

NC State Graduate Catalog

The Graduate Catalog contains Graduate School requirements and pertinent information for individual graduate programs, a current list of graduate faculty, and a selection of other resources for new students. The Catalog is informational only and is subject to change. Official policies and procedures are in the [Graduate School Administrative Handbook](#) and on the [NC State Policies, Rules and Regulations](#) website.

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This catalog is intended for informational purposes only, and it is subject to change.
Please see the online Administrative Handbook at <http://www.ncsu.edu/grad/handbook/> for changes in policies, rules, regulations, and procedures.

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North Carolina State University

[North Carolina State University](#) (NC State) is a national center for research, teaching and extension, and its graduate education has stood for quality for more than a century. 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.

NC State is one of 16 constituent institutions of the multi-campus [University of North Carolina system](#). 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."

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

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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, natural resources, humanities and social sciences, management, physical and mathematical sciences, textiles and veterinary medicine.

[The Graduate School](#) is currently composed of more than 2,500 graduate faculty members. Educated at major universities throughout the world and established both in advanced teaching and research, these scholars guide the University's more than 7,000 master's and doctoral students from all areas of the U.S. 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 institution.

Application and Admissions

The criteria used for admissions decisions vary according to programs and schools/colleges, reflect an evaluation of the applicant's potential for graduate work, and consider the ability of a program to accommodate additional students. Commonly, departmental admissions committees consider requests for admission and forward their recommendations to the Graduate School. However, Graduate School regulations govern the criteria for the classification of graduate student status.

Application

All applicants must submit the online [NC State University Graduate School Application Form](#). Application is made for a specific degree program and date of enrollment (see [Admissions](#)).

Applications for admission require the following:

- Non-refundable application processing fee of \$65.00 (US) for U.S. citizens and Permanent Residents or \$75.00 (US) for Non-Resident Aliens (Internationals);
- One unofficial transcript from all colleges and universities previously attended; (**NOTE:** Applicants currently attending, or who have previously attended NC State, are not required to provide an NC State transcript.)
- Three recommendations from people who know the prospective student's academic record and potential for graduate study;
- On-line North Carolina Residency Form if claiming NC residence for tuition purposes;
- A list of courses in progress if enrolled as a Post-Baccalaureate Studies (PBS) student at NC State;
- GRE or other standardized test scores, statements of purpose, portfolios or other work samples, depending on requirements of particular program; and
- TOEFL scores, where applicable

English Proficiency Requirements for International Students

In order to be eligible for admission to the Graduate School all non-U.S. citizen applicants (i.e., non-resident aliens and permanent residents) must demonstrate proficiency in English at a level necessary to be successful in a graduate program at NC State. This requirement can be met for most applicants in one of the following ways; however, some programs may require additional evidence of English proficiency:

1. Provide [Test of English as a Foreign Language](#) (TOEFL) with a total score of **at least 80** on the Internet-based Test (iBT). Minimum test scores for each section:

Listening	18 points
Reading	18 points
Writing	18 points
Speaking	18 points for admission to the Graduate School
	23 points for TA appointment where TA has direct verbal interactions with students
	26 pints for TA appointment where TA presents lectures in the class or laboratory

2. The maximum total score for the iBT is 120 with each section worth 30 points.
3. Provide [International English Language Testing System](#) (IELTS) scores with an overall band score of **at least 6.5**. Minimum test scores for each section are listed below:

Listening	6.5
Reading	6.5
Writing	6.5
Speaking	6.5 for admission to the Graduate School
	7.0 for TA appointment

4. be a citizen of a [country where English is an official language](#) and the language of instruction in higher education; or
5. have successfully completed at least one year of full-time study in a degree program at a four-year US College or university.
6. TOEFL or IELTS test date must be **no older** than two years (24 months) prior to the beginning of the requested entry term.

NOTE: The current computer- and paper-based versions of the TOEFL test will be given until the iBT version is implemented in a particular location. Computer-based TOEFL scores must be 213 or higher (with at least 17 on three sections and no section score below 13). The paper-based test requires a score of 550 or higher (with scores of 50 on at least two of the three sections and no section score below 45).

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 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 program admissions committees that forward the program 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 program 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" or register in the "Post-Baccalaureate Studies" program through the [Division of Lifelong Education](#).

Immunization and Medical History

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 initial registration. This report must document immunization against tetanus/diphtheria, measles, German measles, polio, and for international students, show results of a tuberculin skin test. Graduate students who have recently completed their undergraduate work at NC State must update their medical history. [Student Health Services](#) must receive the required reports at least 30 days before registration. If the student does not meet this requirement, dismissal from school is mandatory under the law.

Transcript Requirements

The University requires that official copies of transcripts of all prior course work be on file in the student's permanent record at NC State. Students are required to provide the Graduate School with official copies of their latest transcript(s) from all universities attended (official translation required for non-English transcripts), including statements of all degrees awarded, no later than the last day of classes of the first semester they are enrolled.

Admission to Degree Programs

Full Graduate Status

To be considered for admission in full graduate standing, an applicant must have a Bachelor's degree from an accredited college or university as determined by a regional or general accrediting agency and must have at least a "B" (3.000/4.000) average in the undergraduate major or in the latest graduate degree program.

Exceptions on standard accreditation may be granted for applications with international degrees, including applicants with three-year degrees from institutions in Europe participating in the [Bologna Process](#).

Provisional Status

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 can attain full graduate standing after completion of nine or more graduate credit hours with a minimum GPA of 3.00. Courses taken for S/U grade cannot be used as part of the minimum.

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. Applicants with bachelor's degrees from non-accredited institutions may be granted provisional admission when their academic records warrant this status.

Full graduate standing is granted when the deficiencies responsible for the provisional status are corrected through additional course work (without graduate credit), provided the student has maintained a satisfactory academic record (3.000 GPA) 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.

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

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 12 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.

Admission for International Students

International graduate students are admitted to either full-time study in a specific graduate program or into the Graduate-Unclassified category as an international visitor. In addition to admission requirements listed elsewhere for graduate admission, applicants who are not U.S. citizens must complete and submit a Visa Clearance Form and/or a Certificate of Financial Responsibility before a final admission decision can be made. Criteria for international visitors are as follows:

1. International student visitors must state their educational objectives at NC State and the time expected to accomplish those objectives (normally one semester or one academic year). 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 research only, they are not required to take the TOEFL.
4. They must be recommended by the DGP of the program in which they plan to take courses or do research. Special admission status may apply for a period not to exceed one year.
5. They may hold a research assistantship but may not hold a teaching assistantship (provided their nonimmigrant status allows on-campus employment).
6. They will not be eligible for the Graduate Student Support Plan.
7. Those in F-1 or J-1 status must maintain full-time enrollment and all other requirements based on their particular nonimmigrant status.

Post-Baccalaureate Studies (PBS)

The [Post-Baccalaureate Studies](#) (PBS) classification is designed for U. S. citizens or permanent residents who wish to undertake academic work beyond the Bachelor's 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 PBS classification. The following rules apply to students who wish to register for PBS.

Please note that the following are university minimum requirements. Some departments may have more restrictive requirements.

1. All must have Bachelor's degrees from accredited institutions of higher education. Registration is through the Division of Continuing Studies.
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 appear on the student's transcript.
3. If the student is admitted as a graduate student, a maximum of 12 hours may apply toward the minimum university requirement of the master's degree (i.e., 30 credit hours) for which the student is enrolled, including hours approved for graduate credit while classified as a senior or unclassified graduate. The first 12 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 12 hours is made by the student's advisory committee and approved by the Graduate Dean. A maximum of 12 credit hours taken while in PBS status may be transferred into a doctoral degree program. If a student's graduate degree is terminated, he/she cannot use courses taken in PBS status after termination for credit toward the same graduate degree program.
4. 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 400-800 level. However, no course taken six (6) years prior to graduation from a program can be used to meet the requirements for a later graduate degree at NC State.
5. 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.
6. The PBS classification carries with it no implication that the student will be admitted to the Graduate School in any degree classification.
7. 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.

8. PBS students are expected to familiarize themselves with Graduate School and departmental policies and to seek further advice or clarification as needed.

Distance Education

Distance learning offers you the opportunity to participate in a different learning environment by allowing students to have instruction off campus. Valuable learning time is gained by providing an educational environment that increases accessibility and flexibility for learners.

NC State's distance learning includes some Internet-based courses, but also offers study through the use of videotape, cable TV, interactive TV, satellite, and independent study programs. In addition, [Distance Education](#) courses require more writing than in a traditional classroom setting via electronic participation. On-line discussions and e-mail communications allow regular involvement by all students, not just a few.

Distance Education Programs

NC State offers credit courses on a vast number of subjects, with more than 100 individual distance education courses to choose from in the humanities, engineering, social sciences, textiles, physical sciences, and more.

Degree programs require admission to the university. Since each program sets its own admission requirements, students should contact the program of their interest for details. A full listing of programs is available on the Distance Education website.

Professional development courses are also available through Distance Education; all are for-credit offerings designed to meet the professional development needs of specific audiences. No admission to the university is required.

Other options include non-credit and continuing education programs such as short courses, computer training, or customized programs for businesses and other groups. No admission to the university is required to enroll in these programs.

Evening Degree Programs

Some graduate degree programs offer late afternoon and evening courses for students who are unable to attend classes during the day. These students may also have the option of earning their degree through [Distance Education](#). For further information about these programs, students should contact the specific department.

Alternative Teacher Education Programs

[Alternative teacher education programs](#) are for people with a desire to teach in elementary, middle, or high schools but do not have an undergraduate degree in education. Please note that all alternative licensure programs at NCSU require a minimum GPA of 2.500 and a four-year degree from an accredited college or university. There are two types of alternative licensure: licensure only and lateral entry.

Licensure only programs are for people who want to complete their teaching license ("A"-level) before entering the classroom. These programs include education coursework, content-specific coursework, and student teaching.

Lateral entry programs are for people who want to work on their coursework while teaching full-time. Lateral entry programs include education coursework, content-specific coursework, and a one-hour practicum in place of student teaching. Participants in lateral entry programs will receive a lateral entry license when they are hired in a

teaching position and then will be recommended for a clear ("A"-level) license upon completion of the lateral entry program. There are two types of lateral entry programs offered at NCSU. The traditional lateral entry program can be completed over the course of three years. The NC TEACH program is an intensive one-year program in which participants enter as a cohort and are provided with an extensive support network to aid their transition into the classroom.

Graduate Programs

The Graduate School offers programs of study leading to both master's and doctoral degrees. 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. Emphasis is placed upon the student's scholarly development through formal course work, seminars, research and independent investigation.

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. It is the responsibility of **ALL** graduate students to know and understand their degree requirements. Students are responsible for the fulfillment of those requirements.

Master's Degree Programs

Master of Science and Master of Arts

All Master of Science and Master of Arts degree 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 Arts programs do not require a thesis.

Requirements

1. A minimum of 30 semester hours of graduate work in the degree program, unless the specific program requires more hours. (See also [Credit Hour Requirements for Master's Degrees](#) in the Graduate Handbook.)
2. A reading knowledge of a foreign language (in a few programs)
3. A comprehensive written examination (in some programs)
4. A thesis (in most programs)
5. A comprehensive oral examination (except Option B programs)

Time Limit

Requirements for **ALL** master's degrees must be completed within six (6) calendar years. For further information about the time limit for degrees, please see [Administrative Handbook Section 3.4](#).

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

1. A minimum of 30 semester hours of graduate work in the degree program (unless the specific program requires more hours).
2. A comprehensive written examination (in some programs)
3. A comprehensive oral examination (except Option B programs)

Option B Master's Degree

The [Option B Master's degree](#) requires that students adhere to the general guidelines for a Master of Arts or Master of Science degree with the following exceptions:

1. A comprehensive oral exam is not required
2. A thesis is not required
3. Departmental research credit hours will not be included as part of the course work
4. Individual departments define other requirements for their Option B program, such as additional course work or final projects
5. Option B Master's degree programs may not carry an officially designated minor
6. Students have a single assigned advisor rather than an advisory committee.

Transfer Credits

Transfer of graduate credits earned at other universities

A course that was completed at another college or university may be considered for transfer to a master's program provided that (1) the course is classified as a graduate course; (2) it was completed while the student was in a graduate or post-baccalaureate classification; (3) it was not taken as part of a previous master's degree program at another institution; (4) the grade in the course is B or better (courses with grades of B- or lower will not be allowed to transfer); and (5) the college or university is accredited by one of the following six U.S. regional accrediting agencies: the Southern Association of Colleges and Schools, the Middle States Association of Colleges and Schools, the New England Association of Colleges and Schools, the North Central Association of Colleges and Schools, the Northwest Association of Colleges and Schools, or the Western Association of Colleges and Schools.

Transfer of graduate credits earned while enrolled in an undergraduate program at NC State University

A course that was completed while the student was enrolled as an undergraduate at NC State University may be considered for transfer to a master's program provided that (1) it is at the 400 level or higher; (2) the grade is B or better (courses with grades of B- or lower will not be allowed to transfer); (3) it was not counted to fulfill undergraduate requirements; and (4) it is recommended by the Director of Graduate Programs (DGP) at the time of the student's enrollment in the Graduate School. Students admitted to the Accelerated Bachelor's/Master's program may use up to 12 hours of graduate credit to satisfy requirements for both the bachelor's and the master's degrees. No graduate credit will be allowed for a course completed in an undergraduate classification at another institution.

Transfer of graduate credits earned while enrolled in a previous graduate degree program at NC State University

A graduate course that was completed while the student was enrolled in a previous graduate program at NC State University may be considered for transfer to a master's program provided that (1) it is at the 500 level or higher; and (2) the grade is B or better (courses with grades of B- or lower will not be allowed to transfer).

Transfer of Post-Baccalaureate Studies (PBS) graduate credits earned at NC State University

A graduate course that was completed while the student was enrolled in PBS status at NC State University may be considered for transfer to a master's program provided that (1) it is at the 500 level or higher; and (2) the grade is B or better (courses with grades of B- or lower will not be allowed to transfer). All PBS credits that are used to satisfy requirements of a specific master's degree must be earned before the student is admitted to that degree program. A maximum of 12 credit hours taken while in PBS status may be transferred into a master's degree program. If a student's graduate degree program is terminated, he/she cannot use courses taken in PBS status after termination for credit toward the same graduate degree program.

Master's Advisor and Advisory Committee

All students in graduate programs must have a graduate advisor who is a member of the graduate faculty in the student's major program and is appointed by the Dean of the Graduate School upon recommendation of the DGP. In the case of master's programs requiring theses and/or final oral examinations, the graduate advisor serves as chair or co-chair of the committee.

The primary function of the committee is to advise the student in all aspects of the educational program and to monitor and evaluate that student's progress toward the degree. The committee should provide an intellectually stimulating foundation for the student's professional and scholarly development and should be sensitive to any difficulties in the student's progress, research performance or methodology requiring attention. The committee certifies whether the student has met NC State's standards for a graduate degree. Advising and guiding the student on how best to qualify for the requirements of a degree is a key part of this responsibility.

In all master's programs except those designated "Option B," the committee will consist of at least three NC State graduate faculty members, one of whom is designated as chair and one of whom represents the minor if one has been declared. Those master's programs designated "Option B" require that the student choose only a major advisor or co-advisors but no committee.

Master's Plan of Work

Master's students are required to submit a conditional [Plan of Work](#) (POW) in consultation with their advisor/advisory committee by the time they have completed one half of the credits required for the degree.

The final POW submitted to the Graduate School must be approved by (1) members of the advisory committee for programs with a required thesis, or the major professor for Option B students; and (2) the DGP. The approved POW must be submitted electronically by the DGP to the Graduate School.

Language Requirement**Requirements for Master of Arts and Master of Science Students**

A reading knowledge of one modern foreign language (Germanic, Romance or Slavic) is required by some programs for the Master of Science and Master of Arts degrees. Other programs 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 program for specific language requirements.

Master's Degrees in Designated Fields

There is no language requirement in the professional master's degree programs (master's degrees in designated

fields) with the exception of the Master's of International Studies, which requires knowledge of one foreign language at a level of conversational proficiency.

Master's Minor

The Graduate School does not require a minor, though individual programs may require one. If a program does not require a minor, the graduate student has the option of choosing one, except in an Option B Master's program. The minor work will usually be from a single discipline or field that in the judgment of the advisory committee provides relevant support to the major field. However, the committee has the alternative of developing an interdisciplinary minor if it best serves the needs of the student. When a student does select a minor, the advisory committee must include a representative of the minor field. The minor credits on the Plan of Graduate Work must be approved by the graduate advisory committee member representing the minor, and, in some cases, the DGP from the minor program.

Master's Comprehensive Examination

Written Examination

Written examinations covering the subject matter of the major and the minor may be required. Information concerning written examination schedules should be obtained from the student's program.

Oral Examination

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 minor fields and that this knowledge can be used with promptness and accuracy. This exam takes the form of a traditional defense of the thesis in those programs requiring theses. In programs that require a thesis, the thesis must be submitted in complete form, except for such revisions which may be necessary as a result of the final oral exam, to all members of the advisory committee at least two (2) weeks prior to the exam.

Failure of a student to pass the oral examination terminates the student's graduate work at NC State unless the graduate advisory committee unanimously requests that the Graduate School permit a re-examination. Only one re-examination will be given.

Oral examinations where one or more of the participants are located remotely from the others may occasionally become necessary, but they should never be normal practice. If such circumstances arise, please see [Section 3.6](#) of the Administrative Handbook for rules requesting and conducting a remote exam.

Thesis

Candidates for the Master of Arts or Master of Science degrees in programs requiring a thesis must undertake an original investigation into a subject, which has been approved by the student's advisory committee and DGP, and prepare a thesis. Information on form and organization of the thesis, in addition to other regulations, is presented in the University's on-line [Thesis and Dissertation Guide](#).

Time Limit

All requirements for the master's degree 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 academic college/school or program. The term limit remains at six (6) years

even if a student was on approved leave of absence during the six-year period. For further information about the time limit for degrees, please see [Administrative Handbook Section 3.4](#).

Summary of Master's Procedures

All Master's Students

1. Application materials and required fees received.
2. Application materials reviewed by graduate program.
3. Graduate program forwards recommendation regarding applicant's admissibility to the Dean of the Graduate School.
4. The Dean of the Graduate School reviews the recommendation and the student is notified of the action taken on the request for admission.
5. Outstanding transcripts, if any, showing any or all post-secondary coursework attempted and degree(s) conferred since application should be submitted by student to the Graduate School, prior to matriculation.
6. Student arrives, reports to the graduate program, is assigned a graduate advisor and develops a roster of courses and credits with the advisor.
7. Student subject to continuous registration policy until graduation.
8. Student signs and submits Patent Agreement.
9. Student develops a Plan of Graduate Work, in consultation with and the approval of his/her graduate advisor and Director of Graduate Programs (DGP). The Plan of Work must be submitted via SIS to the Graduate School, where graduate records staff will review it and advise the program of any changes that need to be made before the Request for a Permit to Schedule the Master's Oral Examination or Request for Option B Graduation Checkout can be approved by the Graduate School.
10. Student passes language examination, if required.
11. Student passes written examination, if required.
12. Student submits Diploma Order Request form by end of third week of the semester or summer session of anticipated graduation.
13. A GPA of at least 3.000 for the degree requirements as well as on overall graduate course work at NC State is required for graduation.
14. All degree requirements must be completed within six calendar years, beginning with the date the student takes courses carrying graduate credit applicable to the degree program, unless a more restrictive time limit has been established by the program or academic college/school.

Students in Thesis Programs

1. Graduate advisory committee of three or more graduate faculty members is appointed by the DGP.
2. A preliminary copy of the thesis is submitted to the chair of the student's advisory committee.
3. 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 DGP submits to the Graduate School the Request for a Permit to Schedule the Master's Oral Examination .
4. If Graduate School requirements are met, the Request for a Permit to Schedule the Master's Oral Examination is approved by the Graduate School within 10 working days of receipt of the request, and the permit, Admission to the Final Master's Oral Examination, is issued.
5. 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.
6. Final examination is scheduled and conducted.
7. The Admission to the Final Master's Oral Examination form is completed by the committee members, including date and result, and submitted to the Graduate School by the DGP. The Graduate School should receive the report within five working days of the examination.

8. Student submits the required PDF file into the Electronic Thesis and Dissertation (ETD) Submission system for the thesis review within 24 hours of unconditionally passing the defense. The date the student properly submits the required PDF file into the ETD Submission System is the date of the thesis review.
9. The deadline for submitting the thesis to the Graduate School in order for the student to graduate in a given semester or summer session appears in the Graduate School Calendar.
10. The thesis is reviewed by the Graduate School to ensure that the format conforms to the specifications prescribed in the Thesis and Dissertation Guide.
11. The thesis must then be approved by the advisory committee members prior to publication by the library.

Students in Master's of Discipline Non-Thesis Programs

1. Graduate advisory committee of three or more graduate faculty members is appointed by the DGP.
2. When all requirements except completion of the course work in the final semester are satisfied, DGP submits to the Graduate School the Request for a Permit to Schedule the Master's Oral Examination.
3. If Graduate School requirements are met, a Request for a Permit to Schedule the Master's Oral Examination is approved by the Graduate School within 10 working days of receipt of the request and the permit, Admission to the Final Master's Oral Examination, is issued.
4. Final examination is scheduled and conducted.
5. Final examination report, including date and result of the examination, submitted to the Graduate School by the DGP. The Graduate School should receive the report within five working days of the examination.
6. 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 Graduate School Calendar.

Students in Option B Programs

The student Applies to Graduate via MyPack Portal and the DGP sets the Graduation Approval page to "Departmental Review Complete" no later than six weeks 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 in his or her program and anticipates graduation.

Doctoral Degree Programs

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 preliminary examinations in the field of specialization and related areas of knowledge, and successfully defending the dissertation.

Requirements

1. At least two residence credit points secured in continuous semesters' residence as a graduate student at the University.
2. Doctoral degrees at North Carolina State University require a minimum of 72 graduate credit hours beyond the bachelor's degree. For a student who has a master's degree from a university other than

NC State, a maximum of 18 hours of relevant graduate credit from the master's degree may be applied toward this minimum, upon the recommendation of the student's Graduate Advisory Committee. If a student completes a master's degree at NC State and continues for a doctoral degree without a break in time, up to 36 credit hours taken while in master's status may be used to meet minimum requirements for the doctoral degree.

3. A preliminary comprehensive examination (written and oral components)
4. A dissertation
5. A final comprehensive oral examination
6. Dissertation defense.

