department of State to visit and lecture in six African countries in 1971 and was appointed by President Carter to serve on the U.S.-Liberian Commission in 1980.

Robinson, who was born in Batesburg, S.C., graduated from Voorhees School and Junior College in Denmark, S.C., before earning a bachelor's degree in economics and social science from Saint Augustine's. He earned master's and doctoral degrees in rural education and rural sociology-economics from Cornell University.

He was a dean and sociology professor at Saint Augustine's between 1956 and 1964, was appointed executive dean and professor in 1964 and was named acting president in June 1966. He became president and a professor of sociology eight months later.

Robinson has earned recognition throughout his career, both as a faculty member and an administrator. He was voted one of three outstanding teachers at Saint Augustine's in 1961-62, was awarded a U.S. Fulbright Fellowship to India in 1965 and was selected one of 20 college presidents in the "100 Most Effective Presidents of America" in 1986. Robinson has received 11 honorary degrees.

Robinson has a long history of involvement in the Raleigh community. He is active in the Episcopal Church, at the parish, diocesan and national levels. In addition, Robinson is vice chairman of the North Carolina State Board of Education and has served on numerous academic and community organizations. They include: the executive committee of the International Association of University Presidents; the board of directors of The Episcopal Church Foundation; the Association of Southern Colleges and Universities, of which he was president in 1974-75; the executive committee of the United Negro College Fund, of which he was president and a member from 1978 to 1981; the National Association for Equal Opportunity in Higher Education, of which he was president from 1982 to 1985; the Association of Episcopal Colleges, of which he was president from 1989 to 1994; the board of directors of The Episcopal Church Pension Fund, on which he has served since 1985; and the board of trustees of Peace College in Raleigh and of Voorhees College.

Robinson, who lives in Raleigh, retired in 1995. He and his wife, Lulu, have one daughter.

# Time and Location of College and Departmental Ceremonies

## College of Agriculture and Life Sciences - 11:30 a.m.

Agricultural Business Management .....	225 Nelson Hall
Agricultural and Extension Education .....	2 Ricks Hall
Agronomy, Conservation, Crop, and Soil Science .....	2215 Williams Hall
Animal Science .....	McKimmon Center
Biochemistry .....	1404 Williams Hall
Biological and Agricultural Engineering .....	158 Weaver Laboratories
Biological Sciences .....	2722 Bostian Hall

Biological Sciences Major  
Botany  
Ecology  
Entomology  
Genetics

Microbiology  
Nutrition  
Plant Pathology  
Toxicology

Environmental Sciences .....	Location of Major Faculty Advisor
Food Science .....	105 Schaub Hall
Horticultural Science .....	159 Kilgore Hall
Natural Resources .....	Location of Major Faculty Advisor
Physiology Program .....	Location of Major Faculty Advisor
Poultry Science .....	106 Scott Hall
Applied Sociology .....	218 Withers Hall
Zoology .....	3712 Bostian Hall

Fisheries and Wildlife Sciences  
Medical Technology  
Zoology Majors

**School of Design - 3:00 p.m.** ..... Stewart Theatre  
Coffee & Dessert - 12:30 p.m. - 2:00 p.m. .... Brooks Hall Gallery

**College of Education and Psychology - 11:30 a.m.** ..... McKimmon Center,  
Western Boulevard

## College of Engineering - 11:30 a.m.

Aerospace Engineering .....	Cinema, University Student Center Annex
Biological and Agricultural Engineering .....	158 Weaver Laboratories
Chemical Engineering .....	11 Riddick Laboratories
Civil Engineering .....	240 Nelson Hall Auditorium
Computer Science .....	Pullen Memorial Baptist Church, 1801 Hillsborough Street
Electrical and Computer Engineering .....	Stewart Theatre, University Student Center
Industrial Engineering .....	Ephesus Baptist Church, 6767 Hillsborough Street

Integrated Manufacturing Systems Engineering	117 Park Shops
Master of Engineering	117 Park Shops
Materials Science and Engineering	234 Riddick Laboratories
Mechanical Engineering	Cinema, University Student Center Annex
Nuclear Engineering	1202 Burlington Laboratories

**College of Forest Resources - 11:30 a.m.** ..... McKimmon Center,  
Western Boulevard

**College of Humanities and Social Sciences - 11:30 a.m. except for those marked with an asterisk**

Communication	Memorial Auditorium
* English - 1:30	Fairmont United Methodist Church, 2501 Clark Avenue
Foreign Languages and Literatures	3118 University Student Center
History	107 Harrelson Hall
* Multidisciplinary Studies - 1:30	Fairmont United Methodist Church, 2501 Clark Avenue
Philosophy and Religion	3118 University Student Center
Political Science and Public Administration	216 Poe Hall
Social Work	Forest Hills Baptist Church, 3110 Clark Avenue
Sociology and Anthropology	218 Withers Hall

**College of Management - 11:30 a.m.**

Accounting	Reynolds Coliseum
Business Management	Reynolds Coliseum
Economics	Reynolds Coliseum

**College of Physical and Mathematical Sciences - 11:30 a.m.**

Chemistry	124 Dabney Hall
Marine, Earth and Atmospheric Sciences	2010 Biltmore Hall
Mathematics	207 Harrelson Hall
Physics	206 Cox Hall
Statistics	Roosevelt Room, Brownstone Hotel, 1707 Hillsborough Street

**College of Textiles - 11:30 a.m.** ..... W. Duke Kimbrell Atrium,  
Centennial Textiles Complex

Reception - Immediately following departmental ceremony. . Convocation Center,  
Centennial Textiles Complex

# ROTC COMMISSIONING CEREMONY

LIEUTENANT COLONEL JOHN F. MCINERNEY  
Presiding

University Student Center Ballroom  
18 December 1996

- PROCESSIONAL MARCH, 4:00 p.m . . . . . Dr. Robert B. Petters  
*Director, North Carolina State University British Brass Band*
- POSTING OF THE COLORS . . . . . Multi-Service Color Guard
- NATIONAL ANTHEM
- INVOCATION . . . . . Reverend Phillip Wiehe
- WELCOME . . . . . Dr. Larry K. Monteith  
Chancellor
- INTRODUCTIONS . . . . . Lieutenant Colonel John F. McInerney  
*Military Science*
- ADDRESS . . . . . Brigadier General Maxwell C. Bailey  
Commander, 2nd Air Force, Keesler Air Force Base, Mississippi
- ADMINISTRATION OF THE OATH  
OF OFFICE . . . . . Captain Richard J. Field  
*Professor of Naval Science*
- Colonel Robert H. Penny  
*Professor of Aerospace Studies*
- PRESENTATION OF CERTIFICATES . . . . . Dr. Larry K. Monteith  
Brigadier General Maxwell C. Bailey
- BENEDICTION . . . . . Reverend Phillip Wiehe
- RETIRING OF THE COLORS . . . . . Multi-Service Color Guard
- RECESSIONAL . . . . . North Carolina State University British Brass Band  
*The audience is requested to remain seated until the Recessional music is completed.*

# Graduation Ushers

## Air Force ROTC Ushers

Christopher Autry  
James Chambers  
Dustin Keck  
Robert Lackey  
John McClung  
Steven Shearin  
Steven Storms  
J. C. Strickland, Jr.  
Andrew White  
Heather Wyss

## Navy ROTC Ushers

Spencer Anderson  
William Capone  
Benjamin Caricofe  
Kevin Crow  
Jereal Dorsey  
Matthew Foster  
Chapin Hough  
Eugene Reynolds  
John Scorzello  
Seth Stallings

## Army ROTC Users

Donald Buffoni  
Scott Carter  
Christopher Culpepper  
Timothy Duggan  
Edward Gomez  
Rebekah Gunn  
Jason MacKenzie  
Robert McCracken

# Graduation Marshals

Mark D. Anthony  
Matthew K. Boone  
Jeremy S. Bordeaux  
Corrie R. Camalier  
Jenny C. Chang  
Felton S. Dengler, IV  
Kent P. Dezendorf  
Marshal K. Eagle  
Kelly J. Fairchild  
Patricia M. Festin  
S. Michelle Garoutte  
Stephen E. Garrett

Tiffany R. Goins  
J. Zachariah Hall, II  
David R. Higgins  
Melani Hix  
Steven E. Hughes  
P. Michael Juby, Jr.  
Aaron J. Kalarovich  
Erik O. Lie-Nielsen  
Matthew T. Lisi  
Abee C. Lowman  
Sybil L. MacDonald  
William J. Mitchell

Chad Myers  
Emily N. O'Quinn  
M. Claire Pittman  
Mary C. Pollard  
Heather E. Reidinger  
James A. Reinke  
Aimee D. Smart  
Bryan H. Stypmann  
Jacob Gerald Vanden Bosch  
Tracey M. Westbrook  
Catherine E. Wilfong



# The Alma Mater

*Words by:*

ALVIN M. FOUNTAIN, '23

*Music by:*

BONNIE F. NORRIS, JR., '23

Where the winds of Dixie softly blow  
o'er the fields of Caroline,

There stands ever cherished N.C. State,  
as thy honored shrine.

So lift your voices; Loudly sing  
from hill to oceanside!

Our hearts ever hold you, N.C. State  
in the folds of our love and pride.

# Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc cut away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimming, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long, respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty in which the degree was awarded. For each faculty there is a corresponding color; so a glance at the trimming is all that is needed to identify the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.

# Academic Honors

Honors participants benefit from a more individualized and rigorous approach to their desired degree through special classes, seminars and individual research.

Undergraduate degree honor designations are:

- Cum Laude--for GPA 3.250 through 3.499 (white sash)
- Magna Cum Laude--for GPA 3.500 through 3.749 (red sash)
- Summa Cum Laude--for GPA 3.750 and above (gold sash)

# UNDERGRADUATE DEGREES



## College of Agriculture and Life Sciences

### BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

*Degree Conferred August 8, 1996*

David McKinley Stein, Jr. . . . . Fayetteville

*Degrees Conferred December 18, 1996*

- \*\*\* David Spruill Anderson . . . . . Rocky Mount
- Channin Hyde Bennett . . . . . Raleigh
- Sandra Kay Cartwright . . . . . Winston-Salem
- Susan Louise Cauley . . . . . Kinston
- S\*\*\* Wendy Michelle Lovelace . . . . . Lawndale
- Charles Worth McCormick . . . . . Fairmont
- Brian Matthew Simpson . . . . . Marshville
- Katherine Nicole Starrette . . . . . Currituck
- Rachel Ann VanBenthuyssen . . . . . Cary

### BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

*Degree Conferred June 25, 1996*

Dermott John Cooke . . . . . Cleveland, OH

*Degrees Conferred December 18, 1996*

John Walter Dettelbach . . . . . Hickory

+Co-major  
\*Cum Laude

H Honors Program  
\*\*Magna Cum Laude

S University Scholars Program  
\*\*\*Summa Cum Laude

Stephen Forrest Morton .....	Reidsville
*** Roger Alan Serrette .....	Raleigh

**BACHELOR OF SCIENCE IN CONSERVATION**

Jointly administered by the College of Agriculture and Life Sciences and the College of Forest Resources.

*Degree Conferred December 18, 1996*

John Tamp Bandy .....	Conover
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**BACHELOR OF SCIENCE AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY**

*Degree Conferred August 8, 1996*

James Latman Lamb .....	Clinton
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**BACHELOR OF SCIENCE IN AGRICULTURAL BUSINESS MANAGEMENT**

*Degrees Conferred June 25, 1996*

Brett Clifford Paulsen .....	Eden
Mehul Mahesh Shah .....	Winston-Salem
Jerome Edward Smith .....	Oxford

*Degrees Conferred August 8, 1996*

Ronnie Keyleen Hill, Jr. ....	Temple, TX
Michael Joseph Rubish .....	Columbiana, OH

*Degrees Conferred December 18, 1996*

Heidi Lee Blount .....	Plymouth
James Andrew Boaz .....	Yanceyville
Thomas Allen Cook .....	Bakersville
John Raymond Donovan .....	Marlboro, NY
John Allen Jacobs .....	Statesville
Mark Wilson Lassiter .....	Four Oaks
Robert Craven Millican .....	Fuquay-Varina
Tyler David Mitchell .....	Taylorsville
Raphael Caleb Parker .....	Clinton, MD
+ Shane Phillip Poplin .....	Albermarle
Mary Catherine Powell .....	Raleigh
Thomas Wyatt Richardson .....	Nakina
Curtis Edward Solomon .....	Fuquay-Varina
Webb Allen White .....	Roanoke Rapids
Lori Ann Wilson .....	Brevard
Ronald Corbett Wood .....	Benson
Nathan Barrett Wright .....	Greenville

## BACHELOR OF SCIENCE IN AGRICULTURAL EDUCATION

*Degree Conferred August 8, 1996*

Larry Brian Jenkins ..... Deep Run

## BACHELOR OF SCIENCE IN AGRICULTURAL SYSTEMS TECHNOLOGY

*Degree Conferred December 18, 1996*

Derek Lee McLamb ..... Roseboro

## BACHELOR OF SCIENCE IN AGRONOMY

*Degrees Conferred December 18, 1996*

Jonathan Richard Bender ..... Norlina  
James Wesley Caddell ..... Carthage  
Durwood Travis Gardner ..... Smithfield  
Sheila Joanne Hughes ..... Durham  
Timothy David Mack ..... Wilmington  
Steve Wayne Money, Jr. .... Kernersville

## BACHELOR OF SCIENCE IN ANIMAL SCIENCE

*Degrees Conferred June 25, 1996*

Michael Adrian Johnson ..... Statesville  
Lee Alan Menius ..... Salisbury  
Rebecca Gail Weaver ..... Hudson

*Degrees Conferred August 8, 1996*

Karen Michelle Carter ..... Kansas City, MO  
Bruce Wayne McBride, Jr. .... Concord

*Degrees Conferred December 18, 1996*

Kimberly Ann Boutin ..... Raleigh  
Ronald Derek Brown ..... Rose Hill  
Teresa René Bryant ..... Zebulon  
\*\* Kristin Ann Carbine ..... Rutland, VT  
Timothy Paul Dollyhite ..... Mount Airy  
\* Kevin Donald Hardison ..... Benson  
\* Craig Allen Harris ..... Hudson  
Amy Michele Hawley ..... Raleigh  
Christopher Scott Jolly ..... Maysville  
+\*\* Regina Carol Linville ..... Madison  
\* Kelly Kathleen Meador ..... Apex  
Mark Edward Mills ..... Peachland  
William Thomas Oliver ..... Wendell  
Sylvia Pete Poulos ..... Atlanta, GA  
Angela Christine Rogers ..... Mill Spring



** Shawntel Monique Sechrist	Denver
John Daniel Shevock	Durham
Yvonne Anne Stroupe	Indian Trail
Amy Dawn Wlodkowski	Pittsfield, MA

## BACHELOR OF SCIENCE IN APPLIED SOCIOLOGY

*Degree Conferred June 25, 1996*

* Elizabeth Denise Roberts	Garner
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*Degree Conferred December 18, 1996*

Fletcher Marvin Edens	Salisbury
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## BACHELOR OF SCIENCE IN BIOCHEMISTRY

*Degrees Conferred August 8, 1996*

Marcia Celeste Carroll	Boomer
H** James Edward Corcoran	Charlotte
*** Sharon Monk Elledge	Lillington
Jonathan Brett Morgan	Wilmington
+ Katherine Mary Rouse	Vienna, VA
Karen Elizabeth Twiford	Rocky Mount

*Degrees Conferred December 18, 1996*

Jimmy Lane Allgood, Jr.	Henderson
S* Jill Marie Barker	Raleigh
Benjamin Todd Campbell	Raleigh
S+*** Crystal Noël Carter	Linden
+* Robert Glenn Coon	Charleston, SC
Wendelin Nicole Dixon	Greenville
+ Shera Rebecca Forrester	Gastonia
+ Stephanie Dale Hamley	High Point
Timmy Ray Hatley	Albemarle
+** Derek Adrian Hauser	Wake Forest
+ Thuha Thi Hoang	Apex
John Daniel Kelly	Plymouth
+* Yangchong Kue	Morganton
+** Regina Carol Linville	Madison
+ Mariana Marchi Molina	Raleigh
Heather Blue Nelson	Fayetteville
Brian Keith Newcomb	Walstonburg
Scott Alan Northrup	Rural Hall
** Christy Violet Perry	Garner
S+*** Christopher Britt Peterson	Pisgah Forest
*** David Russell Phillips	Garner
HS*** Angela Teresa Racine	Cary
+*** Kelly Anne Sigmon	Hickory
+ Cynthia Lucille Sparrow	Wilmington
HS*** Steven Carl Spruill	Lucama

***	Jerry Tracy Staley	Greensboro
	Kevin Gerard Sullivan	Hopatcong, NJ
	Timothy Allen Sullivan	Raleigh
+***	Kimberly Lynne Whitehead	Durham
	Wendy Kathrine Wortham	Brownsville, TN
	Lawrence Wonsik Yoon	Toronto, Canada

## BACHELOR OF SCIENCE IN BIOLOGICAL SCIENCES

*Degrees Conferred June 25, 1996*

*	Jamie Scott Crowder	Maiden
	Ronald Craig Smith	Durham

*Degrees Conferred August 8, 1996*

*	Derrick Carl Blackmon	Burlington
	Michael Lee Brooks	Winston-Salem
	Joanna Elizabeth Long	Stone Mountain, GA
	Kathy Ann Woolever	Ravenswood, WV

*Degrees Conferred December 18, 1996*

H***	Gavin Douglas Blosser	Dillwyn, VA
	Betsy Hau Cao	Raleigh
S+***	Crystal Noël Carter	Linden
	Mary Catherine Conklin	Chesapeake, VA
	Bryan James Conner	Wayne, PA
	Scott Clifford Dennis	Raleigh
+	Patrick Richard Haikal	Raleigh
	Derik Michael Hinz	Victor, NY
	William Eugene Johnson IV	Harrells
	Jason Michael Kopp	Hickory
	Matthew Calvin Larson	Lyons, CO
	John William Matthews	Louisburg
	Andreas O'Neal	Belhaven
	Suzanne Vann Robinson	Henderson
	Brian Kenneth Rose	Greenville
	Lauren Nicole Shryock	Baltimore, MD
+	Cynthia Lucille Sparrow	Wilmington
	Shellie Delaine St. Jean	Nashville, TN
	Emily Elizabeth Starnes	Taylorsville
	Cynthia Ann Stroupe	Charlotte
	Billy Orvis Watkins, Jr.	Richlands
***	April Ann Wood	Clayton

## BACHELOR OF SCIENCE IN BOTANY

*Degree Conferred August 8, 1996*

	Brian Lee Ridenhour	Murphy
--	---------------------	--------

*Degree Conferred December 18, 1996*

Leigh Anne Weitzenfeld ..... Floyd, VA

**BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCES**

*Degree Conferred December 18, 1996*

Tanner Edward Holland ..... Lumberton

**BACHELOR OF SCIENCE IN FISHERIES AND WILDLIFE SCIENCES**

*Degree Conferred June 25, 1996*

Ronald McArthur Smith II ..... Chesnee, SC

*Degrees Conferred December 18, 1996*

Christine Marie Alvarez ..... Shadyside, OH

Rachelle Lyn Beauregard ..... Raleigh

Jeffrey Neel Burleson ..... Lumberton

Wilbur Emmett Carawan ..... Hyde County

\* Thomas Matthew Cardwell ..... Mayodan

Gary Harold Egbert ..... Voorhees, NJ

\* Shawn Paul Hopson ..... Knotts Island

\* Brent Neal Lineberger ..... Raleigh

Bonnie Erin McNally ..... Concord

Mitchell Alan Morton ..... Mouth Of Wilson, VA

Derek Dwayne Murry ..... Lee Center, NY

Ronald Jason Satterwhite ..... Granite Falls

James Michael Sutton ..... Raleigh

Brenda Gail Tyner ..... Carthage

Ray Harding Williams III ..... Sneads Ferry

\* Elizabeth Sato Workman ..... Raleigh

**BACHELOR OF SCIENCE IN FOOD SCIENCE**

*Degree Conferred August 8, 1996*

Jennifer Royster Pruitt ..... Raleigh

*Degrees Conferred December 18, 1996*

Cherié Lynn Armstrong ..... Jupiter, FL

\*\* Tiffany Marie Ashburn ..... Waterford, VA

Lia Michele Goeller ..... Hickory

+ Gregory Paul Herndon ..... Wilson

+ Douglas Heath LaFevers ..... Glen Alpine

\* Zack Smokey Steele ..... Hickory

Shannon Marie Teague ..... Advance

## BACHELOR OF SCIENCE IN HORTICULTURAL SCIENCE

*Degree Conferred August 8, 1996*

Natalie Jill Dunn ..... Raleigh

*Degrees Conferred December 18, 1996*

\*\*\* Jay Stephen Aime ..... Raleigh  
Patrick Lee Dabbs ..... Fayetteville  
Brian Douglas Dunn ..... Charlotte  
Rudolph John Eisenzopf III ..... Glen Burnie, MD  
Brian Curtis Elledge ..... Hickory  
Bonnie Denise Faulkner ..... Kinston  
Brian Matthew Free ..... High Point  
Jennifer Leigh Hamran ..... Trenton, NJ  
Terrel Wayne Knutson ..... Wake Forest  
Robert Jay Markley ..... Clyde  
\*\* Benjamin Waverly McIver ..... Durham  
Brian Lewis Morrison ..... Elkins, WV  
\* Gerard Joseph Nieters ..... Morgantown  
+ Shane Philip Poplin ..... Albermarle  
Deborah Marie Rummel ..... Leesburg, VA  
\* Ted Bryan Sanderson ..... Spring Hope  
Dustin Trent Swain ..... Walkertown  
\*\*\* Ann Marie Campbell Waller ..... Raleigh

## BACHELOR OF SCIENCE IN MEDICAL TECHNOLOGY

*Degrees Conferred June 25, 1996*

Lisa Marie Berlanga ..... Fayetteville

\* William George Knapp ..... Cary

*Degrees Conferred August 8, 1996*

\* Anna Yuri Hicks ..... Charlotte

\* Michelle Marlene Netto ..... Willow Springs

## BACHELOR OF SCIENCE IN MICROBIOLOGY

*Degree Conferred June 25, 1996*

\* Leena Rajendra Dave ..... Raleigh

*Degrees Conferred August 8, 1996*

Cheryl Woody Brame ..... Henderson

\*\* Elisa Gellar Newkirk ..... Four Oaks

*Degrees Conferred December 18, 1996*

\*\*\* Stefanie Diane Brock ..... Hof West, West Germany

Dana Nicole Capps	Charlotte
Denise Dunn	Charlotte
+ Patrick Richard Haikal	Raleigh
+ Gregory Paul Herndon	Wilson
+ Jennifer Leigh Lett	Wantagh, NY
Patrick Joseph Nadol	Mooresville
Christy Ann Smith	Albemarle

**BACHELOR OF SCIENCE IN NATURAL RESOURCES**

*Degrees Conferred December 18, 1996*

Brian Alton Batten	Selma
* Jennifer Morris Chambers	Reidsville
Kathleen Diane Hoban	Wilmington
* Samuel Ashley Rollans	Salisbury

**BACHELOR OF SCIENCE IN POULTRY SCIENCE**

*Degree Conferred June 25, 1996*

+ Eric Martin King	Charlotte
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*Degrees Conferred August 8, 1996*

Ted Hall Lankford	North Wilkesboro
Chad Jonathan Larson	Sargeant, MN
Jason Frederick Stroude	Hays

*Degrees Conferred December 18, 1996*

Laura Diane Cain	Turkey
+ Douglas Heath LaFavers	Glen Alpine
Mary Carol Stephenson	Coats

**BACHELOR OF SCIENCE IN ZOOLOGY**

*Degrees Conferred June 25, 1996*

* James Michael Edmundson	Wilmington
Shavale Lee Godwin	Lumberton
*** Christopher Michael Lochmuller	Durham
** Karen Faye Stanaland	Calabash
Kimberly Lane Tabor	Raleigh

*Degrees Conferred August 8, 1996*

William Maxwell Carpenter	Asheville
Gina Leigh Collins	Jacksonville
Stephanie Diane Cordle	Gastonia
Kuan Jamel Gethers	Bronx, NY
Amanda Jane Huffman	Virginia Beach, VA
Benjamin Douglas McIntosh, Jr.	Spotsylvania, VA

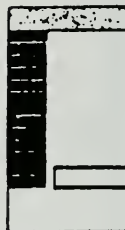


+ Chiga Miyake	Akechi-Cyoun, Japan
Vikram Vasudev Mohip	Wilmington
* Christina Ann Morgan	Raleigh
*** Kimberly Rae Parks	Morganton
JoAnna Lynn Perry	Wilson
Benjamin Daniel Schramm	Raleigh