Residence Credits

A student working toward a doctoral degree is expected to be registered for graduate work at NC State for at least six (6) semesters beyond the bachelor's degree. The University has basic residence requirements, as defined below, but the academic schools/colleges have the prerogative of establishing more restrictive requirements within the respective schools/colleges. Residence credit is determined by the number of semester hours of graduate work carried during a regular semester.

The POW should include both a list of the course work to be undertaken (in all programs) and the dissertation topic; be developed by the student and his/her advisory committee; be approved by the committee and the DGP or Department Head prior to submission to the Graduate School for final approval; be submitted prior to completion of 12 hours of a doctoral program.

At least two residence credits are necessary in continuous residence (registration in consecutive semesters) as a graduate student at the University, but failure to take courses in the summer does not break continuity.

Semester Credits (Hours)	Residence Credits
9 or more	1
6-8	2/3
less than 6 (including registration in 590, 690 series)	1/3

Summer Residency

Summer course work, however, can be used in partial fulfillment of this requirement. A single summer session 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.

Doctoral Advisor and Advisory Committee

All students in graduate programs must have a graduate advisor who is a member of the graduate faculty in the student's major program and is appointed by the Dean of the Graduate School upon recommendation of the DGP. The graduate advisor serves as chair or co-chair of the committee.

The primary function of the committee is to advise the student in all aspects of the educational program and to monitor and evaluate that student's progress toward the degree. The committee should provide an intellectually stimulating foundation for the student's professional and scholarly development and should be sensitive to any difficulties in the student's progress, research performance or methodology requiring attention. The committee certifies whether the student has met NC State's standards for a graduate degree. Advising and guiding the student

on how best to qualify for the requirements of a degree is a key part of this responsibility.

A doctoral student's committee will consist of at least four NC State graduate faculty members, one of whom represents the minor field if a minor has been declared. The committee is indicated on the Plan of Graduate Work. In this way, the committee is officially recommended by the DGP, and must be approved by the Graduate School at the time of the approval of the Plan of Graduate Work.

Plan of Work

Doctoral students are required to complete a [Plan of Work](#) (POW) in consultation with their advisors. The doctoral POW, including the courses to be undertaken in the student's program and the dissertation topic, should be prepared by the doctoral student and his/her advisory committee and submitted electronically to the Graduate School. The POW as a whole should be rationally unified, with all constituent parts contributing to an organized plan of study and research, and courses must be selected from groups embracing one principal subject of concentration, the major, with the option of designating courses in a cognate field, the minor. When a student elects to designate a minor, he/she should select the minor course work from a discipline or field that, in the judgment of the advisory committee, provides relevant support to the major field.

The POW should include both a list of the course work to be undertaken (in all programs) and the dissertation topic; be developed by the student and his/her advisory committee; be approved by the committee and the DGP or Department Head prior to submission to the Graduate School for final approval; be submitted prior to completion of 12 hours of a doctoral program.

Co-Major

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

Candidacy

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

Comprehensive Examinations

Preliminary Examinations

Each doctoral student is required to take preliminary or comprehensive examinations, consisting of written examinations and an oral examination, 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.

Written examination questions 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 his/her field and the adequacy of preparation for research. Committee members must notify the DGP when a student has completed the written examination. Failure to pass the written portion terminates the student's work at this institution, subject to departmental and/or school/college 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, the student submits a [Request to Schedule the Doctoral Oral Examination](#), indicating that he/she wishes to schedule the preliminary examination.

The preliminary oral examination is conducted by the student's advisory committee and the Graduate School Representative and is open to all graduate faculty members. The Graduate School will notify the student and the examining committee. 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 (refer to [NC State policy on grievance procedures for students](#)).

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 in a given doctoral program.

Final Oral Examination

As with the preliminary oral examination, the chair of the student's advisory committee is in charge of conducting the 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 four calendar months 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, the data collected, 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.

While the chair has the option of allowing visitors to ask questions of the candidate, the chair also has the obligation to maintain a scholarly atmosphere and to keep the student's best interest foremost. Graduate faculty members who are not on the advisory committee will have the opportunity to express their opinions to the committee in the absence of the student. However, the final deliberations and the vote are private to the examining committee.

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 his or her 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.

Oral examinations where one or more of the participants are located remotely from the others may occasionally become necessary, but they should never be normal practice. If such circumstances arise, please see [Section 3.6](#) of the Graduate Handbook for rules for requesting and conducting a remote exam.

Dissertation

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

The dissertation will be reviewed by all members of the advisory committee and must receive their approval prior to submission to the Graduate School. Information on the required form and organization of the dissertation, in addition to other regulations, is presented in the University's [Thesis and Dissertation Guide](#). At the time of the dissertation's submission to the Graduate School, the student is also required to submit one copy each of the Survey of Earned Doctorate form and University Microfilms International Agreement form and to complete a brief, standard questionnaire about his or her experience as a graduate student at NC State. The University also requires that all doctoral dissertations be microfilmed by University Microfilms International, Ann Arbor, MI, including the publication of the abstract in Dissertation Abstracts International. The student pays the cost of this service.

Time Limit

Doctoral students must attain candidacy for the degree within six (6) calendar years. All degree requirements must be completed within 10 calendar years. For further information about the time limit for degrees, please see [Administrative Handbook Section 3.4](#).

Summary of Doctoral Procedures

1. Application materials and required fee received.
2. Application materials reviewed by graduate program.
3. Graduate program forwards recommendation regarding applicant's admissibility to Graduate Dean.
4. The graduate program's recommendation is reviewed and the student is notified of the action taken on the request for admission.
5. Outstanding transcripts, if any, showing any or all post-secondary coursework attempted and degree(s) conferred since application should be submitted by student to the Graduate School, prior to matriculation.
6. If admitted, the student arrives, reports to the graduate program, is assigned an advisor and makes out a roster of courses in consultation with the departmental advisor and DGP.
7. Advisory committee of at least four NC State Graduate Faculty members, one of whom is designated as the chair and one of whom represents the minor field (where appropriate), is appointed by the Graduate Dean upon the recommendation of the DGP. The Graduate Dean also selects a graduate faculty member to serve as the Graduate School Representative on the student's committee.
8. Student signs and submits Patent Agreement.
9. A dissertation subject is selected and an outline of the proposed research is submitted to the student's advisory committee and the DGP for review and approval.
10. Plan of Graduate Work is prepared by the advisory committee with the student, is approved by the DGP, and is submitted to the Graduate School for approval as soon as feasible after completion of 12 hours of course work.
11. 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. The results of these examinations will be reported to the Graduate School.
12. When all written examinations have been completed satisfactorily, the chair submits the Request for Approval to Schedule the Doctoral Oral Examination, designating the preliminary oral examination, at least two weeks prior to the suggested date. Upon approval of the request, the student and examining committee are notified of the time and place. The DGP sends the report of the exam to the Graduate School and if the exam is passed without conditions, the student is admitted to candidacy.
13. A copy of the preliminary draft of the dissertation is submitted to the chair of the student's advisory committee for review.
14. The Diploma Order Request Form must be filed with the Graduate School by the end of the sixth week of the semester or summer session of anticipated graduation. Failure to submit the form by this date may result in the student's failure to receive the diploma at graduation.
15. 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.

16. Four calendar months after admission to candidacy or later, and after the dissertation is complete except for such revisions as may be necessary as a result of the final exam, the chair submits to the Graduate School the Request for Approval to Schedule the Doctoral Oral Examination, designating a request for permission for the candidate to take the final oral exam. Requests should be filed at least two weeks before the date of the examination. Upon approval of the request, the student and the examining committee, including a Graduate School representative, are notified of the time and place of the examination. The Graduate School Representative receives a copy of the dissertation at least one week prior to the examination.
17. The Graduate School requires that all theses and dissertations be properly submitted electronically following the requirements in the Electronic Thesis and Dissertation (ETD) website. Specific deadlines for each semester, as well as formatting requirements, are posted in the online Thesis and Dissertation Guide, located on the ETD website.
18. The dissertation is reviewed by the Graduate School to ensure that the format conforms to the specifications prescribed in the Thesis and Dissertation Guide.
19. All students must apply to graduate before the semester deadline via MyPack Portal in order to be placed on the graduation list, have the name printed in the graduate programs, have the diploma ordered and the transcript posted.
20. All course work scheduled in a graduate degree classification must be completed prior to graduation.
21. A GPA of at least 3.000 is required for graduation.
22. All degree requirements must be completed within 10 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 program or academic college/school.

Registration

The [Department of Registration and Records](#) must have authorization from the Graduate School before a graduate student in any classification will be permitted to register for classes. This authorization will be sent to the Department 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.

Course Load

Fall and Spring Semesters

A full-time graduate course load is nine to 15 credits per semester. Graduate students holding assistantships, however, have additional course load restrictions

Summer Sessions

Graduate students are not required to be registered in summer sessions. If they are full time in the previous spring semester and are continuing their graduate study in the following fall semester, they are considered to be full time in the summer. If a student needs to be registered, one credit hour is considered full time.

International Students

The [U.S. Citizenship and Immigration Services](#) (USCIS) requires international students on F-1 and J-1 visas to carry a full-time course of study to remain in status.

Course loads and assistantships

Graduate students holding assistantship appointments are restricted to 9 hours per semester if they hold an

appointment of one-half-time or greater and 12 hours per semester if they hold a one-quarter-time appointment. With advance written permission from the Graduate School, a student may take more than the maximum semester course load during a particular semester if the total credit hours do not exceed the maximum for the term of the appointment.

Full-Time/Part-Time Determination for All Graduate Students

NC State uses a uniform Schedule of Full-Time Status of Graduate Students for Loan Deferment, Financial Aid, Payroll Tax Withholding and Veteran's Benefits Purposes. To maintain consistency throughout the university system, faculty members do not have the authority to submit individual letters verifying the status of a graduate student. This schedule will be the only resource used to determine a student's status for these purposes. [Registration and Records](#) in Room 1000, Harris Hall processes all student loan deferments. The Graduate School will not be directly involved in preparing loan deferment letters.

These definitions apply to all graduate students, U.S. and international, participants and non-participants in the Graduate Student Support Plan.

Fall and Spring Semesters

Classification	Full-Time	Half Time
Non-Thesis Master's	Registration for nine (9) or more credit hours per Fall or Spring semester, or a minimum of three (3) hours per semester during the semester in which the student is completing the last course(s) required to complete the degree. Students who have completed ¹ all credit hour requirements for their degree must register for three (3) hours of XXX 689 (Non-Thesis Master Continuous Registration – Full Time Registration). Students may register for this course a maximum of one semester.	Registration for 3-8 credit hours per Fall or Spring semester, or one (1) hour of XXX 688 (Non-Thesis Master's Continuous Registration-Half Time Registration) for students who have completed ³ all credit hour requirements for their degree.
Thesis Master's	Registration for nine (9) or more credit hours per Fall or Spring semester, or a minimum of three (3) hours per semester during the semester in which the student is completing the last course(s) required to complete the degree. For thesis students, this could include XXX 695. Students who have completed ² all credit hour requirements (including research credits) for their degree except for completing their research and/or writing and defending the thesis should register for three (3) hours of XXX 699 (Master's Thesis Preparation) each semester until graduation.	Registration for 3-8 credit hours per Fall or Spring semester, or one (1) hour of XXX 699 (Master's Thesis Preparation) for students who have completed ⁴ all credit hour requirements (including research credits) for their degree and are completing their research and/or writing and defending the thesis.
Doctorate	Registration for nine (9) or more credit hours per Fall or Spring semester until the student completes all credit hour requirements for the degree, including research credits, and the oral preliminary examination, or three (3) hours per semester of XXX 899 (Doctoral Dissertation Preparation) for students who have completed ⁵ all credit hour requirements for their degree (including research credits and the oral preliminary examination) except for completing their research and/or writing and defending the dissertation.	Registration for 3-8 credit hours per Fall or Spring semester, or one (1) credit of XXX 899 for students who have completed ⁶ all credit hour requirements for their degree (including research credits and the oral preliminary examination) except for completing their research and/or writing and defending the dissertation.

¹Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for three (3) hours of 689 and be considered full time.

²Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for three (3) hours of 699 and be considered full time.

³Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for one (1) hour of 688 and be considered half time.

⁴Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for one (1) hour of 699 and be considered half time.

⁵Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for three (3) hours of 899 and be considered full time.

⁶Students with an IN grade who have successfully completed all of the remaining degree requirements that are listed above are also eligible to register for one (1) hour of 899 and be considered half time.

Summer Sessions

Graduate students are not required by the University to be registered during the summer. However, students who receive a stipend but who are not enrolled in the University during a period of five weeks or more are subject to Social Security tax withholding. In particular, this means that Social Security taxes will be withheld from the paychecks of Graduate Research Assistants (RAs) who do not register in the summer. Specifically, Social Security taxes will be withheld in June for RAs who are not registered in Summer Session I and in July for RAs who are not registered in Summer Session II. The source of funds that pays the stipend must pay the same amount of Social Security tax as is withheld from the student's paycheck during these months.

Two special registration categories are available for Graduate Research Assistants who would not otherwise take courses in the summer: XYZ 696 (Summer Thesis Research) and XYZ 896 (Summer Dissertation Research), where XYZ represents the course prefix of a specific department or program. Each of these courses is for 1 hour of credit, with registration for 10 weeks, beginning the first day of Summer Session I. Social Security taxes will not be withheld from the June or July paychecks of RAs who register for either 696 or 896.

Please note that student who are not registered during the summer do not have access to financial aid during that period, nor do they have access to the Student Health Service unless they pay the student health fee for each of the two summer sessions.

Accelerated Bachelors/Masters Degree Program

The objective of the Accelerated Bachelors/Master's (ABM) degree program is to provide a means by which exceptional undergraduate students at NC State may complete the requirements for both the bachelor's and masters degrees at an accelerated pace. It provides an opportunity for exceptional undergraduate students at NC State to double count up to 12 graduate-level credits (500 or 700 level) and obtain a non-thesis master's degree within 12 months of completing the bachelor's degree or obtain a thesis based master's degree within 24 months of completing the bachelor's degree.

Students interested in the ABM Program should contact their department.

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.

Leave of Absence

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 not to exceed one year within a given

graduate program. 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., six (6) years for master's and ten (10) for doctoral.

Termination

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, and pay the admission fee (\$65.00 for US Citizens and Permanent Residents or \$75.00 for Non-Resident Aliens [Internationals]), if they wish to resume their graduate studies at NC State.

Adding Courses

Courses may be added during the first week of a semester, via MyPack Portal alone, or during the second week, via MyPack Portal and with permission of the instructor. In a summer session, courses may be added during the first two days via MyPack Portal alone, and/or during the third and fourth days via MyPack Portal with permission of the instructor. To add a student to a course after the deadline for adding courses, an instructor must submit a [Schedule Revision Form](#) to the School/College or Graduate Dean's approval.

Dropping Courses

All 500-800 level courses may be dropped through MyPack Portal without grades during the first eight weeks of a semester and during the first two weeks of a summer session. Students and advisors should consult the specific Registration and Records calendar for drop deadlines. Students should make schedule changes as early as possible in the semester. The number of hours for which a student is officially enrolled and upon which tuition and fees are based is that number in which the student is enrolled at the end of the second week of classes of a semester and at the end of the fifth day of a summer session (the last day to withdraw or drop a course with a refund). A [Schedule Revision Form](#) is required to drop a course after the deadline. No dropping of courses shall be allowed except for documented medical reasons or other verified, unforeseen grounds of personal or family hardship. Making such exceptions to policy requires the recommendation of the chair of the student's advisory committee, the DGP or Department Head, and the Dean of the Graduate School. Courses may not be dropped after the final grades have been submitted by the instructor and processed by Registration and Records.

Dropping 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. Instructors teaching minicourses (courses which last only a portion of the semester) should announce at the outset of these courses their appropriate drop deadlines.

Course Numbering

Graduate-level courses are numbered at the 500, 600, 700 and 800 levels. Courses at the 500 level are available to advanced undergraduate students unless otherwise specified. Courses at the 700 and 800 level are doctoral courses and are open only to students in graduate or PBS standing. Exceptions may be made for undergraduate students in honors program and seniors in the ABM Program. Consent of the department is required for enrollment in all 600- and 800-level courses. Refer to the [NC State University Courses Catalog](#) for course descriptions and prerequisites.

Note: Courses at the 500 and 700 level are letter graded. Students cannot enroll in these courses for "credit only".

Grading and Academic Standing

The Grading System

NC State University uses the following grading system:

Grade	Grade Points/Credit Hour
A+	4.33
A	4.00
A-	3.67
B+	3.33
B	3.00
B-	2.67
C+	2.33
C	2.00
C-	1.67
D+	1.33
D	1.00
D-	0.67
F	0.00

Grade Point Average (GPA)

The number of credit hours at the 400-level of higher that are attempted in a semester or summer session (for which regular grades are received) is divided into the total number of grade points earned to arrive at the grade point average. The cumulative and semester GPAs will include the effect of any A+ grades awarded (at 4 1/3 grade points) up to a grade point average of 4.000. The GPA will be calculated to three decimal points. Credits earned in PBS classification are also included in the GPA calculations and the determination of academic standing that become part of the Plan of Graduate Work.

Graduate Credit

To receive graduate degree credit, a grade of "C-" or higher is required in all courses taken after admission. Grades on courses taken for graduate credit as an undergraduate at NC State, in PBS classification, or transferred from other universities must have a grade of "B" or better to be transferred. All grades on courses numbered 400 and above taken in a graduate classification or for graduate credit as an undergraduate are included in the graduate GPA. Courses at the 300 level and below are not eligible for graduate credit and subsequently do not affect the graduate GPA. To graduate, a student must have a minimum 3.00 average on all graduate course work as well as all courses on his or her Plan of Graduate Work.

Graduate students who take 400-level courses that are letter graded do not have the option of taking the courses for "credit only" if they intend for the course to be part of their Plan of Graduate Work. It is appropriate for them to take selected 400-level letter-graded courses that are required by the program but will not be included in the Plan of Graduate Work for S-U grade. Examples would be 400-level courses in the student's major and FLE courses.

Grading of Graduate Courses

5XX	Letter Graded Master's Courses
6XX	S-U Graded Master's Courses
7XX	Letter Graded Doctoral Courses (ALL 7XX courses are restricted to the following classification of students (class MR, DR, SR, SP and GR)
8XX	S-U Graded Doctoral Courses (ALL 8XX courses with the exception of those specifically listed at the end of this section are restricted to the following classification of students class MR, DR, SR, SP and GR)
9XX	Professional Courses in the College of Veterinary Medicine (not covered by this document)

NOTE: Courses at the 500 and 700 level are letter graded. Students cannot enroll in these courses for "credit only".

Incompletes

The grade of "IN" (Incomplete) may be given in any course at the discretion of the instructor for work not completed because of a serious interruption in the student's 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 receives an "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 "IN" 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, grades on courses transferred from another institution will not be included in computing the GPA.

Grade Changes

When submitted to the Department of Registration and Records, end-of-course grades are final and not subject to change by reason of a revision of the instructor's judgment; nor are submitted grades to be revised on the basis of a second trial (e.g., a new examination or additional work undertaken or completed). Changes may only be made within one calendar year after the date final grades were submitted in order to correct an error of computation or transcribing or where part of the student's work has been unintentionally overlooked.

Academic Warning, Probation and Termination

Graduate students are given a notice of academic warning if they have accumulated 18 or fewer hours at the 400 level or above and have less than a 3.000 GPA. Graduate students are placed on academic probation if they have accumulated more than 18 hours at the 400 level or above and have a GPA in the range of 2.667 to 2.999 and will be ineligible for financial aid or appointment or reappointment to an assistantship or fellowship. A student's graduate study is terminated if they have accumulated more than 18 hours at the 400 level or above and have a GPA below 2.667, or if they have accumulated 30 or more hours and have less than a 3.000 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 if the student is not making satisfactory progress toward the degree.

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 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.

Audits

Graduate students wishing to audit a course must have the approval of their advisor and of the department offering the course. While auditors receive no course credit, they are expected to attend class regularly. The degree to which an auditor must participate in class beyond regular attendance is optional with the instructor. Any auditing requirements should be clearly explained in writing to the student at the beginning of the semester. Should an instructor conclude that an auditor has failed to fulfill the stipulated requirements, the instructor is justified in marking NR (no recognition given for an audit) on the final grade report.

Audits (AU) in subjects in which the graduate student has had no previous experience will be evaluated at full credit value in determining course loads. Audits taken as repetition of work previously accomplished are considered at one-half their credit value in calculating course loads. With the single exception of foreign language audits, all audit registration must fall within the maximum permissible course loads. While audit registrations are evaluated for purposes of determining permissible course loads in terms of the regulations of the Graduate School, the University Cashier's Office considers all audits, except one permitted free of charge, in terms of full credit value in calculating tuition.

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. All students scheduled to graduate in the fall or spring semesters are strongly encouraged to attend the respective 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.

Diplomas

Doctoral students graduating in the spring and fall are awarded their diplomas during the commencement exercises. Master's students, both master's and doctoral students graduating at the end of second summer session or those students receiving permission to receive the degree in absentia can pick up their diploma during the designated pick-up dates and times in Registration and Records. Any diplomas not picked up are mailed by the Department of 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 major or program of study. Students earning a master's degree 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.

Apply to Graduate

Each student must make sure to Apply to Graduate in MyPack Portal (Student Self Service > Degree Progress / Graduation > Apply for Graduation) for the term in which they plan to graduate in. It is advised that students apply to graduate when the defense is scheduled, but it can be done at any time in the semester up until 5:00 p.m. on the Apply to Graduate Deadline, which is the same as the Registration Required Thesis Review Deadline. The date is on the Graduate School Calendar. A student must apply to graduate in order to graduate, have transcript posted, and receive a diploma.

Interinstitutional Registration Program

NC State participates in an [Interinstitutional Registration program](#) with the [University of North Carolina at Chapel Hill](#), the [University of North Carolina at Greensboro](#), the [University of North Carolina at Charlotte](#), [North Carolina Central University](#), and [Duke University](#). The program provides the opportunity for students to enroll at another institution for a course or courses not offered on their home campus. Other activities include a cooperative library arrangement, joint student activities, and faculty cooperation and interchange.

Even though taking a course on another campus, the 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 an [Interinstitutional Approval](#) form from Registration and Records. Such courses are considered by the Graduate School to be a part of the student's normal load and the student will be billed for the courses 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 of the other institutions varies from that of NC State, 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.

Cooperating Raleigh Colleges

The [Cooperating Raleigh Colleges](#) (CRC) is a voluntary organization composed of [NC State](#), [Meredith College](#), [Peace College](#), [St. Augustine's College](#), and [Shaw University](#). Graduate programs are currently offered only at NC State and Meredith College, but graduate students can enroll at either institution for a course or courses not offered by 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 fall or spring semester, provided that

1. the course is not taught on the NC State campus, and
2. 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 not 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. Special fees may be required for specific courses at Meredith, and the student is responsible for paying these fees.

Academic Common Market

The [Academic Common Market](#) (ACM) is a cooperative agreement among universities in 16 states in the southeastern United States. The ACM allows a student to enroll in a graduate program at a university in another state without having to pay out-of-state tuition if that program of study is neither

1. offered by the public institutions in the student's home state, nor
2. commonly available in the other southeastern states.

Tuition and Fees

The [University Cashier's Office](#) provides billing, financial aid disbursement and account management services to all students. All students paying tuition and fees are entitled to University services, facilities and programs, including the services, facilities, and programs offered by the Student Center, Health Services, Physical Education Department, and Athletics Department.

[Residence for Tuition Purposes](#)

Financial Aid

Graduate students may receive financial support through fellowships, traineeships and teaching or research assistantships sponsored by federal, state and private agencies. A graduate student must be in good academic standing (3.000 GPA or better) 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. There are also minimum registration requirements for eligibility for tuition and health insurance benefits.

[Assistantships](#)

[Fellowships](#)

[Graduate Student Support Plan](#)

Admission to Degree Programs

The [Office of Scholarships and Financial Aid](#) (OSFA) assists students and parents in applying for and securing financial assistance when family resources are insufficient to meet educational expenses. The OSFA offers assistance with any part of the financial aid process (including scholarships, grants, loans and campus employment), as well as providing financial aid counseling assistance.

Fields Offering Graduate Degrees

The Graduate School offers major programs of study in the following fields. Except where noted by 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 - MR (GMAT)

Adult and Community College Education - EdD, MS, MEd (GRE)

Aerospace Engineering - PhD, MS (GRE)

Agricultural and Extension Education - EdD (GRE)

Agricultural and Resource Economics - MS (GRE (required if requesting financial aid))

Agricultural Education - MS, MR (GRE)

Analytics - MS (GRE General Test)

Animal Science - MS, MR (GRE)

Animal Science & Poultry Science - PhD (GRE)

Anthropology - MA (GRE)

Applied Mathematics - PhD, MS (GRE General Test (Subject Test not required but strongly encouraged))

Architecture - MR (GRE (required for track 3 applicants only))

Art and Design - MR (GRE (not required; strongly recommended if GPA is lower than 3.0))

Biochemistry - PhD, MS, MR (GRE)

Bioinformatics - PhD, MR (GRE)

Biological and Agricultural Engineering - PhD, MS, MR (GRE (exceptions apply; contact program))

Biomathematics - PhD, MS, MR (GRE)

Biomedical Engineering - PhD, MS (GRE, TOEFL for internationals)

Business Administration - MR (GMAT)

Chemical Engineering - PhD, MS, MR (GRE)

Chemistry - PhD, MS (GRE)

Civil Engineering - PhD, MS, MR (GRE; TOEFL (or IELTS))

Clinical Mental Health Counseling - MS, MEd (GRE or MAT)

College Counseling and Student Development - MS, MEd (GRE or MAT)

Communication - MS (GRE)

Communication Rhetoric and Digital Media - PhD (GRE)

Comparative Biomedical Sciences - PhD, MS (GRE)

Computer Engineering - PhD, MS (GRE; TOEFL)

Computer Networking - MS (GRE, GRE Subject Test recommended for aid)

Computer Science - PhD, MS, MR (GRE, GRE Subject Test recommended for PhD and aid)

Creative Writing - MFA (GRE)

Crop Science - PhD, MS, MR (GRE)

Curriculum and Instruction - PhD, MS, MEd (GRE (PhD); GRE or MAT (MEd and MS))

Design - PhD (GRE)

Economics - PhD, MR, MS (GRE)

Educational Administration and Supervision - EdD (GRE or MAT)

Educational Research and Policy Analysis - PhD (GRE)

Electrical Engineering - PhD, MS (GRE; TOEFL)

Elementary Education - MS, MEd (GRE or MAT)

Engineering - MR (entrance exam not required)

English - MA (GRE general test; analytical writing)

Entomology - PhD, MS, MR (GRE)

Environmental Assessment - MR

Environmental Engineering - MS, MR (GRE; TOEFL (or IELTS))

Extension Education - MS, MR (GRE)

Family Life and Youth Development - MS, MR (GRE)

Fiber and Polymer Science - PhD (GRE)

Financial Mathematics - MR (GRE and GRE Math Subject Test)
Fisheries, Wildlife, and Conservation Biology - PhD, MS, MR (GRE)
Food Science - PhD, MS, MR (GRE)
Foreign Languages and Literature - MA (Candidates must prove fluency in French or Spanish.)
Forest Biomaterials - PhD, MS, MR (GRE (exceptions apply; contact program))
Forestry and Environmental Resources - PhD, MS, MR (GRE)
Functional Genomics - PhD, MS, MR (GRE)

Genetics - PhD, MS, MR (GRE)
Geospatial Information Science and Technology - MR
Global Innovation Management - MR (GMAT; TOEFL (or IELTS))
Graphic Design - MR (GRE (exceptions apply; contact program))

Higher Education Administration - MS, MEd, EdD (GRE)
History - MA (GRE)
Horticultural Science - PhD, MS, MR (GRE)
Human Resource Development - MS (GRE)

Immunology - PhD, MS (GRE)
Industrial Design - MR (GRE (exceptions apply; contact program))
Industrial Engineering - PhD, MS, MR (GRE)
Instructional Technology - MS, MEd (GRE or MAT (MEd and MS))
Integrated Manufacturing Systems Engineering - MR (GRE (exceptions apply; contact program))
International Studies - MR (GRE)

Landscape Architecture - MR (GRE (not required; strongly recommended if GPA is lower than 3.0))
Liberal Studies - MA (entrance exam not required)

Marine, Earth, and Atmospheric Sciences - PhD, MS (GRE; GRE and GRE Subject Test for disciplines in Biological Oceanography and Geology)
Materials Science and Engineering - PhD, MS, MR (GRE (exceptions apply; contact program))
Mathematics - PhD, MS (GRE General Test (Subject Test not required but strongly encouraged))
Mathematics Education - PhD, MS, MEd (GRE)
Mechanical Engineering - PhD, MS (GRE)
Microbial Biotechnology - MR (GRE)
Microbiology - PhD, MS, MR (GRE)

Natural Resources - MS, MR (GRE)
Nuclear Engineering - PhD, MS, MR (GRE (exceptions apply; contact program))
Nutrition - PhD, MS, MR (GRE)

Operations Research - PhD, MS, MR (GRE)

Parks, Recreation, and Tourism Management - PhD, MS, MR (Please see program website)
Physics - PhD, MS (GRE and GRE Subject Test)
Physiology - PhD, MS, MR (GRE)
Plant Biology - PhD, MS, MR (GRE)
Plant Pathology - PhD, MS, MR (GRE)
Poultry Science - MS, MR (GRE)
Psychology - PhD, MS (GRE. The GRE Subject Test is no longer required, but is strongly encouraged, especially for non-psychology majors. MAT not required but strongly encouraged.)
Public Administration - PhD, MR (GRE)
Public History - MA (GRE)

School Administration - MR (GRE or MAT)
School Counseling - PhD, MS, MEd (GRE or MAT)
Science Education - PhD, MS, MEd (GRE or MAT (MS, MEd); GRE (PhD))
Social Work - MR (GRE or MAT (required under certain conditions; contact department))

Sociology - PhD, MS, MR (GRE)
Soil Science - PhD, MS, MR (GRE required for US students, recommended for internationals)
Special Education - MS, MEd (GRE and MAT)
Specialized Veterinary Medicine - MR (GRE)
Statistics - PhD, MS, MR (GRE)

Teaching - MA (GRE)
Technical Communication - MS (GRE)
Technology Education - MS, MEd, EdD (GRE or MAT)
Textile Chemistry - MS (GRE)
Textile Engineering - MS (GRE)
Textile Technology Management - PhD (GRE or GMAT)
Textiles - MS, MR (GRE)
Toxicology - PhD, MS, MR (GRE)
Training and Development - MEd (GRE)

Veterinary Public Health - MR

Zoology - PhD, MS, MR (GRE)

Fields Offering Minors

Biomanufacturing
Biotechnology
Cognitive Science
Computational Engineering and Science
Ecology
Environmental Remote Sensing and Image Analysis
Food Safety
Geographic Information Systems
Interdisciplinary
Life Science Ethics
Plant Physiology
Water Resources
Women's & Gender Studies

Fields Offering Graduate Certificates

Administration and Leadership - Family and Youth Programs
Agricultural Education
Community College Teaching
Consumer Textile Product Design and Development
Design and Analysis of Environmental Systems: Watershed Assessment and Restoration
E-Learning
Environmental Assessment
Family Life and Parent Education
Family Life Coaching
Feed Science
Geographic Information Systems
Gerontology
Horticultural Science
Mathematics
Medical Devices
Molecular Biotechnology
Nonprofit Management
Nonwovens Science and Technology
Program Development in Family Life Education
Public Policy

Renewable Electric Energy Systems
Technology Entrepreneurship and Commercialization
Textile Brand Management and Marketing
Textile Supply Chain Management
Training and Development
Volunteer Management and Administration
Youth Development and Leadership

Fields Offering Courses or Other Support to Graduate Programs

Biological Sciences
Education
Multidisciplinary Studies
Philosophy and Religious Studies

Accounting

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Accounting					Y		

GRADUATE FACULTY

F. A. Buckless, *Department Head*

Director of Graduate Programs:

K. A. Krawczyk, Box 8113, 515-4439, katherine_krawczyk@ncsu.edu, Accounting

Deloitte Professor: M. S. Beasley

KPMG Professor: F. A. Buckless

Professors: J. W. Bartley, B. C. Branson, Y. A. Chen, K. A. Krawczyk, D. P. Pagach, R. L. Peace, R. B. Sawyers, P. F. Williams; **Associate Professors:** M. Bradford, J. F. Brazel, R. Pennington, R. L. Wright, G. J. Zuckerman; **Assistant Professors:** E. Z. Taylor

The Master of Accounting (MAC) is a professional degree designed to prepare students for careers in public accounting, in the Accounting and finance divisions of major corporations, and in education, government, and non-profit institutions. Job titles of recent graduates include Staff Accountant, Internal Auditor, Financial Analyst, Budget Analyst, Cost Accountant, Tax Specialist, Assistant Controller, SBI Agent, State Auditor, and Internal Revenue Agent. Graduates will also be prepared to complete the CPA Examination.

Admission Requirements: Admission to the MAC program is competitive. The best-qualified applicants will be accepted up to the number of spaces available for new students. The Admissions Committee evaluates candidates on three criteria:

- undergraduate academic record and grade point average;
- GMAT score*;
- "Leadership" -- such as relevant activities and/or work experience; and presence, leadership, integrity, and other personal characteristics.

[*The Admissions Committee requires all applicants who score below 530 on their first attempt to retake the exam prior to the application deadline.]

Individuals with a Bachelor's degree in any major may apply to the program; however, any applicant without a Bachelor's degree in Accounting must complete a series of undergraduate Accounting prerequisites before qualifying as a MAC degree candidate. More complete information can be found on the [MAC website](#).

Master's Degree Requirements: Students complete a 12-course sequence in one year that includes ten graduate-level Accounting courses and two non-Accounting MBA courses (31 total credit hours). The curriculum is designed to provide a broad-based professional education. Students can choose to obtain a concentration in Information Technology (IT) or Enterprise Risk Management (ERM).

Other Relevant Information: Masters students must begin the degree program in the summer or in the fall

semester. The program is primarily designed for full-time students, and most classes meet during the day. A limited part-time option, where students complete the program in two years, is also available.

All application materials are due by one of two application deadlines--**February 1** for consideration in both the MAC Fellowship and Scholarship programs; **March 1** for all other applicants.

Click on [Graduate Courses](#) for current course information.

Agricultural and Extension Education

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Agricultural and Extension Education		Y					
Agricultural Education			Y		Y		
Extension Education			Y		Y		

GRADUATE FACULTY

J. L. Flowers, *Interim Department Head*

Director of Graduate Programs:

G. E. Moore, Box 7607, 515-1756, gary_moore@ncsu.edu, Agricultural and Extension Education

J.C. Raulston Distinguished Professor: D. J. Werner

Professors: D. B. Croom, C. E. Farin, J. L. Flowers, L. A. Guion, D. M. Jenkins, B. M. Kirby, T. T. McKinney, G. E. Moore, R. W. Shearon, P. M. Sobrero; **Adjunct Professors:** M. M. Baker; **Emeritus Professors:** G. W. Bostick, R. D. Mustian; **Associate Professors:** R. M. Stewart, C. S. Whisnant, E. B. Wilson; **Adjunct Associate Professors:** D. A. Boone, R. J. Harrell; **Emeritus Associate Professors:** C. D. Bryant; **Assistant Professors:** J. A. Bruce, K. S. Jayaratne, D. W. Jones, M. J. Kistler, W. J. Warner; **Teaching Assistant Professors:** C. V. Jordan

The Agricultural and Extension Education Department provides advanced study for professionals in agricultural education, extension education or related careers. Programs of study are 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. The following graduate programs are available in the Department:

- Graduate Certificate in Agricultural Education (requires 15 hours)
- Master of Science in Agricultural Education (requires 36 hours including a thesis)
- Master of Science in Extension Education (requires 36 hours including a thesis)
- Master of Agricultural Education (requires 36 hours)
- Master of Extension Education (requires 36 hours)
- Master of Agricultural Education (a 100% internet-based degree program requires 36 hours)
- Sixth-Year Certificate in Agricultural Education
- Doctor of Education in Agricultural and Extension Education

Admission Requirements: In addition to the Graduate School admission requirements, the department requires the GRE, three positive references, and a statement of career goals and/or research interests. An interview (personal or by telephone) may be 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, and a Master of Agricultural Education and a Master of Extension Education as a non-thesis track. All Master's degree programs require a total of 36 credit hours. The Master of Science in Extension Education and the Master of Extension Education require a core of 21 hours (AEE 501, 505, 521, 523,

526, 577, and 578). The Master of Science in Agricultural Education and the Master of Agricultural Education require a core of 18 hours (AEE 501, 505, 526, 528 or 529, 535 or 735, and 578). Minors are optional but, if selected, require a minimum of nine credit hours.

Graduate Certificate Requirements: The Department also offers a graduate certificate in agricultural education. This certificate program involves completion of 15 credit hours. Students are to choose from AEE 500, 503, 521, 522, 528, 529, 535, 641, and 735.

Sixth-Year Certificate: The Department offers an array of courses that are recognized by the Department of Public Instruction as comprising a Sixth-Year Certificate. Students are required to complete 24 hours of advanced graduate work past the Master's degree. Contact the Director of Graduate Programs for details.

Doctoral Degree Requirements: A Doctor of Education degree in Agricultural and Extension Education is offered. A minimum of 72 hours past the Bachelor's degree is required. More hours may be required based upon the past degrees and experiences of the candidate. The student's graduate committee will determine the specific courses needed. At least six hours of statistics is required. Twelve hours of credit is earned for writing the dissertation.

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

Other: The graduate courses listed below are available live, online, or both. Students should refer to the current [Registration and Records Course Inventory](#) or to the [AEE graduate program](#) website.

Click on [Graduate Courses](#) for current course information.

Analytics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Analytics			Y				

GRADUATE FACULTY

Director of Graduate Programs:

M. A. Rappa, Box 7293, 513-0480, michael_rappa@ncsu.edu, Analytics

Distinguished University Professor: M. A. Rappa

Edwin Gill Professor of Business Management: C. P. Jones

William Neal Reynolds Professor: D. A. Dickey

Professors: H. A. Devine, C. Meyer; **Adjunct Professors:** S. M. Hsiang; **Associate Professors:** P. K. Bergey, R. Y. Chirkova, J. B. Earp, C. G. Healey, R. S. Warr, B. A. Watson, L. A. Williams, T. Xie; **Assistant Professors:** S. Dasmohapatra

The Master of Science in Analytics (MSA) is an intensive 10-month degree with a strong practical orientation designed to give students a thorough understanding of the tools, methods, and applications of advanced analytics. The curriculum is designed entirely for MSA students and classes are taught as a cohort. Students work frequently in teams and receive hands-on training with industry-standard software tools. Its educational objectives include but are not limited to topics, such as data quality and integration, data and text mining, time series forecasting, optimization, survival analysis, and other areas of statistics; data security and privacy; project management and communication skills. Student team projects aim to provide experience with solving complex analytical problems in industry and in other areas of science and engineering.

Admission Requirements: Admission to the MSA program is highly competitive. The best-qualified applicants will be accepted up to the limited number of seats available for students each year. The Admissions Committee evaluates candidates on criteria such as:

- overall academic record and grade point average;
- academic performance in analytical/quantitative subjects;
- relevant employment experience and potential to succeed in the profession; and
- leadership, integrity, and other personal character traits.

Individuals with a bachelor's degree in any major may apply to the program; however, an applicant without prior coursework in statistics, mathematics, computer programming, would need to complete a set of prerequisite courses before qualifying as a candidate for admission. More information can be found on the [MSA website](#).

Master's Degree Requirements: Students complete 30 credit hours of defined coursework in a period of ten months beginning in Summer Session I and ending the following Spring semester. The integrated curriculum is designed to provide a focused education in the software tools, methods and applications of data analytics.

Other Relevant Information: Students must begin the degree program in the first semester (Summer Session I) and complete all 30 credit hours of the curriculum. The program is designed for full-time students

only. Applications for admission are reviewed between December and April. International applicants must apply early.

Click on [Graduate Courses](#) for current course information.

Animal Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Animal Science			Y		Y		

GRADUATE FACULTY

M. T. See, *Department Head*

Director of Graduate Programs:

J. W. Spears, Box 7621, 515-4008, jerry_spears@ncsu.edu, Animal Science

NAMED PROFESSOR EMERITUS: J. G. Lecce

William Neal Reynolds Professor: J. Odle

WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS: E. Eisen

Professors: G. W. Almond, W. J. Croom, J. Eisemann, K. L. Esbenshade, C. E. Farin, W. L. Flowers, W. M. Hagler, B. A. Hopkins, G. B. Huntington, D. K. Larick, J. Luginbuhl, R. L. McCraw, W. M. Morrow, R. M. Petters, J. A. Piedrahita, M. H. Poore, O. W. Robison, M. T. See, J. W. Spears, E. VanHeugten, S. P. Washburn, L. W. Whitlow, C. M. Williams; **USDA Professors:** J. C. Burns; **Adjunct Professors:** M. Choct, W. B. Roush, T. A. van Kempen; **Emeritus Professors:** B. P. Alston-Mills, G. A. Benson, L. S. Bull, K. R. Butcher, E. V. Caruolo, J. C. Cornwell, R. G. Crickenberger, R. W. Harvey, W. L. Johnson, J. R. Jones, C. A. Lassiter, R. D. Mochrie, R. M. Myers, C. R. Parkhurst, F. D. Sargent, J. C. Wilk; **Associate Professors:** M. S. Ashwell, J. P. Cassady, V. Fellner, S. W. Kim, H. Liu, J. A. Moore, K. E. Saker, P. D. Siciliano, C. H. Stahl, C. S. Whisnant, M. D. Whitacre, E. B. Wilson; **Adjunct Associate Professors:** R. J. Harrell; **Emeritus Associate Professors:** E. U. Dillard, J. J. McNeill; **Assistant Professors:** G. R. Hansen, C. Maltecca, S. E. Phillips; **Research Assistant Professors:** L. Xi; **Adjunct Assistant Professors:** D. S. Casey, J. V. Felts, A. G. Gernat, C. L. Heggen-Peay, J. W. Holl, R. O. Maguire, T. F. Middleton, D. W. Newcom; **Extension Assistant Professors:** J. E. Turner; **Teaching Assistant Professors:** S. Trivedi

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, genomics, 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: A minimum of 30 credit hours of graduate work in the degree program is required. The minor is optional and external faculty representation is not required on the advisory committee.

Master of Animal Science: The non-thesis Master of Animal Science degree (Option B) requires a minimum of 36 credit hours, 19 credits of core courses and 17 credits of elective courses. Additional information regarding core courses and elective course requirements can be found on the [Animal Science Graduate Program](#) web site.

Doctoral Degree Requirements: The department offers a Ph.D. program in [Animal Science and Poultry Science](#) with a concentration in Animal Science.

Student Financial Support: A limited number of research and teaching assistantships are available through the department and are awarded on a competitive basis. Students may also be supported by research grant funds awarded to faculty members. Students applying for assistantships are advised to apply by February 15 for fall admission.

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.

Click on [Graduate Courses](#) for current course information.