*Degrees Conferred December 18, 1996*

Angela Amedee Abel	Franklin
Courtney Kamil Amaker	Winston-Salem
*** Laura Minwer Badwan	Raleigh
Sara Griffin Brewen	Kannapolis
Stephanie Jane Britt	Garner
* Jennifer Lynne Brock	Columbia, MD
*** Mary Catherine Bruton	Raleigh
Melissa Dudero Buan	Easton, CT
Kristin Amanda Buckley	Scotch Plains, NJ
*** Debra Renee Burch	Matthews
** Michelle Deneen Calkins	Durham
Mickael Jeffrey Cariveau	Middlesex
Tamyra Tant Carpenter	Bailey
*** Angela Marie Cheyunski	Raleigh
** David Husslar Cline IV	Elkin
+* Robert Glenn Coon	Charleston, SC
* Leah Paige Crawford	Huntersville
*** Brigitte Diane Flythe	Raleigh
Gregory Scott Frey	Louisville, KY
*** Jeffrey Andrew Gage	Chapel Hill
Jennifer Marie Garrett	Medford, NJ
S** James Perrin Hammond III	Charlotte
+** Derek Adrian Hauser	Wake Forest
George Cuthbert Heyward	Raleigh
* Carolyn Renea Hubbard	Fayetteville
Teshor Lashon Jones	Goldsboro
Anil Francis Joy	Raleigh
Satya Pratap Karamchandani	Raleigh
*** Melanie Eileen Kirk	Durham
*** Sherry Shirley Knouse	Youngsville
Kerrie Lane Knowles	Sneads Ferry
+* Yangchong Kue	Morganton
* Stacey Michelle Lawrence	Como
Christopher David Laxton	Wake Forest
+ Jennifer Leigh Lett	Wantagh, NY
Audra Lynn MacAulay	Raleigh
Jason Arthur Malphurs	Raleigh
* Alice Thomas Meyer	Raleigh
* Sheri Lynn Oswald	Woodland Hills, CA
Lara Adrienne Reid	Whitsett
+* Gregory Paul Richmond	Charlotte
David Anthony Sabio	Raleigh
Jonathan Patrick Scoggins	Rocky Mount
Jewel Lynette Scott	Raleigh

Elizabeth Vick Sloan	Raleigh
** Claire Elizabeth Smith	Raleigh
*** Christian Suzanne Spruill	Greensboro
Brian Keith Tolley	Smithfield, VA
Chukwuma Ukata	Raleigh
Heather Diane Warrender	Morehead City
Michael David Whitley	New Bern
Alena Susann Wirt	Cary



## School of Design

### BACHELOR OF ARCHITECTURE

*Degree Conferred December 18, 1996*

* David Christopher Sledge	Norlina
----------------------------	---------

### BACHELOR OF ART AND DESIGN

*Degrees Conferred December 18, 1996*

** Amanda Kyle Davis	Hopkinsville, KY
Jenifer Marie Padilla	Chapel Hill
+** Kirsten Uta Schambra	Chapel Hill
S*** Frederic Welterlin	Cary

### BACHELOR OF ENVIRONMENTAL DESIGN

*Degrees Conferred June 25, 1996*

** Emerson Tay Ong	Metuchen, NJ
Matthew Douglas Starr	Rocky Mount
* Angela Caroline Waters	Morganton

### BACHELOR OF ENVIRONMENTAL DESIGN IN ARCHITECTURE

*Degree Conferred June 25, 1996*

* Wakako Tokunaga	Tokyo, Japan
-------------------	--------------

*Degrees Conferred August 8, 1996*

Jock deBoer	New Orleans, LA
Leslie Edward Linsmier	Raleigh
+ Robin Allison Taylor	Charlotte

*Degrees Conferred December 18, 1996*

** Minda Lea Brown	Anniston, AL
* Shawn Patrick Corbin	Gatesville
* Philip John Dagostino	Mooresville
Michelle Lynette Degruy	Wake Forest
* Jose Maria Gonzalez	Madrid, Spain
** Soo Zee Park	Wilmington
* Shannon Ronn Rushing	Monroe
* Ginger Renee Stancil	Angier
* Nicole Marie Starnes	Monroe
** Ann Celeste Waid	Concord
+ Richard Allen Woodland	Chapel Hill

**BACHELOR OF ENVIRONMENTAL DESIGN IN GRAPHIC DESIGN**

*Degrees Conferred June 25, 1996*

Jonathan Michael Gerler	Raleigh
Kendra DeSean Williams	Waynesboro, VA

*Degree Conferred August 8, 1996*

** Tiffany Rishelle Miller	Goldsboro
----------------------------	-----------

**BACHELOR OF ENVIRONMENTAL DESIGN IN INDUSTRIAL DESIGN**

*Degrees Conferred August 8, 1996*

* William Lee Cherry	Fayetteville
* Maria Veronica Frontado	Caracas, Venezuela
+ Robin Allison Taylor	Charlotte

**BACHELOR OF ENVIRONMENTAL DESIGN IN LANDSCAPE ARCHITECTURE**

*Degree Conferred December 18, 1996*

** Steven John Megesi	Novi, MI
-----------------------	----------

**BACHELOR OF GRAPHIC DESIGN**

*Degrees Conferred December 18, 1996*

* Danielle Jeanine Anthony	Purlear
Kelli Holland Holmes	Raleigh
+ Kimberly Anne Horner	Jamestown
* Gregory Ryan Melrath	Oxford, PA
Cheryl Potter Mills	Raleigh

## BACHELOR OF INDUSTRIAL DESIGN

*Degrees Conferred December 18, 1996*

* Dorje Seattle Bellbrook	Pfafftown
Bryan Sean Covington	Charlotte
+ Kimberly Anne Horner	Jamestown
Michael Curtis McGraw	Warren, PA
John William Peele	High Point
+** Kirsten Uta Schambra	Chapel Hill
Randolph Gerhard Schiener	Wilmington
+ Richard Allen Woodland	Chapel Hill

## BACHELOR OF LANDSCAPE ARCHITECTURE

*Degree Conferred December 18, 1996*

Dennis Charles Terry	Mooresboro
----------------------	------------

# College of Education and Psychology



## BACHELOR OF ARTS IN PSYCHOLOGY

*Degrees Conferred June 25, 1996*

Lee Joseph Andron	Raleigh
Jon Thomas Fields	Wilmington
* Jennifer Anne Greene	Raleigh

*Degrees Conferred August 8, 1996*

* Marsha Dawn Bailey	Cary
* Rebecca Brantley Collins	Zebulon
** Andra Lynn Corn Smith	Durham
** Amy Lynn Kay	Knightdale
Amy Marie Lamneck	Apex
** Nicole Marie Omiatek	Horsheads, NY
Mary Jo Robertson	Raleigh
Amy Denise Sills	Marion
Xavier Antoine Tondeur	Chapel Hill

*Degrees Conferred December 18, 1996*

Robert Ward Angley	Morganton
* Susan Ann Bagwell	Asheville
* Karen Danees Barnette	Stanley
** Thomas Allen Beam	Raleigh
* Eileen Marie Bomstein	Bethesda, MD

***	Julie Baxter Bradburn	Raleigh
	Melissa Lynn Chamberlin	Hillsborough
	Corey Dale Chenoweth	Port Jefferson, NY
**	Denise Margaret Curtis	Belleville, IL
*	Meghan Kathleen Denny	Raleigh
**	Kelly Lynn Drake	Raleigh
	Teresa Diane Grimes	Cary
	David Howell Hart	Oxford
	Richard Ernest Hicks	Raleigh
	Willie Dallas Jacobs	Burgaw
*	Erik Michael Johnson	Salisbury
***	Cynthia Elizabeth Killough	Raleigh
	Timika Telitia Little	Newport
***	Debra Poteat Lucas	Wake Forest
HS***	Lori Reneé McDowell	Stella
*	Laura Margaret McGovern	Raleigh
S+	Richard Ernest Mearns, Jr.	Greensboro
***	Deborah Ware Mettler	Fuquay-Varina
	Ross Nicholson Miller	Cary
+	Chiga Miyake	Akechi-Cyoun, Japan
*	Adrienne Christine Murrell	Greenville
	Christie Ann Patterson	Broadway
	Patricia Irene Patterson	Raleigh
*	Janet Carol Perry	Windsor
	Charlie Elias Quick II	Raleigh
	Jennifer Carol Teachey	Greensboro
	Talesha Ayana Wagner	Virginia Beach, VA
	Melanie Anne Webb	Pokomoke City, MD
H***	Gillian Norton Will	Raleigh

## BACHELOR OF SCIENCE IN EDUCATION

### Education, General Studies

*Degree Conferred June 25, 1996*

*	Leslie Thaggard Lawrence	Raleigh
---	--------------------------	---------

*Degrees Conferred December 18, 1996*

	Mary Katherine Rissmiller	Greensboro
	Tonya Lavette Scott	Enfield

### Health Occupations, Teacher Education

*Degrees Conferred December 18, 1996*

**	Michelle Russell Barker	Raleigh
***	Linda Joy Blake	Rolesville
*	Shelby Scott Chadwick	Burgaw
	JoAnn Foye	Garner
***	Mary Margaret Vicente	Raleigh



**Language Arts and Social Studies, Middle Grades**

*Degrees Conferred December 18, 1996*

- \*\* Karla Susan Boldt . . . . . Cary
- \* Rhonda Bowes Clayton . . . . . Roxboro
- \* James Allen White . . . . . Zebulon

**Mathematics Education**

*Degrees Conferred December 18, 1996*

- Benjamin Wayne Jones . . . . . Winston-Salem
- Mary Jacquenette Jones . . . . . Wilson Mills
- Beatrice B. Lyons . . . . . Tarboro
- \* Christopher John Remaley . . . . . Garner
- Stephanie Elizabeth Watson . . . . . Kenly

**Mathematics Education, Middle Grades**

*Degrees Conferred December 18, 1996*

- Johmar Lavon Barringer . . . . . Winston-Salem
- Victoria Leeds Cooper . . . . . Medford, NJ
- Gertrude Lyons . . . . . Tarboro

**Mathematics and Science, Middle Grades**

*Degree Conferred June 25, 1996*

- Wayne Leon Williams . . . . . Henderson

*Degrees Conferred December 18, 1996*

- Kimberli Dawn Adams . . . . . Raleigh
- \*\* Susan Hunt Baker . . . . . Raleigh
- Andrea Dale Dobbins . . . . . High Point
- Christophe Anderson Huestis . . . . . New Bern
- David Andrew Wilder . . . . . Gastonia

**Science Education**

*Degree Conferred August 8, 1996*

- Kimberly Anne Williams . . . . . Southern Pines

*Degrees Conferred December 18, 1996*

- \* Stacy Leigh Allred . . . . . Winston-Salem
- \*\*\* Scott Edward Caudill . . . . . Oakton, VA
- \*\*\* Susan Lara Eure . . . . . Clayton
- \*\*\* Courtney Lynne High . . . . . Bailey
- Jeffrey Thomas Layton . . . . . Wilmington

S** Shannon Marie Mullens	Casar
* Christie Ann Shepherd	Tarboro

**Science Education, Middle Grades**

*Degrees Conferred December 18, 1996*

Laura Teresa Day	Greensboro
Michelle Rebecca Flowers	Fuquay-Varina
* Guy David Munger	Raleigh
*** Katherine Wilkins Smyre	Cary

**Technology Education**

*Degrees Conferred June 25, 1996*

James Walter Brown III	Durham
Bennett Michael Harris	Smithfield
Nahanni McMeans	Goldsboro

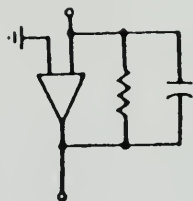
*Degrees Conferred August 8, 1996*

George Anthony Sales	Asheville
Rex Olson Woody, Jr.	Newland

*Degree Conferred December 18, 1996*

Daniel Benjamin Alley	Raleigh
-----------------------	---------

# College of Engineering



**BACHELOR OF SCIENCE IN BIOLOGICAL AND AGRICULTURAL ENGINEERING**

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

*Degree Conferred August 8, 1996*

David McKinley Stein, Jr.	Fayetteville
---------------------------	--------------

*Degrees Conferred December 18, 1996*

** David Spruill Anderson	Rocky Mount
Channin Hyde Bennett	Raleigh
Sandra Kay Cartwright	Winston-Salem
Susan Louise Cauley	Kinston
S*** Wendy Michelle Lovelace	Lawndale

Charles Worth McCormick .....	Fairmont
Brian Matthew Simpson .....	Marshville
Katherine Nicole Starrette .....	Currituck
Rachel Ann Vanbenthuyssen .....	Cary

### **BACHELOR OF SCIENCE IN BIOLOGICAL ENGINEERING**

Jointly administered by the College of Agriculture and Life Sciences and the College of Engineering.

*Degree Conferred June 25, 1996*

Dermott John Cooke .....	Cleveland, OH
--------------------------	---------------

*Degrees Conferred December 18, 1996*

John Walter Dettelbach .....	Hickory
Stephen Forrest Morton .....	Reidsville
** Roger Alan Serrette .....	Raleigh

### **BACHELOR OF SCIENCE IN TEXTILE ENGINEERING**

Jointly administered by the College of Textiles and the College of Engineering.

*Degree Conferred June 25, 1996*

Aaron Scott Earley .....	Leicester
--------------------------	-----------

*Degree Conferred August 8, 1996*

Eric Jon Campbell .....	Raleigh
-------------------------	---------

*Degrees Conferred December 18, 1996*

Andrea Lynn Berry .....	Engelhard
Catherine Leigh Briley .....	Greenville
** Jennifer Lynne Holt .....	Elkton, MD
Jason Boyette Shirley .....	Cary
* Jennifer Leigh Singletary .....	Winston-Salem

### **BACHELOR OF SCIENCE IN AEROSPACE ENGINEERING**

*Degree Conferred June 25, 1996*

Dawn Marie Fra .....	Andover, CT
----------------------	-------------

*Degree Conferred December 18, 1996*

Thomas Stevenson Bowie .....	Raleigh
------------------------------	---------

## BACHELOR OF SCIENCE IN CHEMICAL ENGINEERING

*Degree Conferred June 25, 1996*

+ Eric Alan Witzgall ..... Dalton, MA

*Degree Conferred August 8, 1996*

Shannon Kelly Cox ..... Sanford

*Degrees Conferred December 18, 1996*

+ Robert Layne Andrews ..... Covington, VA  
Steven Christopher Bacon ..... Dexter, GA  
\* Kendra Krystyna Batley ..... Wilmington  
James Edwin Cawthorne, Jr. .... Lynchburg, VA  
+ Azelia Carolnet Edwards ..... Snow Hill  
Christel Linnette Graham ..... Wilmington  
Angela Dawn Hall ..... Burlington  
+\*\* Jon Russell Jackson ..... Ashland, VA  
\* Phillip Todd Jordan ..... Rock Hill, SC  
+ Seung Yong Lee ..... Fayetteville  
+\* Jess Vail Nauman ..... McLeansville  
\*\*\* Wesley Boyd Petrea ..... Kannapolis  
+\*\* Sue Ann Quick ..... Piney River, VA  
\* Melissa Carol Ricks ..... Smithfield  
James Earle Ringelspaugh ..... Rocky Mount  
\*\* Timothy Lee Schleining ..... Pisgah Forest  
\*\*\* Son Ngoc Tran ..... Raleigh  
S\*\* Robert Chung-Hua Yang ..... Chesterfield, VA

## BACHELOR OF SCIENCE IN CIVIL ENGINEERING

*Degrees Conferred June 25, 1996*

Stacie Deyton Burleson ..... Burnsville  
Sean Aaron Dolle ..... Jacksonville, FL  
John Harrison Ellinwood ..... Raleigh  
Bryan Clinton Key ..... Staley

*Degree Conferred August 8, 1996*

Steven Kenneth Gagnon ..... Charlotte

*Degrees Conferred December 18, 1996*

S+\* Jessica Claire Allen ..... Tampa, FL  
\* Bryon James Brown ..... Seagrove  
\*\* John Thomas Calvin ..... Cary  
Kenneth Parker Cates ..... Wilson  
\*\*\* Jeffrey Dalton Causey ..... Grifton  
Donald Lee Curry, Jr. .... Fayetteville  
Joshua Grady Dalton ..... Brevard

+*	Jason Scott Geary	Wilmington
	Sean Patrick Gleason	Pittsburgh, PA
*	Aaron Scott Harrell	Brevard
+*	Jennifer Denys Harrison	Roanoke Rapids
	Kevin Rondel Hedrick	Lexington
	Kyle Arthur Hubert	Cary
	Jeremy Scott Icard	Conover
	Tod Micah Kobik	Shaftsbury, VT
**	Cahal Joseph Lyden	Wendell
	Matthew Daniel Mead	St. Charles, IL
	Michael Andrew O'Sullivan	Sanford
	Richard Baldwin Priory, Jr.	Charlotte
	Michael Patrick Reese	Raleigh
	John Phillip Rhyne	Lewisville
	Gary Ray Schenk, Jr.	Salisbury
**	Barbara Ann Sich	Wilmington
	Erich William Strohacker	Lincolnton
	Karen Allison Thomas	Charlotte
+**	Mark David Thompson	Burlington
	Brian Thomas Williams	Spindale

## BACHELOR OF SCIENCE IN CIVIL ENGINEERING - CONSTRUCTION OPTION

*Degrees Conferred June 25, 1996*

	Scott Alan Clark	Raleigh
*	Bao Quoc Nguyen	Cary

*Degrees Conferred December 18, 1996*

*	Bradley Dean Bowling	Burlington
**	Johnny Lee Branch	Mount Airy
	Hoye McCray Coates	Mars Hill
	David Lane Core	Dunn
	Samuel Stephen Daniel	Elm City
	Christopher Keith Davis	Charlotte
	William Scott Grigg	Lawndale
	David Aaron Hollis	Leland
	Anthony Neil Jarman	Pink Hill
	William Todd Lambert	Burlington
	Hillary Hillsworth Leacock	Tobaso
*	Robert Chadwick Link	Statesville
+	Brian Thomas Messengill	Benson
	Robert Daniel McDiarmid	Raeford
*	David Brewster Moore	Raleigh
	Brian Gordon Moss	Stem
	Daniel Scott Poulton	Charlotte
	Paul Alan Stephenson	Raleigh
**	Jeremy Davis Troxler	Elon College
	Brian Craig Young	Matthews



## BACHELOR OF SCIENCE IN COMPUTER ENGINEERING

### *Degrees Conferred August 8, 1996*

	Arthur James Ankney III	Durham
	Danny Todd Bolin	Aberdeen
	Melanie Rose Boyd	Bahama
***	Michael Chou	Durham
	Tien Linh Do	Raleigh
*	Elebeoba Ude Eni	Raleigh
	Shermitta Lashun Kelly	Lillington
+	Pamela Inez Thomas	Hamlet

### *Degrees Conferred December 18, 1996*

	Ammar Mohammad Bali	Raleigh
+++	Billy Wayne Barr, Jr.	Lansing
	Chad Franklin Bennett	Pamlico County
**	Todd Matthew Berkebile	Fremont
	Brian Lonnie Bottoms	Dobson
	Michael Glenn Brandenburg	Linthicum, MD
	Thomas Joseph Bryan Burger	Clemmons
S**	Bryan Jennings Byerly	Kannapolis
S*	Michael Chie-Kai Chu	Cary
+	Gregory Lyn Cox	Durham
+	Laura Ann Crompton	Chapel Hill
*	Michael David Durham	Raleigh
+	Lief Emerald Erickson	Prior Lake, MN
	Peter Bacon Forrester	Lincolnton
****	Charles Nelson Gale	Winston-Salem
	Gary Dale Hoke, Jr.	Lewisburg, WV
****	Jeffrey Douglas Jackson	Red Springs
+	Paul Gregory Kehle	Boynton Beach, FL
	Jennifer Renae Laney	Matthews
	Douglas Layne, Jr.	King
	Jason James McCarthy	Wendell
+	Gregory Christopher McGee	Charlotte
	Christopher Edwin Morgan	Sprivey's Corner
S**	J. Brandon Myers	Lexington
*	Nina Janine Ngo	Greensboro
S***	Daniel Lyle Noffsinger	Manteo
	David Linwood Pearce	Ahoskie
	Jason Bromwell Phebus	Charlotte
***	Thomas Joseph Pierce	Charlotte
	Srikanth Ponnappalli	Guntur, India
	Steven Lee Rose	Morganton
S+++	Bryan Scott Schulz	Columbia, SC
S****	Vance Alexander Tate	Greensboro
+	Walter Scott Tester	Greenville
*	Mark Christopher Toburen	Winston-Salem
+	Byron Edward Trimmer	Cary
	Valecia Jtannyonnoh Wahyon	Monrovia, Liberia
S****	Jay Carter Wells	Miami Lakes, FL

+*	Michael Allen Whitaker	Siloam
	Ronald G. Wilhelmson	Apex
	Anthony David Womack	Green Creek

## BACHELOR OF SCIENCE IN COMPUTER SCIENCE

### *Degrees Conferred June 25, 1996*

	Ronald Frank Batcho, Jr.	Kill Devil Hills
	Russell Scott DeMolay	Lagura Hills, CA
	Christopher Stephen Floyd	Raleigh
***	Patrick William Garrett	Roanoke, VA
	Kyle Stanley Johnston	Montreal, Canada
	David Charles Zahn	Manteo

### *Degrees Conferred August 8, 1996*

*	Christine Michelle Barnes	Gamer
	Becky Lynn Chapman	Cary
	John Bainbridge Crick, Jr.	Apex
	Michael Jay Dickheiser	Winston-Salem
	Fletcher Bartley Hubbard	Southern Pines
	Timothy Eric Hunt	Raleigh
	William Thomas Jefferson	Chapel Hill
***	Brandon Wayne Kitchen	Brevard
	Rachele Shannon Kurtz	Raleigh
	Ashutosh Narhari	Raleigh
	Mui-Kim Ng	Raleigh
	Brian Joseph Olive	New Hill
	Jeremy Hand Pace	Graham
	Gordon Gregory Smith	Morrisville
	Nathan Phillip Stewart	Julian
	Daniel Henry Strong	Binghamton, NY
	Kristin Scott Thomas	Raleigh
	Paula Sexton Violet	Atkins, VA
	Daniel James Waller	Ahoskie
	Dean Merritt West II	Durham
**	Lane Cameron Wigley	Raleigh
***	Andrew Michael Woods	San Deigo, CA

### *Degrees Conferred December 18, 1996*

	Arnold Richard Banks, Jr.	Asheville
	Michelle Dawn Banks	Arapahoe
*	Neil James Bell	Raleigh
	Michael Lee Burriss	Fayetteville
S***	Christopher Louis Capps	Raleigh
	Michael Shannon Cirioli	Raleigh
	Robert Leroy Collum, Jr.	Cary
	Robert Randolph Cusson	Raleigh
**	Stacey Anne Eckhardt	Raleigh
*	Julia Sweeney English	Charleston, WV
+***	Charles Nelson Gale	Winston-Salem

	Reece Beauford Gardner, Jr.	Kinston
+	Haley Wilson Gray	Durham
+	Chris Lee Grove	San Jose, CA
*	Joseph Andrew Holliday	Greensboro
	Harry Luther Hoots III	Hendersonville
	Michael Hollis Johnson	Raleigh
	Michael Vickers Johnson	Raleigh
	Joel Dimitri Kamentz	Raleigh
	John Paul Kelsey	Cary
	Sean Philip Korb	Raleigh
	Jason Jung Lai	Greensboro
	Billy Leathers, Jr	Raleigh
	Joseph Patrick Madden	Raleigh
*	Julie Burkett McDonnell	Sterling, VA
	Paul Christopher Mojica	Morehead City
	Charles Stuart Mumford	Raleigh
*	Dwayne Richard Need	Waxhaw
**	Bradley Tadayuki Nishida	Rocky Mount
*	David Scott Peterson	Raleigh
	James David Roten	Creston
H**	Asif Saleh	Raleigh
***	Gregg Gerald Seipp	O'Fallon, IL
	Erwin David Sloan, Jr.	Magnolia
	Kimberly Nicole Sook	Raleigh
	Derek Emil Speerschneider	Novi, MI
	Elizabeth Page Strother	Greensboro
*	Zhixin Tang	Durham
	Christopher Eric Teagle	Schenectady, NY
**	Chu Ly Tran	Greensboro
	Ali Ribhi Treish	Al-Bireh, Isreal
*	Christopher Ted Underwood	Selma
**	Long Kimthi Vo	Raleigh
	Trevor Lane Williams	Austin, TX
H**	Robert Anthony Woodside	Raleigh
	Cynthia Baldwin Wright	Raleigh