Animal Science and Poultry Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Animal Science & Poultry Science	Y						

GRADUATE FACULTY

Directors of Graduate Programs:

J. T. Brake, Box 7608, 515-5060, jbrake@ncsu.edu, Poultry Science

J. W. Spears, Box 7621, 515-4008, jerry_spears@ncsu.edu, Animal Science

Blanton J. Whitmire Professor of Structural Pest Management: C. J. Schal

NAMED PROFESSOR EMERITUS: J. G. Lecce

William Neal Reynolds Distinguished Professor: J. T. Brake

William Neal Reynolds Professor: P. R. Ferket, J. Odle

WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS: E. Eisen

Professors: G. W. Almond, K. E. Anderson, F. W. Edens, J. Eisemann, K. L. Esbenschade, C. E. Farin, W. L. Flowers, J. L. Grimes, W. M. Hagler, B. A. Hopkins, G. B. Huntington, D. K. Larick, J. Luginbuhl, R. L. McCraw, W. M. Morrow, P. E. Mozdziak, S. L. Pardue, J. N. Petite, R. M. Petters, J. A. Piedrahita, M. H. Poore, O. W. Robison, M. T. See, J. W. Spears, E. VanHeugten, D. P. Wages, S. P. Washburn, L. W. Whitlow, C. M. Williams, M. J. Wineland; **USDA**

Professors: J. C. Burns; **Adjunct Professors:** W. O. Herring, K. K. Krueger, S. M. Shane, Z. Uni; **Emeritus Professors:** B. P. Alston-Mills, G. A. Benson, L. S. Bull, K. R. Butcher, T. A. Carter, V. L. Christensen, J. C. Cornwell, R. G. Crickenberger, J. D. Garlich, E. W. Glazener, J. R. Harris, R. W. Harvey, G. B. Havenstein, W. L. Johnson, J. R. Jones, C. A. Lassiter, R. D. Mochrie, R. M. Myers, C. R. Parkhurst, F. D. Sargent, B. W. Sheldon, J. C. Shih, T. D. Siopes, J. C. Wilk; **Associate Professors:** C. M. Ashwell, M. S. Ashwell, D. K. Carver, J. P. Cassady, V. Fellner, S. W. Kim, H. Liu, J. A. Moore, K. E. Saker, C. H. Stahl, C. S. Whisnant, M. D. Whitacre; **Adjunct Associate Professors:** R. J. Harrell;

Emeritus Associate Professors: E. U. Dillard, J. J. McNeill; **Assistant Professors:** G. R. Hansen, J. B. Hoffman, M. D. Koci, C. Maltecca, E. O. Oviedo-Rondon; **Adjunct Assistant Professors:** C. L. Heggen-Peay, T. F. Middleton, D. W. Newcom, C. J. Williams; **Teaching Assistant Professors:** S. Trivedi

Doctoral Degree Requirements: A doctoral degree in Animal Science and Poultry Science with a concentration in either Animal Science or Poultry Science is offered. Specific course requirements are flexible and each student's program of study is developed in consultation with their Ph.D. advisory committee. The minor is optional but external faculty representation is required on the advisory committee.

Note: The Master's program in [Animal Science](#) and [Poultry Science](#) are administered independently by each department.

Admission Requirements: Factors considered for admission include: grade point average, scores on the GRE, undergraduate courses, and letters of recommendation. A member of either the Animal Science Department or Poultry Science Department faculty can serve as the applicant's advisor.

Student Financial Support: The Departments of Animal Science and Poultry Science offer a limited number of research and teaching assistantships that are awarded on a competitive basis. Students may also be supported by research grant funds awarded to faculty members. Students applying for these assistantships are advised to apply by February 15 for fall admission.

Other Relevant Information: There are two curriculum codes for the Animal Science and Poultry Science doctoral degree program. If a student is interested in a program concentration in Animal Science the appropriate curriculum code for the admissions application is ANA. If the student is interested in a program concentration in Poultry Science the appropriate curriculum code for the admissions application is ANP. If the appropriate curriculum code is not selected, it will likely delay the department's receipt of the applicant's information from the Graduate School.

Click on [Graduate Courses - Animal Science](#) for current course information.

Click on [Graduate Courses - Poultry Science](#) for current course information.

Anthropology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Anthropology				Y			

GRADUATE FACULTY

Director of Graduate Programs:

A. H. Ross, Box 8107, , ann_ross@ncsu.edu, Sociology

Adjunct Professors: A. L. Schiller; **Associate Professors:** D. T. Case, S. M. Fitzpatrick, N. M. Haenn, A. H. Ross, J. M. Wallace; **Assistant Professors:** K. L. Ebert, R. S. Ellovich; **Teaching Associate Professors:** W. E. Wormsley

The graduate degree in Anthropology is a 30-hour, two-year long Master of Arts thesis program which will enable students to gain a deeper understanding of the behavior, beliefs, and evolutionary legacy of the human species. In addition to common core courses, students normally select one of three specialty areas in which to focus their studies: Bioarchaeology, Cultural Anthropology, or Environmental Anthropology.

The program provides excellent preparation for students wishing to pursue a Ph.D. in Anthropology. Graduates of the program may also pursue employment in a variety of areas including development organizations and non-profits, human resource management, cultural resource management, museums, or in physical anthropology or archeology labs.

Admissions Requirements: In addition to general Graduate School requirements, applicants are required to provide a completed application, including transcripts, GRE scores, three letters of recommendation, and a personal statement. A writing sample and CV are optional but encouraged. The deadline for completed applications is January 15. The curriculum is set for fall admission only.

Master's Degree Requirements: The M.A. degree requires a total of 30 credit hours. All students take six hours of common core courses in theory and qualitative research and then select one of the three areas: bioarchaeology, cultural anthropology, or environmental anthropology. All students will take six hours of thesis research credit (ANT 695).

Student Financial Support: Teaching and research assistantships are available on a competitive basis. Students are appointed to assistantships with the expectation of reappointment, assuming normal progress, for a period of one year which may be renewable.

Click on [Graduate Courses](#) for current course information.

Architecture

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Architecture					Y		

GRADUATE FACULTY

R. F. Abrams, *Director of the School of Architecture*

Director of Graduate Programs:

D. B. Hill, Box 7701, 515-8357, dbhill@ncsu.edu, Architecture

Professors: R. F. Abrams, T. M. Barrie, G. Bizios, R. H. Clark, M. J. Malecha, W. Place, J. P. Rand, P. Tesar; **Adjunct Professors:** S. D. Atkinson; **Emeritus Professors:** P. Batchelor, F. A. Rifki, H. Sanoff; **Associate Professors:** F. C. Harmon, B. W. Laffitte, H. P. Marchant Montenegro, P. E. Morgado, K. J. Schaffer, J. O. Tector; **Adjunct Associate Professors:** M. Perlik; **Assistant Professors:** D. B. Hill, J. Hu; **Teaching Assistant Professors:** W. H. McKinnon

The School of Architecture offers three tracks to the Master of Architecture degree: Track 1 is for applicants with a four-year undergraduate pre-professional 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 three 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 time.

A variety of courses are available within the School of Architecture in urban and community design, architectural history and theory, material fabrication, 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 5: (1) Portfolio of work; (2) Completed School Personal Data Form; (3) GRE scores (Track 3 applicants only); (4) TOEFL scores (foreign language students only). 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 school stipulates the minimum course credits based on educational and professional goals to individualize a plan of study.

Student Financial Support: The school awards a number of scholarships, awards, and teaching assistantships competitively. It also supports national and statewide scholarships, fellowships, and awards. All support is merit based, not need based. No special application for such support is necessary at the time of admissions.

National Architectural Accrediting Board (NAAB): "In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on its degree of conformance with established educational standards.

"Master's degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, comprise an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

"Professional degree programs in the NC State University School of Architecture (i.e. Master of Architecture and Bachelor of Architecture) are fully accredited by the NAAB. The Bachelor of Environmental Design in Architecture (BEDA) degree, being a pre-professional program, does not fall under NAAB accreditation jurisdiction although it serves as the foundation for the two accredited professional degrees."

Click on [Graduate Courses](#) for current course information.

Art and Design

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Art and Design					Y		

GRADUATE FACULTY

C. D. Cox, *Department Head*

Director of Graduate Programs:

S. D. Brandeis, Box 7701, 515-3876, susan.brandeis@ncsu.edu, Art and Design

Professors: S. D. Brandeis, C. E. Joyner; **Associate Professors:** C. D. Cox, L. M. Diaz, P. J. Fitzgerald, V. K. Plume, D. G. Raymond; **Emeritus Associate Professors:** S. M. Toplikar; **Assistant Professors:** M. Freeman, K. C. Rieder

The Art and Design program offers an educational structure that creates a new art and design professional: one for whom artistic and practical talents are developed as different expressions of individual potential. Our objectives are to graduate highly educated art and design professionals with integrated competencies in art, design, aesthetics, theory, hand and digital technologies, design process, and the combination of skills in the chosen concentration with other disciplines of human knowledge.

Areas of concentration in the Master of Art and Design are (1) Fibers and Surface Design, and (2) Animation and New Media.

Admission Requirements: Students will be required to submit a portfolio of past work in slide or electronic format; three letters of recommendation; a statement of personal goals; and transcripts of undergraduate work (minimum undergraduate GPA of 3.0). An interview will be required, but in cases of international applicants or those quite distant from NC State University, may be conducted by means of a long distance phone conversation or may be waived at the faculty's discretion.

Masters Degree Requirements: The program of study requires a minimum of 48 credit hours of graduate work depending on background preparation of the applicant. Separate tracks of 60 and 72 credit hours accommodate students changing design disciplines or with insufficient background in the chosen concentration.

Other Information: We will only admit students to the program in the fall semester each year. Deadline for application is January 5.

Click on [Graduate Courses](#) for current course information.

Biochemistry

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Biochemistry	Y		Y		Y		

GRADUATE FACULTY

D. T. Brown, *Department Head*

Director of Graduate Programs:

E. S. Maxwell, Box 7622, 515-5803, stu_maxwell@ncsu.edu, Biochemistry

Edwin F. Conger Distinguished Professor of Forestry and Environmental Resources: R. R. Sederoff

William Neal Reynolds Professor: J. Cavanagh, L. K. Hanley

WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS: H. R. Horton

Professors: D. T. Brown, A. C. Clark, H. M. Hassan, C. L. Hemenway, C. Mattos, E. S. Maxwell, E. S. Miller, J. W. Moyer, P. L. Wollenzien; **Adjunct Professors:** K. S. Korach, J. D. Otvos; **Emeritus Professors:** J. S. Kahn, E. C. Sisler, E. C. Theil; **Emeritus Distinguished Professors:** W. L. Miller, H. E. Swaisgood; **Associate Professors:** J. W. Brown, M. B. Goshe, C. C. Hardin, J. M. Horowitz, J. A. Knopp, R. B. Rose, K. R. Weninger; **Research Associate Professors:** H. Gracz, R. Hernandez; **Adjunct Associate Professors:** D. F. Ferreira; **Assistant Professors:** F. Meilleur; **Adjunct Assistant Professors:** R. E. Cannon

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 physical chemistry, as well as biochemistry/molecular biology.

Master of Science Degree Requirements: The Master of Science degree requires a minimum of 30 credit hours of courses and thesis research including nine credit hours in biochemistry graduate core courses. On average, completion of the M.S. degree requires two to three years.

Doctoral Degree Requirements: Requirements for the Ph.D. degree include a minimum of 30 credit hours in course work and thesis research, including the three graduate core courses and 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 five 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.

Click on [Graduate Courses](#) for current course information.

Biological and Agricultural Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Biological and Agricultural Engineering	Y		Y		Y		

GRADUATE FACULTY

R. O. Evans, *Department Head*

Director of Graduate Programs:

D. H. Willits, Box 7625, 515-6755, dan_willits@ncsu.edu, Biological and Agricultural Engineering

Phillip Morris Professor: M. D. Boyette

William Neal Reynolds Distinguished Professor of Biological and Agricultural Engineering: R. W. Skaggs

Professors: J. J. Cheng, C. R. Daubert, R. O. Evans, B. E. Farkas, S. A. Hale, G. D. Jennings, T. M. Losordo, K. P. Sandeep, L. F. Stikeleather, D. H. Willits; **Emeritus Professors:** P. W. Westerman; **Associate Professors:** M. S. Chinn, J. J. Classen, G. L. Grabow, R. L. Huffman, W. F. Hunt, L. W. Li, P. L. Mente, G. T. Roberson, S. B. Shah, R. R. Sharma; **Research Associate Professors:** G. M. Chescheir; **Assistant Professors:** F. P. Birgand, M. R. Burchell, P. Kolar, M. W. Veal, M. A. Youssef; **Research Assistant Professors:** O. D. Simmons; **Adjunct Assistant Professors:** D. M. Amatya, P. R. Puckett; **Extension Professors:** J. Spooner

Course offerings or research facilities are available in the following areas: bioinstrumentation, biomechanics, bioprocessing, food and process engineering, biological systems modeling, aquaculture, hydrology, water table management, ground water management, animal waste management, non-point source pollution, power and machinery, soil and water, controlled environment agriculture, electrical and electronic systems, 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 applicants 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 the last two years was at or above the 3.00 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 Option B non-thesis degree requires 30 hours of approved graduate course work. This degree is available via Distance Education.

M.S.: This is a thesis degree requiring 30 hours of approved graduate coursework.

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.

Click on [Graduate Courses](#) for current course information.

Biomathematics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Biomathematics	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

A. L. Lloyd, Box 8205, 515-1910, allloyd@math.ncsu.edu, Mathematics

Burroughs Wellcome Professor of Pharmacology: J. E. Riviere

Camille Dreyfus Distinguished University Professor: C. K. Hall

Drexel Professor of Mathematics: H. T. Banks

William Neal Reynolds Professor: Z. Zeng

Professors: J. F. Gilliam, N. M. Haddad, A. L. Lloyd, S. R. Lubkin, S. V. Muse, K. H. Pollock, J. F. Selgrade, J. L. Thorne, H. T. Tran, G. G. Wilkerson; **Adjunct Professors:** R. B. Conolly, J. M. Hoenig, P. H. Morgan, R. W. Setzer; **Emeritus Professors:** J. W. Bishir, H. E. Schaffer, R. E. Stinner; **Associate Professors:** K. Gross, M. A. Haider, P. L. Hersh, G. R. Hess, M. Olufsen, C. E. Smith, S. M. Sullivant; **Assistant Professors:** J. Harlim, M. A. Hoefer, N. P. Reading, B. J. Reich, W. Sun, Y. Wu; **Adjunct Assistant Professors:** G. Bobashev, J. S. Kimbell, M. W. Lutz; **Teaching Assistant Professors:** A. N. Duca, M. A. Fenn, J. R. Griggs

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. Additional information on requirements, courses, faculty and current research can be found at the website www.ncsu.edu/biomath.

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 771-772 and one other BMA course; two upper-level biology courses; and three 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 771-772, 773 and 774; three 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 five graduate courses approved by the student's committee, which must include a two-semester sequence and at least one 700-level course.

Financial Assistance: TAs (generally in the Departments of Mathematics or Statistics). RAs and internships are available. Awards are based on GRE scores, transcripts, letters of recommendation, and the personal statement. RAs usually are held by continuing students. To receive **full** consideration for financial aid, the completed

application must be received by January 15.

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.

Click on [Graduate Courses](#) for current course information.

Biomedical Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Biomedical Engineering	Y		Y				

GRADUATE FACULTY

N. L. Allbritton, *Department Head*

Distinguished University Research Professor: D. L. Bitzer

INVISTA Professor of Fiber and Polymer Chemistry: A. E. Tonelli

William Neal Reynolds Professor: J. Cavanagh

Professors: C. F. Abrams, N. L. Allbritton, A. J. Banes, G. D. Buckner, M. Chow, M. G. Forest, R. P. Gardner, E. Grant, R. M. Grossfeld, S. A. Hale, C. Kleinstreuer, H. Krim, A. V. Kuznetsov, G. Lazzi, W. Lin, S. R. Lubkin, D. J. Marcellin, N. Monteiro, H. T. Nagle, R. J. Narayan, H. C. Pillsbury, M. K. Ramasubramanian, J. M. Ramsey, S. C. Roe, W. E. Snyder, L. F. Stikeleather, M. K. Stoskopf, D. E. Thrall, M. A. Vouk; **Adjunct Professors:** W. C. Holton, B. J. Oberhardt, S. Seelecke; **Emeritus Professors:** C. N. Lucas, S. A. Rajala; **Associate Professors:** P. A. Dayton, R. G. Dennis, M. Gamcsik, R. E. Gorga, M. A. Haider, O. A. Harrysson, D. S. Lalush, E. G. Loba-Polefka, J. M. Macdonald, M. G. McCord, P. L. Mente, J. F. Muth, M. Olufsen, A. Rabiei, C. E. Smith, A. M. Stomp, M. A. Tommerdahl, G. M. Walker; **Research Associate Professors:** O. V. Favorov, R. L. Goldberg; **Adjunct Associate Professors:** D. R. Cormier, C. C. Finley; **Assistant Professors:** C. M. Gallippi, S. M. Gomez, G. S. McCarty, G. S. Sawicki, B. N. Steele; **Teaching Associate Professors:** L. A. Cartee, H. O. Ozturk; **Teaching Assistant Professors:** A. J. DiMeo

The Joint Biomedical Engineering Graduate Program is administered by the combined biomedical engineering graduate faculty from both North Carolina State University and University of North Carolina at Chapel Hill. The joint program also has close working relations with the Research Triangle Institute and industry within the Research Triangle area. These associations enable students to obtain research training in a wide variety of fields and facilitate the selection and performance of dissertation research. The department, thus, provides students with excellent opportunities to realize the goal of enhancing medical care through the application of modern technology.

Biomedical engineering is a dynamic field stressing the application of engineering techniques and mathematical analysis to biomedical problems. Faculty research programs are key to the program, and they include three primary research directions: rehabilitation engineering, biomedical imaging, and microsystems engineering. The department offers graduate education in biomedical engineering leading to the master of science and doctor of philosophy degrees. Also, a joint graduate certificate in medical devices is offered.

Students enter this program with backgrounds in engineering, physical science, mathematics or biological science. Curricula are tailored to fit the needs and develop the potential of individual students. In addition, courses in statistics, mathematics, life sciences and engineering sciences provide a well-rounded background of knowledge and skills.

Admission Requirements: Students must satisfy all entrance requirements for The Graduate School of the University of North Carolina at Chapel Hill or the Graduate School at North Carolina State University, and must demonstrate interest and capability commensurate with the quality of the biomedical engineering program. Prospective students may apply to the graduate school at either UNC-Chapel Hill or NC State. All applicants are

considered together as a group. Generally, applications should be submitted by December 15 for consideration for admission in the coming fall semester. Applicants are expected to present Graduate Record Examination (GRE) scores; verbal scores should be at or above the 50th percentile and quantitative scores should be at or above the 70th percentile to be competitive. Admitted students are expected to have an average grade of B (cumulative GPA 3.30) or better and are encouraged to have undergraduate research experience. The program requires that a one-to-three page personal statement about research interest and background be submitted.

Students should have a good working knowledge of mathematics at least through differential equations, plus two years of physical or engineering science and basic courses in biological science. Deficiencies in preparation can be made up in the first year of graduate training.

Master's Degree Requirements: For students with a strong engineering background a minimum of 30 semester hours of graduate study is required for the M.S. Degree. Further information on the BME Master's program can be found on the [department website](#).

Doctoral Degree Requirements: A minimum of 52 semester hours of graduate work is required (beyond the Bachelor's degree). Degree candidates in this program are expected to obtain experience working in a research laboratory during their residence and to demonstrate proficiency in research. The Ph.D. dissertation should be judged by the graduate committee to be of publishable quality. The student must meet the Graduate School's residency requirement at UNC-CH or NC State as appropriate. Further information on the BME Ph.D. program can be found on the [department website](#).

Required and highly recommended courses: Students are required to take a BME Seminar each semester which is offered at both UNC-CH and NC State. Students must also complete six credits of graduate engineering topics, six credits of graduate life science topics, three credits of engineering mathematics, and three credits of statistics. Students may choose from a number of courses to meet these requirements. Such choices are made in consultation with the student's academic advisor and the Director of Graduate Programs/Studies.

Comprehensive and Qualifying Examinations: Master's students are required to take a Comprehensive examination, encompassing coursework and thesis research. The Master's Comprehensive exam may be either written or oral, and is administered by the students advisory committee. Doctoral students qualify for the Ph.D. degree by meeting grade requirements in their core courses, and then advance on to written and oral preliminary exams before admission to candidacy. Details can be found on the [department website](#).

Click on [Graduate Courses](#) for more current course information.

For UNC courses, see [UNC Graduate Record](#).

Business Management

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Business Administration					Y		

GRADUATE FACULTY

D. L. Baumer, *Department Head*

Director of Graduate Programs:

S. G. Allen, Box 7229, 5-5584, steve.allen@ncsu.edu, Economics

Bank of America Distinguished University Professor: R. B. Handfield

Edwin Gill Professor of Business Management: C. P. Jones

J. Lloyd Langdon Distinguished Professorship approved by BOT per July 20, 2010 Memo from Chancellor: S. W. King

Professors: S. G. Allen, P. Arasu, S. H. Barr, J. W. Bartley, D. L. Baumer, C. C. Bozarth, K. D. Brouthers, Y. A. Chen, R. L. Clark, R. E. Kouri, S. E. Margolis, R. C. Mayer, A. Padilla, D. P. Pagach, I. R. Weiss; **Emeritus Professors:** G. W. Dickson, D. M. Holthausen; **Associate Professors:** L. Aiman-Smith, E. A. Baker, P. K. Bergey, J. D. Bohlmann, M. Bradford, J. F. Brazel, B. R. Danielsen, K. S. Davis, J. C. Dutton, J. B. Earp, D. H. Henard, S. Krishnamurthy, S. K. Markham, J. K. McCreery, K. Mitchell, S. Moon, P. W. Mulvey, C. M. Newmark, F. C. Payton, B. B. Tyler, M. D. Walker, R. S. Warr, D. P. Warsing, G. S. Young, G. J. Zuckerman; **Emeritus Associate Professors:** S. N. Chapman, C. W. Harrell, E. A. McDermed, J. C. Poindexter; **Assistant Professors:** T. Caner, T. Hollmann, W. Kang, C. L. Rossetti, M. A. Stanko, J. S. Stonebraker, D. M. Townsend, J. Zhao; **Teaching Associate Professors:** S. J. Schanz

The Master of Business Administration (MBA) program develops leaders for tomorrow's markets and technologies. NC State's MBA provides a solid foundation in the principles of finance, marketing, and other traditional business subjects.

The most distinctive feature of the program is its emphasis on management of technology. We offer concentrations in BioSciences Management, Financial Management, Marketing Management, Innovation Management, Services Management, Supply Chain Management, and Technology Entrepreneurship. Most students have a technology background, either from their undergraduate degree or previous work experience.

Admission Requirements: 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, essays, and relevant work experience. Students must have a previous coursework in calculus or statistics before entering the program. For further information, please visit the MBA website at www.mba.ncsu.edu.

Master's of Business Administration: The MBA curriculum requires that every student complete the core curriculum listed below, along with concentration and elective courses, for a total of 56 credit hours for full-time students and 45 credit hours for part-time students.

MBA 503 Survey of Accounting

MBA 504 Data Analysis and Forecasting Methods for Management

MBA 505 Global Economics for Managers

MBA 520 Managerial Finance
MBA 530 People Management
MBA 540 Operations and Supply Chain Management
MBA 550 Management of Technology and Innovation
MBA 560 Marketing Management and Strategy
MBA 580 Global Strategy

Technical Concentration: Minimum of 12 hours of courses in one of the following areas: BioSciences Management, Financial Management, Marketing Management, Innovation Management, Services Management, Supply Chain Management, and Technology Entrepreneurship.