## BACHELOR OF SCIENCE IN CONSTRUCTION ENGINEERING AND MANAGEMENT

*Degree Conferred December 18, 1996*

**	Edgar William Levy	Youngsville
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## BACHELOR OF SCIENCE IN CONSTRUCTION MANAGEMENT

*Degree Conferred December 18, 1996*

+	Brian Thomas Massengill	Benson
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## BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

*Degrees Conferred June 25, 1996*

	Daniel John Heter III	Newburgh, NY
--	-----------------------	--------------

* Curtis Ray Jacobs	Lumberton
** Nancy Lynn Keating	Englewood, FL
Jonathan Gaither Knox	Winston-Salem
Daryl Eugene Merritt	Mount Olive
* Monty Kenneth Murdock	Mount Pleasant
* Nakia Antoinette Rouse	Hookerton
* Cory Scott Thompson	Durham

*Degrees Conferred August 8, 1996*

Steven Douglas Beeson	Raleigh
Lewis Philip Edwards	Dobson
Kevin James Kelly	Fayetteville
* Michael Chad Pease	Cary
Mookyun Frank Shin	Raleigh
Rodney Wayne Smith	Wilmington
+ Pamela Inez Thomas	Hamlet

*Degrees Conferred December 18, 1996*

James Robert Adams	Waynesville
** Clint Slade Adkins	King
Geoffrey Niles Ammons	Durham
Christopher Michael Baker	Bakersville
Kevin Lloyd Baker	Goldsboro
+** Billy Wayne Barr, Jr.	Lansing
Kenneth Dwain Beamon, Jr.	Tarboro
Walter Perry Bullock	Durham
Christopher Judson Burnette	Raleigh
Tina Ting-Hui Chen	Raleigh
Jennifer Ann Cobb	Murfreesboro
* Jamie Carl Coker	Mt. Olive
* Jason Mansfield Cope	Lexington
+ Gregory Lyn Cox	Durham
+ Laura Ann Crompton	Chapel Hill
*** Renard Andre Dellafave	Raleigh
* Deborah Anne Driscoll	Knox, NY
+* Lief Emerald Erickson	Prior Lake, MN
Collin Joseph Every	Durham
Christopher Gillette	Raleigh
S** Kevin Patrick Hales	Roanoke Rapids
LaTonya Michelle Hammonds	Lumberton
Michael Chad Hoyle	Lawndale
Timothy Lloyd Humphrey	Fayetteville
+*** Jeffrey Douglas Jackson	Red Springs
Edward Joseph Karwacki, Jr.	Kingston, NY
+* Paul Gregory Kehle	Boynton Beach, FL
* David Benjamin Kelly	Greensboro
Steven Lawrence Koch	Louisville, KY
S* Michael George Kubovcik	Raleigh
Toi-Hung Lee	Wanchai, Hong Kong
** Darren Ray Lingafeldt	Morganton
Christopher Clifford Little	Raleigh

**	John Kenneth MacKenzie	Guilford, CT
	Charles Edward Mann	Bunn
	Travis Sean Mashburn	Asheville
*	Patrick Wesley Mauney	Hickory
	James Howard McCoy, Jr.	Jacksonville
+	Gregory Christopher McGee	Charlotte
	Gerald McGovern, Jr.	Raleigh
S*	Joseph Scott Miller	Newton
*	Vanna Vince Moua	Albemarle
	Bryan Neal Parson	Asheville
	Lakeisha Nykole Pratt	Durham
	Danny Lee Pride, Jr.	Hillsborough
	Kirk Everett Russell	Winston-Salem
S+**	Bryan Scott Schulz	Columbia, SC
***	Johnny Dale Shepherd	Burlington
	Ambika Hosagrahar Somashekhar	Raleigh
S+***	Vance Alexander Tate	Greensboro
+	Walter Scott Tester	Greenville
	Todd Randell Thomas	Lumberton
	Scott Wilkins Todd	Raleigh
+*	Byron Edward Trimmer	Cary
	Christopher Michael Tripoli	Montoursville, PA
*	Phillip Lee Underwood	Canton
	James Wade Ussery	Flat Rock
	Steven Alexander Wallace	Burlington
S***	Teresa Anne Wenger	Cary
+*	Michael Allen Whitaker	Siloam
*	Michael Ernest Whitley	Apex
	Frank Warren Williams, Jr.	Greensboro
*	Jonathan Mansfield Williams	Charlotte

## BACHELOR OF SCIENCE IN ENVIRONMENTAL ENGINEERING

*Degree Conferred August 8, 1996*

*	William Watson Ross	Wilkesboro
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*Degrees Conferred December 18, 1996*

	Michael Steven Apke	Boone
	Sonya Lynn Avant	Raleigh
***	Robert Christopher Belk	Lenoir
	Kristi Michelle Conder	Matthews
	Lisa Tanya Davies	Weldon
	Richard Edward Gay	Raleigh
+*	Jason Scott Geary	Wilmington
+*	Kathleen Patterson Gray	Gastonia
+*	Jennifer Denys Harrison	Roanoke Rapids
**	Daniel Joseph Lamontagne	Raleigh
	Debra Lynette McDaniel	Martinsville, VA
+*	Emily Brodie Meador	Henderson
	Travis Lee Morgan	Robbins
	Alan Willard Moseley	Valdese



	Kallan Karl Mrozek .....	Durham
**	Margaret Maria Park .....	Charlotte
	Valerie Jean Phipps .....	Jarrettsville, MD
	Lisa Christine Presson .....	Monroe
	Becky Rana Stansell .....	Indian Trail
+++	Mark David Thompson .....	Burlington
	Matthew Glenn Willis .....	Morehead City

## BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING

*Degrees Conferred June 25, 1996*

	Derek Louis Beck .....	Raleigh
	Timothy Matthew Pridgen .....	Durham
	Gary Samuel Spake .....	Charlotte
	Brian Evans Trent .....	Charlotte

*Degrees Conferred August 8, 1996*

	William Shannon Cameron .....	Lillington
	David Ivry .....	Raleigh

*Degrees Conferred December 18, 1996*

	Adam Jeffrey Barlow .....	Raleigh
	Brian Wayne Betts .....	Raleigh
	Pedro Guillermo Cofino .....	Guatemala City, Guatemala
	Brian Keith Conner .....	Richmond, VA
	Rodrigo Alfonso de la Rocha .....	La Paz, Bolivia
*	Daryl Wayne Edwards .....	Matthews
	Elizabeth Anne Fargher .....	New Bern
	Chad James Flynt .....	Greensboro
	Marvin Ray Gibson, Jr. ....	Raleigh
	Andreas Heppner .....	Raleigh
	Eduardo Antonio Herrera .....	Guatemala City, Guatemala
	Henry Lester Hill III .....	Elizabethtown
**	Sharon Lea Kastner .....	Charlotte
	Ching-Han Lee .....	Taipei, Taiwan
*	Stefan Meany .....	Guatemala City, Guatemala
*	Christopher Craig Rand .....	Charlotte
	Deena Marie Smith .....	Charlotte
	Amy Nicole Starling .....	Cary
	Duane Dee Tyler .....	Copeland, KS
	Nicole Tamara Wilson .....	Rocky Mount

## BACHELOR OF SCIENCE IN INDUSTRIAL ENGINEERING, FURNITURE MANUFACTURING OPTION

*Degrees Conferred June 25, 1996*

	Melissa Capitano .....	Charlotte
	Timothy Joe Moore .....	Ellerbe
	Laurence Joseph Pollen .....	Winston-Salem
	Thomas Levi Van Dyke IV .....	Yanceyville

*Degree Conferred August 8, 1996*

John Christian Hindsley . . . . . Fayetteville

*Degrees Conferred December 18, 1996*

\* Daryl Ashley Camper . . . . . Rutherfordton  
Timothy Brian Frasure . . . . . Maiden  
Eugene Christopher Hollifield, Jr. . . . . Marion

**BACHELOR OF SCIENCE IN MATERIALS SCIENCE AND ENGINEERING**

*Degrees Conferred August 8, 1996*

Kevin Rennard Davis . . . . . Glen Burnie, MD  
Nathan Thomas Luck . . . . . Sanford  
Howard Levone Toomer, Jr. . . . . Rocky Mount

**BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING**

*Degrees Conferred June 25, 1996*

Antonia Maria Arnold . . . . . Spartanburg, SC  
John Richard Boswell . . . . . Burlington  
Derrick Rodney Coates . . . . . Fayetteville  
Robert Michael Gron, Jr. . . . . Fort Bragg  
Ryan Robert Krause . . . . . Forked River, NJ  
\* Brian Francis Mellage . . . . . Raleigh  
Avneet Sood . . . . . Eden  
\* Wesley Allan Yates . . . . . Rockingham

*Degrees Conferred August 8, 1996*

Steven Banh . . . . . Chapel Hill  
Jeffrey Dwayne Farris . . . . . Greensboro  
Troy Allen Garcia . . . . . Chicago, IL  
Joshua Wilson Kersey . . . . . High Point  
Alan Lee King . . . . . Asheville  
Emily Annette Miller . . . . . Gastonia  
Eric William Nordquist . . . . . Lexington, SC  
Brian Scot O'Neill . . . . . Chelsea, MA  
\*\* Dwight Kingsley Roberson . . . . . Wilmington  
Paul Joseph Romiti . . . . . Raleigh  
Michael Charles Stone . . . . . Louisburg

*Degrees Conferred December 18, 1996*

\* Robert Fagan Alford, Jr. . . . . Raleigh  
\* Douglas Ray Babcock . . . . . Rockaway, NJ  
Bertram Glenn Barco . . . . . Piscataway, NJ  
\* Jimmy Autrey Beacham, Jr. . . . . Kitty Hawk  
Corey Derek Brown . . . . . Fuquay-Varina  
\* Andrew Jason Burris . . . . . Kannapolis

	Michael Todd Clay	Granite Falls
**	Mark Alan Coats	Raleigh
	James Mitchell Cockerham, Jr.	Gastonia
	David Amos Cooper	Shelby
	Elmer Vincent Dickens	Durham
	Philip Edward Eilertson	Havelock
	Robert Allen Garner	Selma
	William Owen Griffin	Wilmington
S**	Brian Edward Handlon	Apex
	William Joseph Holt	Burlington
	Thomas Austin Hughes, Jr.	Newport
	Carla Jean Jones	Salisbury
S***	Phillip Eugene Jones	Crumpler
**	Tatsuo Kuwahara	Fujisawa, Japan
*	Christopher Frederick Lambiotte	Cornelius
	Brandon Craig Langford	Weaverville
**	Stacy Neal Lindsey	Clyde
	Adam Blanchard Long	Wilmington
***	Philip Worth Longest, Jr.	Wallace
	Gregory James Ludwig	Traverse City, MI
**	Randolph Tate Lyda	Asheville
*	Daniel Joseph Marrujo	Winston-Salem
	Brian Richard McCutcheon	Cary
*	Charles Robert McGuffey	Raleigh
	John Christopher Midgley	Raleigh
**	Gus Pappas	Charlotte
**	Scott Kevin Petty	Sanford
***	Mallory Shane Price	Jacksonville
**	Robert Earl Richard	Ballston Spa, NY
*	Donald Robert Seal, Jr.	Edenton
	Lori Leigh Shewmaker	Greenville
	Ronnie Jackson Shook, Jr.	Candler
	Peter Walter Sokalski	Fayetteville
	Jason Jackson Sullivan	Raleigh
***	Gary Milton Sweezy	Hickory
	Jennifer Elaine Toscano	Montville, NJ
	Stephen Joseph Tracy	New Hartford, NY
+	David Neal Tutor	Fuquay-Varina
	Kiranna Uno	Raleigh
***	Aaron Jeffrey Ware	Winston-Salem

## BACHELOR OF SCIENCE IN NUCLEAR ENGINEERING

*Degree Conferred December 18, 1996*

Thanongdeth Tito Chinyavong ..... Springfield, VA

# College of Forest Resources



## BACHELOR OF SCIENCE IN CONSERVATION

Jointly administered by the College of Agriculture and Life Sciences and the College of Forest Resources.

*Degree Conferred December 18, 1996*

John Tamp Bandy ..... Conover

## BACHELOR OF SCIENCE IN FOREST MANAGEMENT

*Degrees Conferred June 25, 1996*

Burt Hamblen Simons ..... Washington  
 Jennifer Marie Willoughby ..... Anderson, IN

*Degrees Conferred August 8, 1996*

Edward Brian Absher ..... Elkin  
 Jeffrey Cameron Mendenhall ..... Siler City

*Degree Conferred December 18, 1996*

+\*\* John David Nicosia ..... Raleigh

## BACHELOR OF SCIENCE IN NATURAL RESOURCES

*Degrees Conferred August 8, 1996*

Robert Brian Barrett ..... Charlotte  
 Amy Elizabeth Miller ..... Jackson

*Degrees Conferred December 18, 1996*

Charles Pittman Humphrey, Jr. .... Cove City  
 Leigh Ellen Lasher ..... Raleigh  
 Adrian Lee Moon ..... Salisbury  
 +\*\* John David Nicosia ..... Raleigh  
 Timothy Marson Plemmons ..... Asheville  
 Patrick Miller Rogers ..... Nashville  
 James Paul Wilson II ..... Mooresville

## BACHELOR OF SCIENCE IN PARKS AND RECREATION AND TOURISM MANAGEMENT

*Degree Conferred June 25, 1996*

Samantha Lee Dickinson ..... Fairfax, VA

+Co-major  
 \*Cum Laude

H Honors Program  
 \*\*Magna Cum Laude

S University Scholars Program  
 \*\*\*Summa Cum Laude

*Degrees Conferred August 8, 1996*

Angie Lynn Crockett	Virginia Beach, VA
** Amy Katrina Eldridge	Raleigh
*** Elizabeth Jane Griffith	Baltimore, MD
Kathleen Marie Koss	Raleigh

*Degrees Conferred December 18, 1996*

* Lisa Ann Ash	Olean, NY
William Howard Chilkott	Shelburne, VT
** Nicole Leslie Diehl	Raleigh
Christopher Michael Dunlap	Garner
Thomas Robinson Johnson	Jamestown
Mark Rowe Johnston	Fairfax, VA
Christopher Davis Jurgens	Raleigh
*** Christy Ann Mingis	Cary
* Juliane Marie Ostergaard	Arden
Shannon Lynn Sholar	Wilson
* Elizabeth Ann Taylor	Wilmington
Robert Michael Wayne	Lake Waccamaw
Ryan Kevin Williamson	Nakina

**BACHELOR OF SCIENCE IN PULP AND PAPER SCIENCE AND TECHNOLOGY**

*Degree Conferred August 8, 1996*

+ Eric Alan Witzgall	Dalton, MA
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*Degrees Conferred December 18, 1996*

+ Robert Layne Andrews	Covington, VA
+ Milton Leon Burgess, Jr.	Littleton
Tony Lee Clary	Roanoke Rapids
Gary David Gardner	New Bern
+** Jon Russell Jackson	Ashland, VA
Paula Tiffany Kent	Savannah, GA
+ Seung Yong Lee	Fayetteville
Danah Ann Livingston	Pensacola, FL
Carlotta Michelle Mattison	Anderson, SC
James Oliver Foy Moore, Jr.	New Bern
+** Sue Ann Quick	Arrington, VA
Jill Walker Shifflett	Covington, VA
Coley Davis Snowden	Hanahan, SC
+ David Neal Tutor	Fuquay-Varina
Kari Ann Viar	Charlotte
Adam Livant Williams	Davidson

**BACHELOR OF SCIENCE IN WOOD PRODUCTS**

*Degree Conferred June 25, 1996*

Scott Thomas Armstrong	Charlotte
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*Degrees Conferred August 8, 1996*

Jason Matthew Huckaby ..... Raleigh  
Edward Taliaferro Cole Parks ..... Fayetteville  
Kendall Derrick Walker ..... Mocksville

*Degrees Conferred December 18, 1996*

\*\*\* Bernard Claud Harberts ..... Statesville  
Jason Michel Krings ..... Manitowoc, WI

# College of Humanities and Social Sciences



## BACHELOR OF ARTS IN COMMUNICATION

*Degrees Conferred June 25, 1996*

Carrie Michelle Blum ..... Concord  
Rebecca Chapman Brantley ..... Greensboro  
Kristen Marie Burnette ..... Monroe  
Suzanne Carol Ellen ..... Southern Pines  
Nancy Caroline Ford ..... Wilkesboro  
James Adrian Hill ..... Asheville  
\* Wendy Leigh Holt ..... Durham  
Amy Danielle Johnson ..... Cary  
\* Felicia Dione Lord ..... Oak Ridge  
Angela Cornella Miles ..... Raleigh  
Krista Denise Naujoks ..... Matamoras, PA  
Jacqueline Christine Newton ..... Jacksonville, FL  
Amy Theresa Oakley ..... Zebulon  
James Robert Richey ..... Fayetteville  
Sean Patrick Thomas ..... Meyersdale, PA  
Hans Diederik Vandoornewaard ..... Raleigh  
\* Jeffrey Scott Williams ..... Greensboro

*Degrees Conferred August 8, 1996*

Lisa Gail Austin ..... Four Oaks  
Keith Charles Bistline ..... Rocky Mount  
Terri Michelle Britt ..... Wilson  
Michael Richard Cronemeyer ..... Miami, FL  
\*\* Paulette Miller Domino ..... Buffalo, NY  
Kevin Earl Gatlin ..... Charlotte  
Jennifer Marie Gray ..... Daytona Beach, FL  
Amy Eileen Hunt ..... Durham

***	Matthew Alan Johnson	Eustis, FL
	Christopher Lee Knowles	New Bern
	Michael Anthony Lankford	Hickory
	Carri Ann Lehmann	Wilmington
	Terrilyn Donjier Phillips	Jacksonville
	Cameron Maurice Poston	Raleigh
	Jason Scott Robbins	Charlotte
	Távares Yvonne Rodgers	Fayetteville
	George Ragsdale Young	Raleigh

*Degrees Conferred December 18, 1996*

**	Glenn Steven Abbey	Corning, NY
	Cristy Norris Adams	Benson
*	Yolanda Yvette Alexander	Fayetteville
	Stephen Jackson Arnold	Raleigh
	Michelle Morgan Avent	Raleigh
**	Kristina Balic	Raleigh
	Brian Stuart Bark	Owings Mills, MD
+	Fisher Martin Beasley	Concord
	Meredith Angelique Beyer	Houston, TX
	Kristy Joan Bumgarner	Wilkesboro
	Kristen Lee Byrd	Benson
	Benjamin Randolph Canady	Hickory
	John Gregory Castillo	Saginaw, MI
	Neil Kinley Chance	Lillington
	Sharon Beth Cooper	Butner
	Chad Lyndon Dills	Huntersville
	Timothy Ellsworth Dunn	Raleigh
	Mary Barton Eilers	Raleigh
	Sean Reed Fahey	Raleigh
	Pamela Sue Fisher	Robbins
	Emily Kay Freeman	Bolton
*	Stacy Ann Gay	Wilson
	Stephanie Deann Hachtel	Middletown, MD
	Dionne Lynette Hall	Goldsboro
**	Melissa Suzanne Hammond	New Bern
	Michael Dale Harris	Goldsboro
	Brian Kenneth Hartwell	Troy, MI
	Robert J. Hass, Jr.	Beltsville, MD
	Matthew Henderson	Oxford
	Wendy Renee Hoots	Advance
	Philip Hackney Jordan	Raleigh
	Steven Matthew Keim	Harrisburg, PA
*	Mary Quinlan Kosinski	Smithfield
*	Mary Helen Lee	Benson
	Christy Lynn Martin	Concord
	Gabriel Leanord McCrea	Durham
	James Franklin Morgan II	High Point
	Charles Lawrence Norman	Hickory
	Thomas Edward Normanly	Jacksonville
	Elizabeth Kathleen Nunnally	Fayetteville
	Susan Jane O'Driscoll	Raleigh

Diane Catherine Procopio	Chapel Hill
Jonathan David Reep	Hickory
Leslie Dawn Rice	Hendersonville
Mark Anderson Slawter	Winston-Salem
Nancy Jane Snow	Exeter, NH
Michael Jonathan Speanburg	Charlotte
Kara Leighann Stone	Raleigh
+** Tracy Ann Taylor	Kinston
* Rita Woodard Thames	Cary
Alan Lee Trammel	Chapel Hill
David Fred Troutman	Wilmington
Jonathan Bryan Warnock	Southern Pines
John Arrington Williams II	Raleigh
* Christopher Carl Woods III	Raleigh
Marcia Lynette Woods	Weirton, WV
*** Amy Marie Wright	Durham

**BACHELOR OF ARTS IN ENGLISH**

*Degrees Conferred June 25, 1996*

Melissa Lee Bauer	Cary
April L. Errickson	Millville, NJ
Mary Christine Kane	Wilmington
Dolly Rebecca Sickles	Cary
Margaret Leigh Small	Shallotte

*Degrees Conferred August 8, 1996*

H*** Lynne Attix Blair	Raleigh
* Edward Steven Fody	Boonton, NJ
Rebecca Cline Frazer	Goldsboro
Cynthia Elizabeth Hall	Bainbridge Island, WA
H* Thomas Anthony Layton	Naples, FL
Timothy Richard Murphy	Yadkinville
H Angela Rae Perez	Plymouth
Barry Alexander Poole	Raleigh
Evelyn Paige Revelle	Murfreesboro
Shelia Lynn Robertson	Raleigh
Christopher Marvin Spence	Raleigh
Carla Alene Williams	Columbus, GA

*Degrees Conferred December 18, 1996*

Annette Faye Bailey	Raleigh
* Winifred Hope Baldree	Black Creek
Amy Jo Bullock	Kinston
H Knicole Marion Carson	Cary
Alison Crews Conroy	Charlotte
Mary Katherine Denton	Rocky Mount
Sandra Elaine Dickerson	Oxford
Paul Winfield Dreisbach	Raleigh
Andrew Welsh Duvall	Durham

+Co-major  
\*Cum Laude

H Honors Program  
\*\*Magna Cum Laude

S University Scholars Program  
\*\*\*Summa Cum Laude

	Andrew Edward Fisher	Fayetteville
	Erica Parham Garner	Washington
	Shanora Tanique Gatling	Waterbury, CT
	Doreen Marie Gibson	Centerline, MI
H**	Kerri Mai Habben	Raleigh
*	Rebecca Donna Hollis	Morrisville
	Nancy Walker House	Raleigh
	Kathryn Paige Howell	Wilson
	Jason Stuart King	Trinity
	Mary Laura Lee	Charlotte
	Sharon Lee	Rocky Mount
*	Lindsay Steven Loflin, Jr.	Greensboro
	Michele Marie Mannese	Poughkeepsie, NY
	Stephen Michael McNeill	Garner
	Lisa Paige Morgan	Raleigh
*	Caroline Hope Morris	Wilmington
*	Alicia Anne Mullen	Wilmington
	Charles Otis Murray	Raleigh
**	John Stephen Nash	Raleigh
*	Paul Douglas Ossman	New Bern
***	Natalie Dickerson Prewitt	Columbia, SC
H**	Wanda Jones Ramm	Knightdale
	Jessica Paige Schlenger	Cary
**	Lynne Renae Scoggins	Garner
**	Barbara Spivey Scott	Hertford
	Sonya Rene Snyder	Wilmington
	Jennifer Ann Sorber	Roselle, NJ
	Robert Andrew Spencer	Wilmington
	Brian Wayne Swiger	Raleigh
	Jonathan Ragan Taylor	Winston-Salem
	Lindsay Michelle van Welzen	Raleigh
	Janice Maureen Vowell	Raleigh

## BACHELOR OF ARTS IN HISTORY

*Degrees Conferred June 25, 1996*

***	Kathryn Elizabeth Adams	Raleigh
	Howard Lee Bell	Richmond, VA
*	Tonya Ann Bennett	Garner
	David Tron Buff	Morganton
	Giles, William Griffin	Lynchburg, VA
	Matthew Montero High	Marshville
	Anand Nalin Parikh	Chapel Hill
	Kirk Allen Stehman	Coal Township, PA

*Degrees Conferred August 8, 1996*

	Michael Vance Deal	Wilson
+	Mark Wesley Friedrich	Raleigh
**	Kelly James Grissom	Greensboro
	Barbara Mujica Joynner	Raleigh
	Brian Paul Ramoth	Wayne, NJ