Electives: Minimum of 15 hours for full-time students; minimum of nine (9) hours for part-time students.

Minor in Management: Students enrolled in Master's and doctoral programs can complete the minor by taking courses that meet requirements for the MBA degree. Master's students must take nine (9) hours; doctoral students must take 15 hours.

Click on [Graduate Courses](#) for current course information.

Chemical and Biomolecular Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Chemical Engineering	Y		Y		Y		

GRADUATE FACULTY

P. S. Fedkiw, *Department Head*

Director of Graduate Programs:

S. A. Khan, Box 7905, 5-4519, khan@eos.ncsu.edu, Chemical and Biomolecular Engineering

Alcoa Professor of Chemical and Biomolecular Engineering: S. A. Khan, G. N. Parsons

ALCOA Professor of Chemical Engineering: R. M. Kelly

Camille Dreyfus Distinguished University Professor: C. K. Hall

Camille Dreyfus Professor Emeritus: H. B. Hopfenberg

Celanese Acetate Professorship in Chemical and Biomolecular Engineering: J. Genzer

Distinguished Professor: D. F. Ollis

Elis and Signe Olsson Professorship: H. Jameel

Frank Hawkins Kenan Distinguished Professor: R. G. Carbonell

INVISTA Professorship in Chemical and Biomolecular Engineering: O. D. Velev

William A. Klopman Distinguished Professor: B. Pourdeyhyimi

William R. Kenan, Jr. Distinguished Professor of Chemistry: J. M. DeSimone

Worley H. Clark Distinguished University Professor: K. E. Gubbins

Professors: C. M. Balik, A. C. Clark, C. R. Daubert, P. S. Fedkiw, M. C. Flickinger, C. S. Grant, J. M. Haugh, H. H. Lamb, P. K. Lim, R. J. Spontak, P. R. Westmoreland; **Adjunct Professors:** A. L. Andradý, G. H. Findenegg, D. J. Kiserow, M. Schoen, M. Sliwinska-Bartowiak; **Emeritus Named Professors:** R. M. Felder; **Associate Professors:** R. E. Gorga, S. W. Peretti; **Assistant Professors:** M. D. Dickey, W. Henderson, B. M. Rao, G. T. Reeves; **Research Assistant Professors:** K. Efimenko, J. S. Jur, S. Smoukov; **Adjunct Assistant Professors:** M. D. Burke, P. V. Gurgel, E. E. Santiso; **Extension Associate Professors:** H. Winston; **Teaching Associate Professors:** G. L. Gilleskie; **Teaching Assistant Professors:** J. H. van Zanten

Research activities in the department include: computational nanoscience and biology; biomolecular engineering and biotechnology; catalysis, combustion, kinetics and electrochemical engineering; biofuels and renewable energy technology; green chemistry and engineering; innovative textiles, polymers and colloids; nanoscience and nanoengineering; and thermodynamics and molecular simulation.

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: The M.S. degree requires a minimum of 30 credit hours. A set of four core courses is required. Two options are provided. In the thesis option, the thesis must be defended in a final public oral examination. In the non-thesis option, the student must satisfactorily complete a total of 10 graduate

courses. A unique feature of the non-thesis option is the availability of a Distance Education Masters in which the students can complete all 30 credit hours remotely through online courses offered via streaming videos without being on campus.

Master of Chemical Engineering Degree Requirements: The M.Ch.E. degree requires a minimum of 30 credit hours. A set of four core courses is required. A three-credit project is also required.

Doctor of Philosophy Degree Requirements: Students normally take a set of five core courses, two advanced 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.

Click on [Graduate Courses](#) for current course information.

Chemistry

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Chemistry	Y		Y				

GRADUATE FACULTY

C. B. Gorman, *Department Chair*

C. B. Gorman, Box 8204, , chris_gorman@ncsu.edu, Chemistry

Glaxo Distinguished University Professor of Chemistry: J. S. Lindsey

Howard J. Schaffer Distinguished Professor of Chemistry: B. M. Novak

Kobe Steel Distinguished Professor: D. W. Brenner

Professors: A. J. Banks, E. F. Bowden, C. L. Bumgardner, D. L. Comins, S. Franzen, C. B. Gorman, K. W. Hanck, F. C. Hentz, M. Khaledi, J. D. Martin, D. C. Muddiman, D. A. Shultz, A. I. Smirnov, G. H. Wahl, M. H. Whangbo, J. L. Whitten; **Emeritus Professors:** R. D. Bereman, H. H. Carmichael, L. D. Freedman, F. W. Getzen, R. H. Loeppert, C. G. Moreland, S. T. Purrington, A. F. Schreiner, E. O. Stejskal, W. P. Tucker, R. C. White; **Associate Professors:** C. B. Boss, A. Deiters, T. B. Gunnoe, P. A. Maggard, M. T. Oliver-Hoyo, T. I. Smirnova, W. L. Switzer, D. W. Wertz, J. L. White; **Assistant Professors:** R. A. Ghiladi, L. He, E. A. Ison, E. Jakubikova, C. C. Melander, A. A. Nevzorov, L. A. Sombers, W. W. Weare, G. J. Williams

The Department of Chemistry offers programs of study leading to the Doctor of Philosophy and Master of Science degrees. These degrees are based on coursework and original research. 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 January 15 (domestic students) and January 1 (international students); for spring admission, by August 15.

Master's Degree Requirements: The Master of Science (M.S.) degree in chemistry is a research degree that requires six graduate courses, a minimum of 30 credit hours, and research leading to a thesis.

Doctoral Degree Requirements: In the doctoral program, emphasis is placed on original research and a comprehensive knowledge of one's chosen field.

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, biotechnology and 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. Fifteen new faculty members have been added in the last ten years, thereby

greatly enhancing opportunities for graduate research especially in cutting edge interdisciplinary programs.

Click on [Graduate Courses](#) for current course information.

Civil Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Civil Engineering	Y		Y		Y		
Environmental Engineering			Y		Y		

GRADUATE FACULTY

M. A. Barlaz, *Department Head*

Director of Graduate Programs:

V. C. Matzen, Box 7908, 515-7736, matzen@eos.ncsu.edu, Civil Engineering

Distinguished Professor of Civil Engineering: S. Rizkalla

Professors: M. A. Barlaz, J. W. Baugh, R. C. Borden, R. H. Borden, E. D. Brill, J. Ducoste, B. L. Edge, H. C. Frey, M. A. Gabr, T. Hassan, M. I. Hoit, J. E. Hummer, N. P. Khosla, Y. R. Kim, D. R. Knappe, M. J. Kowalsky, G. F. List, V. C. Matzen, J. M. Nau, M. F. Overton, M. S. Rahman, S. Ranjithan, W. J. Rasdorf, N. M. Rouphail, J. R. Stone; **Adjunct Professors:** B. Kasal; **Emeritus Professors:** M. Amein, J. F. Ely, J. S. Fisher, A. K. Gupta, K. S. Havner, C. L. Heimbach, Y. Horie, S. W. Nunnally, C. C. Tung, H. E. Wahls; **Emeritus Distinguished Professors:** D. W. Johnston; **Emeritus Distinguished University Professors:** J. M. Hanson, P. Z. Zia; **Associate Professors:** F. De Los Reyes, M. N. Guddati, A. Gupta, M. L. Leming, G. Mahinthakumar, R. Seracino, A. A. Tayebali, B. M. Williams; **Adjunct Associate Professors:** L. R. Goode, D. van der Vaart; **Emeritus Associate Professors:** W. L. Bingham, A. C. Chao, E. D. Gurley, J. C. Smith; **Assistant Professors:** S. Arumugam, C. P. Bobko, J. F. DeCarolus, T. M. Evans, M. Liu, J. Yu; **Adjunct Assistant Professors:** B. J. Schroeder; **Teaching Assistant Professors:** T. Aziz

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

Admission Requirements: Normal minimum requirements include an overall 3.0 GPA and a 3.2 GPA in the major. Students who do not meet this academic requirement may take graduate courses through the [Non Degree Studies](#) program to demonstrate academic ability, but consultation with the Director of Graduate Programs is advised. Applicants without academic experience in civil engineering, construction engineering, or environmental engineering may be required to take undergraduate courses to remove deficiencies, but graduate credit is not given for these courses. The Graduate Record Examination normally is required of all applicants.

Master's Degree Requirements: Four Master's degrees, requiring a minimum of 30 or 31 credit hours, are available. At least two-thirds of a Master's program should be in a well-defined major area of concentration. The M.CE. is a non-thesis (Option B) degree with other requirements, such as independent projects or core courses, specified in some areas of specialization. A formal minor is not permitted. The M.CE. is available both on-campus and through distance education. The M.S.CE degree requires a thesis and a formal minor is optional. Requirements for the M.ENE and M.S.ENE are the similar to those for the CE degrees.

Doctoral Degree Requirements: The Ph.D. typically requires one year of full-time course work beyond the master's degree and research culminating in a dissertation. 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. All

specialty areas, including Environmental Engineering, are included in the one Ph.D. program.

Student Financial Support: Departmental teaching and research assistantships are available including coverage of tuition and health insurance. Fellowships supplementing the assistantships are available for exceptional applicants. All financial aid recipients are selected on merit-based competition with other applicants. Applications requesting financial aid (both U.S. and international) should be submitted early: February 1 for Fall admission and by July 15 for Spring admission, although these are not deadlines.

Click on [Graduate Courses](#) for current course information.

Communication

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Communication			Y				

GRADUATE FACULTY

K. S. Zagacki, *Department Head*

Director of Graduate Programs:

M. A. Johnson, Box 8104, 515-9757, melissa_johnson@ncsu.edu, Communication

Professors: D. M. Berube, V. J. Gallagher, J. Keyton, R. L. Schrag, C. A. Smith, K. S. Zagacki; ***Emeritus Professors:*** W. J. Jordan, C. A. Parker; **Associate Professors:** K. Albada-Jelgersma, D. P. Dannels, D. A. DeJoy, E. T. Funkhouser, J. K. Jameson, M. A. Johnson, W. J. Kinsella, J. Kiwanuka-Tondo, J. Packer, S. R. Stein, S. B. Wiley; ***Emeritus Associate Professors:*** R. Leonard, B. L. Russell; **Assistant Professors:** A. R. Binder, E. A. Craig, A. de Souza e Silva, K. A. Kosenko, J. L. Moore, R. D. Waters; **Teaching Assistant Professors:** C. L. Moss

The Master of Science program in communication is designed to provide graduate-level expertise for solving problems in modern organizations and social systems from a communication perspective and addresses issues concerned with interpersonal, relational and technologically mediated communication systems essential to modern, networked organizations and societies. Its graduates will acquire advanced-level expertise in communication theory, research and applications that will improve processes and enhance outcomes within and across diverse social systems. The degree prepares students for higher-level managerial positions in communication professions.

Admission Requirements: Applicants should have a minimum 3.0 GPA in the undergraduate major and a minimum of 3.0 over the last 60 hours of undergraduate work.

Master's Degree Requirements: The degree requires 36 credit hours with a minimum of 27 credit hours taken in communication; up to 9 hours may be taken outside of the department with the approval of the graduate advisor. Students will be required to complete 9 hours in communication theory, 6 hours in communication research methods and 12 hours in applied communication courses. They will also be required to complete 9 hours as electives to be chosen from among the first three groups of courses or up to 9 hours of electives may be taken outside the department with the approval of the graduate advisor.

Click on [Graduate Courses](#) for current course information.

Communication, Rhetoric, and Digital Media

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Communication Rhetoric and Digital Media	Y						

GRADUATE FACULTY

Director of Graduate Programs:

S. B. Wiley, Box 8104, 59736, steve_wiley@ncsu.edu, Communication

Distinguished University Professor: C. M. Anson

SAS Institute Distinguished Professor of Rhetoric and Technical Communication: C. R. Miller

Professors: D. M. Berube, M. P. Carter, V. J. Gallagher, H. D. Kellner, A. M. Penrose, R. L. Schrag, K. S. Zagacki;

Emeritus Professors: W. J. Jordan; **Associate Professors:** K. Albada-Jelgersma, D. H. Covington, D. P. Dannels, R. S. Dicks, J. K. Jameson, M. A. Johnson, S. M. Katz, W. J. Kinsella, J. Kiwanuka-Tondo, S. K. Miller-Cochran, J. Packer, D. M. Rieder, S. R. Stein, J. Swarts, S. B. Wiley; **Assistant Professors:** E. A. Craig, A. de Souza e Silva, O. Gelley, J. L. Moore, T. L. Stinson, R. D. Waters

The interdisciplinary Ph.D. program in Communication, Rhetoric, and Digital Media (CRDM) is offered by the College of Humanities and Social Sciences with the cooperation of the Department of Communication and the Department of English. Built on the premise that new developments in communication media and information technologies require a dramatic shift in instruction and research, the program integrates the study of oral, written, and visual modes of communication to focus on the human dimensions of information and communication technologies.

Students can create programs of study in areas such as computer-mediated communication, visual rhetoric, digital culture, electronic communication across the curriculum, media and technology policy, textual mediation, digital literacy, online information design, and new media assessment/analysis. Graduates will help meet the increasing national demand for faculty with technology specializations to teach and lead programs in areas such as writing and speaking across the curriculum, organizational and interpersonal communication, composition studies, technical communication, rhetorical studies, and media studies. Industry and government also need professionals to conduct research, manage development, and analyze policy in the uses and applications of new communication technologies. See our [website](#) for more detail.

Admission Requirements: Master's degree in Communication, English, Rhetoric, or other relevant field with GPA of 3.0 or better. Master's level work should include one quantitative or qualitative methods course, as well as three courses in an approved [disciplinary area](#) and one in a second disciplinary area. Applicants who are otherwise well qualified may make up these courses after admission. GRE scores, a statement of goals and interests, a resume of work experience, and a writing sample are also required for application to the program. The application deadline is January 15.

Ph.D. Degree Requirements: A minimum of 56 hours beyond the Master's degree are required to complete the Ph.D. program: 15 credit hours of core courses, 3 hours of research methods, 6 hours of professional preparation, 12 hours in an elective focus area, and 20 hours of research and dissertation. Students entering directly from a Master's program at NC State may be able to count additional Master's work toward some of these requirements.

Student Financial Support: The CRDM program offers a limited number of Teaching Assistantships, with a stipend, health insurance, and tuition (excluding fees). Teaching Assistants will be assigned according to their interests and qualifications to either the Communication or the English Department with the possibility of teaching in both departments during their course of study. Those who do not have sufficient qualifications to teach in the first semester will participate in a training program. Some Research Assistantships may also be available.

Click on [Graduate Courses](#) for current course information.

Comparative Biomedical Sciences

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Comparative Biomedical Sciences	Y		Y				

GRADUATE FACULTY

Director of Graduate Programs:

S. L. Jones, Box 8401, 3-6459, sam_jones@ncsu.edu, Clinical Sciences

Burroughs Wellcome Professor of Pharmacology: J. E. Riviere

William Neal Reynolds Professor: R. R. Anholt

Professors: K. B. Adler, G. W. Almond, K. L. Anderson, P. Arasu, H. J. Barnes, A. T. Blikslager, M. Breen, E. B. Breitschwerdt, T. T. Brown, J. M. Cullen, G. A. Dean, D. C. Dorman, L. N. Fleisher, F. J. Fuller, J. E. Gadsby, B. C. Gilger, J. S. Guy, B. Hammerberg, E. C. Hawkins, C. L. Hemenway, J. M. Hinshaw, L. Jaykus, S. L. Jones, S. M. Laster, J. M. Law, J. F. Levine, M. G. Levy, D. H. Ley, M. C. McGahan, K. M. Meurs, N. Monteiro, W. M. Morrow, P. E. Mozdziaik, T. J. Olivry, P. E. Orndorff, M. G. Papich, J. A. Piedrahita, M. C. Roberts, P. L. Sannes, B. Sherry, R. C. Smart, J. W. Spears, M. K. Stoskopf, D. E. Thrall, D. W. Threadgill; **Research Professors:** A. R. Brody, S. Kennedy-Stoskopf; **Clinical Professors:** R. A. Mansmann; **Adjunct Professors:** T. K. Archer, R. S. Balaban, M. W. Dewhirst, H. A. Fine, J. N. Kornegay, C. S. Lau, J. A. Raleigh, R. M. Simpson, J. K. Taubenberger; **Associate Professors:** R. E. Baynes, A. J. Birkenheuer, J. C. Bonner, M. T. Correa, P. Cowen, P. W. Farin, S. Y. Gardner, W. A. Gebreyes, M. L. Hauck, J. M. Horowitz, D. X. Lascelles, N. J. Olby, M. Rodriguez-Puebla, B. D. Slenning, G. W. Smith, C. R. Swanson, J. A. Yoder; **Adjunct Associate Professors:** B. R. BERRIDGE, R. S. DeWoskin, J. A. Dye, R. W. Litaker, E. B. Neufeld, R. C. Sills; **Assistant Professors:** C. S. Bailey, L. B. Borst, J. L. Davis, T. Ghashghaei, I. M. Gimeno, J. L. Gookin, Y. Kim, R. J. McMullen, A. J. Moeser, N. M. Nascone-Yoder, J. A. Neel, S. E. Suter, S. Thakur; **Research Assistant Professors:** T. L. Leavens, R. Thomas, X. R. Xia; **Clinical Associate Professors:** R. B. Baker, K. E. Linder, S. L. Marks, W. R. Redding, B. L. Sherman; **Clinical Assistant Professors:** K. H. Chappell; **Adjunct Assistant Professors:** M. L. Bradley, J. M. Giraudel, D. E. Malarkey; **Teaching Associate Professors:** J. A. Barnes

Course offerings and research topics currently include, but are not limited to: cell biology, genomics, infectious diseases, developmental biology, immunology, cardiology, pharmacokinetics, oncology, toxicology, gastroenterology, neuroscience, 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 Studies Committee of the CBS Program, composed of faculty members representing each area of the graduate program and a graduate student representative. 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 as five areas of concentration which include: cell biology, epidemiology/ population medicine, infectious diseases, pathology, and pharmacology. These provide extensive interdisciplinary training and maintain a highly effective liaison with graduate programs in other colleges of the university, as well as those of nearby Duke University and the University of North Carolina at Chapel Hill.

Click on [Graduate Courses](#) for current course information.

Computer Networking

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Computer Networking			Y				

GRADUATE FACULTY

Directors of Graduate Programs:

D. S. Reeves, Box 8206, 515-2044, reeves@csc.ncsu.edu, Computer Science

M. Devetsikiotis, Box 7911, , mdevets@eos.ncsu.edu, Electrical and Computer Engineering

Professors: M. Chow, M. Devetsikiotis, L. Lunardi, V. Misra, A. Nilsson, P. Ning, H. G. Perros, D. S. Reeves, I. Rhee, G. Rouskas, M. P. Singh, W. J. Stewart, D. J. Thunte, H. J. Trussell, I. Viniotis, M. A. Vouk; **Associate Professors:** G. T. Byrd, R. Dutta, D. Y. Eun, K. H. Harfoush, M. L. Sichitiu, W. Wang, T. Yu; **Adjunct Assistant Professors:** R. D. Callaway

The Master of Science in computer networking may be earned through the M.S. with thesis option or through the non-thesis option. Either option may be used as preparation for further graduate study or employment in industrial research, development or design environment, although students planning to continue on for a Ph.D. should discuss the option selected with their advisors.

The Master of Science in Computer Networking is also available as an online degree program. This degree has a non-thesis option, does not require on campus attendance, and may be used in preparation for further graduate student or employment in an industrial research, development or design environment. The program is available to USA residents and to United States military personnel serving overseas and it is offered online through [Engineering OnLine](#).

Admission Requirements: Admissions criteria will adhere to those currently listed on the program website <http://networking.ncsu.edu>.

Master's Degree Requirements: Computer networking core courses constitute 9 of the 30 minimum credit hours. Students take 12 additional credit hours of computer networking courses from one of four currently defined technical concentration areas: network design, network hardware, network software, or networking services. The remaining 9 credit hours may be taken from an approved management concentration sequence, as additional courses in the computer networking technical concentration areas, or as 6 hours of thesis and 3 credit hours from the list of approved computer networking courses. At least 6 of the 30 credits must come from the 700 level, and non-letter graded courses such as individual studies courses may account for a maximum of 3 credit hours.

CORE COURSES

CSC(ECE) 570 Computer Networks

CSC(ECE) 579 Introduction to Computer Performance Modeling

Select one of the following business courses:

MBA 554 Project Management (Summer, Fall, Spring)

MBA 590 Special Topics: Management Foundations (Fall)

MBA 590 Special Topics: Service Management (Spring)

TECHNICAL CONCENTRATION

CSC 501 Operating System Principles
CSC(ECE) 506 Architecture of Parallel Computers
CSC 510 Software Engineering
CSC 513 E-Commerce technology
CSC(MBA) 516 E-commerce Practicum
CSC 557 Multimedia Technology
CSC(ECE) 573 Internet Protocols
CSC(ECE) 574 Information Systems Security
CSC(ECE) 575 Introduction to Wireless Networking
CSC(ECE) 576 High Speed Networks
CSC 714 Real-Time Computer Systems
CSC 715 Concurrent Software System
CSC 716 Design of Secure and Reliable Systems
CSC 724 Advanced Distributive Systems
CSC 750 Service-Oriented Computing
CSC(ECE) 772 Survivable Networks
CSC(ECE) 773 Advanced Topics in Internet Protocols
CSC(ECE) 774 Network Security
CSC(ECE) 776 Performance Evaluation of Computer Networks
CSC(ECE) 775 Advanced Topics in Wireless Networks
CSC(ECE) 777 Telecommunications Network Design
CSC(ECE) 779 Advanced Computer Performance Modeling
CSC(ECE) 778 Optical Networks
ECE 514 Random Processes
ECE 520 Digital ASIC Design
ECE 521 Computer Design and Technology
ECE 523 Photonics and Optical Communications
ECE 546 VLSI System Design
ECE 733 Digital Electronics
ECE 761 Design Automation for VLSI

MANAGEMENT CONCENTRATION

MBA 503 Survey of Accounting
MBA 514 Technology, Competition and the Law
MBA 520 Managerial Finance
MBA 541 Supply Chain Relationships
MBA 542 Supply Chain Logistics
MBA 543 Planning and Control Systems
MBA 554 Project Management
MBA 576 Technology Evaluation and Commercialization Concepts
MBA 577 High Technology Entrepreneurship
MBA 590 Special Topics: Decision Support Systems
MBA 590 Special Topics: Business Process Analysis and Design
MBA 590 Special Topics: Business Relationship Management
MBA 590 Special Topics: Consulting
MBA 590 Special Topics: Service Management

Computer Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Computer Science	Y		Y		Y		

GRADUATE FACULTY

M. A. Vouk, *Department Head*

Director of Graduate Programs:

D. S. Reeves, Box 8206, 515-2044, reeves@csc.ncsu.edu, Computer Science

Distinguished University Professor: M. A. Rappa

Distinguished University Research Professor: D. L. Bitzer

McPherson Family Distinguished Professor of Engineering Entrepreneurship: T. K. Miller

SAS Institute Distinguished Professor of Computer Science: J. Doyle

Professors: A. I. Anton, M. Devetsikiotis, R. J. Fornaro, E. L. Kaltofen, G. Lazzi, J. C. Lester II, C. Meyer, R. F. Mueller, P. Ning, H. G. Perros, D. S. Reeves, I. Rhee, R. D. Rodman, E. Rotenberg, G. Rouskas, C. D. Savage, M. P. Singh, W. E. Snyder, M. F. Stallmann, W. J. Stewart, D. J. Thuente, I. Viniotis, M. A. Vouk; **Adjunct Professors:** S. P. Iyer; **Emeritus Professors:** W. Chou, E. W. Davis Jr, J. C. Glass, D. F. McAllister, A. L. Tharp; **Associate Professors:** D. R. Bahler, G. T. Byrd, R. Y. Chirkova, A. G. Dean, R. Dutta, V. W. Freeh, E. F. Gehringer, K. H. Harfoush, C. G. Healey, S. Heber, T. L. Honeycutt, X. Ma, G. Mahinthakumar, N. F. Samatova, J. S. Scroggs, M. L. Sichitiu, Y. Solihin, R. A. St. Amant, W. Wang, B. A. Watson, L. A. Williams, T. Xie, R. M. Young, T. Yu; **Adjunct Associate Professors:** J. Kang, X. Wang; **Assistant Professors:** X. Gu, X. Jiang, E. R. Murphy-Hill, K. Ogan, D. L. Roberts; **Adjunct Assistant Professors:** A. J. Rindos

The Department of Computer Science is one of the leading computer science departments in the country and indeed the world. Twenty of our faculty have received prestigious NSF CAREER development awards. Total research expenditures have quadrupled over the last few years and graduate enrollments have climbed to approximately 500 students. The faculty has broad-ranging research strengths including **Theory** (Algorithms, Theory of Computation); **Systems** (Computer Architectures and Operating Systems, Embedded and Real-Time Systems, Parallel and Distributed Systems, Scientific and High Performance Computing); **Artificial Intelligence** (Intelligent Agents, Data-Mining, Information and Knowledge Discovery, Engineering and Management; eCommerce Technologies; Information Visualization, Graphics and Human-Computer Interaction); **Networks** (Networking, Performance Evaluation, Sensor Networks, Protocols); **Security** (Software and Network Systems Security, Information Assurance, Privacy); **Software Engineering** (Requirements, Formal Methods, Reliability Engineering, Process and Methods, Programming Languages); and **Computer-Based Education**. Areas of strength in applied research include bioinformatics, scientific computation, e-commerce and data mining.

Admission Requirements: Minimum application requirements include an accredited Bachelor's degree with at least a B average and computer science course work at least equivalent to nearly a major. Applicants must submit scores for the GRE General Tests. It is recommended that financial aid and Ph.D. applicants also take the GRE Computer Science Subject Test.

Master's Degree Requirements: The M.S. requires 30 graduate credits including at least one course from each of the core areas of Theory (CSC 505, 512, 565, 579, 580, and 707) and Systems (CSC 501, 506, 510, 520, 540, 562,

and 570) and thesis research (typically six credits). The advisory committee may waive the thesis requirement for students planning to pursue the Ph.D. who pass the Ph.D. written preliminary examination and complete specified additional course work in lieu of thesis research. The Master of Computer Science (M.C.S.) is a professional degree granted upon successful completion of 30 hours of course work, including three core courses with at least one from each of the two core areas and CSC 600. The M.C.S. degree is offered as an on-campus program or as a Distance Education program. The Master of Science in Computer Networking (M.S.C.N.) is a 30 credit-hour degree offered as either a thesis or non-thesis program and is available as a Distance Education program.

Doctoral Degree Requirements: Ph.D. students normally complete 72 semester hours of post-baccalaureate course and research work. They must also complete at least two courses from each of the two core areas with at least a 3.5 GPA and two 700-level CSC courses, individualized in-depth written and oral preliminary examinations, and a public defense of their dissertation describing substantial, original, and independent scholarly work.

Student Financial Support: During 2010-2011 academic year, approximately 150 students held teaching and research assistantships. The Department also has Nortel, IBM, GEM, Provost's, and Dean's Fellowships, which are awarded to outstanding candidates. In addition, the Department's Industrial Assistantship and Fellowship Programs and co-ops provide graduate student RA positions and part-time work at IT firms across the country.

Other Relevant Information: Graduates at all levels are highly respected and recruited. They have enjoyed successful careers locally and throughout the country and the world. Many Master's degree graduates begin or continue careers in advanced networking or software development in the Research Triangle Park and on the West Coast at companies such as IBM, Microsoft, Google, SAS, Intel, Netapp, and Cisco. Many recent Ph.D.s have positions of technical leadership in well-known large companies and prominent research laboratories, including Google, Microsoft Research, and IBM Research Labs, or have obtained tenure-track faculty positions at Research I institutions.

Click on [Graduate Courses](#) for current course information.

Crop Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Crop Science	Y		Y		Y		

GRADUATE FACULTY

M. G. Waggoner, *Department Head*

Director of Graduate Programs:

R. Wells, Box 7620, 53667, randy_wells@ncsu.edu, Crop Science

Bayer Environmental Science Professor of Sustainable Development: T. W. Rufty

DISTINGUISHED PROFESSOR EMERITUS: G. F. Peedin

Philip Morris Professor: R. E. Dewey

Philip Morris Professorship (Named Associate Professor): L. R. Fisher

Phillip Morris Professor: W. D. Smith

PHILLIP MORRIS PROFESSOR EMERITUS: W. K. Collins

R. J. Reynolds Tobacco Company Professor: J. C. Wynne

University Research Professor: W. F. Thompson

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

William Neal Reynolds Emeritus Distinguished Professor: A. C. York

WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS: E. A. Wernsman

Professors: D. C. Bowman, R. J. Cooper, E. J. Dunphy, K. L. Edmisten, G. E. Fernandez, J. T. Green, C. H. Haigler, R. W. Heiniger, T. G. Isleib, D. L. Jordan, J. Luginbuhl, G. L. Miller, J. P. Mueller, J. P. Murphy, R. P. Patterson, C. H. Peacock, R. Qu, R. C. Rufty, J. F. Spears, H. T. Stalker, P. R. Weisz, R. Wells, T. R. Wentworth, G. G. Wilkerson, F. H. Yelverton; ***USDA Professors:*** F. L. Booker, G. Brown-Guedira, K. O. Burkey, J. C. Burns, J. W. Burton, T. E. Carter, E. L. Fiscus, J. B. Holland, D. P. Livingston, D. S. Marshall, R. F. Wilson; ***Adjunct Professors:*** K. D. Getsinger, R. Liebl, T. R. Sinclair; ***Emeritus Professors:*** C. A. Brim, A. H. Bruneau, B. E. Caldwell, D. S. Chamblee, H. D. Coble, W. A. Cope, F. T. Corbin, D. A. Emery, J. D. Gregory, H. D. Gross, G. L. Jones, J. A. Lee, W. M. Lewis, H. M. Linker, R. C. Long, H. Seltmann, G. A. Sullivan, D. H. Timothy, J. B. Weber, W. W. Weeks, A. K. Weissinger, A. D. Worsham; ***Associate Professors:*** J. M. Alonso, J. D. Burton, A. J. Cardinal, D. A. Danehower, T. H. Emigh, R. S. Lewis, R. J. Richardson, E. B. Wilson; ***USDA Associate Professors:*** M. D. Krakowsky; ***Emeritus USDA Professors:*** G. R. Gwynn, D. L. Thompson; ***Adjunct Associate Professors:*** M. D. Netherland; ***Emeritus Associate Professors:*** R. D. Keys; ***Assistant Professors:*** W. J. Everman, S. Johnson, V. Kuraparthi, S. R. Milla-Lewis, S. C. Reberg-Horton, M. S. Schroeder-Moreno; ***Research Assistant Professors:*** S. P. Tallury; ***USDA Assistant Professors:*** E. Taliario; ***Teaching Assistant Professors:*** C. V. Jordan

The Department of Crop Science offers programs of study leading to the Master of Crop Science (M.C.S.), Master of Science (M.S.) and Doctorate of Philosophy (Ph.D.) degrees. The M.S. and Ph.D. programs are based upon original research while the M.C.S degree is a non-thesis degree program. Areas of study in the department include plant breeding, genetics and molecular biology; crop production, management, chemistry and physiology; sustainable agriculture and agro-ecology; turf grass management and science; integrated pest management, weed science and crop modeling.

Excellent facilities for graduate education are available, including wet and dry labs for preparation and analysis of

plant and soil samples, cold storage facilities, greenhouses, controlled environmental chambers, computing facilities and the Southeastern Plant Environment Laboratories (Phytotron) for highly controlled plant environmental research. Agriculturally, North Carolina has a wide array of environments and soils for field research. This includes the sandy coastal plains and black lands of eastern NC, the central Piedmont with its clay soils, and the mountains of NC with their unique environments and soils. University and State research stations are located strategically throughout each of these regions and are widely used for field research.

Crop Science programs also benefit from strong cooperative ties with other departments and institutions. Graduate students in Crop Science work cooperatively with and/or obtain instruction in the Departments of Animal Science, Biochemistry, Chemistry, Computer Science, Entomology, Horticultural Science, Genetics, Mathematics, Microbiology, Plant Biology, Plant Pathology, Soil Science and Statistics. Cooperative efforts link our programs with faculty at a number of land grant and international universities as well as with leaders in agribusiness and environmental protection.

Admissions Requirements: Prospective students should be graduates of an accredited university with a major in agronomy, animal science, biology, crop science, genetics, horticulture, plant science or related field of study. Graduates from other degree programs will be considered but may be asked to make up certain undergraduate deficiencies. Acceptance of applicants is competitive and limited by program space and funding. Applicants should have a minimum of a 3.0 (out of 4.0) GPA and a minimum combined GRE score of 1000 on the verbal and quantitative portions of the exam. Exceptions to these guidelines may be made for students with special backgrounds, abilities or interests.

Master's Degree Requirements: *Master of Science Degree:* Requirements include a minimum of 30 semester hours of course work, including one hour of Seminar (CS 601) and six hours of Statistics (ST 511 and ST 512 or equivalent), completion of a thesis, a comprehensive oral examination and presentation of an exit seminar. *Master of Crop Science Degree:* M.C.S. requirements include a minimum of 36 semester hours of graduate work with a minimum of four, but no more than six, credit hours of Special Problems (CS 620). One hour of Crop Science Seminar (CS 601), three hours of Statistics (ST 511 or equivalent), a comprehensive oral examination and presentation of an exit seminar are also required.

Doctoral Degree Requirements: Ph.D. Candidates must demonstrate an ability to conduct original research and scholarly work at the highest level and produce an acceptable dissertation. Doctoral students must take a minimum of 72 graduate credit hours beyond the Bachelor's degree. They must also pass a preliminary examination (written and oral components) and a final oral examination. Presentation of an exit seminar is required.

Student Financial Support: Graduate assistantships and fellowships will be awarded to qualified applicants depending on funding availability and program space. Tuition is typically waived for students granted assistantships. Student health insurance is also provided to all students on assistantship.

Other Relevant Information: A thesis (M.S. and Ph.D.) or special problem (Master of Crop Science) outline and Plan of Graduate Work should be submitted to the Director of Graduate Programs by the end of the first regular (spring or fall) semester.

Click on [Graduate Courses](#) for current course information.

Curriculum, Instruction, and Counselor Education

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Clinical Mental Health Counseling			Y			Y	
College Counseling and Student Development			Y			Y	
Curriculum and Instruction	Y		Y			Y	
Instructional Technology			Y			Y	
School Counseling	Y		Y			Y	
Special Education			Y			Y	

GRADUATE FACULTY

E. S. Vasu, *Department Head*

Directors of Graduate Programs:

R. J. Pritchard, Box 7801, 5-1784 or 515-2231, ruie_pritchard@ncsu.edu, Curriculum, Instruction, and Counselor Education

S. Ting, Box 7801, 5-6362, ting@unity.ncsu.edu, Curriculum, Instruction, and Counselor Education

Professors: S. B. Baker, C. Brownie, C. L. Crossland, D. A. Cullinan, E. R. Gerler, P. L. Marshall, E. McIntyre, S. C. Nassar-McMillan, J. A. Picart, G. A. Ponder, C. A. Pope, R. J. Pritchard, E. J. Sabornie, R. D. Safrit, H. A. Spires, S. Ting, E. S. Vasu; **Emeritus Professors:** L. K. Jones, D. C. Locke, B. R. Poulton, N. A. Sprinthall; **Associate Professors:** C. M. Beal, J. T. DeCuir-Gunby, R. C. Kochersberger, J. K. Lee, J. L. Nietfeld, J. W. Osborne, S. S. Osborne, S. S. Snyder, J. E. Swiss, C. A. Young; **Adjunct Associate Professors:** B. M. Gorham; **Emeritus Associate Professors:** J. F. Arnold, E. O'Sullivan, L. M. Thies-Sprinthall; **Assistant Professors:** K. I. Allen, S. J. Amendum, H. A. Davis-Bauer, H. C. Edwards, M. A. Grimmett, L. B. Holcomb, M. M. Manfra, K. M. Oliver, M. M. Pop, A. M. Wiseman; **Research Assistant Professors:** A. S. Overbay; **Clinical Assistant Professors:** E. T. Horne; **Adjunct Assistant Professors:** A. T. Akers, R. A. Callanan, J. O. Corn, L. L. Grable, M. J. Maher, M. K. Monaco, T. E. Ray, B. H. Setser, T. H. Stafford, S. J. Stone, R. S. Sutton, R. E. Tyler; **Extension Assistant Professors:** M. N. Stumpf; **Teaching Assistant Professors:** D. E. Bengé, D. E. Crissman, D. F. Greenfield, J. R. Smith

Curriculum and Instruction: The department offers masters' degrees in curriculum and instruction generalist; curriculum and instruction with a concentration in curriculum and developmental supervision; business and marketing education (offered online); new literacies and global learning with sub concentrations in English education, middle grades education, reading education, and social studies education; and masters' degrees in instructional technology (online program) and special education. Instructional technology offers an online e-learning certificate and the hours can be applied to the master's degree. The department also offers master's degrees in C&I with an informal focus in youth development leadership, in conjunction with faculty in the department of 4-H Youth Development & Family & Consumer Sciences.

The Master's of Arts of Teaching (MAT) administered by the Dean's Office offers a graduate degree and initial teaching license in the areas of middle grades language arts or social studies, secondary English, secondary social studies, and special education (along with a number of other fields). See [Master of Arts of Teaching \(MAT\)](#).

The Ph.D. program in curriculum and instruction is primarily designed to prepare students for roles as researchers

and educators in higher education and industry, or for instructional leadership at school district and state levels. The program is built on foundations of research and application and is composed of three strands: (1) content area specialization, (2) research, and (3) preparation for professional roles. Eight doctoral areas of scholarly endeavor (focus) are offered by the department: curriculum development and supervision, educational psychology, English and language arts education, instructional technology, middle grades education, reading (literacy) education, social studies education, and special education.

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Curriculum and Instruction. The College of Education is approved by the National Council for Accreditation of Teacher Education (NCATE).

Counselor Education: The department also offers masters' degrees in counselor education, school counseling, college counseling and student development, and clinical mental health counseling. The Ph.D. degree program is offered in counselor education. 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 all graduate programs in counselor education.

Admission Requirements: *Curriculum and Instruction:* A 500-800 word statement describing professional goals is required. Some areas of study require that applicants be qualified to hold a baccalaureate-level teaching license or have teaching experience. The Graduate School requires a 3.0 in the undergraduate program. GRE or MAT scores not more than five years old are required for the master's program. GRE scores not more than five years old are required for the doctoral program. *Counselor Education:* Requirements include a 3.00 average (4.00 scale) in the undergraduate program, and one year of work experience in a human service capacity. GRE scores not more than five years old are required for the doctoral program. The best qualified applicants will be accepted up to the number of spaces available for new students. Exceptions to the minimum grade-point average and work experience requirements may be made for students with special backgrounds, abilities and interests.

Master's Degree Requirements: *Curriculum and Instruction:* A minimum of 30 course credit hours and a written examination or culminating project or showcase are required. For the M.S. degree, a minimum of 36 hours is required. The M.S. degree requires a thesis and final oral examination approved by the graduate committee.. *Counselor Education:* A minimum of 60 credits hours is required for the M.Ed. degree. The M.S. degree requires completion of a total of 66 credits, including a thesis and defense.

Doctoral Degree Requirements: *Curriculum and Instruction:* A minimum of 72 course credit hours beyond a bachelor's degree is required, which includes 15-18 hours of research, a curriculum specialty, and 12 hours of dissertation credit. At least 60 new hours must be taken after the student matriculates into the doctoral program. *Counselor Education:* A minimum of 62 credits hours beyond the master's degree is required, including the courses in research, counselor education theory, a cognate area, and professional application.

Student Financial Support: Teaching Assistantships are available on a limited basis. In 2010-2011, 25 graduate students were supported via T.A. (teaching) positions either part or full-time, with one student supported on R.A. (research) positions via grant funds.

Click on [Graduate Courses - Curriculum and Instruction](#) for current course information.

Click on [Graduate Courses - Counselor Education](#) for current course information.

Design

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Design	Y						

GRADUATE FACULTY

Director of Graduate Programs:

A. R. Rice, Box 7701, 515-8347, art_rice@ncsu.edu, Landscape Architecture

Professors: R. F. Abrams, D. M. Crisp, M. J. Davis, H. Khachatoorian, R. C. Moore, W. Place, A. R. Rice, M. Scotford, P. Tesar; **Emeritus Professors:** F. A. Rifki; **Associate Professors:** C. Q. Raub, K. J. Schaffer, J. O. Tector; **Research Associate Professors:** P. K. Baran, N. G. Cosco; **Assistant Professors:** S. B. Joines; **Adjunct Assistant Professors:** C. Pasalar

The mission of the Doctor of Philosophy in Design Program in the College of Design at NC State University is to improve human condition through design research and scholarship. This mission is built in equal parts on the recognition of a fertile common ground among the design disciplines and on the need for specificity and depth within them. The Ph.D. Program therefore values a broad range of research interests that aim to improve the human condition through design.

The aim of the Ph.D. in design is to prepare students holding previous degrees in a design discipline to conduct research in the areas of: design for health and well-being; design for learning; design for sustainability; design and technology; design and the urban context; design methods; and design history and criticism.

Admission Requirements: Two official academic transcripts; three letters of reference; GRE scores; TOEFL scores (for international students); residency statement (U.S. residents only); College of Design personal data form; statement of research intent; and portfolio.

Doctoral Degree Requirements: The program of study requires a minimum of 54 credit hours of graduate work beyond the Master's degree, and of these credit hours, 18 will be independent research and dissertation credit with the remaining 36 hours of course work being completed in the Ph.D. program. In addition, there are three (3) 1-credit colloquia.

Student Financial Support: Teaching and research assistantships are available to doctoral students, and in addition, those students receiving some form of research assistantship will also receive tuition remission. Assistantships are awarded on the recommendation of the admissions committee.

Click on [Graduate Courses](#) for current course information.

Economics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Agricultural and Resource Economics			Y				
Economics	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

T. C. Morant, Box 8110, 515-4617, tamah.morant@ncsu.edu, Economics

Hugh C. Kiger Professorship: A. B. Brown

UNIVERSITY DISTINGUISHED PROFESSOR: V. K. Smith

William Neal Reynolds Distinguished Professor: M. L. Walden, M. K. Wohlgenant

William Neal Reynolds Professor: D. A. Dickey, B. K. Goodwin, W. N. Thurman

Professors: S. G. Allen, R. H. Bernhard, J. A. Brandt, M. Caner, R. L. Clark, L. A. Craig, P. L. Fackler, D. J. Flath, T. J. Grennes, A. R. Hall, D. N. Hyman, A. Inoue, C. E. Joyner, H. J. Kleiss, C. R. Knoeber, S. E. Margolis, M. C. Marra, R. B. Palmquist, D. K. Pearce, D. J. Phaneuf, N. E. Piggott, M. A. Renkow, C. D. Safley, J. J. Seater, L. O. Taylor, T. C. Tsoulouhas, T. Vukina, W. J. Wessels; **Research Professors:** L. U. Hatch; **Adjunct Professors:** T. P. Holmes; **Emeritus Professors:** G. A. Benson, G. A. Carlson, L. E. Danielson, J. E. Easley, E. W. Erickson, E. A. Estes, D. Fisher, D. M. Holthausen, T. Johnson, J. S. Lapp, C. L. Moore, R. A. Schrimper; **Associate Professors:** J. C. Dutton, A. E. Headen, M. B. McElroy, C. M. Newmark, A. W. Oltmans, D. Pelletier, R. M. Rejesus, R. H. von Haefen, K. D. Zering, X. Zheng; **Emeritus Associate Professors:** D. S. Ball, E. A. McDermed; **Assistant Professors:** R. G. Hammond, I. T. Kandilov, A. Leblebicioglu, T. S. Morrill, M. J. Roberts, N. J. Traum; **Research Assistant Professors:** M. S. Morrill; **Adjunct Assistant Professors:** B. J. Hubbell, D. J. MacNair; **Teaching Associate Professors:** T. C. Morant

The graduate program in economics is a joint program of the Department of Agricultural and Resource Economics in the College of Agriculture and Life Sciences and the Department of Economics in the College of Management. All degree tracks offer the option of specialization in either agricultural and resource economics or 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 for Master's study includes intermediate microeconomics and intermediate macroeconomics, calculus I and calculus II, and two semesters of statistics (econometrics courses included). For doctoral study, prerequisites are intermediate microeconomics, intermediate macroeconomics, calculus I-III, differential equations, linear algebra, and a two-course mathematical statistics sequence. The submission of GRE scores is only required for students applying for financial aid.