*Degrees Conferred December 18, 1996*

Vanessa Deeanne Alberson	Virginia Beach, VA
Brian Robert Bandy	Goldsboro
Erin Callahan	High Point
Erica Cooper	Edward
Shirley Ursula Davis	Landstuhl, Germany
Leslie Rae Dick	Hillsborough
Jennifer Smith Falk	Raleigh
Jennifer Diann Hales	Raleigh
Mark David Harris	Asheville
Jonathan Mark Herring	Clinton
Sarah Suni Hobbs	Spring Lake
** Keischa Michelle Lovelace	Raleigh
** Lori Faye Milburn	Marietta, GA
Eric Lee Moorefield	Charlotte
Matthew Christian Purdie	Charlotte
Craig Steven Roper	Marietta, GA
* Joy Christine Tanner	Garner
* William Michael Thomas	Granite Quarry
Aaron David Tschetter	Greenville
*** Robert Alvin Turnbull	Rochester, NY

**BACHELOR OF SCIENCE IN HISTORY**

*Degree Conferred August 8, 1996*

Reynold Wright Barco, Jr.	Elizabeth City
---------------------------	----------------

**BACHELOR OF ARTS IN MULTIDISCIPLINARY STUDIES**

*Degrees Conferred June 25, 1996*

Robert Thomas Snyder	Jacksonville
Robert Horace Stevenson	Raleigh

*Degrees Conferred August 8, 1996*

+ Mark Wesley Friedrich	Raleigh
Robert Spencer Hallyburton	Durham
Amy Covington Marszalek	Burlington
Herbert Sneed, Jr.	Cherokee
*** Carol Ann Thrasher	Raleigh
Benedict Chi-Hin Wong	Charlotte

*Degrees Conferred December 18, 1996*

** Dana Ashley Allen	Greensboro
S+* Jessica Claire Allen	Tampa, FL
*** Stewart Campbell Aycock	Durham
Matthew Jason Edwards	Arden
Mark Wayne Kunkle	Gastonia
Todd William Loy	Raleigh



***	Jeanine Marie McKeon	Pensacola, FL
	Demetria Armita Melton	Charlotte
	Jeffrey Stewart Powell	Raleigh
+*	Gregory Paul Richmond	Charlotte
+*	Maria-Daphne Samoladas	Bronxville, NY
+*	Ghazale Sharifi-Mehr	Millburn, NJ
**	Judith Marie Sidorick	Houtzdale, PA
S**	Ross Alexander Stocklin	Belle Mead, NJ
	Cornelius Francis Sullivan III	Raleigh
	Glyn Curry Thomas	Greensboro
	Christopher Dean Valentini	Hickory

## BACHELOR OF ARTS IN PHILOSOPHY

*Degree Conferred August 8, 1996*

	Krishna Michelle Pinkney	Washington, DC
--	--------------------------	----------------

## BACHELOR OF ARTS IN POLITICAL SCIENCE

*Degrees Conferred June 25, 1996*

	Timothy Morrison Bagley	Charlotte
	Ethan Michael Bernick	Greensboro
	Cindy Michelle Dennis	Concord
	Lisa Renee Floyd	Rockingham
	Kevin Darin Gwynn	Reidsville
	Louise Lan Hoang	Annandale, VA
*	Elizabeth Cannon Kopf	Walnut Cove
	Angela Cornella Miles	Cary
	Douglas William Scott	Pinehurst
	Delisha Spruill	Plymouth
	Tracy Michelle Wall	Franklin, VA

*Degrees Conferred August 8, 1996*

*	Jonathan David Breeden	Laurinburg
	Jackie Lynn Gallion	Garner
***	Michael Hart Glasheen	Hickory
**	Lara Jane Hill	Kinston
	Michael Craig Johnson	Statesville
	Phillip David Jones	Charlotte
	Christine Claire Malone	Yorktown Heights, NY
**	Edward Ronald Mason	Cary
	Phillip Daniel Pabst, Jr.	Cary

*Degrees Conferred December 18, 1996*

	Craig Owen Asbill	Asheboro
+	Fisher Martin Beasley	Concord
	Lauren Michelle Cambra	Worcester, MA
*	Shanon Mills Davis	Raleigh
	Brian Tyler Edwards	Raleigh

Ingrid Linetta Eubanks	Chapel Hill
Rae Clark Ferguson	Asheville
Markino LaVett Gamble	Jacksonville
David Heath Harrell	Raleigh
Leslie Ian Harrison	Fayetteville
Christy Leigh Hawkins	New Bern
Keisha Monshanna Howell	Lenoir
Wayne Leslie Lehto, Jr.	Durham
Tammy Dennis Little	Williamston
Deana Gayle Mitchell	Raleigh
*** Larry Craig Overby	Zebulon
Anjali Pratap Oza	Concord
Jeffrey Michael Petters	Raleigh
Walter Alexander Rhyne	Lowell
Christopher Scott Rosati	Durham
Paul Joseph Savage	Gastonia
Shannon Hope Scoppe	Newport
Lucretia Renee Sellers	Laurinburg
Sabrina Charice Spain	Conway, SC
Meghan Katherine Sural	Greensboro
William Monroe Ward II	Faison
Daniel Noah Webster	Providence
Gary Christopher Wilcox	Warrensville
Julia Meredith Young	Whiteville

## BACHELOR OF SCIENCE IN POLITICAL SCIENCE

*Degree Conferred December 18, 1996*

+ Jamie Bradley Guerrero	Raleigh
--------------------------	---------

## BACHELOR OF ARTS IN RELIGIOUS STUDIES

*Degree Conferred December 18, 1996*

S+*** Christopher Britt Peterson	Pisgah Forest
----------------------------------	---------------

## BACHELOR OF ARTS IN SOCIOLOGY

*Degrees Conferred June 25, 1996*

John Michael Carroll	Garner
Chastity Devone Finch	Raleigh
Emily Carleen Jarrett	Newton
Molly Anne Kenney	Ispwih, PA
Monica Gold McGinnis	Rutherfordton
** Robert Anthony Messig	Ocathie, KS

*Degrees Conferred August 8, 1996*

Lara Michelle Crockett	Raleigh
Staci Reneé Morgan	Charlotte
Benjamin Tahir Muhammad	Washington, DC

Ryan Ruell Renne	Greensboro
Rochelle Marie Stutz	Raleigh
Douglas DeEndris Tyson	Durham

*Degrees Conferred December 18, 1996*

** Mary Jon Barkman	Fayetteville
Melanie Lynn Bergenheim	Cary
Jamesina Anika Bowman	Winston-Salem
Rafael Dominic Carroll	Boca Raton, FL
Matthew Sean Cunningham	Cary
Vanessa Diamond	Rockville, MD
William Scott Effler	King
Maria Danielle Hiatt	Cana, VA
Rae Edwita Hilton	Norfolk, VA
Kevin Lea James	Raleigh
*** Johnny Justus Johnson, Jr.	Tallahassee, FL
Emily Elizabeth Kuhn	Charlotte
Catherine Lee Leonard	Kemersville
Jane Colette McGrath	New Buffalo, MI
Brian Daniel Moore	Charlotte
Terri Collette Moore	Greenville
Lorie Ann Stancil	Garner
Yvaal Marie Valery	Roanoke Rapids
Katina Jo Wilkie	Durham
Helen Denise Willoughby	Kinston
Thomas Gerald Zwirblia, Jr.	Goldsboro

**BACHELOR OF ARTS IN SPANISH LANGUAGE AND LITERATURE**

*Degrees Conferred June 25, 1996*

Karen Louise Garratt	Cincinnati, OH
Daniel A. Tisdell	Denver, CO

*Degrees Conferred August 8, 1996*

Amy Diane Pisarski	Charlotte
Lisa Angelica Saavedra	Raleigh

*Degrees Conferred December 18, 1996*

Brandi Lorraine-Marie Goff	Raleigh
+ Haley Wilson Gray	Durham
Shonda Dawn Moore	Franklin
Delynda Rae Ramirez	Cary
* Matthew David Smith	Charlotte
+** Tracy Ann Taylor	Kinston
Lisa Miranda Thorpe	Raleigh
Tomás Townsend	Raleigh

## BACHELOR OF SOCIAL WORK

*Degrees Conferred June 25, 1996*

Jennifer Anne Cummings	Elkin
Tina Denise McKnight	Louisburg
Candace Pamela Stansberry	Halifax

*Degree Conferred August 8, 1996*

Alneshia J-Vett Richardson	Enfield
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*Degrees Conferred December 18, 1996*

Meredith Ashely Altman	Goldsboro
* Sulin Lumley Anthony	Durham
*** Laura Guerry Aycock	Greensboro
** Belinda Knight Ayscue	Louisburg
*** Edwin Grantham Ball	Goldsboro
Dana Stafford Costanza	Southern Pines
Leslie Reshonne Covington	Rockingham
Donitra Janeé DuBois	Carrboro
S*** Carol Anne Earnhardt	Salisbury
Matthew Ross Frazier	Charlotte
** James Richard Gonzalez	Chicago, IL
* Stacy Marie Hanson	Charlotte
Kim Denise Meyers Houston	Raleigh
* Gloria J. Kearney	Wake Forest
Misty Dawn Lewis	Raleigh
Veronica Monique McNair	Plymouth
Patrice Sharriem McPhaul	Fayetteville
* Stephanie Lee Melton	Fayetteville
* Emily Caitlin Morrow	Raleigh
Phyllis Jones Paschall	Oxford
** Julia Ann Schlumpf	Durham
Tammy Annette Streater	Durham
*** Bobby Newell West	Cary
Lisa Ann Woody	Apex

## College of Management



### BACHELOR OF ARTS IN ACCOUNTING

*Degrees Conferred December 18, 1996*

* Emily Thigpen Booth	Garner
Lisa Ann Hawthorne	Lansdale, PA

Diane Hall Jeffries .....	Poughkeepsie, NY
Howard Evan Katowitz .....	Hopewell Junction, NY
Jennifer Renee O'Neil .....	Smithfield

**BACHELOR OF SCIENCE IN ACCOUNTING**

*Degrees Conferred June 25, 1996*

* Carol Grogan Dalton .....	Zebulon
William Diaz, Jr. ....	Fayetteville
Donald Mark Kolesar, Jr. ....	Madison, CT
Scott Patrick Logan .....	Southern Pines
* Tara Leigh Puckett .....	Cary
*** Wendy Elizabeth Rinaldi .....	Durham
Candy Marie Roberts .....	Andrews
* James Michael Thompson .....	Wilmington

*Degree Conferred August 8, 1996*

Justin Daniel Volentine .....	Oakdale, VA
-------------------------------	-------------

*Degrees Conferred December 18, 1996*

*** Lori Nicole Adams .....	Raleigh
Robert Paul Barbour .....	Smithfield
** Mark Robert Baxter .....	Raleigh
Lori Evatte Bogues .....	Durham
Clegg Alexander Boyce .....	Greensboro
Jason Douglas Briggs .....	Cameron
+ Abby Holloman Burnette .....	Wilson
Roger McLaine Cox .....	Loris, SC
Franklin Bennett Dunn .....	Manassas, VA
Michael Anthony Ellison .....	Pearl River, NY
Ronnie Barris Eubanks .....	Jacksonville
Christopher Todd Farmer .....	Goldsboro
Brent Edward Galloway .....	Wilson
Melanie Reneé Garcia .....	Raleigh
* Jody Michael Garison .....	Raleigh
Natalie Suzanne Geier .....	Raleigh
John Matthew Godwin .....	Greensboro
*** John Fredrick Grebeta .....	Simi Valley, CA
* Michelle Lee Griffis .....	Fuquay-Varina
** Jesse Halliday .....	Albany, NY
Steven Daniel Hardison .....	Jamesville
** Eric Bronson Harrell .....	Tarboro
** Elizabeth Hope Jackson .....	Oxford
** Li Jiang .....	Shanghai, China
* Huei-Wen Kao .....	Taipei, Taiwan
Jae Hoon Kim .....	Apex
Stephanie Lyn Kowalski .....	Raleigh
*** Debra Lynn Lockwood .....	Toms River, NJ
Melissa Ann Miller .....	Apex
Amber Nicole Nassef .....	Goldsboro



Shirley Diano Neil	Wilmington
David Bryan Nell	Charlotte
Hue Lam Ngo	Raleigh
Brian Ken Parsons	Pinehurst
Aaron Gavin Peak	Page, AZ
Carly Ann Perin	Brevard
Laurie Dena Pinnix	Reidsville
* Rahul Punj	Faridabad, India
Amanda Anne Richardson	New Bern
Karen Lee Sandritter	Raleigh
Leonard Dale Summey	Dallas
* Emi Sasaki Swaim	Hiroshima, Japan
* Nicole Marie Uvino	Central Islip, NY
Bryan Jackson Wiggins	Fuquay-Varina
Noah Ollin Woods	Pembroke

## BACHELOR OF ARTS IN BUSINESS MANAGEMENT

### *Degrees Conferred June 25, 1996*

* Robert Paul Clabough	Charlotte
* Monty Shea Johnson	North Wilkesboro
Matthew Gregory King	Greensboro
Thomas Hughes Masten, Jr.	Roxboro
Michael Harvey McMillan	Rocky Mount
Connie Whitley Rowland	Raleigh

### *Degrees Conferred August 8, 1996*

** Lynette McDaniel Batchelor	Raleigh
** Sandra Bradsher Horton	Raleigh
David Cecil Reedy	Manassass, VA
Angela Lewis Stallings	Garner
William Frazier Vaughan	Durham

### *Degrees Conferred December 18, 1996*

John Louis Breedlove III	Goldsboro
* Benjamin Steven Celinski	Raleigh
Daniel Mark Chaimovich	Old Bridge, NJ
Kevin Dean Farmer	East Amherst, NY
+* Jeffrey Jay Hahn	Hendersonville
Elma Branch Harris	Middlesex
Keith Richard Hilton	Fayetteville
* Raven Huff	Charleston, SC
*** Timothy Lee Merritt	Garner
James David Morgan	Raleigh
* Ashley Marie Roberts	Winston-Salem
Stephanie Elaine Snow	Asheboro
Sharitta LaCarol Speight	LaGrange
Matthew David Wilmesher	Lewisville
Richard Scott Winningham	Mebane
Earl Eung-Suk Yuh	Raleigh

## BACHELOR OF SCIENCE IN BUSINESS MANAGEMENT

### *Degrees Conferred June 25, 1996*

Dawn Michelle Cawthon	Raleigh
Raymond Watson Cox	Sanford
Eric Cobun Hobbs	Fuquay-Varina
* Diederik Allewyn Kruger	Raleigh
Erin Elizabeth McNulty	Greensboro
Christopher Daniel Morgan	Wingate
Myles Ellis Newell	Raleigh
Heather Leigh Parsons	Seagrove
Brooke Lee Pritchard	Richmond, VA
Matthew Ronald Smith	Matthews
Philip Isaac Vedell	Cary
Kevin Scott Vroome	Charlotte
DeMarc Eugene White	Raleigh

### *Degrees Conferred August 8, 1996*

Mark Adam Acitelli	Charlotte
Victor John Collins	San Diego, CA
* Sheryl Lynnette Deal	Elizabeth City
* Gary Lee Easter	Ripley, WV
* David James Harris	Virginia Beach, VA
John Wesley Hight	Greensboro
Terrell Edwin Johnson, Jr.	Louisburg
Chad Christopher Killian	Hickory
+ Eric Martin King	Charlotte
Badir Mamed Mamedov	Raleigh
Christopher Girard Medve	Kingston, NY
Joe Land Pearce	Raleigh
** Robert Joseph Quinn	Virginia Beach, VA
Wendy Ann Rowland	Raleigh
** Ann Parady Thomas	Raleigh
Ann-Marie Welsh	Massena, NY
Jaehoon Tom Yun	New York, NY

### *Degrees Conferred December 18, 1996*

Peyton Howard Alls	Raleigh
* Erum Rehman Ansari	Houston, TX
Allison Brooke Atwater	Mooreville
Cheryl Kathryn Barbour	Benson
Charlotte Elizabeth Batchelor	Rocky Mount
William Michael Best	Clemmons
Carey William Borden	Knightdale
Crystal Dawn Bradley	Clayton
* Gregory Harris Brown	Raleigh
* Jennifer Leigh Brown	Rocky Mount
Benjamin Michael Burgin	Bahama
Jason Mitchell Burgin	Durham
Jennifer Taylor Burnett	Annandale, NJ

+ Abby Holloman Burnette	Wilson
David Franklin Butts	Roanoke Rapids
David Francis Carter	High Point
Chastity Dawn Chandler	Louisville, KY
Adam Christopher Claybrook	Ayden
Jason David Cole	Statesville
Petrina Lynn Collins	Clinton
Amany Nidal Dahir	Raleigh
Stephanie Dawn Dodson	Burlington
** Marlene Lee Dunn	Butner
Jon Hardiman Estes	Ruffin
Marie Elizabeth Farr	Asheville
Craig Fields	Oxford
Daniel Reid Fulcher	West End
Edyta Marta Gocek	Chapel Hill
DeLena Christine Griego	Mocksville
William Powell Gustafson	Fairfax, VA
** Mitchell Joseph Harris	Raleigh
Jeffrey Roger Hartsock	Raleigh
Kristin Ashley Herman	Lenoir
Shafton Wayne Hewett, Jr.	Rocky Mount
Donald Francis Hilke	Chesterfield, VA
Anthony Blake Hood	Elizabethtown
Joshua Chapin Houghton	Wilmington
* Bryan Alex Huffman	Hickory
Michael Stephen Kaplan	Charlotte
James William Koncal	Newport
Cam Vinh Lai	Cary
** James Benjamin Landis	Sellersville, PA
** Heather Michelle Maldegen-Long	Dearborn, MI
Scot Alan Mann	Raleigh
* Meredith Lynn May	Farmville
Christopher Frank McElfresh-Moore	High Point
Jason Charles McGeorge	Plantation, FL
Cristina Anne McHugh	Parkridge, IL
Chad Landon McMahan	Clyde
Aaron Christopher Messick	Winston-Salem
Brandi Nicole Mitchell	Vienna, VA
Joshua Komegay Moffitt	Greensboro
Michael James Morris	Reidsville
Jessica Leigh Munday	Granite Falls
Sara Elizabeth Murphy	Califon, NJ
Christopher Lee Nance	Sanford
Brett Travis Nelson	Raleigh
Jonathan Michael Ogintz	Newark, DE
Everett Todd O'Tuel	Lumberton
Laurie Ann Pelletier	Westbrook, ME
Joelle Anissa-Addison Pierce	Raleigh
Brian Edward Pinel	Lansing, NY
William Edward Powell IV	Kinston
Shannon Marie Proctor	Apex
Michelle Lutterloh Prozman	Sanford
James Francis Pugh	Matthews

Joseph Allen Reams, Jr.	Sharpsburg
Stephanie Jean Renehan	Gaithersburg, MD
Christopher Thomas Rhodes	Matthews
Cornell Adrian Rogers	Grifton
Kevin Wayne Rogerson	Cary
Suzanne Christine Russell	St. Clair, MI
* Brent Boland Sharpe	Raleigh
Shuo-Luan Stephanie Shih	Taiwan, China
* Judith Klibbe Shubert	Raleigh
Somkhit Sibounheuang	Raleigh
* Beth Melissa Smith	Madison
** Ly Chou Sov	Jefferson
Danielle Allyce Spohr	Raleigh
Carmen James Squadrito	Syracuse, NY
Allison Claire Summerlin	Wilmington
Lanh Tang	Raleigh
Robin Catherine Valsecchi	Hendersonville
Joseph Gregory Walker	Charlotte
Allen Edward Wannamaker	Winston-Salem
Wade Alexander White	Wilmington
Britt Thomas Whitfield	Lexington
Robyn Kristine Whitten	Raleigh
Terri Lynn Wilkins	Garner
Dori Antoinette Williams	Queens, NY
Randy George Williams	Roanoke Rapids
Amanda Diane Willis	Morehead City
Vanessa Darlene Woods	Greensboro
Christy Garner Woolard	Garner
Jianping Yu	Ningbo City, China

## BACHELOR OF ARTS IN ECONOMICS

*Degree Conferred June 25, 1996*

Micah William Mattix ..... Spokane, WA

*Degree Conferred August 8, 1996*

Johnny James Harrington ..... Laurinburg

*Degrees Conferred December 18, 1996*

* Joseph Vernon Asbell	Greenville
Susan J. Morin Beauvais	Cary
Andrew Michael Galloway	Greensboro
Brian Winfield Holcomb	Asheville
Ashley Edward Pak	Concord
Audwin Underwood	Charlotte

**BACHELOR OF SCIENCE IN ECONOMICS**

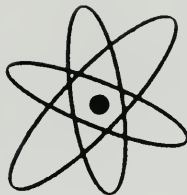
*Degree Conferred June 25, 1996*

Joshua Robert Worthington ..... Kinston

*Degrees Conferred December 18, 1996*

Jeff Joseph Cashin ..... Rockford, IL  
 Bryan Keith Paynter ..... Raleigh

**College of Physical  
 and Mathematical Sciences**



**BACHELOR OF SCIENCE IN APPLIED MATHEMATICS**

*Degrees Conferred August 8, 1996*

\* Scott Davenport Ingold ..... Claremore, OK  
 Bryan Lee Wilkins ..... Walkertown

*Degrees Conferred December 18, 1996*

Reham Suleiman Asad ..... Raleigh  
 Tiffany Yolanda Jarrett ..... Smithfield, VA  
 S\*\* Owen Thomas Price ..... Wake Forest  
 Matthew James Walton ..... King

**BACHELOR OF ARTS IN CHEMISTRY**

*Degrees Conferred June 25, 1996*

\*\* Angela Michele Hodges ..... Morganton  
 Ayse Karca ..... Durham  
 + Katherine Mary Rouse ..... Vienna, VA

*Degrees Conferred August 8, 1996*

+ Azelia Carolnet Edwards ..... Snow Hill  
 \*\*\* Lawson Alan Jackson, Jr. .... Charlotte  
 Jennifer Adelaide Jeffress ..... Milton  
 Susan Simpson Sullenberger ..... Tampa, FL

*Degrees Conferred December 18, 1996*

\*\* Jennifer Elizabeth Babinec ..... Holly Springs  
 David Richard Beauregard ..... Cary

+Co-major  
 \*Cum Laude

H Honors Program  
 \*\*Magna Cum Laude

S University Scholars Program  
 \*\*\*Summa Cum Laude



	David Richard Beauregard	Cary
+	Milton Leon Burgess, Jr.	Littleton
	Nathan Scott Ciliberto	Sanford
+	Shera Rebecca Forrester	Gastonia
+	Stephanie Dale Hamley	High Point
	John Mark Hedgpeth	Mooreville
+	Thuha Thi Hoang	Apex
S***	Amy Cheryl Langdon	Raleigh
	Susan Michelle Lee	Raleigh
	Sarah Elizabeth Little	Midland
**	Stephanie Carol Lovell	Summerfield
S+*	Richard Ernest Mearns, Jr.	Greensboro
+	Mariana Marchi Molina	Raleigh
*	Tom Orli	Wilmington
***	Akash Arvind Patel	Cary
+	Kara Elizabeth Sczesny	Williston Park, NY
+***	Kelly Anne Sigmon	Hickory
	Patrick Joseph Smith	Raleigh
+	Cynthia Lucille Sparrow	Wilmington
+	Vonetta Kareena Tyson	Greenville
+***	Kimberly Lynne Whitehead	Durham

## BACHELOR OF SCIENCE IN CHEMISTRY

*Degree Conferred June 25, 1996*

	Andrew Kiskadden Boal	Raleigh
--	-----------------------	---------

*Degrees Conferred December 18, 1996*

***	Juliette Christine Bates	Adamsville, TN
	David Frederic Cauble, Jr.	Charlotte
***	Laura Camille Daughtry	Kenly
	Nancy Dyer Dunbar	Smithfield
	Kelly Hester Guillen	Lumberton
H**	Charles Edmond Marshall	Mount Airy
	Allen Worth Olmstead	New Bern
**	David Mark Pace	Cary
	David Sean Paxton	Canton
	Christopher Clark Reynolds	Roanoke Rapids
	Scott Eric Stephenson	Willow Springs
	Sonya Nicole Wright	Raleigh
	Yunlan Yueh	Hickory

## BACHELOR OF SCIENCE IN ENVIRONMENTAL SCIENCE

*Degrees Conferred December 18, 1996*

	Christopher Edward Bryant	Durham
+	Leslie Anne Marshall	Wilmington

## BACHELOR OF ARTS IN GEOLOGY

*Degrees Conferred August 8, 1996*

Philip Gray Boswell .....	Raleigh
*** Catherine Jane Shrier .....	Apex

*Degree Conferred December 18, 1996*

* John Ashley Vines .....	Durham
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## BACHELOR OF SCIENCE IN GEOLOGY

*Degrees Conferred August 8, 1996*

* Michael Edward Cunningham .....	Raleigh
Anna Stewart Formy-Duval .....	Wilmington
Benjamin Joseph Troxler .....	Concord
Joshua Bourke Wilson .....	Greensboro

*Degrees Conferred December 18, 1996*

H** Fred LeGray Ginn .....	Raleigh
H** Sarah Ridgway Hoover .....	Apple Valley, CA

## BACHELOR OF SCIENCE IN MATHEMATICS

*Degrees Conferred June 25, 1996*

Christy Lynn Dilda .....	Raleigh
** Hoa Anh Pham .....	Raleigh
Michael Charles Ray .....	Pilot

*Degrees Conferred August 8, 1996*

Scott William Allsbury .....	Raleigh
Margaret Mary Hunter .....	Cornwall, NY
Shawn Edward McKnight .....	Fairfax, VA

*Degrees Conferred December 18, 1996*

Kelvin Gerard Barnes .....	Rocky Mount
Kevin James Calvo .....	New York, NY
Kimberly Deonne Ellerbe-Marlow .....	Jacksonville, FL
Jay Warren Evans .....	Raleigh
+ Chris Lee Grove .....	San Jose, CA
+* Jeffrey Jay Hahn .....	Hendersonville

## BACHELOR OF SCIENCE IN METEOROLOGY

*Degree Conferred August 8, 1996*

Gail Marie Andrews .....	Bostic
--------------------------	--------

*Degrees Conferred December 18, 1996*

John Scott Keziah .....	Burlington
* Wendy Lee Scaman .....	Saddle Brook, NJ
Brian Curtis Simmons .....	Albertson

**BACHELOR OF SCIENCE IN NATURAL RESOURCES**

*Degrees Conferred August 8, 1996*

Ashley Dunnington Orgain .....	Chesapeake, VA
Shawn Michael Tucker .....	Pfafftown

*Degrees Conferred December 18, 1996*

William Chandler Herr .....	Salisbury
+* Emily Brodie Meador .....	Henderson
James Glenn Medlin .....	Wilmington
SH** Anne Marie Queen .....	Raleigh
Marc Daniel Recktenwald .....	Durham
+ Kara Elizabeth Sczesny .....	Williston Park, NY
** Heath Leverne Stanley .....	Carolina Beach

**BACHELOR OF SCIENCE IN PHYSICS**

*Degree Conferred June 25, 1996*

Kerry Scott Chestnut II .....	Clayton
-------------------------------	---------

*Degree Conferred August 8, 1996*

Peter Johnathan Dickson .....	Arden
-------------------------------	-------

*Degrees Conferred December 18, 1996*

Robert Lee Readling, Jr. ....	Mooresville
Karl Gregory Reavis .....	Gastonia

**BACHELOR OF SCIENCE IN STATISTICS**

*Degree Conferred June 25, 1996*

Sarah Robertson Wright .....	Davidson
------------------------------	----------

*Degrees Conferred August 8, 1996*

Shelley Christine Partridge .....	Schaumburg, IL
Anthony Tyrone Wells .....	Wilmington

*Degrees Conferred December 18, 1996*

Anh Tuyet Aragon .....	Broadway
------------------------	----------

Shannon Leigh Hilton ..... Lillington  
 + Leslie Anne Marshall ..... Wilmington

# College of Textiles



## BACHELOR OF SCIENCE IN TEXTILE ENGINEERING

Jointly administered by the College of Textiles and the College of Engineering.