Master's Degree Requirements: The Master of Science in economics requires core courses in micro-economics (ECG 700), macroeconomics (ECG 703), statistics (ST 421-422) and econometrics (ECG 750). The degree carries additional elective requirements and requires a thesis. The Master of Economics is a non-thesis degree with two options: (1) Ph.D. Preparatory and (2) Applied Economics and Policy Analysis. The Ph.D. preparatory option carries the same course requirements as the Master of Science in Economics. The Applied and Policy Analysis option requires a core of ECG 505, ECG 506, ST 514, and ECG 561. In addition, ECG 765 is highly recommended for Option 1, while Option 2 also requires ECG 562 and ECG 580. Both options have elective requirements. All three Master's

degrees require a total of 30 credit hours. Accelerated Bachelor's/Master's degree programs are available for non-thesis options.

Doctoral Degree Requirements: The Ph.D. program requires a minimum of 72 hours and at least six semesters of work beyond the Bachelor's degree. Students must pass written comprehensive examinations in micro-economics and macro-economics. Course requirements include two semesters of econometrics and six field courses.

Student Financial Support: Research and teaching assistantships are available and are awarded competitively on a merit basis. These assistantships go to Ph.D. students only; there is no financial support for Master's students. Prospective doctoral students who wish to be considered for assistantships should apply for fall admission by January 1.

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.

Click on [Graduate Courses](#) for current course information.

Electrical and Computer Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Computer Engineering	Y		Y				
Electrical Engineering	Y		Y				

GRADUATE FACULTY

D. D. Stancil, *Department Head*

Director of Graduate Programs:

M. Devetsikiotis, Box 7911, , mdevets@eos.ncsu.edu, Electrical and Computer Engineering

Alcoa Distinguished Professor: D. D. Stancil

Alton and Mildred Lancaster Distinguished Professor: R. J. Trew

Distinguished Professor of Computer and Electrical Engineering: N. A. Masnari

Distinguished Professor of Electronic Devices and Materials: J. R. Hauser

Distinguished University Professor: B. J. Baliga

Distinguished University Professor of Physics: D. E. Aspnes

Distinguished University Research Professor: D. L. Bitzer

John C. C. Fan Family Distinguished Professor of Materials Science and Engineering: J. Narayan

Lampe Distinguished Professor of Electrical and Computer Engineering (4/15/2010): M. B. Steer

McPherson Family Distinguished Professor of Engineering Entrepreneurship: T. K. Miller

Progress Energy Distinguished Professor in Electrical and Computer Engineering: A. Q. Huang

Professors: W. E. Alexander, M. E. Baran, S. A. Bedair, G. L. Bilbro, M. Chow, M. Devetsikiotis, A. Duel-Hallen, P. D. Franzon, J. J. Grainger, E. Grant, B. L. Hughes, K. W. Kim, R. M. Kolbas, H. Krim, G. Lazzi, L. Lunardi, V. Misra, R. F. Mueller, H. T. Nagle, A. Nilsson, M. C. Ozturk, H. G. Perros, D. S. Reeves, I. Rhee, E. Rotenberg, G. Rouskas, J. F. Schetzina, W. E. Snyder, M. F. Stallmann, J. K. Townsend, H. J. Trussell, I. Viniotis, M. A. Vouk, F. Wu; **Research Professors:** M. O. Aboelfotoh, J. M. Zavada; **Adjunct Professors:** A. K. Agarwal, W. C. Holton, G. J. Iafrate, J. R. Mattox, D. L. Woolard; **Emeritus Professors:** T. H. Glisson, A. J. Goetze, M. A. Littlejohn, J. B. Oneal, C. M. Osburn, S. A. Rajala, J. J. Wortman; **Emeritus Distinguished University Professors:** D. R. Rhodes; **Associate Professors:** S. T. Alexander, P. K. Bergey, G. T. Byrd, R. Y. Chirkova, D. H. Covington, H. Dai, W. R. Davis, A. G. Dean, M. J. Escuti, D. Y. Eun, B. A. Floyd, E. F. Gehringer, K. H. Harfoush, D. S. Lalush, J. F. Muth, M. L. Sichitiu, Y. Solihin, G. M. Walker, W. Wang, T. Xie, H. Zhou; **Adjunct Associate Professors:** D. W. Barlage, R. P. Burgos, W. W. Edmonson, J. H. Enslin, A. W. Kelley; **Emeritus Associate Professors:** G. F. Bland, W. C. Peterson; **Assistant Professors:** D. Z. Baron, S. Bhattacharya, A. Y. Bozkurt, A. Chakraborty, S. M. Lukic, J. Tuck, C. M. Williams; **Adjunct Assistant Professors:** R. D. Callaway, R. J. Evans, K. Gard, A. S. Morris, D. Novosel, A. J. Rindos, D. Schurig, J. M. Wilson; **Teaching Professors:** S. D. Jackson; **Teaching Associate Professors:** T. L. Mitchell, H. O. Ozturk, S. J. Walsh, D. G. Yu; **Teaching Assistant Professors:** L. J. Bottomley, M. Yadav

Admissions Requirements: Admission to the M.S. program requires a B.S. in electrical engineering, computer engineering or computer science, and an overall undergraduate GPA of at least 3.25. The minimum acceptable TOEFL score for admission to the M.S. program is 90 (minimum 18 in each area, with minimum of 19 on Speaking). Admission is further limited by available room in the elected program of study. 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 3.50. The minimum acceptable TOEFL score for admission to the Ph.D. program is 90 (minimum 18 in each area, with minimum of 19 on Speaking). 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: Thirty (30) credit hours; a thesis is optional. Students must have at least 21 hours of ECE courses that cover at least three specialty areas and have at least six credit hours of advanced-level (700-level) ECE courses. Students electing the Option B non-thesis option must meet core course requirements and have at least six credit hours of 700-level ECE courses.

The Master's degrees are now offered online through [Engineering OnLine](#). Applications to these MS on-line programs are through the ECE Department and all students must comply with ECE program requirements.

Doctoral Degree Requirements: Approximately 54 credit hours are required beyond the M.S. degree or 72 credit hours beyond the B.S. degree. A minimum of 18 of the 42 credit hours or a minimum of 42 of the 72 credit hours must be in scheduled, graduate-level graded courses. Nine hours of graduate-level courses outside the major area are required.

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.

Click on [Graduate Courses](#) for current course information.

Elementary Education

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Elementary Education			Y			Y	

GRADUATE FACULTY

Director of Graduate Programs:

E. McIntyre, Box 7801, , emcinty@ncsu.edu, Elementary Education

Professors: P. L. Marshall, E. McIntyre, P. Sztajn; **Assistant Professors:** S. J. Amendum, S. J. Carrier, M. J. Jeffries, J. Minogue, T. A. Walkowiak, A. M. Wiseman

The mission of the Department of Elementary Education is to develop teacher leaders who have a deep, general content knowledge with a focus in science and mathematics, expert pedagogy, and a commitment to equity and social justice. The Department offers a Masters in Elementary Education – a program designed to prepare education professionals for the 21st century.

Admission Requirements: Admission to both the M.S. and M.Ed. programs require a 500-800 word statement describing professional goals is required. Both programs require that applicants hold a baccalaureate-level teaching license. GRE or MAT scores not more than five years old are required for the Master's program.

Master's Degree Requirements: The Department of Elementary Education offers two advanced-level graduate programs for students *who already hold a K-12 teaching license*: The M.Ed. program requires 30 credit hours, and the M.S. degree requires 33 credit hours (30 hours plus a thesis).

There is also an Elementary Master's of Arts of Teaching (MAT) administered by the Dean's Office. This program offers a graduate degree and *initial teaching license* in the areas of elementary education, middle grades language arts or social studies, secondary English, secondary social studies, and special education (along with a number of other fields). See [Master of Arts of Teaching](#) (MAT).

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

Click on [Graduate Courses](#) for current course information.

Engineering - (Off-campus program only)

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Engineering					Y		

GRADUATE FACULTY

Director of Graduate Programs:

T. J. Hodgson, Box 7906, 5-5194, hodgson@ncsu.edu, Industrial Engineering

Alcoa Professor of Chemical and Biomolecular Engineering: S. A. Khan, G. N. Parsons

Celanese Acetate Professorship in Chemical and Biomolecular Engineering: J. Genzer

Distinguished Research Professor: J. J. Cuomo

James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing: T. J. Hodgson

Kobe Steel Distinguished Professor: C. C. Koch

R. J. Reynolds Professor in Mechanical and Aerospace Engineering: R. D. Gould

R.J. Reynolds Industries: C. F. Zorowski

Professors: M. A. Barlaz, M. Chow, A. Duel-Hallen, Y. Fathi, P. D. Franzon, C. S. Grant, J. M. Nau, H. G. Perros, S. Ranjithan, D. S. Reeves, P. I. Ro, G. Rouskas, R. O. Scattergood, L. M. Silverberg, M. P. Singh, J. K. Townsend, H. J. Trussell, I. Viniotis, M. A. Vouk; **Research Professors:** R. B. Benson; **Emeritus Professors:** T. Johnson, C. M. Osburn; **Emeritus Distinguished Professors:** D. W. Johnston; **Associate Professors:** J. W. Eischen, E. F. Gehringer, T. L. Honeycutt, E. C. Klang, M. L. Leming; **Adjunct Associate Professors:** D. R. Cormier; **Emeritus Associate Professors:** E. Sanii; **Adjunct Assistant Professors:** L. D. Krute

The College of Engineering offers a program leading to the Master of Engineering. This degree is primarily for individuals whose schedule or location does not allow on-campus study. Convenience and flexibility are the key advantages of this program. The students can take a variety of courses in different engineering fields and in computer science. This Option B program requires 30 credit hours and does not require GRE, thesis, final oral exam, or on-campus attendance. All international students are required to provide evidence of English proficiency. Two exams will be accepted to demonstrate English proficiency: Test of English as a Foreign Language (TOEFL) with a total score of **at least 80** on the Internet-based Test (iBT) or International English Language Testing System (IELTS) scores with an overall band score of **at least 6.5**. The Master of Engineering degree can be earned totally through the [Engineering Online](#) program. The [Engineering Online](#) program delivers credit courses in Engineering and in Computer Science directly to home or workplace via streaming media on the Internet. The on-line courses are the same as the on-campus courses in terms of content, requirements and academic rigor.

Each student in the Master of Engineering program must complete a minimum of three (3) courses from a single concentration area and courses from a second area of engineering or computer science. The concentration area will appear on the student's transcript if a minimum of five (5) courses is taken in the designated concentration field. At least 18 hours of the minimum 30 hours required to satisfy the Master of Engineering degree requirements must be taken from a department in the College of Engineering. The concentration fields in the Master of Engineering are Chemical Engineering, Computer Science, Electrical and Computer Engineering, Industrial Engineering, Materials Science and Engineering, and Mechanical and Aerospace Engineering.

Admission Requirements: Prerequisites for admission to the Master of Engineering include an accredited undergraduate degree in engineering or physical sciences with a minimum overall GPA of 3.0.

GRADUATE COURSES

EGR 688 Non-Thesis Master's Continuous Registration - Half-Time Registration

EGR 689 Non-Thesis Master's Continuous Registration - Full-Time Registration

English

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Creative Writing							Y
English				Y			
Technical Communication			Y				

GRADUATE FACULTY

A. H. Harrison, *Department Head*

Directors of Graduate Programs:

A. Baker, Box 8105, , abaker@unity.ncsu.edu, English

J. Balaban, Box 8105, , jbabala@ncsu.edu, English

R. S. Dicks, Box 8105, 37354, sdicks@unity.ncsu.edu, English

Alumni Distinguished Undergraduate Professor: J. M. Grimwood

Distinguished Professor: M. T. Hester

Distinguished University Professor: C. M. Anson, A. H. Harrison

SAS Institute Distinguished Professor of Rhetoric and Technical Communication: C. R. Miller

William C. Friday Distinguished University Professorship: W. A. Wolfram

Professors: J. Balaban, M. P. Carter, A. M. Davis-Gardner, C. Gross, H. D. Kellner, J. J. Kessel, Y. R. Kim, D. L. Laux, T. D. Lisk, L. H. MacKethan, J. C. McCorkle, J. M. Nfah-Abbenyi, M. E. Orr, A. M. Penrose, M. T. Pramaggiore, C. A. Prioli, S. M. Setzer, L. R. Severin, A. F. Stein, E. R. Thomas, J. F. Thompson, M. H. Thunte, J. N. Wall, R. V. Young; **Emeritus Professors:** B. J. Baines, G. W. Barrax, P. E. Blank, L. S. Champion, J. W. Clark, J. D. Durant, M. Halperen, L. T. Holley, W. J. Jordan, A. S. Knowles, B. G. Koonce, W. E. Meyers, F. H. Moore, J. J. Small, L. Smith, J. J. Smoot, W. B. Toole, M. C. Williams, P. Williams; **Associate Professors:** A. Baker, W. W. Barnhardt, B. A. Bennett, A. Bolonyai, H. G. Braunbeck, D. H. Covington, R. S. Dicks, N. Halpern, S. M. Katz, R. C. Kochersberger, L. S. May, W. J. Miller, S. K. Miller-Cochran, J. D. Morillo, D. A. Orgeron, M. G. Orgeron, J. Packer, J. L. Reaser, D. J. Reavis, D. M. Rieder, S. Smith McKoy, J. Swarts; **Emeritus Associate Professors:** M. F. King, C. E. Moore, H. C. West; **Assistant Professors:** J. C. Charles, C. J. Crosbie, R. M. Dodsworth, M. K. Dudley, O. Gelley, M. E. Lamont, T. L. Stinson, R. A. Walsh, M. L. Welch; **Teaching Associate Professors:** B. Blackley, D. A. Hooker, M. W. Hunt; **Teaching Assistant Professors:** S. L. Joffe

MASTER OF ARTS (MA)

The Master of Arts program offers instruction in English and American literature, world literature, film studies, rhetoric and composition, and linguistics. It can serve either as a complete course of study or as the first phase of study toward a doctoral degree at another institution.

Admission Requirements: Overall GPA of 3.0 or higher. Applicants should submit GRE scores (general aptitude and analytical writing); one official transcript of all undergraduate and graduate work; three letters of recommendation; a personal statement; and a writing sample.

Requirements for MA in English: The program requires 32 credit hours. American/British literature and world literature 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, or literary theory. Linguistics and rhetoric/composition students take two literature classes of their choice to fulfill the distribution requirement. Film studies students take four literature courses of their choice. In addition, all students (except those in linguistics) must take an introduction to research and bibliography (ENG 669). All students must pass a foreign language reading requirement, and complete a Master's capstone project.

Beyond these basic requirements, the program comprises five concentrations in British and American literature, film studies, composition and rhetoric, world literature, and linguistics. Each concentration requires five additional courses, of which three must pertain to the area of concentration. The capstone project will be in the area of the concentration and directed by a specialist in the field.

Student Financial Support: Teaching assistantships are available for a limited number of promising students. Applications for assistantships are due February 1 for those entering in the fall, and November 1 for those entering in the spring. (New assistantships are rarely available for the spring semester.) During their first year those selected to teach composition must take ENG 511 (Theory and Research in Composition), be mentored by a composition instructor, and attend a second workshop (ENG 624) in their third semester.

TECHNICAL COMMUNICATION (MS)

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 web design and development, software documentation, environmental communication, medical writing, 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 (ENG 214) and technical writing (ENG 314, 317, 331, 332, or 333) or equivalent courses and/or work experience. The application deadline is June 15 for the fall semester and November 1 for the spring semester. Those who wish to be considered for teaching assistantships should complete the application by February 1 for fall.

Requirements for MS in Technical Communication: The program requires 33 semester hours: 15 hours in the fields of technical writing, publication management, rhetoric and a projects course; the remaining hours are taken in applications, theory and methods and cross-disciplinary courses. Students must also satisfy a requirement for one semester of professional work experience.

Student Financial Support: Teaching assistantships are available for a limited number of promising students. These students work with an experienced teacher in their first year to assist in 300-level writing courses. They devote half time in subsequent semesters to teaching technical communication.

CREATIVE WRITING (MFA)

The Department of English offers a two-year studio/academic program in fiction or poetry leading to the Master of Fine Arts degree. The program provides an opportunity for students of superior and demonstrated ability in imaginative writing to develop their skills and critical judgment through the practice of writing and the study of literature. The aim of the program is to prepare talented students for careers in writing. Degree candidates are expected to produce a book-length work of literary value and publishable quality.

Admission Requirements: Overall GPA of 3.0 or higher; applicants should submit GRE scores (general aptitude and analytical writing); one official transcript of all undergraduate and graduate work; three letters of recommendation; and two writing samples, one creative, one critical. Creative sample: for fiction, two short stories, or for a novel, three chapters (or one chapter and a short story) totaling 25-40 pages; for poetry, 12 complete poems. Critical sample: no more than 15 pages of writing demonstrating your ability to succeed in graduate-level literature classes, a required part of the MFA curriculum

Requirements for the MFA in Creative Writing: Candidates for the MFA degree must complete a total of 36 credits. Eighteen of these are taken in the area of writing specialization. These include workshop courses (12 credits) and thesis (6 credits). The remaining credits are taken in literature and directed readings (12 credits), elective (3 or 6 credits), and, for those on a composition teaching assistantship, ENG 511, Theory and Research in Composition (3 credits).

In their final semester, students must pass a comprehensive written examination on writing craft, based on a book list selected jointly by the student and the faculty. The final thesis must be a book-length manuscript in the student's field of interest. In fiction, an approximate 200 pages are expected; in poetry, 60 pages.

Student Financial Support: Teaching assistantships are available for a limited number of promising students. Selected new Teaching Assistants are also eligible for fellowship money awarded as an increase in assistantship stipend. TAs in the MFA train to teach undergraduate creative writing classes or composition classes.

Other Relevant Information: Application deadline is April 1 for both U.S. and international students; February 1 for those seeking assistantships. Students are admitted for the fall semester only.

The English department has a long tradition of academic and literary excellence, including its heritage of writers from Guy Owen to Lee Smith, its publishing of the *Southern Poetry Review*, *The John Donne Journal*, *Free Verse*, and *Obsidian*. The strength of NCSU in the sciences offers students the opportunity to do creative work that engages with issues of technology and its effect on individuals and institutions that are not typically addressed in fine arts programs.

Through its Owen/Walters Readings Series, the department sponsors readings and residencies by distinguished poets, fiction and non-fiction writers, and has initiated a semester-long Visiting Distinguished North Carolina Writers program.

Click on [Graduate Courses](#) for current course information.

Entomology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Entomology	Y		Y		Y		

GRADUATE FACULTY

G. G. Kennedy, *Department Head*

Director of Graduate Programs:

D. W. Watson, Box 7613, 3-2028, wes_watson@ncsu.edu, Entomology

Blanton J. Whitmire Professor of Structural Pest Management: C. J. Schal

Charles G. Wright: J. Silverman

Phillip Morris Emeritus Extension Professor: J. W. VanDuyn

William Neal Reynolds Distinguished Professor: F. L. Gould, G. G. Kennedy, R. M. Roe

William Neal Reynolds Professor Emeritus 10/1/10: C. S. Apperson

William Neal Reynolds Professor: R. L. Brandenburg

Professors: J. T. Ambrose, J. S. Bachelier, W. G. Buhler, N. M. Haddad, F. P. Hain, J. R. Meyer, D. J. Robison, C. E. Sorenson, E. L. Vargo, J. F. Walgenbach, D. W. Watson, B. M. Wiegmann; **Research Professors:** A. C. Cohen; **Adjunct Professors:** J. J. Arends, G. Gordh, N. M. Hamon, D. A. Herbert, D. E. Sonenshine; **Emeritus Professors:** R. C. Axtell, J. R. Baker, J. R. Bradley, W. M. Brooks, W. V. Campbell, L. L. Deitz, M. H. Farrier, J. D. Harper, R. J. Kuhr, H. B. Moore, H. H. Neunzig, J. F. Roberts, R. L. Robertson, K. A. Sorensen, P. S. Southern, R. E. Stinner, C. G. Wright; **Associate Professors:** R. R. Dunn, D. B. Orr, D. R. Tarpy; **Adjunct Associate Professors:** S. Bloem, C. M. Grozinger, K. R. Lakin, C. Nalepa, A. A. Perez de Leon, R. A. Sequeira, J. W. Smith; **Emeritus Associate Professors:** R. C. Hillmann; **Assistant Professors:** M. R. Abney, D. B. Buchwalter, H. J. Burrack, Y. J. Cardoza, A. R. Deans, S. D. Frank, M. D. Lorenzen, D. D. Reisig; **Adjunct Assistant Professors:** K. T. Kreitlow, K. A. Suiter; **Extension Associate Professors:** M. G. Waldvogel

Course offerings or research facilities are available in the following areas: agricultural entomology, apiculture, aquatic entomology, behavior, biological control, ecology, forest entomology, functional genomics, host-plant resistance, insect pathology, insect transmission of plant pathogens, medical and veterinary entomology, pest management, physiology, molecular biology, population dynamics, urban entomology, systematics and toxicology.

Admission Requirements: A minimum score of 1000 (verbal plus quantitative) is necessary for admission to the M.E. 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 two years of the undergraduate program.

Master's Degree Requirements: A minimum of 30 credits are required for graduation 14 credits of letter grade entomology courses plus 2 credits of entomology student seminars are also required. The student's advisory committee will meet with the student to identify an appropriate plan of course work.

Doctoral Degree Requirements: A minimum of 72 credits (18 may be transferred from a Master's degree) are required for graduation. For Ph.D. students without a M.S. degree, 17 credits of letter grade entomology courses

plus 3 credits of entomology student seminars are required. For Ph.D. students with a M.S. degree, 9 credits of letter grade entomology courses plus three credits of entomology student seminars are required. The student's advisory committee will meet with the student to identify an appropriate plan of course work.

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..

Click on [Graduate Courses](#) for current course information.

Environmental Assessment

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Environmental Assessment					Y		

GRADUATE FACULTY

Professors: R. I. Bruck, H. V. Daniels, B. Goldfarb, D. Shea; **USDI Professors:** T. J. Kwak; **Associate Professors:** D. D. Aday, G. B. Blank, E. G. Nichols, S. T. Warren; **Assistant Professors:** L. V. Kochtcheeva; **Teaching Associate Professors:** H. M. Cheshire; **Teaching Assistant Professors:** C. S. Hofelt; **Lecturers:** L. R. Taylor

The Master of Environmental Assessment Degree is an interdisciplinary program focused on understanding the adverse impacts that pollutants and naturally occurring substances pose on human health and the environment. The program builds upon NC State University's expertise in environmental issues and problem solving.