*Degree Conferred June 25, 1996*

Aaron Scott Earley ..... Leicester

*Degree Conferred August 8, 1996*

Eric Jon Campbell ..... Raleigh

*Degrees Conferred December 18, 1996*

Andrea Lynn Berry ..... Engelhard

Catherine Leigh Briley ..... Greenville

\*\* Jennifer Lynne Holt ..... Elkon, MD

Jason Boyette Shirley ..... Cary

\* Jennifer Leigh Singletary ..... Winston-Salem

## BACHELOR OF SCIENCE IN TEXTILE AND APPAREL MANAGEMENT

*Degrees Conferred June 25, 1996*

\*\* Caroline Berry Bolt ..... Greenville, SC

Eric Aaron Edgar ..... Newport

Richard Rankin Jarman, Jr. .... Gastonia

Amber Lynette Joyner ..... Rocky Mount

Lee Marion Sanderson, Jr. .... Raleigh

Michael James White ..... Greensboro

*Degrees Conferred August 8, 1996*

David Michael Harrison, Jr. .... Henderson

Torrey Blayne Seidel ..... Wilmington

*Degrees Conferred December 18, 1996*

\* Sarah Katherine Atwater ..... Gambrells, MD

William Bamonte ..... Hillsborough

\*\*\* Megan Elizabeth Bartnick ..... Cary

Michael Edward Bennett ..... Matthews

+Co-major  
 \*Cum Laude

H Honors Program  
 \*\*Magna Cum Laude

S University Scholars Program  
 \*\*\*Summa Cum Laude

	Lloyd Scott Brown	Hickory
	Michael Edward Buffalo	Garner
*	Thomas Bridgham Champlin	Statesville
	Rodrigo Ricardo Crespo	Chapel Hill
	Tawanda Catrice Dancy	Winston-Salem
	Casey Edward Ebner	Charlotte
	Nima Farmanara	Beverly Hills, CA
	Antonio Alexandre Ferreira, Jr.	Sete Lagas, Brazil
	Bradley Harris Fleming	Henderson
	Amber Dawn Hartbarger	Raleigh
	Jonathan William Henry Hill	Statesville
	Richard Patrick Holloway	Wake Forest
	Mary Margaret Huffman	Hickory
	Alexa Larice Hester	Henderson
	William Barret Jackson	Biscoe
***	Asif Jaffar	Karachi, Pakistan
	Wes Ryland Johnson	Raleigh
***	Michael John Keryeski	Fairfax, VA
***	Suhasini Lakshminarayanawamy	Raleigh
	Jean Marie Lange	Atlanta, GA
*	Mindy Estelle Lowder	Norwood
	Laquisa Venice Lytch	Greensboro
	Matthew Francis O'Connell	Greensboro
*	Eric Paul Reed	Matthews
+	Maria-Daphne Samoladas	Bronxville, NY
+	Ghazale Sharifi-Mehr	Millburn, NJ
	Christian Mea Signoret	Guatemala City, Guatemala
***	Heather Alicia Sparger	Salisbury
*	Phillip Allen Stocks	Raleigh
	Kerry Elizabeth Sullivan	Charlotte
	John Davis Suther	Concord
	Erica Lynn Whitmire	Raleigh
	Belinda Renae Williams	Louisburg

## BACHELOR OF SCIENCE IN TEXTILE CHEMISTRY

*Degrees Conferred August 8, 1996*

***	Muqsit Ashraf	Karachi, Pakistan
	Charlotte Carter Hill	Mooreville
	Harrie Peter Schoots	Boston, MA

*Degrees Conferred December 18, 1996*

	Leigh Joanna Costantini	Pinehurst
	Jennifer Susan Gerald	Charlotte
	Todd Owen Helton	Indian Trail
**	Lawrence Arthur Higby, Jr.	McAdenville
***	Matthew Jason Partin	Garner
	Vaibhav Radhy Patel	Reidsville
S***	Garrett David Poe	Lewisville
	Monchai Suesatayasilp	Bangkok, Thailand



\*\*\* Karen Denise Watkins ..... Raleigh  
 Frank Xavier Weber ..... Detroit, MI

**BACHELOR OF SCIENCE IN TEXTILE MATERIALS SCIENCE**

*Degrees Conferred December 18, 1996*

Eric Johnathan Stacy ..... Greenville, SC  
 Olin Thurmond Stewart III ..... Garner  
 Michael William Tolbert, Jr. .... Shelby

**BACHELOR OF SCIENCE IN TEXTILE SCIENCE**

*Degree Conferred December 18, 1996*

+ Angela Dean Benson ..... Benson

**BACHELOR OF SCIENCE IN TEXTILE TECHNOLOGY**

*Degree Conferred August 8, 1996*

Khalil Ishaque ..... Cary

*Degrees Conferred December 18, 1996*

Rita Carol Daniels ..... New Bern  
 Cecil Ryan Webster ..... Pittsboro

**BACHELOR OF SCIENCE IN TEXTILES**

*Degree Conferred June 25, 1996*

Eric Lorinzo Wilkins ..... Greensboro

*Degree Conferred August 8, 1996*

\* Nicole Morgan Wayne ..... Raleigh

*Degrees Conferred December 18, 1996*

Yolanda Evonne Avery ..... Benson  
 + Angela Dean Benson ..... Benson  
 Kristen Leigh Conner ..... Shelby  
 Christopher David Hawks ..... Raleigh  
 Amy Danielle Livingston ..... Burlington  
 Anna Maria Mantak ..... Conover  
 Yuko Matsuyama ..... Tokyo, Japan  
 \*\* Suzannah Lynn Poteat ..... Salisbury  
 Christian Mea Signoret ..... Guatemala City, Guatemala  
 Alison Megan Sullivan ..... Woodbridge, VA  
 Alicia Carol Swanner ..... Albemarle  
 \* Chong Ran Yi ..... Raleigh  
 \* Amy Maria Zech ..... Winston-Salem

# GRADUATE DEGREES



## Master's Degrees

### MASTER OF ACCOUNTING

*Degrees Conferred August 8, 1996*

Angela Elua Awoseyi	Durham
Stephanie Brooke Bell	Greenville
Evangeline Bazemore Brodie	Lewiston
Virginia Chase Davis	Eureka
John Haran Kelley	Sanford
Beverly Kennedy Paley	Winnipeg, Manitoba, Canada
Robin Die Pasquarello	Raleigh
Nita Ashok Patel	Bombay, India
Athos Rostan	Valdese
Alonzo RaMez Salter	Durham
Sally Ann Self	Raleigh
Erica Portus Timberlake	Columbia, SC
Miao-Ju Chiang Wu	Taipei, Taiwan, Republic of China

*Degrees Conferred December 18, 1996*

Dimple Dhutia Bhatia	Raleigh
Mark Allen Bond	Fayetteville
Tamara Isbill Burns	Cary
Lisa Lutz Gantt	Hickory
Denise Marie Gram	Cary
James Hugh Hysong	Conyers, GA
Michael Charles Johnson	Winston-Salem
Linwood Waitus Kearney	Goldsboro
Amy Lynn LaVaute	Manlius, NY
Bonnie Diane Mates	Elmhurst, IL
Paula Dare Parks	Kinston
Norma Iris Ramirez	Miami Lakes, FL
Jennifer Karen Stanley	Angier
WeiQing Zhang	Shanghai, People's Republic Of China

### MASTER OF AGRICULTURE

*Degrees Conferred August 8, 1996*

Re Bai	Huhhot, People's Republic of China
Michelle Lee Kern	Troy
Guadalupe Rojas	Talavera De La Reina, Spain

## MASTER OF ARCHITECTURE

*Degree Conferred August 8, 1996*

Randall Arthur Reggi . . . . . Beckley, WV

*Degrees Conferred December 18, 1996*

Amy Charlene Allen . . . . . Bear Creek  
Robert Keith Helmstetter . . . . . San Antonio, TX  
Tobias Gray Hinkle . . . . . Rochester, NY  
Cynthia Dianne Marvin . . . . . Winston-Salem  
Shannon Kimberly Peek . . . . . Charlotte  
Gregory Scott Terry . . . . . Knoxville, TN  
Kristen Ann Woods . . . . . Los Angeles, CA

## MASTER OF BIOMATHEMATICS

*Degrees Conferred December 18, 1996*

Elizabeth Nicole Brooks . . . . . Pittsburgh, PA  
Diane Alice Burch . . . . . Lockport, NY  
Robert James Latour . . . . . Warren, MA  
+ Li Yang . . . . . Dandong City, People's Republic Of China

## MASTER OF CHEMISTRY

*Degree Conferred August 8, 1996*

James Luther Tomlin . . . . . Huntington, WV

## MASTER OF CIVIL ENGINEERING

*Degrees Conferred August 8, 1996*

Terry Lee Albrecht . . . . . Raleigh  
Ufuk Dilek . . . . . Ismir, Turkey  
Jason Bradley Fukuda . . . . . Kula, HI  
Gregory Garth Gularte . . . . . Ventura, CA  
Melanie Ann Mann . . . . . Durham  
Keith Mack Roberts . . . . . Elizabethtown  
Adam Gabriel Schwartz . . . . . Armonk, NY  
Mikele Edward Winters . . . . . Pfafftown

*Degrees Conferred December 18, 1996*

Anna Caroline Cline . . . . . Sanford  
Ronnie-John Anselmo Deeb . . . . . Beirut, Lebanon  
James Bradley Ellinwood . . . . . Durham  
Brian Edward Freed . . . . . Durham  
Dwain Garrett Hathaway . . . . . Mooresville  
Ibrahim Oguz Kuruuzum . . . . . Ankara, Turkey  
Amanda Kaye Lee . . . . . Benson  
Wen-Der Lee . . . . . Taipei, Taiwan, Republic Of China

Toni Michelle Maiorano .....	Charlotte
Ronald Vincent Palumbo .....	Cranston, RI
Benjamin Seabrook Rivers .....	Black Mountain
Bryan Gregory Stilwell .....	Matthews
Brian Richard Thorsvold .....	Charlotte
Chad Alan Van Hying .....	Raleigh
Becky Mursch Ward .....	Raleigh
Stuart Bradley Woodall .....	Norwood
Xu-Ming Xie .....	Canton, People's Republic Of China

## MASTER OF COMPUTER SCIENCE

*Degrees Conferred August 8, 1996*

Hailiang Cai .....	Fengcheng, People's Republic Of China
James Franklin Farlow .....	Raleigh
Nianci Gan .....	Wuhan, People's Republic Of China
Malie Yin .....	Wuxi, People's Republic Of China
James Joseph Yuill .....	Raleigh

*Degrees Conferred December 18, 1996*

Samuel Bruce Farthing .....	Lexington
Trina Monique Washington .....	Cambria Heights, NY
Jianqing Ye .....	Shanghai, People's Republic Of China

## MASTER OF ECONOMICS

*Degrees Conferred August 8, 1996*

SoEun Ahn .....	Chungju-si, Chungbuk, South Korea
Nur Asena Caner .....	Ankara, Turkey
William Eric Gribbins .....	Lincolnton
Yan Jin .....	Raleigh

*Degrees Conferred December 18, 1996*

Roswitha Garcia Damm .....	Raleigh
Sofia Elizabeth Keith .....	Mexico City, Mexico
Dmitri Vladimirov Miklush .....	Minsk, Belarus
Asgytisg Pal .....	Raleigh
Tomas Venckevicius .....	Vilnius, Lithuania

## MASTER OF EDUCATION

### Adult And Community College Education

*Degree Conferred August 8, 1996*

Guy Winstead Gardner .....	Olive Hill
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*Degrees Conferred December 18, 1996*

Annamae Virginia Burnside .....	Freeport, Bahamas
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Kathleen Seno Cariker .....	Port Jefferson, NY
Andrew Baker Lull .....	Franklin
Lisa Woodruff Roberds .....	Raleigh
Lourdes Ortiz Shelley .....	Raleigh
Leta Short VanStory .....	Raleigh

### Counselor Education

#### *Degrees Conferred August 8, 1996*

Elizabeth Hornthal Worley .....	Edenton
Wilma Leonia Worsley .....	Robersonville

#### *Degrees Conferred December 18, 1996*

Jennifer Beth Clifton .....	Slidell, LA
Sharon DuRant Evans .....	Fayetteville
David Richard Martin .....	Raleigh
Lari Marie Meeker .....	Monkton, MD
Ardell Meadow Shepherd .....	Raleigh
Wilma Doris Watkins .....	Raleigh

### Curriculum And Instruction

#### *Degrees Conferred August 8, 1996*

Glenda Henderson Johnson .....	Benson
Nadia Fahmy Sandukas .....	Raleigh
Kelley Leigh Walker .....	Raleigh
Melissa Bragg Wood .....	Raleigh

#### *Degrees Conferred December 18, 1996*

Margaret Beck Haynes Arne .....	Wilmington
Sylvia Berry Brooks .....	Raleigh
Christopher John Coby .....	Wake Forest
Linda Jones Jones .....	Cary
Leatha Benvie Koefler .....	Cincinnati, OH
Gary Martin Russell .....	Raleigh
David Joseph Savino .....	Cortland, NY
Kim Lee Smith .....	Highland Falls, NY
Deborah Lynn Van Tassel .....	Pittsburgh, PA
Sally Phipps Walton .....	Cary

### Educational Administration And Supervision

#### *Degrees Conferred December 18, 1996*

Judith Celec Andersen .....	Annandale, VA
Ann Wilson Carper .....	Charleston, WV
Kimberly Hopson Lunceford .....	Greensboro
Kevin Ray Ross .....	Thomasville



## Higher Education Administration

### *Degrees Conferred August 8, 1996*

Tracy Appling Biel	Cary
Sharon Diane Buddemeier	Raleigh
Paula Kay Daniels	Burkesville, KY
Tia Marie Doxey	Norfolk, VA
Stephanie Helms Harris	Chicago, IL

### *Degree Conferred December 18, 1996*

Denise Phillips Stinagle	Selma, IN
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## Middle Grades Education

### *Degrees Conferred June 25 1996*

Gillian Secrest Clark	Cary
Robert Jamieson Hallenbeck	Cary

### *Degrees Conferred August 8, 1996*

Jenelle Hatch Bumgarner	Raleigh
Linda Mahnen McGee	Eastchester, NY
Per Saul Rosenbaum	Cary
Amy Elizabeth Stapleford-Diener	Carrboro

### *Degree Conferred December 18, 1996*

Lisa Lee Joyner	Durham
Andrew-Joseph de Lara Pietrus	Raleigh

## Occupational Education

### *Degree Conferred December 18, 1996*

Jenean Evans Gray	Elizabeth City
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## Science Education

### *Degree Conferred August 8, 1996*

Mary Priscilla Holland	Shelby
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### *Degree Conferred December 18, 1996*

Susan Elizabeth Anderson	Garner
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## Special Education

### *Degrees Conferred August 8, 1996*

Carol Griffin Graessley .....	Ypsilanti, MI
George Edward Romaine Hervey III .....	Raleigh
Diane Anderson Michael .....	Raleigh
Carol Wells Russ .....	Chapel Hill

### *Degrees Conferred December 18, 1996*

Lynne Beazlie Brock .....	Raleigh
Sheila Garner Brown .....	Garner
Amanda Leigh Ebken .....	Sanford
Peyton Whetstone Hatfield .....	Raleigh
Julie Bennett Latimer .....	Midlothian, VA
Jo Ann Loutzenhiser Parrish .....	Wake Forest
Susan Jinnette Perkins .....	Greensboro
Melinda Dawn Whitley .....	Clayton

## Training And Development

### *Degrees Conferred December 18, 1996*

Bobbie Finch Cathey .....	Raleigh
Jill Ellen Murphy .....	Coming, NY

## MASTER OF ENGINEERING

### *Degrees Conferred August 8, 1996*

Julian Matthews Chesnutt .....	Gastonia
William Perry Hancock .....	Richmond, VA
Michael Robert Harper .....	Rockford, IL
Ruth Ellen Mormino Lanni .....	Lenoir
Jill Denise Price .....	Clemmons
Blaine Edward Ramey .....	Durham

### *Degrees Conferred December 18, 1996*

Monia Ben-Khaled .....	Mellouleche, Tunisia
Hoy Rolla Bohanon, Jr. ....	Winston-Salem
Peter Jon Brown .....	Kennebunk, ME
Anthony Matteo Gallo .....	Apex
Ronald Scott Schnell .....	Fletcher
Mark Andrew Wilkinson .....	Chandler, AZ

## MASTER OF INDUSTRIAL DESIGN

### *Degree Conferred August 8, 1996*

Gregory Scott Thompson .....	Hillsborough
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*Degrees Conferred December 18, 1996*

Cölin Mark Duggleby .....	Jeffers, MT
Albert Michael Forlenza .....	Pittston, PA
Jean-Paul Haire .....	Fayetteville
James Oscar Hancock .....	Raleigh

**MASTER OF INDUSTRIAL ENGINEERING**

*Degrees Conferred August 8, 1996*

Mark Edward Fitzpatrick .....	Charlotte
Thomas Richard Ulmer .....	Crestline, OH

*Degrees Conferred December 18, 1996*

Deborah Keay Bohl .....	Greensboro
Jaideep Dilip Deshmukh .....	Pune, India
Robert Edward Warner .....	Garner

**MASTER OF INTEGRATED MANUFACTURING SYSTEMS ENGINEERING**

*Degrees Conferred August 8, 1996*

Nghia Dai Nguyen .....	Fayetteville
Elizabeth Gwyn Williams .....	Chandler, AZ

*Degrees Conferred December 18, 1996*

Amgad Mazen Abdel Wahab .....	Cairo, Egypt
Frank Bradley Armstrong IV .....	Raleigh
Ashish Balyan .....	Rishikesh, India
Sandra Lee Holt .....	Denver, CO
Rajeev Shreekant Joshi .....	Pune, India
Michael Shawn Maxon .....	Greenville
Samuel Adams Moore .....	Asheville
Naveenchan Purushothaman .....	Metturdam, India
Benton Sapp Satterfield, Jr. ....	Raleigh
James Michael Sills .....	Lenoir

**MASTER OF LANDSCAPE ARCHITECTURE**

*Degree Conferred August 8, 1996*

Joseph Paul Godfrey .....	Brookline, MA
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*Degrees Conferred December 18, 1996*

Michele Merritt Maxwell .....	Raleigh
Amro Abdulrahman Taibah .....	Jeddah, Saudi Arabia

## MASTER OF LIFE SCIENCES

*Degrees Conferred August 8, 1996*

Christopher Dixon Creech .....	Garner
Lawrence William Diener .....	Apex
Latifa El Hadri .....	Casablanca, Morocco
Reza Edward Ershadi .....	Charlotte
James Hiott Mitchell .....	Stanley
Sally Jean Morin .....	Fitchburg, MA
Robert Glenn Townsend III .....	Rae ford
Susan Elizabeth Woolwine .....	Wilmington

## MASTER OF MATERIALS SCIENCE AND ENGINEERING

*Degree Conferred August 8, 1996*

Thomas Charles Wenzel .....	Raleigh
-----------------------------	---------

## MASTER OF MECHANICAL ENGINEERING

*Degree Conferred August 8, 1996*

Paul Andrew Austin .....	Tacoma, WA
--------------------------	------------

*Degree Conferred December 18, 1996*

Erwinskyah Putra .....	Bandung, West Java, Indonesia
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## MASTER OF NATURAL RESOURCES ADMINISTRATION

*Degree Conferred December 18, 1996*

William Lewis Branch .....	Mount Airy
----------------------------	------------

## MASTER OF NUCLEAR ENGINEERING

*Degree Conferred December 18, 1996*

Ingmar Eugene Sterzing .....	Austin, TX
------------------------------	------------

## MASTER OF OPERATIONS RESEARCH

*Degrees Conferred August 8, 1996*

Hany Abdul-Hafez Elkordy .....	Cairo, Egypt
Kevin Ashley Kirby .....	Charlotte

## MASTER OF PARKS, RECREATION AND TOURISM MANAGEMENT

*Degree Conferred August 8, 1996*

Michael Edward Parsons .....	Kill Devil Hills
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*Degrees Conferred December 18, 1996*

Doc Berry Oliver III .....	Pine Level
Charles William Perkins .....	Reidsville

**MASTER OF PHYSIOLOGY**

*Degrees Conferred December 18, 1996*

Patricia Ann Evans .....	Central, SC
Thomas Dale Helton .....	Raleigh
Lisa White Johnson .....	Apex
Robert Kamiel Lark .....	Dallas
Emmett Clive Willis IV .....	Hickory

**MASTER OF PUBLIC ADMINISTRATION**

*Degrees Conferred August 8, 1996*

Margaret Dower Foley .....	Burlington, VT
Victoria Milda Genys .....	Seabrook, MD
Jill Heather Hollows .....	New Bern
Kathryn Lowery Johnston .....	Wilmington
James Klopovic .....	Durham
Silas Daudi Likasi .....	Dar-es-salaam, Tanzania
Gail Jean Paddock .....	Northhampton, MA
George Richard Sago II .....	Fairmont, WV
David McKenna Shonerd .....	Raleigh
Heather Michelle Simmons .....	Wilmington
Monica Denise Smoot .....	Raleigh
Jennifer Rebecca Sumpter .....	Lenoir

*Degrees Conferred December 18, 1996*

William Joseph Callahan .....	Enfield, CT
William Carlton Chandler .....	Apex
Lalla Hodges Howard .....	Washington
David Landrum Jones .....	Raleigh
Carolyn Regennia Mattocks .....	Edwards
Janet Louise Nichols .....	Pittsboro
David Michael Powell .....	Winston-Salem
Daryl Wayne Poythress .....	Wilson
Monica Ahzel Price .....	Raleigh
Fred Morris Williams .....	Raleigh

**MASTER OF SOCIOLOGY**

*Degrees Conferred December 18, 1996*

Robert Steven Apple .....	Bluffton, IN
Johnny Bouras .....	Greensboro
Myles Keith Kimble .....	Raleigh
Cheryl Ann Miskell .....	Dogpatch, AR



## MASTER OF STATISTICS

*Degree Conferred August 8, 1996*

Keith Jehan Jayawickrama . . . . . Colombo, Sri Lanka

*Degrees Conferred December 18, 1996*

Joseph Pe De Juan . . . . . Iloilo City, Philippines

Nikki Kristeen Godfrey . . . . . Springfield, VA

Jolee Marie Graham . . . . . Murphy

Douglas Elwin Kendrick . . . . . Sacramento, CA

Marlina Dumasari Nasution . . . . . Bogor, Indonesia

Joseph Edward Norman, Jr. . . . . Granite Falls

Christopher Ian Ogilvie . . . . . Miller Place, NY

Helen Naylor Strickland . . . . . Raleigh

John Leonard Szumiloski . . . . . Knightdale

+ Li Yang . . . . . Dandong City, People's Republic of China

## MASTER OF TECHNOLOGY FOR INTERNATIONAL DEVELOPMENT

*Degree Conferred August 8, 1996*

Kathryn Miller Ktul . . . . . Pittsford, NY

*Degrees Conferred December 18, 1996*

Nita Michelle Gregory-Hill . . . . . Timberlake

Janice Irene Pollard . . . . . Morganton

Ida Perry Vann Schafer . . . . . Clinton

Deirdre Milligan Shore . . . . . Jacksonville

## MASTER OF TEXTILES

*Degree Conferred August 8, 1996*

Leslie Celeste Caskey Clark . . . . . Winston-Salem

*Degrees Conferred December 18, 1996*

Clarence Michael Godfrey . . . . . Forest City

Mohammed Imran Shekhani . . . . . Karachi, Pakistan

Cevin Brent Smith . . . . . Raleigh

Sridhar Sripathy . . . . . Vizau, India

## MASTER OF WILDLIFE BIOLOGY

*Degree Conferred August 8, 1996*

Pamela Patricia Robinson . . . . . Troy, NY

# Master of Arts Degrees

## English

### *Degrees Conferred August 8, 1996*

Lynda Paige Battle	Pensacola, FL
Laura Baker Campbell	Raleigh
Arwa Fakhoury	Aleppo, Syria
Karen Delaney Kerr	Kensington, MD
Michelle Kathleen Mason	Youngsville
Krista Nicole Michael	Uniontown, PA
Kevin Scott Midkiff	Raleigh
Susan Meredith Moss	Raleigh
Thomas Andrew Phillips	Raleigh
Tracey Lynn Phillips	Clemmons

### *Degrees Conferred December 18, 1996*

Aziza Boutaleb	Taza, Morocco
Pamela Yvonne Duncan	Shelby
Jill Elswick	Raleigh
Stephanie Dale Hibner	Fredericksburg, VA
Elizabeth Elkins High	Clarkton
Deborah Scruggs Hill	Wake Forest
Caroline Hampton Lipscomb	Charlotte
Anne-Lindsay Beale Mitchell	Lenoir
Kimberly Ann Williams	Raleigh

## History

### *Degree Conferred August 8, 1996*

Joseph Christopher Daw	Chapel Hill
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### *Degree Conferred December 18, 1996*

Joseph John Pisapia	Raleigh
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## Liberal Studies

### *Degrees Conferred August 8, 1996*

Bettina Laraine Adams-Melvin	Zebulon
Tracey Torry Daley	Raleigh
Briecce R. Edwards	Burtonsville, MD
Laura Naykki Emery	Durham
Tinley Joan Falls	Raleigh
David Allen Hufton	Raleigh
Don Franklin Jennings, Jr.	King
Robert Thomas Lynam	Morganton
Oswald Olatungie Woode	Raleigh

*Degrees Conferred December 18, 1996*

Diana Méndez Beddow .....	Selma
Keith Michael Cochran .....	Chapel Hill
Nancy Geiger Huslage .....	Raleigh

**Political Science**

*Degrees Conferred August 8, 1996*

Robert Douglas Gunsalus .....	Bartlesville, OK
Glenn Ronald Page .....	Raleigh

*Degrees Conferred December 18, 1996*

James Harold Bender .....	Washington, DC
Amitabh Pal .....	Raleigh

**Public History**

*Degrees Conferred December 18, 1996*

Robert Todd Crumley .....	Lincolnton
Laurie Lynn Edgerton .....	Raleigh

# Master of Science Degrees

**Adult And Community College Education**

*Degree Conferred December 18, 1996*

Jewell Johnson Valrie .....	Garner
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**Aerospace Engineering**

*Degrees Conferred August 8, 1996*

Rebecca Lynn Hanna .....	Meadville, PA
Alison Marie Lamp .....	Louisville, KY
Mahesh Subba Rao .....	Raleigh

*Degree Conferred December 18, 1996*

Adam Peter Kelly .....	Cary
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**Animal Science**

*Degree Conferred August 8, 1996*

Curtis Alton Alexander III .....	Fayetteville
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**Agricultural Economics**

*Degree Conferred December 18, 1996*

Paul Carter Voigt ..... Raleigh

**Applied Mathematics**

*Degrees Conferred August 8, 1996*

Kelly Scott Lowder ..... Albemarle  
Matthew Robert Schulze ..... Des Moines, IA  
Shannon Nicole Todd ..... Fayetteville  
David Sherman Torain II ..... Hillsborough

*Degrees Conferred December 18, 1996*

Joseph Nicholas Abbate ..... Montvale, NJ  
Kendall Robert Bailey ..... Des Moines, IA  
Gretchen Elizabeth Feulner ..... Summerfield  
Christopher David Jang ..... San Francisco, CA  
David Matthew Milkes ..... Fresh Meadows, NY

**Biochemistry**

*Degree Conferred August 8, 1996*

Marianne Elizabeth Tioran ..... Raleigh

*Degree Conferred December 18, 1996*

Ann Brier Miller ..... Holly Springs

**Biological And Agricultural Engineering**

*Degrees Conferred August 8, 1996*

Theodore Alfred Endreny ..... Interlaken, NY  
Matthew Wyatt Kay ..... Knightdale

*Degrees Conferred December 18, 1996*

Jing Lu ..... Shanghai, People's Republic Of China  
Russell Dean Merz ..... Fort Fraser, British Columbia, Canada  
+ Ying Xie ..... Hefei, Ankui, People's Republic of China

**Biomathematics**

*Degree Conferred December 18, 1996*

Shannon Darlene Peak ..... West Columbia, SC

## Botany

*Degrees Conferred August 8, 1996*

Carolyn Margaret Foley .....	Swansea, MA
Christine Jodie Small .....	Hampton, VA
Robert David Tompkins .....	Greensboro

## Chemical Engineering

*Degree Conferred August 8, 1996*

Marco Antonio Marquez .....	Caracas, Venezuela
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*Degrees Conferred December 18, 1996*

Sanyou Chen .....	Anhui, People's Republic Of China
Kaihong Huang .....	Nanjing, People's Republic Of China
Anuraag Singh .....	New Delhi, India

## Chemistry

*Degree Conferred August 8, 1996*

Julie Harrold Glenn .....	Richland, WA
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*Degrees Conferred December 18, 1996*

Jan Alice Anderson .....	Annapolis, MD
Nayane Gupta .....	Jamshedpur, India
Dawn Kathleen King .....	San Marcos, TX
Paresh Madhusudan Thakker .....	Bombay, India

## Civil Engineering

*Degrees Conferred August 8, 1996*

Kenneth Bertone Ivanetich .....	Annandale, VA
Jo Ellen Sias .....	North Attleboro, MA
George Michael Sloop .....	Cheraw, SC
Eric G. Solano-Mora .....	San Jose, Costa Rica
Francesco Joseph Spagna .....	New Britain, CT
Ellen Kay Stone .....	Pilot Mountain
Michael Oliver Fleming Townley .....	Midland, MI

*Degrees Conferred December 18, 1996*

Dennis Patrick Allen III .....	Spring Lake, MI
Robert John Fairweather .....	Ogdensburg, NJ
Heather Jane Hildebrandt .....	Wilmot, MI
Mitesh Damodar Kini .....	Bombay, India
Joseph Samuel Milazzo II .....	Blairsville, PA
Loan Thi Kim Tran .....	Port Arthur, TX
David John Willers .....	Raleigh



## Computer Engineering

### *Degrees Conferred August 8, 1996*

Bruce Thomas Armstrong	Chapel Hill
Jonathan Edward Brooks	Altavista, VA
Kyle Gene Brown	Apex
Rajendra V. Godse	Pune, India
Venkata Ratna Mukerji Surapaneni	Chapel Hill
Hung Ngoc Tran	Raleigh

### *Degrees Conferred December 18, 1996*

Christopher Sean Beasley	Cary
Amrapali Bose	Calcutta, India
John Faulkner Cornelius II	Charlotte
Joseph Albert DeRusso III	West Islip, NY
Craig Francis Deuschle	Rochester, MN
Thomas Ivey Faison	Chapel Hill
Chao-ying Fu	Taipei, Taiwan, Republic Of China
Haicong Fu	Nanjing, People's Republic Of China
Quanlin Guo	Anyang, People's Republic Of China
Craig David Hughes	Cary
Neeraj Malhotra	Delhi, India
Rashmi Murthy	Bangalore, India
Peter Ronald Meyer	Brevard
Gregory Keith Neighbors	Benson
Yi Pan	Hefei, People's Republic Of China
Charles Lee Ramiller	Cary
Karen Tible Szypulski	Currituck

## Computer Science

### *Degrees Conferred August 8, 1996*

Neerja Bhatt	Bombay, India
Patrick Wayne Brewer	Mocksville
Susan Langley Jones	Raleigh

### *Degrees Conferred December 18, 1996*

Zhiyong Dai	Beijing, People's Republic Of China
Martin Skippy Dulberg	New York, NY
Hong Han	Beijing, People's Republic Of China
Maciej Piotr Tyrlik	Fuquay-Varina
Radhika Venkatraman	Orlando, FL

## Crop Science

### *Degrees Conferred August 8, 1996*

Stephen Peter Dorer	Apex
David Wayne Krueger	Metropolis, IL

*Degrees Conferred December 18, 1996*

Hongxia Judy Li .....	Harbin, People's Republic Of China
Matthew Charles Martin .....	Raleigh
+ Azur Moulaert Quiros .....	Alajuela, Costa Rica

**Ecology**

*Degrees Conferred August 8, 1996*

Tara Michelle Disy .....	Raleigh
Amelia Suzanne Morgan .....	New Bern

**Economics**

*Degree Conferred December 18, 1996*

+ Dequan He .....	Shenyang, People's Republic of China
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**Electrical Engineering**

*Degrees Conferred August 8, 1996*

Monalisa Bora .....	Guwahati, India
Aaron Randolph Coleman, Jr. ....	Winston-Salem
Prashant Shamaroo .....	Bombay, India
Erik Paul Vick .....	Raleigh

*Degrees Conferred December 18, 1996*

Priotomo Robert Abiprojo .....	Jakarta, Indonesia
Subramani Bhamidipati .....	Pune, India
Tahereh Z. Brunson .....	Raleigh
Kenyon Heath .....	Asheville
Gregory Mitchell Daughtry .....	Smithfield
Paul Andrew Denisowski .....	Charleston, SC
Charles Linwood Dozier .....	Camden
Steven Woodrow Edwards .....	Louisville, KY
Wei-Lun Huang .....	Tainan City, Taiwan, Republic Of China
Makeshwar Kothandaraman .....	Raleigh
+ Jenn-Shing Lin .....	Taichung, Taiwan, Republic Of China
Laura Marie Maciejewski .....	Clifton Park, NY
James Francis McElwee, Jr. ....	Raleigh
Shetal Natwarbhai Patel .....	Apex
Fredy Quan .....	Guatemala, Guatemala
Cory Donavon Royster .....	Milton
Darryl Leroy Shepard .....	Los Angeles, CA
Brian Jonathan Sigmon .....	Newton
Ravindra Govind Soman .....	Raleigh
Larry Barnard Stansell, Jr. ....	Raleigh
Jason Tennant Teeter .....	Raleigh
Parakalan Venkataraghavan .....	Madras, India
Scott Ward .....	Durham

Chad Everett Weintraub ..... Buffalo, NY  
Tianxiang You ..... Sichuan, People's Republic Of China

## Entomology

*Degrees Conferred August 8, 1996*

Peter Joseph Crawford ..... Oshkosh, WI  
Michael Scott Stanghellini ..... Tucson, AZ

## Food Science

*Degree Conferred August 8, 1996*

Joann Careyva Stryker ..... Ringtown, PA

*Degrees Conferred December 18, 1996*

Diego R. Darquea ..... Quito, Ecuador  
Lisa Kay Dimmig ..... Chana, IL  
Rebecca Lea Guzy ..... Washington, MO  
Eduardo Mundo Paredes ..... Mexico City, Mexico  
Deanna Marie Nuskowski ..... Buffalo, NY  
April Joy Pontius ..... New Cumberland, PA  
Christopher Paul Wilcox ..... Blacklick, OH  
+ Ying Xie ..... Hefei, Ankuai, People's Republic Of China

## Forestry

*Degrees Conferred August 8, 1996*

Kelly Dawn Beissel ..... Raleigh  
Jeffrey Mead Warren ..... Chapel Hill

*Degrees Conferred December 18, 1996*

Benjamin Jacob Addlestone ..... Washington, DC  
Robert Joseph Eaton ..... Raleigh  
+ Dequan He ..... Shenyang, People's Republic Of China  
David Alan Klimkowski ..... Gastonia  
Laura Ann Lombardo ..... Cranford, NJ  
+ Azur Moulart Quiros ..... Alajuela, Costa Rica

## Horticultural Science

*Degree Conferred August 8, 1996*

Jorge Raul Soria Baraibar ..... Montevideo, Uruguay

*Degrees Conferred December 18, 1996*

Scott Eric Henson ..... Laurel Springs  
Gary Lynn Pierce ..... Gatesville

Nischit Vasanth Shetty .....	Bangalore, India
Richard Lester Wahlers .....	Raleigh

## Industrial Engineering

*Degrees Conferred December 18, 1996*

+ John Curtis Badgett .....	Advance
Rahul Hasmukhbha Patel .....	Winston-Salem
Kittinan Unnanon .....	Bangkok, Thailand

## Management

*Degrees Conferred August 8, 1996*

Sanjot Kaur Arora .....	Raleigh
James Lester Hager, Jr. ....	Cary
Bengi Karacali .....	Zmir, Turkey
Robin Barreau Richardson .....	Raleigh
Amy Teresa Ruggiero .....	Raleigh
Keith David Sabol .....	Cary
Renuka Kocherlakota Singh .....	Pune, India

*Degrees Conferred December 18, 1996*

Bernard David Assa .....	Raleigh
Angela Brinson .....	Nashville
Scott Michael Corrigan .....	Greensboro
Richard Albert Daniel .....	Raleigh
Ivan A. Ditscheiner .....	Cary
Flavio De Aquino Ferreira .....	Raleigh
Stefan Forster .....	Munich, Germany
Garry Ray Garver .....	Garner
Alan Carl Gehring .....	Apex
Kevin James Hanmann .....	Brewster, NY
Jeffrey Christopher Hoffman .....	Raleigh
Randolph Andrew Houck .....	Fuquay-Varina
Timothy Edward Iseminger .....	Lancaster, PA
Nattapote Kuslasayanon .....	Bangkok, Thailand
Thomas Joseph Maher .....	Raleigh
Randall Bryan Moore .....	Bailey
Stephanie Dawn Pointer Owens .....	Toccoa, GA
Brian Scott Ricker .....	Apex
Edward Joe Sallee, Jr. ....	Warner, OK
Jill Shumate .....	Elkin
Michelle Anne Zedick .....	Greensberg, PA

## Marine, Earth And Atmospheric Sciences

*Degrees Conferred August 8, 1996*

William Loyd Fomes .....	Monroe
Lisa Marie Hagerman .....	Colorado Springs, CO
Debra Kay Hoium .....	Columbia Heights, MN

Wendy Michele Nix-Morris	Gainesville, FL
James Robert O'Connor	Lyndonville, NY
Paul Andrew Roelle	Virginia Beach, VA
Irena Bozena Rybak	Birmingham, AL
Joel Shannon Schafer	Columbus, NE
Robert William Trayers, Jr.	Lynnefield, MA
Shaocai Yu	Yongan, People's Republic of China

*Degrees Conferred December 18, 1996*

Philip Julian Bradley	Savannah, GA
Catherine Aileene Burkett	Alexandria, PA
Roy Linton Deal III	Waycross, GA
Richard Charles Dentzman	Glenwood, IL
David Walker Hamilton	Winston-Salem
Matthew James Heller	Baltimore, MD
Joanna Kosecki	Warsaw, Poland
Tony Christian Krogh	Seattle, WA
Mark Steven Kulie	Ishpeming, MI
Adam Hadwen Langmaid	McLean, VA
Sarah Patricia Merchant	Cleveland, OH
Devdutta Sadananda Niyogi	Bombay, India
Regi George Oommen	Raleigh
Leanne Wheeler Siedlarz	Harmonsburg, PA
Kyle David Turner	Chicago, IL
Brian Nason Wenny	Wilmington, DE

**Materials Science And Engineering**

*Degrees Conferred August 8, 1996*

Donna Marie Thaus	Orland Park, IL
Peter Joshua Wolf	Raleigh

*Degrees Conferred December 18, 1996*

Amy Elizabeth Miller	Chattanooga, TN
Anthony Peter Santavy	Swartz Creek, MI
Meimei Xu	Nantong City, People's Republic Of China

**Mathematics**

*Degrees Conferred August 8, 1996*

Rebekah Lee Crisp	Raleigh
Amanda Buffington Matthews	Pine Park, GA

*Degrees Conferred December 18, 1996*

Craig Paul Bauer	Allentown
Jeffrey Scott Webster	Greensboro



## Mathematics Education

*Degree Conferred December 18, 1996*

William Lee Creighton . . . . . Dunn

## Mechanical Engineering

*Degrees Conferred August 8, 1996*

Woodrow Clifton II . . . . . Charlotte  
Kenneth James Kelmer . . . . . Hatteras  
Jason Allen Luehrs . . . . . Stone Mountain, GA  
Marco Salvador Orsini . . . . . High Point  
Ming-Te Pan . . . . . Taipei, Taiwan, Republic Of China  
Pradeep Tandon . . . . . Utrecht, Holland

*Degrees Conferred December 18, 1996*

Jared Newton Baucom . . . . . Charlotte  
John Ralph Buchanan, Jr. . . . . Pittsburgh, PA  
William Russell Crews . . . . . Mt. Holly, VA  
Bradley Howell Jared . . . . . Knoxville, TN  
Chul Kim . . . . . Busan, South Korea  
Lyle Houston Lee . . . . . Raleigh  
Brent Andrew Stancil . . . . . Greensboro  
Matthew Donald Swecker . . . . . Roanoke Rapids

## Microbiology

*Degree Conferred August 8, 1996*

Gregory Lawrence Wagner . . . . . Durham

*Degrees To Be Conferred December 18, 1996*

Sung Kyu Chang . . . . . Charlotte  
Scott Preston Evans . . . . . Kannapolis  
Kristie Lynn Falk . . . . . Columbus, OH  
Beverly Midge Vucson . . . . . Meriden, CT

## Natural Resources Administration

*Degree Conferred December 18, 1996*

William Stevens Slocumb . . . . . Cary

## Nuclear Engineering

*Degrees Conferred December 18, 1996*

Rebecca Whiteley Caress . . . . . Annandale, VA  
Edward Alfred Preble . . . . . Foxboro, MA

Yun Yeng Wang ..... Malacca, Malaysia  
 Lian Yan ..... Yunchang, People's Republic Of China

**Nutrition**

*Degrees Conferred December 18, 1996*

Kevin Lee Adams ..... Dallas  
 Susan Marie Creed ..... Columbia, SC

**Operations Research**

*Degrees Conferred December 18, 1996*

+ John Curtis Badgett ..... Advance  
 + Jenn-Shing Linn ..... Taichung, Taiwan, Republic of China

**Parks, Recreation And Tourism Management**

*Degrees Conferred August 8, 1996*

Nancy Susan Bell-Edwards ..... Edison, NJ  
 Jill Denise Vasquez ..... Columbia, IL

*Degrees Conferred December 18, 1996*

Jui-Chi Chen ..... Tainan, Taiwan, Republic Of China  
 Shellie Marie Holerud ..... Lodi, WI  
 Gary William Mills ..... Raleigh  
 Helen Marlise Moody ..... Spruce Pine  
 Alan Clarke Roberds ..... Raleigh  
 Julie Brett Tanner ..... Durham

**Physics**

*Degree Conferred August 8, 1996*

Hugh Lacy Harrington ..... Asheboro

*Degree Conferred December 18, 1996*

Michael Austin Netzer, Jr. .... Ralcigh

**Physiology**

*Degree Conferred December 18, 1996*

Angela Renee Sigmon Kittrell ..... Corapeake

**Poultry Science**

*Degree Conferred December 18, 1996*

Deana Robinson Jones ..... Mount Gilead

## Psychology

### *Degrees Conferred August 8, 1996*

Catherine Grace Busam .....	Raleigh
Maria Fungueirino-Lorenzo .....	Vigo, Pontevedna, Spain
Renee Yung-Rae Lao .....	Greenville
Barbara Ella Le .....	Selinsgrove, PA
Thelma Jane Pritzl .....	Largo, FL
Michelle Marie Treptau .....	Golden Valley, MN
Sandra Jones Waters .....	Johnson City, TN

### *Degrees Conferred December 18, 1996*

Tanya Norika Bibby .....	Lynchburg, VA
Molly Ann Carter Imhoff .....	Durham
Kristin Freund Murphy .....	Apex
William Eugene Wimpee .....	San Antonio, TX

## Rural Sociology

### *Degrees Conferred August 8, 1996*

Michael Ray Futreal .....	Raleigh
Daphne Holden .....	Raleigh
James Kirk Miller .....	Charlottesville, VA

## Soil Science

### *Degree Conferred August 8, 1996*

Gail Lynn Olson .....	Racine, WI
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### *Degrees Conferred December 18, 1996*

Reginald David Sterling .....	Charlotte
Pauline Tisdale Warren .....	North Wilkesboro

## Technical Communication

### *Degrees Conferred August 8, 1996*

Julia Richardson McIver .....	Raleigh
Lori Lianne Phelps .....	West Palm Beach, FL
Jennifer Ruff Tamburro .....	Harrisonburg, VA

### *Degrees Conferred December 18, 1996*

Mark Stephen Armagost .....	Lebanon, PA
Michael Dennis Carver .....	Cary

## Textile Chemistry

### *Degrees Conferred August 8, 1996*

Heather Ann Bardole . . . . . Vincennes, IN  
Tatjana Elisabeth van Delden . . . . . Gronau, Germany

### *Degrees Conferred December 18, 1996*

Edwin Russell Lee . . . . . Garner  
James Mallary Leonard . . . . . Shallotte  
Xiao-Ping Liu . . . . . Nantong, People's Republic Of China  
Farhan Mushtaq Ahmed Patel . . . . . Bombay, India  
William Edward Snyder . . . . . Albemarle  
Hirofumi Tochikawa . . . . . Fukui, Japan

## Textiles

### *Degrees Conferred August 8, 1996*

Allen Dunlap Copeland . . . . . Durham  
Raoul Farer . . . . . Essen-Werden, Germany

### *Degrees Conferred December 18, 1996*

Samuel Keith Black . . . . . Lexington  
Elizabeth Anne Hosford . . . . . Skaneateles, NY  
Ann Marie Richards . . . . . Raeford  
LaDawnya Caprice Turner . . . . . Winston-Salem

## Veterinary Medical Sciences

### *Degrees Conferred December 18, 1996*

Adriana Maria Doi . . . . . Sao Paulo, Brazil  
Lynetta Michelle Johnson . . . . . Siler City

## Zoology

### *Degrees Conferred August 8, 1996*

Braden Reid McCollum . . . . . Mililani, HI  
Kimberly Joy Tripp . . . . . Raleigh

### *Degrees Conferred December 18, 1996*

Melissa Sellers Forté . . . . . Anniston, AL  
John Andrew Quinlan . . . . . Philadelphia, PA  
Lynn Marie Waller . . . . . Bethesda, MD  
Karle Owen Woodward . . . . . Linn, KS  
Limin Zhang . . . . . Harbin, People's Republic Of China

# Doctor of Education

*Degrees Conferred August 8, 1996*

Karen Harton Allen, Adult And Community College Education  
Asheboro, North Carolina

Dissertation: Successful Adult Literacy Instructors: Teaching Processes, Motivation Strategies and Instructor Characteristics. (Under the direction of Edgar J. Boone and Scipio A. J. Colin III.)

Vinetta Marie Bell, Curriculum And Instruction  
Kinston, North Carolina

Dissertation: The Origin, Intent and Purposes of the Christian Schools (Grades 1-12) Movement: 1950-1980. (Under the direction of Barbara M. Parramore and Bruce G. Beezer.)

Audrey Louise Downing-McGinty, Adult And Community College Education  
Greenville, North Carolina

Dissertation: The Relationship between Academic Study in a Workplace Basic Skills Program and Employee Job Performance. (Under the direction of J. Conrad Glass, Jr.)

Marjorie Jo MacDonald, Adult And Community College Education  
Durham, North Carolina

Dissertation: Exploration of the Impact of Corporate Culture in a Health Care Setting on Effective Clinician-Patient Communication. (Under the direction of Scipio A. J. Colin III.)

Diane Hill Roberts, Higher Education Administration  
Goldsboro, North Carolina

Dissertation: Non-technical Skills Needed by Graduates of Selected North Carolina Community College Associate Degree Programs to Be Successful in the Workplace: Perceptions of Employers and Program Heads. (Under the direction of Edgar J. Boone.)

Lisa Ann Trainer, Industrial Arts Education  
Morrow, Ohio

Dissertation: Assessing the Worth of the National Technology Student Association Curriculum Activities in Promoting Creative Problem-solving and Critical Thinking in North Carolina Technology Education Programs (Under the direction of Robert E. Wenig and William J. Haynie III.)

Sandra Wall Williams, Adult And Community College Education  
Rockingham, North Carolina

Dissertation: The Effectiveness of Technical Trainers in the Delivery of Technical Training. (Under the direction of Scipio A. J. Colin III.)

*Degrees Conferred December 18, 1996*

Cassandra Atkinson, Adult And Community College Education  
Clayton, North Carolina

Dissertation: A Study of How Perspectives of Leaders Affect and Influence Diversity Practices in a State Public Education Agency. (Under the direction of Ronald W. Shearon.)



June St. Clair Atkinson, Educational Administration And Supervision  
Raleigh, North Carolina

Dissertation: An Analysis of Achievement and Matriculation Rates of 1994-95 High School Graduates Completing a Tech Prep or Non-tech Prep Course of Study in Three North Carolina School Districts. (Under the direction of Elizabeth MacPhail-Wilcox.)

Shirley Stokes Boyd, Higher Education Administration  
Wilson, North Carolina

Dissertation: Community College Climate and the Effects on the Academic Departments. (Under the direction of George A. Baker III and Edgar J. Boone.)

Carlous Caple, Technology Education  
Durham, North Carolina

Dissertation: The Effects of Spaced Practice and Spaced Review on Recall and Retention Using Computer Assisted Instruction. (Under the direction of V. William DeLuca.)

Cynthia Mercer Chamblee, Curriculum And Instruction  
Wilson, North Carolina

Dissertation: Peer Group Discussions: Developing the Evolving Personal Interpretations of Literary and Expository Text in the Middle School. (Under the direction of Hiller A. Spires.)

Peggy Anne Hopkins, Adult And Community College Education  
Elizabeth City, North Carolina

Dissertation: The Effect of Induction Interventions on the Desire of Beginning Teachers to Remain in Teaching. (Under the direction of Edgar J. Boone.)

Kari Kamile Lewis, Curriculum And Instruction  
Raleigh, North Carolina

Dissertation: Physical Fitness as a Predictor of the Self Concept among Boys and Girls with Learning Disabilities, Attention Deficit Hyperactivity Disorder and Normal Academic Achievement. (Under the direction of Susan S. Osborne.)

James Edward Osler II, Technology Education  
Durham, North Carolina

Dissertation: The Effects of an Ergonomically Designed Computer-based Tutorial on Elementary Students' Recall. (Under the direction of V. William DeLuca.)

Tina Joy Pitt, Adult And Community College Education  
Denver, Colorado

Dissertation: The Multi-user Object Oriented Environment: A Guide with Instructional Strategies for Use in Adult Education. (Under the direction of Edgar I. Farmer.)

Denise Marie Lavallee Sessoms, Adult And Community College Education  
Wilson, North Carolina

Dissertation: A Study to Examine Demographic Variables Related to GED Students Enrolled in Three North Carolina Community Colleges to Determine Significant Differences. (Under the direction of Edgar I. Farmer.)

Linda Gail Sheffield, Adult And Community College Education  
Farmville, Virginia

Dissertation: The American Community College: The Relationship Between the Perceived Transformational Leadership Style of the Community College President and the Involvement of the Community College in Community-based Programming. (Under the direction of Edgar J. Boone.)

Jean Hurst Williams, Occupational Education

Apex, North Carolina

Dissertation: Perceived Importance of Education Levels on Pay Levels in Selected Manufacturing Industries in the Raleigh Area. (Under the direction of Dewey A. Adams.)

Xiaoyun Yang, Adult And Community College Education

Nanjing, People's Republic Of China

Dissertation: A Study of Factors Related to Students' Postsecondary Aspirations. (Under the direction of Edgar J. Boone.)

## Doctor of Philosophy Degrees

*Degrees Conferred August 8, 1996*

Michael Stephen Acquesta, Civil Engineering

Geneva, New York

Dissertation: Utilization of Natural Organic Matter to Achieve Denitrification of Municipal Wastewater. (Under the direction of Robert C. Borden.)

Timothy Russell Baker, Forestry

Monticello, Georgia

Dissertation: Ozone Impacts on Foliar Nutrients and Carbohydrates in Loblolly Pine (*Pinus taeda* L.). (Under the direction of Howard Lee Allen, Jr.)

Aditi Dipankar Banerjee, Materials Science And Engineering

Dhanbad, India

Dissertation: Remote Plasma Enhanced Chemical Vapor Deposition of Silicon Based Dielectrics. (Under the direction of Klaus J. Bachmann and Gerald Lucovsky.)

Charles John Brabec, Physics

Raleigh, North Carolina

Dissertation: Classical and Quantum Molecular Dynamics Studies of Novel Carbon Systems. (Under the direction of Jerzy Bernholc.)

Catherine Elisabeth Brawner, Education Research And Policy Analysis

Miami, Florida

Dissertation: The Workplace Preparation of North Carolina Public Education Graduates: The Employers' Perspective. (Under the direction of Robert C. Serow.)

Ransom Hal Castleberry, Materials Science And Engineering

Radford, Virginia

Dissertation: Physical and Chemical High Pressure Vapor Transport of  $ZnGeP_2$ : Optical Properties and Intrinsic Defect Density Control. (Under the direction of Klaus J. Bachmann.)

Neeraja Reddy Chanumalla, Marine, Earth And Atmospheric Sciences

Hyderabad, India

Dissertation: Investigation of Mesoscale Circulations Induced by Surface Processes with Special Emphasis on Carolina Coastal Front. (Under the direction of Sethu Raman.)

Shin-Shi Chen, Chemistry  
Tainan, Taiwan, Republic Of China  
Dissertation: Stereoselective Aldol Reactions of Trialkylstannyl Substituted Acetals. (Under the direction of Russell J. Linderman.)

David Alan Crouse, Soil Science  
Raleigh, North Carolina  
Dissertation: Poultry Litter Phosphorus: From Microscale to Macroscale. (Under the direction of Robert L. Mikkelsen and Arthur G. Wollum II.)

Glen Patrick Doggett, Aerospace Engineering  
Raleigh, North Carolina  
Dissertation: Hypersonic Boundary-layer Stability on a Flared-cone Model of Angle of Attack. (Under the direction of Ndaona Chokani.)

Martha Stewart Doolittle, Psychology  
Austin, Texas  
Dissertation: Predicting the Decision to Go to Graduate School among College Seniors in Engineering: A Study at One University. (Under the direction of Denis O. Gray.)

Ronald Edward Giachetti, Industrial Engineering  
Massapequa Park, New York  
Dissertation: The Mathematics of Triangular Fuzzy Numbers to Support a Model of Imprecision in Design. (Under the direction of Robert E. Young.)

Simon Petrus Ginting, Nutrition  
Medan, Indonesia  
Dissertation: Nutrition-Parasite Interaction in Tropical Sheep Infected with *Haemonchus contortus*. (Under the direction of Dwight S. Fisher and Kevin R. Pond.)

Kerrick Milton Hartman, Plant Pathology  
Berkley, Michigan  
Dissertation: Biology and Ecology of *Sphaeronema sasserii*, *Pratylenchus macrostylus* and Associated Nematodes on Fraser Fir and Red Spruce. (Under the direction of Kenneth R. Barker.)

Debra Ann Holt, Psychology  
Mitchellsburg, Kentucky  
Dissertation: On the Function of Procedural Justice: A Clarification of the Original Theory of Procedure. (Under the direction of Rupert W. Nacoste.)

Yih-Shyan Huang, Electrical Engineering  
Hsinchu, Taiwan, Republic Of China  
Dissertation: Dielectrically Isolated High Voltage Power Devices. (Under the direction of B. Jayant Baliga.)

Ronald Brett Hulfachor, Electrical Engineering  
Genoa, Illinois  
Dissertation: Advanced Simulation of Hot Electron Phenomena and Reliability in Deep-submicron Silicon Devices. (Under the direction of Michael A. Littlejohn and Ki Wook Kim.)

Larry Scott Jackson, Wood And Paper Science  
Ashland, Virginia  
Dissertation: Interaction of Cellulase and Xylanase with Recycled Bleached Kraft Fiber. (Under the direction of Thomas W. Joyce and John A. Heitmann, Jr.)

Gopala Krishna Reddy Kakivaya, Civil Engineering  
Nellore, India

Dissertation: Computational Approaches to Intelligent Transportation Systems. (Under the direction of John W. Baugh, Jr.)

Alan Philip Ker, Economics and Statistics  
Owen Sound, Ontario, Canada

Dissertation: Rating and Yield Predicting Procedures for the Group Risk Federal Crop Insurance Program: A Nonparametric Approach. (Under the direction of Barry K. Goodwin and A. Ronald Gallant.)

Sandra Lynn Kerman, Psychology  
Batavia, Ohio

Dissertation: Interpersonal Understanding and Rapport among University Roommates with and without Learning Disabilities. (Under the direction of Patricia F. Horan.)

Joel Edward Kimmelshue, Soil Science  
Durham, California

Dissertation: The Influence of Drainage Management and Nitrogen Fertility Practices on Nitrate Leaching. (Under the direction of James W. Gilliam and Robert O. Evans, Jr.)

Sandeep Kumar, Computer Engineering  
Varanasi, India

Dissertation: Specification and Detection of Parallelism in Object-oriented Programs. (Under the direction of Dharma P. Agrawal and S. Purushothaman Iyer.)

Manoj Mehrotra, Electrical Engineering  
Kanpur, India

Dissertation: MOS Gate AC Switch Structures. (Under the direction of B. Jayant Baliga.)

Peter Daniel Milewski, Materials Science And Engineering  
Albuquerque, New Mexico

Dissertation: Growth, Characterization and Deposition of Luminescent Nanoparticles. (Under the direction of Angus I. Kingon.)

Sungwoo Moon, Civil Engineering  
Samsung, South Korea

Dissertation: Construction Automation: Effectiveness of a Virtual Human-Machine Interface for Large-scale Manipulator Control. (Under the direction of Leonhard E. Bernold.)

Cynthia Ann Moulton, Zoology  
Greenbelt, Maryland

Dissertation: Assessing Effects of Pesticides on Frog Populations. (Under the direction of W. James Fleming.)

Alline Frances Myers, Materials Science And Engineering  
Raleigh, North Carolina

Dissertation: Characterization of Diamond Coated Silicon and Molybdenum Field Emitters. (Under the direction of John J. Hren.)

Kristen Anne Myers, Sociology  
Raleigh, North Carolina

Dissertation: Sailing under False Colors: Race, Class and Gender in a Women's Organization. (Under the direction of Barbara J. Risman.)

Amitkumar Manoharrao Paradkar, Computer Science  
Badlapur, India

Dissertation: Specification-based Testing Using Cause-Effect Graphs. (Under the direction of Mladen A. V. Vouk and Kuo-Chung Tai.)

Hoan-Jae Park, Economics  
Kangrung, South Korea

Dissertation: Econometric Welfare Evaluation of Regulatory Fishing Restrictions: A Synthetic Inverse Demand System Approach. (Under the direction of Walter N. Thurman.)

Karen Faye Parker, Sociology  
Clinton, North Carolina

Dissertation: The Effects of Structural Conditions on Racially Disaggregated Homicide Rates. (Under the direction of Patricia L. McCall.)

Robert Harris Pope III, Marine, Earth And Atmospheric Sciences  
Cary, North Carolina

Dissertation: A Multitracer, Radiochemical Investigation of Bioturbation in Abyssal and Continental Margin Sedi-ments. (Under the direction of David J. DeMaster.)

Jianhua Qian, Marine, Earth And Atmospheric Sciences  
Nanton, People's Republic Of China

Dissertation: Development of an Adiabatic Global Nonhydrostatic Semi-implicit Semi-Lagrangian Atmospheric Model. (Under the direction of Fredrick H. M. Semazzi.)

Rosemary Lemmond Ritzman, Sociology  
Raleigh, North Carolina

Dissertation: Critical Work Characteristics and Well-being: Contemporary and Longitudinal Effects. (Under the direction of Donald Tomaskovic-Devey and L. Richard Della Fave.)

Vincent John Roscigno, Sociology  
Bronx, New York

Dissertation: Race, Place and the Reproduction of Educational Disadvantage: The Black-White Gap and Local Structures of Opportunity. (Under the direction of Donald Tomaskovic-Devey.)

Khalil Georges Saikali, Statistics  
Indianapolis, Indiana

Dissertation: Uniformly More Powerful Tests for Linear Inequalities. (Under the direction of Roger L. Berger.)

Lynae Emerson Sakshaug, Mathematics Education  
Statesville, North Carolina

Dissertation: Instrument Development for Assessment of Algebra I Teachers' Attitudes toward Algebra for All. (Under the direction of John R. Kolb.)

Lilly Whitaker Saulter, Psychology  
Garner, North Carolina

Dissertation: Teachers' Attitudes toward Multicultural Education. (Under the direction of William P. Erchul and Tracy L. Robinson.)



Peter William Schuhmann, Economics  
Holmdel, New Jersey

Dissertation: A Welfare Analysis of Commercial Fishery Harvest Restrictions: A Bioeconomic Model of Red Drum Stock Dynamics and Recreation Demand. (Under the direction of James E. Easley, Jr. and Walter N. Thurman.)

Laura Lynne Signor Smith, Materials Science And Engineering  
Ellicott City, Maryland

Dissertation: Ohmic Contact Formation in GaN-based Semiconductors. (Under the direction of Robert F. Davis.)

Douglas James Stephens, Physics  
Monmouth, Illinois

Dissertation: Reflectance Spectroscopy of Thin Transparent Films. (Under the direction of Gerald Lucovsky.)

Sharon Louise Stephenson, Physics  
Clinton, Mississippi

Dissertation: Parity Violation in  $^{232}\text{Th}$ : A Study of the 'Sign Effect.' (Under the direction of Gary E. Mitchell.)

Vernard Ray Thomas, Jr., Chemistry  
Greensboro, North Carolina

Dissertation: Photocatalytic and Excimer Laser Photolytic Studies of the Environmentally Hazardous Compound 4-chlorophenol. (Under the direction of Anton F. Schreiner.)

Gerard Ambrose Vavrina, Physics  
Media, Pennsylvania

Dissertation: Resonance Spectroscopy of the  $^{29}\text{Si}(p,\gamma)^{30}\text{P}$  Reaction. (Under the direction of Gary E. Mitchell and Eugene F. Moore.)

Ting-An Wang, Marine, Earth And Atmospheric Sciences  
Taipei, Taiwan, Republic Of China

Dissertation: Mechanisms of Wave Ducting and Severe Downslope Windstorms in a Structured Shear Flow. (Under the direction of Yuh-Lang Lin.)

George Merrill Woodall, Jr., Toxicology  
Fort Pierce, Florida

Dissertation: Effects of Dietary Casein Levels on the Activation and Metabolism of Promutagens by Rat Hepatic S9, Microsomes and Cytosol. (Under the direction of Patricia E. Levi.)

Russell Louis Wrobel, Botany  
Milwaukee, Wisconsin

Dissertation: Expression of Molecular Chaperones in Endoplasmic Reticulum of Maize Endosperm. (Under the direction of William F. Thompson and Rebecca S. Boston.)

Ling Xia, Biochemistry  
Shanghai, People's Republic Of China

Dissertation: Genomic Organization of U14 snoRNA Genes in *Xenopus laevis* and Essential Elements for Intronic U14 snoRNA Processing. (Under the direction of E. Stuart Maxwell.)

Jie Zhang, Statistics  
Shanghai, People's Republic Of China  
Dissertation: Inference for Correlated Categorical Data and Analysis of Interaction between Treatments and Patient Subsets. (Under the direction of Dennis D. Boos.)

*Degrees Conferred December 18, 1996*

Amzie Allen Adams, Physics  
Wilmington, North Carolina  
Dissertation: Analysis of Transition Strength Distributions in  $^{22}\text{Na}$  and  $^{26}\text{Al}$ . (Under the direction of Gary E. Mitchell and John F. Shriner, Jr.)

Michael Edward Adams, Marine, Earth And Atmospheric Sciences  
Milford, Connecticut  
Dissertation: Terrain-induced Midtropospheric Frontogenesis and Jet Streak Development during STORM- FEST IOP-17, 8 & 9 March 1992. (Under the direction of Steven Businger and Gerald F. Watson.)

David William Aho, Soil Science  
Bassett, Virginia  
Dissertation: Nitrogen Transformations and Loss in Pastures Receiving Swine Lagoon Liquid. (Under the direction of Larry D. King and Robert L. Mikkelsen.)

Dev Alok, Electrical Engineering  
New Delhi, India  
Dissertation: Silicon Carbide Device Fabrication Based on Amorphization Using Ion Implantation. (Under the direction of B. Jayant Baliga.)

Nabil Mohamed Abdel-Wahab Anwar, Biological And Agricultural Engineering  
Cairo, Egypt  
Dissertation: TFMOD: A Transfer Function Model for the Transport of Reactive Solute Species in Unsaturated Soils. (Under the direction of R. Wayne Skaggs and Gregory D. Jennings.)

Gary Adair Aurand, Chemical Engineering  
Chapman, Nebraska  
Dissertation: Deposition of  $\text{SiO}_2$  and  $\text{GeO}_2$  Films by Rapid Expansion from Supercritical Solution (RESS). (Under the direction of H. Henry Lamb and David F. Ollis.)

Metin Aydemir, Computer Engineering  
Ankara, Turkey  
Dissertation: Virtual Path Assignment in ATM Networks. (Under the direction of Ioannis Viniotis.)

Sven Oliver Bader, Nuclear Engineering  
Zofingen, Switzerland  
Dissertation: Investigation of Condensation and Evaporation Rates for High Temperature Liquid Metal Heat Pipes for Space Reactor Applications. (Under the direction of J. Michael Doster.)

Yong Bai, Civil Engineering  
Shanghai, People's Republic Of China  
Dissertation: Planning and Control Model for Robotic Bridge Painting. (Under the direction of Leonhard E. Bernold and John W. Baugh, Jr.)

Keith Richard Baldwin, Soil Science  
Sacramento, California  
Dissertation: Effects of Compost Amendments on Nutrient Availability, Chemical Properties and Bulk Density of a Dyke Soil. (Under the direction of Gordon S. Miner and Brian W. Sheldon.)

Charles R. Bartlett, Entomology  
Essex Junction, Vermont  
Dissertation: Revision of the New World Delphacid Planthopper Genus *Pissonotus* Van Duzee, 1897 (Homoptera: Auchenorrhyncha). (Under the direction of Lewis L. Deitz.)

Diane Lynn Beaudoin, Chemical Engineering  
Austin, Texas  
Dissertation: Mobilization of a Broad Host Range Plasmid in Suspension and in Biofilms. (Under the direction of Steven W. Peretti and David F. Ollis.)

Michel André Beck, Soil Science  
Basel, Switzerland  
Dissertation: Phosphorus Sorption and Desorption Characteristics by a Soil Column Technique. (Under the direction of Stanley W. Buol.)

Diane Keiser Beeman, Zoology  
Rochester, New York  
Dissertation: The Hepatic Cytochrome P450-associated Monooxygenase Activities of Wood Ducks (*Aix sponsa*) as Biomarkers of PCDD/PCDF Exposure: A Laboratory and Field Study. (Under the direction of W. James Fleming and Phillip D. Doerr.)

Jerry Lamont Bettis, Sr., Forestry  
Malcolm, Alabama  
Dissertation: The Ecological Changes in a Pocosin Site Following Intensive Site Preparation and Plantation Management, Contrasted to the Ecological Conditions of a Natural Unaltered Pocosin: A Soil, Vegetation and Planted Pine Volume Analysis. (Under the direction of Robert C. Kellison and Arthur W. Cooper.)

Dorwin Clay Black III, Nuclear Engineering  
Raleigh, North Carolina  
Dissertation: Direct Magnetic Field Measurement of Flow Dynamics and Micro-turbulence Enhanced Electron Collisionality in Magnetized Coaxial Accelerator Channels. (Under the direction of Robert M. Mayo and John G. Gilligan.)

Martha Farmer Bragg, Mathematics Education  
Eden, North Carolina  
Dissertation: The Effect of Transactional Writing on College Algebra Students' Achievement and Attitude. (Under the direction of William M. Waters, Jr.)

Frank Joseph Brauns, Aerospace Engineering  
Pleasant Garden, North Carolina  
Dissertation: A New Approach to Calculating Radiating Equilibrium Flows Applied to Blunt Reentry Vehicles. (Under the direction of Hassan A. Hassan.)

Liana Brentano, Veterinary Medical Sciences  
Concordia, Brazil  
Dissertation: The Reovirus Protein  $\mu 2$  is an RNA-binding Protein. (Under the direction of Barbara Sherry.)

Philip David Brune, Plant Pathology  
Raleigh, North Carolina

Dissertation: Differences in Peanut (*Arachis hypogaea* L.) Root Growth Dynamics Which May Provide Field Resistance to *Cylindrocladium* Black Rot. (Under the direction of Marvin K. Beute.)

Jefferson Gail Bumgarner, Chemistry  
Garner, North Carolina

Dissertation: Characterization and Application of Pseudostationary Phases in Micellar Electrokinetic Chromatography (MEKC). (Under the direction of Morteza G. Khaledi.)

Alp Caner, Civil Engineering  
Ankara, Turkey

Dissertation: Analysis and Design of Jointless Bridge Decks Supported by Simple-Span Girders. (Under the direction of Paul Z. Zia.)

Li Ang Chen, Chemical Engineering  
Sao Paulo, S.P., Brazil

Dissertation: Recovery of Proteins and Other Biological Compounds from Model and Actual Systems Using Fibrous Materials. (Under the direction of Ruben G. Carbonell.)

Maurice Kent Crawford, Zoology  
Pittsfield, Massachusetts

Dissertation: Habitat Heterogeneity in Seagrass Meadows: Effects on Estuarine Fish Populations. (Under the direction of Larry B. Crowder and James F. Gilliam.)

Mita Das, Marine, Earth And Atmospheric Sciences  
Vizag, India

Dissertation: Trends, Photochemistry and Analysis of Volatile Organic Compounds in the Lower Troposphere of the Southeast United States. (Under the direction of Viney P. Aneja.)

John William Dawson, Jr., Economics  
LaGrange, North Carolina

Dissertation: Essays on Government and Economic Growth. (Under the direction of John J. Seater and Douglas K. Pearce.)

Viswanath Devanarayan, Statistics  
Madras, India

Dissertation: Simulation Extrapolation Methods for Heteroscedastic Measurement Error Models with Replicate Measurements. (Under the direction of Leonard A. Stefanski.)

Ke Dong, Plant Pathology  
Shenyang, People's Republic Of China

Dissertation: Genetics and Molecular Aspects of *Heterodera glycines*-Soybean Interactions. (Under the direction of Kenneth R. Barker and Charles H. Opperman.)

Patricia Douville-Ricker, Curriculum And Instruction  
New Bern, North Carolina

Dissertation: Bringing Text to Life: The Effects of Instruction in a Multi-sensory Imagery Strategy on Fifth-graders Prose Processing and Attitude toward Reading. (Under the direction of Hiller A. Spires.)

Laura Cleveland Edwards, Fiber And Polymer Science

Alpine, Alabama

Dissertation: The Aquatic Toxicity and Mutagenicity of Azo and Formazan Dyes. (Under the direction of Harold S. Freeman.)

Curtis William Emenhiser, Food Science

New Haven, Indiana

Dissertation: Chromatographic Separation and Spectroscopic Identification of Geometrical Carotenoid Isomers and Their Analysis in Biological Tissues. (Under the direction of Steven J. Schwartz.)

Juan Andres Espinosa, Economics

Quito, Ecuador

Dissertation: Consistent General Equilibrium Measurement on the Net Benefits for Improving Environmental Quality: A Computable General Equilibrium Analysis of the European Community. (Under the direction of V. Kerry Smith and Raymond B. Palmquist.)

James Gregory Falls, Toxicology

West Monroe, Louisiana

Dissertation: Hormonally Regulated Expression of Flavin-containing Monooxygenases (FMO) Isozymes; Cloning, Sequencing and cDNA-expression in *E. coli* of a Murine Female-specific Liver Form, FMO3. (Under the direction of Ernest Hodgson.)

Shenfu Fan, Civil Engineering

Jiangxi, People's Republic Of China

Dissertation: Effect of Deleterious ASR Expansion on the Structural Behavior of Reinforced Concrete Elements. (Under the direction of John M. Hanson.)

Gaylene Marie Fasenko, Physiology

Edmonton, Alberta, Canada

Dissertation: Factors Influencing Embryo and Poults Viability and Growth during Long Term Storage of Turkey Eggs. (Under the direction of Vern L. Christensen.)

Liana Faith Fryer, Fiber And Polymer Science

Granite Bay, California

Dissertation: Cotton Fiber Property Measurement, Variability and Significance. (Under the direction of Jon P. Rust.)

Chung-Hong Fu, Forestry

Louisville, Kentucky

Dissertation: Measuring Economic Welfare Effects of Supply Shifts in the Southern Softwood Stumpage Market: With Application to Climate Change Impact Analyses in the Forest Sector. (Under the direction of J. Edward deSteiguer.)

Lisa Dare Grant, Psychology

Atlanta, Georgia

Dissertation: A Comprehensive Examination of the Latent Structure of Job Performance. (Under the direction of Mark A. Wilson.)

Roger Robert Grenier, Jr., Civil Engineering

Raleigh, North Carolina

Dissertation: The Influence of Turbulence Closure Strategy on Numerical Models of Shallow Water Systems. (Under the direction of John S. Fisher.)



Maha Attia Hana, Biological And Agricultural Engineering  
Cairo, Egypt

Dissertation: Qualitative and Quantitative Near Infrared Analysis Using Artificial Neural Networks. (Under the direction of W. Fred McClure.)

David Bryan Hash, Aerospace Engineering  
Boone, North Carolina

Dissertation: A Hybrid Direct Simulation Monte Carlo/Navier-Stokes Flow Solver. (Under the direction of Hassan A. Hassan.)

Christopher Charles Hobbs, Electrical Engineering  
Lexington, Kentucky

Dissertation: Integrating Selective Silicon Epitaxy with Thin Sidewall Spacers for Submicron Elevated Source/Drain MOSFETs. (Under the direction of Jimmie J. Wortman.)

Brian Ray Hollis, Aerospace Engineering  
Dubois, Pennsylvania

Dissertation: Experimental and Computational Aerothermodynamics of a Mars Entry Vehicle. (Under the direction of John N. Perkins and Fred R. DeJarnette.)

Michael Eric Hood, Plant Pathology  
Virginia Beach, Virginia

Dissertation: Investigations into the Ecology and Pathology of *Thielaviopsis basicola*. (Under the direction of H. David Shew.)

Christopher Raymond Houck, Industrial Engineering  
Lewisburg, Pennsylvania

Dissertation: Meta-heuristics for Manufacturing Problems. (Under the direction of Michael G. Kay and Russell E. King.)

Hong-yeen Hsieh, Computer Engineering  
Kaohsiung, Taiwan, Republic Of China

Dissertation: Clocking Optimization and Distribution in Digital Systems with Scheduled Skews. (Under the direction of Wentai Liu and Ralph K. Cavin III.)

Lap Thiet Huynh, Computer Engineering  
Raleigh, North Carolina

Dissertation: Adaptive Rate-based Congestion Control and Proportional Bandwidth Allocation for High-speed Networks. (Under the direction of Arne A. J. Nilsson and Wushow Chou.)

Maria de Los A. Irizarry, Industrial Engineering  
Mayaguez, Puerto Rico

Dissertation: Simulation-based Methodology for the Design of World-class Manufacturing Cells. (Under the direction of James R. Wilson and Jaime Trevino.)

Keith Jehan Jayawickrama, Forestry  
Kurunegala, Sri Lanka

Dissertation: Date of Earlywood-Latewood Transition in Provenances and Families of Loblolly Pine and Its Relationship to Growth Phenology and Juvenile Wood Specific Gravity. (Under the direction of Steven E. McKeand and Jackson B. Jett, Jr.)

Jeffrey Allen Joines, Industrial Engineering  
Winston-Salem, North Carolina

Dissertation: Hybrid Genetic Search for Manufacturing Cell Design. (Under the direction of Russell E. King and Michael G. Kay.)

Holly Lynn Jordan, Veterinary Medical Sciences  
Lawrence, Kansas

Dissertation: Detection of Feline Immunodeficiency Virus in Semen and Transmission by Artificial Insemination. (Under the direction of Wayne A. F. Tompkins.)

Jin-Ku Kang, Computer Engineering  
Jin-ju, South Korea

Dissertation: CMOS High Speed Data Recovery Circuit Design Using Matched Delay Sampling Technique. (Under the direction of Wentai Liu.)

Lisa Ann Kelly, Botany  
Fayetteville, North Carolina

Dissertation: Short-term Effects of Longleaf Pine Straw Raking on Plant Diversity and Community Dynamics in Croatan National Forest, North Carolina. (Under the direction of Thomas R. Wentworth.)

Hongseog Kim, Electrical Engineering  
Seoul, South Korea

Dissertation: Trapping and Detrapping of Electrons in Oxide Defects at Room and Reduced Temperatures. (Under the direction of Arnold Reisman.)

Tae-Won Kim, Toxicology  
Seoul, South Korea

Dissertation: Mirex Promotes a Unique Population of Epidermal Cells That Cannot Be Distinguished by Their Mutant *Ha-ras* Genotype. (Under the direction of Robert C. Smart.)

Hyun-Jin Koo, Fiber And Polymer Science  
Seoul, South Korea

Dissertation: Variance Tolerancing and Decomposition in Textile Products and Processes. (Under the direction of Moon W. Suh.)

Havish Koorapaty, Computer Engineering  
Madras, India

Dissertation: Structural Analysis of and Decoding Algorithms for Convolutional Codes. (Under the direction of Mladen A. V. Vouk and Donald L. Bitzer.)

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Madras, India

Dissertation: Pulping and Bleaching Studies on Kraft and Extended Delignified Kraft Pulps. (Under the direction of Hou-min Chang and Hasan Jameel.)

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Charlotte, North Carolina

Dissertation: Denitrification of Groundwater Using Immobilized Cell Technology. (Under the direction of Jy S. Wu and Allen C. Chao.)

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Seoul, South Korea

Dissertation: Uniaxial Constitutive Modeling of Asphalt Concrete Using Viscoelasticity and Continuum Damage Theory. (Under the direction of Y. Richard Kim.)

Psychii Lee, Biochemistry

Taipei, Taiwan, Republic Of China

Dissertation: Lipase Immobilization by Biospecific Adsorption. (Under the direction of Harold E. Swaisgood.)

Yi-Ju Li, Statistics

Taichung, Taiwan, Republic Of China

Dissertation: Characterizing the Structure of Genetic Population. (Under the direction of Bruce S. Weir.)

Shuzhi Zhang Lo, Operations Research

Jinan, People's Republic Of China

Dissertation: ATM Network Topological Design and Network Modification. (Under the direction of Salah E. Elmaghraby and Griff L. Bilbro.)

Lisa Yates Lowie, Physics

Raleigh, North Carolina

Dissertation: Parity Nonconservation in Neutron Resonances in Mass  $\approx 100$  Nuclei. (Under the direction of Gary E. Mitchell.)

Douglas John MacNair, Economics

Durham, North Carolina

Dissertation: A Discrete Choice Analysis of Forest Service Decision Making and the Value of Forest Eco-systems. (Under the direction of Raymond B. Palmquist and Barry K. Goodwin.)

James Michael Malone, Civil Engineering

York, Pennsylvania

Dissertation: Chemical Leaching and Transport Modeling of Organic Reagents Used in Sodium Silicate Grouts. (Under the direction of Roy H. Borden and Morton A. Barlaz.)

Prabhu Manyem, Operations Research

Devakottai, India

Dissertation: Routing Problems in Multicast Networks. (Under the direction of Matthias F. M. Stallmann.)

Michael Shawn McCutchen, Chemical Engineering

Martin, Tennessee

Dissertation: Synthesis of Alcohols from Carbon Monoxide and Hydrogen in a Slurry Reactor. (Under the direction of George W. Roberts.)

Joseph Douglas McLean, Chemical Engineering

Mansfield, Arkansas

Dissertation: Basic Principles and Control of Refinery Emulsions through Crude Solvency and Resin- Asphaltene Interactions. (Under the direction of Peter K. Kilpatrick.)

Ashok Kumar Mishra, Economics

Winston-Salem, North Carolina

Dissertation: Farm Income Variability and Off-farm Labor Supply of Farm Operators and Their Spouses. (Under the direction of Barry K. Goodwin.)

Brian Randolph Moore, Nuclear Engineering

Marietta, Georgia

Dissertation: Higher Order Generalized Perturbation Theory for BWR In-core Nuclear Fuel Management Optimization. (Under the direction of Paul J. Turinsky.)

Jane Elizabeth Morgan, Statistics

Tuscaloosa, Alabama

Dissertation: Methods for Testing Variance Parameters Equal to Zero in a Random Coefficient Regression Model. (Under the direction of Sastry G. Pantula and Marcia L. Gumpertz.)

Gary Christopher Moyer, Computer Engineering

Virginia Beach, Virginia

Dissertation: The Vernier Techniques for Precise Delay Generation and Other Applications. (Under the direction of Wentai Liu.)

Lynne Wilson Myers, Psychology

Raleigh, North Carolina

Dissertation: Conjoint Behavioral Consultation as an Intervention for Young Children with Disruptive Behaviors. (Under the direction of Mary E. Haskett and William P. Erchul.)

Todd William Nuteson, Electrical Engineering

Fairborn, Ohio

Dissertation: Electromagnetic Modeling of Quasi-optical Power Combiners. (Under the direction of Michael B. Steer.)

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Taipei, Taiwan, Republic Of China

Dissertation: Performance Evaluation of the North Carolina Information Highway. (Under the direction of Arne A. J. Nilsson.)

David Michael Owens, Toxicology

Augusta, Georgia

Dissertation: Genetic Alterations Cooperate with *ras* to Influence Premalignant Progression in Skin. (Under the direction of Robert C. Smart.)

Gerardo Pacheco-López, Forestry

Texcoco, Mexico

Dissertation: Empirical Modeling of Timber Supply in the U. S. South. (Under the direction of Robert C. Abt.)

Susan Elizabeth Piscopo, Physiology

Belmont, Massachusetts

Dissertation: Effects of Albendazole Sulfoxide on Preimplantation Embryonic Development. (Under the direction of Ida W. Smoak and Warren J. Croom, Jr.)

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Ranchi, India

Dissertation: Enhancement Strategies for Multistage Interconnection Networks. (Under the direction of Dharma P. Agrawal.)

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Apex, North Carolina

Dissertation: Development of a Quantitative Process Model for Object-oriented Software Development. (Under the direction of Mladen A. V. Vouk.)

Jammie Lynn Price, Sociology

Winterville, North Carolina

Dissertation: Navigating Differences: Friendships Between Gay Men and Straight Men. (Under the direction of Michael L. Schwalbe and Barbara J. Risman.)

Eric Morris Queen, Aerospace Engineering

Charlotte, North Carolina

Dissertation: Optimal Control of Linear Systems with Dissimilar Actuators. (Under the direction of Lawrence M. Silverberg.)

Darren Kevin Robinson, Horticultural Science

Falmouth, Nova Scotia, Canada

Dissertation: Potato (*Solanum tuberosum*) and Weed Response to Rimsulfuron and Mechanism for Differential Resistance to Rimsulfuron. (Under the direction of Thomas J. Monaco and David W. Monks.)

Daniel Sheldon Root, Toxicology

Greenfield, Massachusetts

Dissertation: Studies of the Toxicity, Mode of Action and Physical Degradation of the Insect Growth Regulator Cyromazine. (Under the direction of Patricia E. Levi.)

Doug-Young Ryu, Toxicology

Seoul, South Korea

Dissertation: Regulation of Cytochrome P450 Monooxygenase Isozymes CYP1A1, CYP1A2 and CYP1B1 by Piperonyl Butoxide and Acenaphthylene. (Under the direction of Ernest Hodgson and Patricia E. Levi.)

Hussein Farouk Salama, Computer Engineering

Cairo, Egypt

Dissertation: Multicast Routing for Real-time Communication of High-speed Networks. (Under the direction of Ioannis Viniotis and Douglas S. Reeves.)

Satish Sankaran, Civil Engineering

Madras, India

Dissertation: A Calibrated Mechanistic Design Procedure for Flexible Pavements. (Under the direction of Narendra P. Khosla.)

Kurt Anthony Schwabe, Economics

Shoreview, Minnesota

Dissertation: Source Heterogeneity, Resource Characteristics and the Performance of Marketable Permits. (Under the direction of James E. Easley Jr. and V. Kerry Smith.)

Gaurav Sharma, Electrical Engineering

Ghaziabad, India

Dissertation: Color Scanner Characterization, Performance Evaluation and Design. (Under the direction of H. Joel Trussell.)

Supriya Sandeep Sharma, Computer Engineering

Nagpur, India

Dissertation: Optimal Buffer Management for Shared Buffer ATM Switches. (Under the direction of George N. Rouskas and Ioannis Viniotis.)



- Hsin-Chin Shen, Chemical Engineering  
 Yangmei, Taiwan, Republic Of China  
 Dissertation: Chain Dynamics and Phase Structure in High Barrier and Membrane Polymers as Probed by Solid State NMR. (Under the direction of Benny D. Freeman.)
- Diana Cecilia Silva Ledezma, Industrial Engineering  
 Monterrey, Mexico  
 Dissertation: An Approach to Tolerances for the Concurrent Design of Products and Manufacturing and Assembly Processes. (Under the direction of Thom J. Hodgson and Carl F. Zorowski.)
- Seetharaman Sridhar, Electrical Engineering  
 Madras, India  
 Dissertation: SIMOX Based Power Devices. (Under the direction of B. Jayant Baliga.)
- Robert James Stanley II, Mechanical Engineering  
 Cary, North Carolina  
 Dissertation: Parabolic-cylinder and Full-paraboloid Reconfigurable Electrostatic Antennas Possessing Pointing and Beam-width Control. (Under the direction of Lawrence M. Silverberg.)
- Cheng Su, Statistics  
 Xiamen City, People's Republic Of China  
 Dissertation: Random Coefficient Models for Degradation and Spatially Correlated Count Data. (Under the direction of Jacqueline M. Hughes-Oliver and Jye-Chyi Lu.)
- Jan Christian Svensson, Forestry  
 Stenungsund, Sweden  
 Dissertation: Genetic Differences in Carbon Dioxide Assimilation, Nutrition and Biomass Production in a 10-year-old Loblolly Pine (*Pinus taeda* L.) Plantation. (Under the direction of H. Lee Allen, Jr. and Steven E. McKeand.)
- Brahmanandam Venkata Tanikella, Materials Science And Engineering  
 Rajahmundry, India  
 Dissertation: Controlled Microcutting Tests on Glassy Materials and Single Crystal Silicon. (Under the direction of Ronald O. Scattergood.)
- Michelle White Trawick, Economics  
 Auburn, Kentucky  
 Dissertation: Corporate Behavior and Labor Costs: Wages and Pension Benefits. (Under the direction of Robert L. Clark and Lee A. Craig.)
- Ronald Lynn Underwood, Mechanical Engineering  
 Raleigh, North Carolina  
 Dissertation: Re-examination of Acoustic Horn Theory by the Boundary Element Method and by Experiment. (Under the direction of Thomas H. Hodgson.)
- Natarajan Vaidhyanathan, Computer Science  
 Madras, India  
 Dissertation: Degrees of Delay: Semantic Theories for Priority, Efficiency, Fairness and Predictability in Process Algebras. (Under the direction of Walter Rance Cleaveland II.)

David Alejandro Velasco Gallegos, Industrial Engineering  
Monterrey, N. L., Mexico

Dissertation: Computer Aided Design of Warehouses. (Under the direction of Michael G. Kay and Jaime Trevino.)

Manoj G. Vellaikal, Materials Science And Engineering  
Bombay, India

Dissertation: Processing and Characterization of Ferroelectric and Electrode Materials for Non-volatile and Dynamic Random Access Memories. (Under the direction of Angus I. Kingon.)

Margarita Roxana Villagarca Ortega, Horticultural Science  
Lima, Peru

Dissertation: Analysis of Sweetpotato Growth under Differing Rates of Nitrogen Fertilization. (Under the direction of Wanda W. Collins.)

Tara Joan Walsh, Physiology  
Southern Pines, North Carolina

Dissertation: The Effects of Nutrition and Feed Programs on Reproductive Performance and Fertility of Broiler Breeders. (Under the direction of John T. Brake.)

Jianhua Wang, Applied Mathematics  
Chengdu, Sichuan, People's Republic Of China

Dissertation: Monotone Iterative Method for Diffusion Equations with Nonlinear Diffusion Coefficients. (Under the direction of Chia-Ven Pao.)

Shuyu Wang, Wood And Paper Science  
Shandong, People's Republic Of China

Dissertation: Delignification and Bleaching with Peracids. (Under the direction of Hou-min Chang and Hasan Jameel.)

Xiaogang Wang, Electrical Engineering  
Hangzhou, People's Republic Of China

Dissertation: An Interpolation Method for Two Dimensional Imaging Using a Map Model. (Under the direction of Griff L. Bilbro and Wesley E. Snyder.)

Kevin Dale Wells, Genetics  
Morristown, Tennessee

Dissertation: Toward Modification of Digestion Via Gene Transfer: Attempts to Use a Cellulase Gene from *Clostridium thermocellum*, *celD*. (Under the direction of Robert M. Petters.)

Anne-Marie Witkege, Education Research And Policy Analysis  
Raleigh, North Carolina

Dissertation: Seeing Themselves: A Qualitative Study of African-American Middle School Females and Body Image. (Under the direction of Robert C. Serow.)

Hsin-Yu Wu, Electrical Engineering  
Tauyuan, Taiwan, Republic Of China

Dissertation: Multiuser Detection and Channel Estimation for Flat Rayleigh Fading Code Division Multiple Access Channels. (Under the direction of Alexandra Duel-Hallen and Winsor E. Alexander.)

Michael Keith Wyatt, Toxicology

Arlington, Virginia

Dissertation: Gene Analysis and Structure/Function Studies of Flavin-containing Monooxygenases (FMO1 and FMO2) from Rabbit and Pig. (Under the direction of Ernest Hodgson and Richard M. Philpot.)

Naiyue Zhou, Fiber And Polymer Science

Jiangsu, People's Republic Of China

Dissertation: On-line Measurement of Fabric Bending Behavior. (Under the direction of Tushar K. Ghosh.)

Yimin Zhu, Civil Engineering

Beijing, People's Republic Of China

Dissertation: Improved Finite Element Analysis for Piping Components Involving Ratcheting. (Under the direction of Vernon C. Matzen and Tasnim Hassan.)

# **1996 GRADUATION ACKNOWLEDGEMENTS**

The following non-University organizations have contributed significantly to the success of our graduation exercises.

## **Sound Systems:**

**Mr. Wade C. Miller, Jr., Owner  
Sound Engineering, Greensboro, NC**

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**Johnson-Paschal Floral Co., Inc.  
Raleigh, NC**







# Agricultural Institute

*College of Agriculture  
and Life Sciences*



*Jane S. McKimmon Center  
North Carolina State University  
December 18, 1996*



# AGRICULTURAL INSTITUTE GRADUATION EXERCISES

*December 18, 1996*

## COLLEGE OF AGRICULTURE AND LIFE SCIENCES

### NORTH CAROLINA STATE UNIVERSITY

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**Durward F. Bateman, Dean**

Presiding

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Pastor, Zebulon Baptist Church  
Zebulon, North Carolina

ADDRESS ..... Mr. Robert A. Caldwell  
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AWARDING OF DIPLOMAS ..... Durward F. Bateman, Dean  
  
Jeffrey D. Armstrong  
Assistant Director of Academic Programs and  
Director of the Agricultural Institute

CONFERRING OF DEGREES ..... Larry K. Monteith  
Chancellor  
North Carolina State University

MOVING OF THE TASSELS ..... Andrew Christian Rasberry  
Class Valedictorian

REMARKS ..... Larry K. Monteith

STUDENT COMMENCEMENT SPEAKER .... Forrest Spencer Jones

RECOGNITION OF MARSHALS ..... Durward F. Bateman

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\*RECESSIONAL

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\*Please Stand.

# PROSPECTIVE GRADUATES AGRICULTURAL INSTITUTE

*December 18, 1996*

## ASSOCIATE IN APPLIED SCIENCE IN AGRIBUSINESS MANAGEMENT

H †	William Timothy Clarke . . . . .	Wakefield, VA
	Robert Davidson Craig . . . . .	Swannanoa
	Kimberly Anne Edwards . . . . .	Creswell
†	James Lee Herman . . . . .	Taylorville
†	Donathan Morton Jernigan . . . . .	Dunn
†	Forrest Spencer Jones . . . . .	Benson
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**ASSOCIATE IN APPLIED SCIENCE  
IN LIVESTOCK MANAGEMENT AND  
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OPTION**

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H ‡	†	George Pearson Chrismon, Jr.	Bath
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	†	Robert Lee Smith, III	Garner
		Eric Thomas Stephens	Apex
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## Academic Honors

Students with a grade point average of 3.00-3.49 graduate with **Honors**

Students with a grade point average of 3.50-4.00 graduate with **High Honors**.

† **Co-major**

‡ **Agribusiness Concentration**

**H Honors**

**HH High Honors**

**\*\* Valedictorian**

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## **Marshals**

*Members of Delta Tau Alpha, Honorary Society*

Deanna Matthews

Michael Stern

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# Academic Costume

Academic gowns represent a tradition handed down from the universities of the Middle Ages. These institutions were founded by the Church; the students, being clerics, were obliged to wear the prescribed gowns at all times. Round caps later became square mortarboards; the hoods, originally cowls attached to the gowns, could be slipped over the head for warmth.

Many European universities have distinctive caps and gowns which are different from those commonly used in this country. Some of the gowns are of bright colors and some are embellished with fur. A number of these may be noted in the procession.

The usual color for academic gowns in the United States is black. The bachelor's gown is worn closed, the master's and doctor's may be worn open or closed. The shape of the sleeve is the distinguishing mark of the gown: bachelor--long pointed sleeves; master--oblong, square cut in the back with an arc away in front; doctor--bell shaped.

Caps are black. The tassels for the Ph.D. degree are gold and those for other graduate and professional degrees may be of the color corresponding to the trimmings on the hoods. The color of the tassels for bachelor's degrees indicates the curriculum of the graduate: Agriculture, maize; Design, brown; Education, light blue; Engineering, orange; Forest Resource, russet; Liberal Arts, white; Physical and Mathematical Sciences, yellow; Textiles, wine red.

Of all the components of the academic costume, the hood bears the heaviest symbolic burden. The hood must make clear the level of the degree, the faculty in which it was given, and the institution which awarded it. The level of the degree is shown by the size of the hood, the width of the velvet trimmings, and in the case of doctors, by the shape. The bachelor's, master's, and doctor's hoods are three feet, three and one-half feet, and four feet long respectively. The velvet trimming in the same order is two, three, and five inches and extends all around the hood on the exposed edge. This same trimming identifies the faculty. A partial list of the colors follows: Agriculture, maize; Architecture and Art, brown; Science, golden yellow; Economics, copper; Education, light blue; Engineering, orange; Forestry, russet; Physical Education, sage green; Religion, scarlet; Speech, silver gray; Veterinary Medicine, gray; Textiles, wine red. The following faculties have the same color--dark blue: Anthropology, History, Languages, Literature, Philosophy, Political Science, Sociology.















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