The program is designed as a completely online degree. This allows professionals the flexibility to complete their degree while still working. In addition, individuals can boost their credentials through our (non degree) certificate program. Through the program, students combine multiple fields of study to tackle complex environmental problems.

Admission Requirements: Admissions to the Master of Environmental Assessment degree is based on the evaluation of several criteria and credentials including educational and professional experience, potential for graduate work, and availability and interest of faculty advisors. Final admission to the degree is granted by the Graduate School upon recommendation of the Environmental Assessment Director of Graduate Programs. Although applications are reviewed when materials are submitted and admissions are granted on a rolling basis, we recommend that all materials be submitted by dates published by the Graduate School (Fall: June 25, Spring: Nov 25)

Graduate Record Exam (GRE) results are NOT required for admittance to the program. In general, applicants should hold a B.A. or B.S degree in a natural resources, environmental science and management, engineering, or related field and have an undergraduate GPA of 3.0 or higher. Experience in environmental management, consulting or regulatory administration will be considered for students with a Bachelors degree in an unrelated field. For those without the necessary background courses in undergraduate science, or mathematics, some additional coursework may need to be completed prior to the start of the graduate student program. Admission is contingent upon meeting departmental requirements and acceptance by an advisor.

Master's Degree Requirements: The Master of Environmental Assessment Program requires students to complete 30 credit hours of graduate coursework. Twenty-two hours will be in required courses with the remaining eight hours selected from the list of elective courses or equivalent.

Once enrolled, each student must submit a plan of work outlining the 30 credit hours which will be included in the students program. Students in the Master of Environmental Assessment program are self-supported. Self-supported students may take up to 12 credit hours of course work per semester. However, students who are employed full time may find it advantageous to enroll in one or two courses per semester.

Other Relevant Information: The Masters of Environmental Assessment requires completion of a professional project. Students will develop a project in his/her area of interest in collaboration with an appropriate

organization, agency or business under the direction of their faculty advisor. The Professional Project, is an applied “capstone” experience that is a “paper study” which might include such tasks as assembling existing data and performing a risk assessment. Students will enroll in EA 665 as part of their project research. Upon completion of the research or project work, each student presents their project (both process and results) in a public departmental seminar and turns in a paper summarizing the relevant research of the professional project.

Click on [Graduate Courses](#) for current course information.

Family Life and Youth Development

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
<u>Family Life and Youth Development</u>			Y		Y		

GRADUATE FACULTY

R. M. Stewart, *Department Head*

Director of Graduate Programs:

R. D. Safrit, Box 7606, 513-0306, dale_safrit@ncsu.edu, 4-H Youth Development and Family and Consumer Science

Professors: P. C. Dunn, J. W. McClelland, T. T. McKinney, R. D. Safrit; ***Emeritus Professors:*** K. B. DeBord; ***Associate Professors:*** L. B. Bearon, S. D. Kirby, B. Silliman; ***Emeritus Associate Professors:*** D. W. Matthews; ***Assistant Professors:*** K. I. Allen, A. O. Behnke, C. L. Bird, B. J. Chapman, H. C. Edwards; ***Extension Assistant Professors:*** S. S. Jakes, M. N. Stumpf

The Department of 4-H Youth Development and Family & Consumer Sciences provides graduate study for current and emerging professionals in parent education, family life education, and community-based youth development, or related careers. The demand for professionals to teach, administer, and create support systems for children, youth and families is increasing through Cooperative Extension programs, government agencies and initiatives, community-based non-profits, court systems, prisons, social service organizations, health care agencies/organizations, and schools. The following distance-based graduate programs are available in the Department:

Master of Science in Family Life and Youth Development (requires 36 total hours including a thesis)

Master of Family Life and Youth Development (requires 30 hours and a culminating capstone project)

Programs of study are designed to meet the individual needs of the student. Additional specialization in the student's current or future field is provided through one or more of six concentration areas: Youth Development Leadership, Volunteer Management and Administration, Administration and Leadership of Youth and Family Programs, Family Life and Parent Education, Gerontology, and Family Life Coaching.

Admission Requirements: Students apply through NC State via the normal Graduate School admissions procedures; applications are reviewed twice each year on March 15 and October 15. Only complete applications (including application form, applicant's statement, GRE scores, and three academic references) are reviewed. In addition to all Graduate School admission requirements, the Department requires GRE scores not more than five years old, three academic references, and a 500-800 word statement of current/future career goals. The statement should also indicate whether the applicant is interested in the thesis or non-thesis option, and which concentration they plan to pursue. The Graduate School requires a 3.00 average (4.00 scale) in the undergraduate program. The most qualified applicants will be accepted up to the number of spaces that are available for new students. Exceptions to the minimum grade point average and lower-than-desired GRE scores may be made for students with special backgrounds, abilities, circumstances, and interests.

Master's Degree Requirements: The Master of Science in Family Life and Youth Development requires 36 hours culminating in a final oral examination and thesis approved by the student's graduate committee. The Master of Family Life and Youth Development is a non-thesis degree that requires a total of 30 credit hours culminating in a

capstone project. Both degree programs are built upon foundations of theory and application composed of four focus areas: (1) foundations of family life and youth development, (2) professional development and leadership, (3) research and methodological inquiry, and (4) content area concentration.

Student Financial Support: No financial aid/assistantships are available directly from the Department. Research/Extension assistantships in targeted areas and part-time hourly work are sometimes available from individual faculty. Other financial aid is available from the NC State Office of Financial Aid and on a competitive basis from the NC State Graduate School. Students seeking financial aid should contact the NC State Financial Aid Office directly.

Other Relevant Information: Distance course delivery methods include: totally asynchronous web-based classes, synchronous Internet based classes, and hybrid (distance and minimal on-campus) classes. These are not 100% distance/online degrees; however, multiple teaching methods are used and instructors work with individual students' needs and logistics.

Click on [Graduate Courses](#) for current course information.

Fiber and Polymer Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Fiber and Polymer Science	Y						

GRADUATE FACULTY

Director of Graduate Programs:

W. Oxenham, Box 8301, 515-6573, william_oxenham@ncsu.edu, College of Textiles

Alcoa Professor of Chemical and Biomolecular Engineering: S. A. Khan

Burlington Industries Professorship of Textile Technology: R. L. Barker

Camille Dreyfus Professor Emeritus: H. B. Hopfenberg

Celanese Acetate Professorship in Chemical and Biomolecular Engineering: J. Genzer

CHARLES A CANNON PROFESSOR EMERITUS: S. P. Hersh

Charles A. Cannon Professor: S. K. Batra

Ciba-Geigy Distinguished Professor: H. S. Freeman

Cone Mills Professorship of Textile Chemistry: C. B. Smith

Glaxo Distinguished University Professor of Chemistry: J. S. Lindsey

Howard J. Schaffer Distinguished Professor of Chemistry: B. M. Novak

INVISTA Professor of Fiber and Polymer Chemistry: A. E. Tonelli

Joseph D. Moore Professorship of Textile and Apparel Management and Technology: A. B. Godfrey

Lineberger Chair in Yarn Manufacturing: W. Oxenham

R.J. Reynolds Industries: C. F. Zorowski

William A. Klopman Distinguished Professor: B. Pourdeyghi

Professors: H. Ade, C. M. Balik, K. R. Beck, M. A. Bourham, C. L. Bumgardner, N. L. Cassill, R. A. Donaldson, P. S. Fedkiw, R. E. Fornes, T. K. Ghosh, C. B. Gorman, H. Hamouda, P. J. Hauser, D. Hinks, S. M. Hudson, W. J. Jasper, M. W. King, T. J. Little, J. P. Rust, A. M. Seyam, M. W. Suh, R. A. Venditti; **Emeritus Named Professors:** S. C. Winchester; **Emeritus Professors:** D. R. Buchanan, A. H. El-Shiekh, P. L. Grady, G. N. Mock, H. G. Olf, S. T. Purrington, E. O. Stejskal, W. C. Stuckey, M. H. Theil, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** P. Banks-Lee, K. A. Barletta, R. E. Gorga, H. H. Hergeth, G. L. Hodge, C. L. Istook, J. A. Joines, R. Kotek, W. E. Krause, T. A. Lamar, E. G. Lobo-Polefka, M. G. McCord, S. Michielsen, O. J. Rojas, R. Shamey, G. W. Smith; **Assistant Professors:** P. D. Bradford, K. E. Carroll, A. M. El-Shafei, H. Lee, M. Pasquinelli, J. A. Willoughby, X. Zhang; **Research Assistant Professors:** N. Anantharamaiah, J. S. Jur, B. Maze, E. Shim, B. Yeom; **Adjunct Assistant Professors:** R. T. Kuehn, H. Vahedi Tafreshi

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: Credit-hour requirements for the Doctor of Philosophy degree are 72. (Up to 18 hours from an M.S. may be applied against the 72.) Students are admitted to candidacy for the Ph.D. degree after passing a prescribed group of courses, completing a scholarly critique of existing knowledge in the field of specialization, and orally defending a research proposal. 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 U.S. full-time students. Financial aid in the form of Graduate Research/Teaching Assistantships may be available to a limited number of international students.

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

Click on [Graduate Courses](#) for current course information.

OTHER GENERAL COURSES

TC 704 Fiber Formation--Theory and Practice
TC(CH,MSE) 762 Physical Chemistry of High Polymers--Bulk Properties
TC 791 Special Topics in Textile Science
TMS 500 Fiber and Polymer Microscopy
TMS 761 Mechanical and Rheological Properties of Fibrous Material
TMS 762 Physical Properties of Fiber Forming Polymers, Fibers and Fibrous Structures
TMS(MSE) 763 Characterization of Structure of Fiber Forming Polymers

COURSES IN AREAS OF SPECIALIZATION

Polymer Chemistry and Synthesis

TC 530 The Chemistry of Textile Auxiliaries
TC(MSE) 561 Organic Chemistry of Polymers
TC 720 Chemistry of Dyes and Color
TC 721 Dye Synthesis Laboratory

Polymer Physics and Physical Chemistry

TC 704 Fiber Formation--Theory and Practice
TC 705 Theory of Dyeing
TC(CH,MSE) 762 Physical Chemistry of High Polymers--Bulk Properties
TC(CHE) 769 Polymers, Surfactants and Colloidal Materials
TC(CH,MSE) 772 Physical Chemistry of High Polymers--Solution Properties
TC(CHE) 779 Diffusion in Polymers
TC 792 Special Topics in Fiber Science
TMS 500 Fiber and Polymer Microscopy

Mechanics of Textile Materials and Processes

FPS(TT) 781 Mechanics of Twisted Structures
FPS(TT) 782 Mechanics of Fabric Structures
TE 565 Textile Composites
TT 500 Understanding the Textile Complex
TT 503 Materials, Polymers, and Fibers used in Nonwovens
TT 504 Introduction to Nonwovens Processes and Products
TT 505 Advanced Nonwovens Processing
TT 506 Bonding Principles in Nonwovens
TT 507 Nonwoven Characterization Methods

TT 508 Nonwoven Product Development
TT 520 Yarn Processing Dynamics
TT(TE,TMS) 521 Filament Yarn Production Processing and Properties
TT 549 Warp Knit Engineering and Structural Design
TT 550 Production Mechanics and Properties of Woven Fabrics
TT 551 Advance Woven Fabric Design & Structure
TT 552 Formation, Structure and Assembly of Medical Textile Products
TT 570 Textile Digital Design and Technology
TT 571 Professional Practices in Textile Design and Technology
TT 581 Technical Textiles
TT 591 Special Studies in Textile Technology
TT(FPS) 720 Yarn Production Properties: Advanced Topics

Financial Mathematics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Financial Mathematics					Y		

GRADUATE FACULTY

Director of Graduate Programs:

J. S. Scroggs, Box 8205, 515-7817, scroggs@unity.ncsu.edu, Mathematics

William Neal Reynolds Professor: D. A. Dickey

Professors: R. H. Bernhard, P. Bloomfield, P. L. Fackler, S. K. Ghosh, K. Ito, N. G. Medhin, S. G. Pantula, J. J. Seater, T. Vukina, J. R. Wilson; **Associate Professors:** M. J. Kang, T. Pang, D. Pelletier, J. S. Scroggs, C. E. Smith

The Departments of Agricultural and Resource Economics, Economics, Industrial and Systems Engineering, Mathematics, and Statistics offer a program leading to the degree of Master of Financial Mathematics. After completing the core requirements, students choose electives to suit their individual needs and interests.

Admissions Requirements: Applicants for admission should have an undergraduate degree that would preferably include courses in advanced calculus, modern algebra, and linear algebra. It is strongly recommended that applicants take the GRE Advanced Test in Mathematics.

Master of Financial Mathematics Requirements: In addition to course requirements (six core courses and four electives), the Master of Financial Mathematics degree requires completion of a three-credit internship or research project.

Student Financial Support: No financial aid is available on a regular basis. Some funding is available through a limited number of scholarships. Consideration for the scholarships is automatic.

REQUIRED CORE COURSES

ECG(MA) 790 Advanced Special Topics
 ECG 528 Asset Pricing
 ISE 711 Capital Investment Economic Analysis
 MA(ST) 546 Probability and Stochastic Processes I
 MA 547 Financial Mathematics
 ST 522 Statistical Theory II

GRADUATE COURSES

MBA 522 Portfolio and Capital Market Theory
 MBA 526 International Finance
 MBA 529 New Firm Financing
 MBA 590 Special Topics in Business Management (Advanced Corporate Finance)
 ECG 716 Topics in Environmental and Resource Economics
 ECG 749 Monetary Aspects Of International Trade
 ECG(ST) 751 Econometrics
 ECG(ST) 752 Topics in Econometrics

ECG 784 Advanced Macroeconomics

ISE 709 Dynamic Programming

ISE 712 Bayesian Decision Analysis for Engineers and Managers

MA(ST) 747 Probability and Stochastic Processes II

MA(ST) 748 Stochastic Differential Equations

MA 584 Numerical Solution of Partial Differential Equations-Finite Difference Methods

ST 730 Applied Time Series Analysis

ST 782 Time Series Analysis: Time Domain

ST 783 Time Series Analysis: Frequency Domain

ST 810 Advanced Topics in Statistics

Fisheries, Wildlife, and Conservation Biology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Fisheries, Wildlife, and Conservation Biology	Y		Y		Y		

GRADUATE FACULTY

Directors of Graduate Programs:

C. E. Moorman, Box 8001, , chris_moorman@ncsu.edu, Forestry

H. V. Daniels, Box 7617, 515-4589, harry_daniels@ncsu.edu, Zoology

M. K. Stoskopf, Box 8401, 3-6279, michael_stoskopf@ncsu.edu, Clinical Sciences

William Neal Reynolds Professor: C. V. Sullivan

Professors: R. J. Borski, F. W. Cubbage, H. V. Daniels, D. B. Eggleston, J. F. Gilliam, N. M. Haddad, J. M. Hinshaw, J. F. Levine, T. M. Losordo, K. M. Meurs, K. H. Pollock, J. A. Rice, C. E. Sorenson, T. A. Steelman, M. K. Stoskopf; **Research Professors:** S. Kennedy-Stoskopf; **USDI Professors:** J. A. Collazo, J. E. Hightower, T. J. Kwak, T. R. Simons; **Adjunct Professors:** J. G. Boreman, J. Rogers; **Emeritus Professors:** G. T. Barthalmus, P. T. Bromley, B. J. Copeland, P. D. Doerr, J. M. Miller, R. L. Noble, R. A. Powell; **Associate Professors:** D. D. Aday, J. A. Buckel, W. G. Cope, M. T. Correa, L. A. Degernes, C. S. DePerno, J. R. Godwin, K. Gross, C. A. Harms, G. R. Hess, C. E. Moorman, S. C. Nelson, R. J. Richardson, J. L. Stape; **Adjunct Associate Professors:** W. G. Dorgeloh, C. A. Harper; **Assistant Professors:** B. A. Gardner, M. N. Peterson; **Adjunct Assistant Professors:** D. T. Cobb, R. J. Heise, J. A. Homyack, R. W. Laney, M. R. Loomis

The degrees are offered through the Fisheries, Wildlife, and Conservation Biology program, an intercollegiate program administered by the Department of Forestry and Environmental Resources and shared with the Department of Biology and the College of Veterinary Medicine. Students are affiliated with the department of their major professor. The degrees emphasize assessment, biology, ecology and management of fish and wildlife species and their habitats.

Admissions Requirements: Application for admission is made directly to the Fisheries, Wildlife, and Conservation Biology program. Minimum requirements include an undergraduate grade point average of 3.0 in an appropriate biological discipline and a graduate record examination score of 1000, calculated as the sum of verbal and quantitative scores. Admission is competitive and depends on the willingness of a member of the faculty to serve as major professor. Exceptions to minimum requirements may be made for students with special backgrounds.

Master's Degree Requirements: The M.S. degree program requires a minimum of 30 credit hours, including 1-2 hours of seminar and no more than six hours of research. A research-based thesis is required, as is a minor (usually 9-10 hours). The Master of Fisheries and Wildlife Sciences degree requires a minimum of 36 credits, including 4-6 hours of special problems and 1-2 hours of seminars, and a professional paper is required. For either degree, further requirements may be imposed by the advisory committee and/or department.

Doctoral Degree Requirements: The Ph.D. program requires 36 to 54 credits of course work beyond the Master's degree, including two seminars and an ethics course, and a dissertation. Exceptionally well-prepared students may petition to have their degree objective changed to Ph.D. before completing the Master's degree.

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 near campus is facilitated by excellent field, laboratory and computer resources. Off-campus research is conducted at the Pamlico Aquaculture Field Laboratory, research and extension centers in eastern and western NC, The Center for Marine Sciences and Technology in Morehead City, Bull Neck Swamp, Hill and Hofmann Forests, and at facilities of state and federal agencies and private organizations. For additional information, see the Fisheries, Wildlife, and Conservation Biology graduate web page: <http://cnr.ncsu.edu/fer/grads/gradfw.html>.

Click on [Graduate Courses](#) for current course information.

COURSES FROM ASSOCIATED DEPARTMENTS

BIO 561 Conservation Biology
FW 511 Human Dimension of Wildlife
FW 553 Principles of Wildlife Science
FW 560 International Wildlife Management and Conservation
FW 565 African Ecology and Conservation
FW 602/802 Seminar in Fisheries and Wildlife
FW 720 Epidemiology of Wildlife Diseases
FW 730 Ethics in Fisheries and Wildlife Sciences
FW 801 Issues in Fisheries and Wildlife Sciences Doctoral Seminar
ST 506 Sampling Animal Populations
ZO 501 Ornithology
ZO 519 Limnology
ZO 542 Herpetology
ZO 544 Mammalogy
ZO 726 Quantitative Fisheries Management

Food, Bioprocessing, and Nutrition Sciences

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Food Science	Y		Y		Y		

GRADUATE FACULTY

C. R. Daubert, *Department Head*

Director of Graduate Programs:

J. C. Allen, Box 7624, 3-2257, jon_allen@ncsu.edu, Food, Bioprocessing, and Nutrition Sciences

Alcoa Professor of Chemical and Biomolecular Engineering: S. A. Khan

David H. Murdock Distinguished Professor approved by Provost & Chancellor 8/4/2010.: M. Lila

William Neal Reynolds Distinguished Professor: E. A. Foegeding, K. R. Swartzel

William Neal Reynolds Distinguished University Professor: T. R. Klaenhammer

Professors: J. C. Allen, K. E. Anderson, S. L. Ash, G. L. Catignani, C. R. Daubert, M. A. Drake, B. E. Farkas, D. P. Green, S. A. Hale, H. M. Hassan, L. Jaykus, S. Kathariou, T. C. Lanier, D. K. Larick, J. L. Oblinger, J. E. Rushing, K. P. Sandeep, J. D. Sheppard, D. R. Ward; **USDA Professors:** F. Breidt, R. F. McFeeters, T. H. Sanders, V. D. Truong; **Adjunct Professors:** A. Kilara, R. C. Theuer; **Emeritus Professors:** L. W. Aurand, H. R. Ball, L. C. Boyd, R. E. Carawan, D. E. Carroll, M. E. Gregory, A. P. Hansen, M. W. Hoover, V. A. Jones, C. J. Lackey, D. H. Pilkington, S. J. Schwartz, B. W. Sheldon, L. G. Turner; **Emeritus Distinguished Professors:** H. E. Swaisgood; **Associate Professors:** P. Cowen, D. J. Hanson, R. R. Sharma; **Research Associate Professors:** J. Simunovic; **Emeritus USDA Professors:** H. P. Fleming, W. M. Walter; **Assistant Professors:** F. M. Arritt, L. S. Goodell, G. K. Harris, T. G. Phister; **USDA Assistant Professors:** J. P. Davis, L. L. Dean, I. M. Perez Diaz; **Adjunct Assistant Professors:** A. Amezcuita, S. Sang

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 two research centers, the Southeast Dairy Foods Research Center and the Center for Advanced Processing and Packaging Studies. 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 have additional course requirements. The best qualified applicants will be accepted up to the number of spaces that are available for new students.

Master's Degree Requirements: A Master's program must include courses from at least two of the following categories: chemistry-biochemistry, engineering, microbiology, nutrition and processing technology. The M. S. in Food Science requires 30 credit hours and the Master of Food Science requires 36 credit hours of course work.

Doctoral Degree Requirements: A doctoral program must include courses from at least three of the categories listed above (or equivalent courses at another university). Total course credits will vary depending on the needs of the student and the requirements of the Graduate School. All doctoral students are required to pass a departmentally 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. Admission does not guarantee availability of financial support.

Other Relevant Information: Students are encouraged to make personal contact with individual faculty whose research program is of interest to them. Information describing each faculty member's program is available at our website (<http://ncsu.edu/foodscience>).

Click on [Graduate Courses](#) for current course information.

Foreign Languages and Literatures

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Foreign Languages and Literature				Y			

GRADUATE FACULTY

Director of Graduate Programs:

J. S. Despain, Box 8106, 513-1482, despain@gw.ncsu.edu, Foreign Languages and Literatures

Professors: G. A. Dawes, T. P. Feeny, R. V. Gross, Y. B. Rollins, E. Tai; **Emeritus Professors:** J. R. Kelly, M. A. Witt; **Associate Professors:** V. Bilenkin, H. G. Braunbeck, M. A. Darhower, J. S. Despain, M. D. Garval, H. A. Jaimes, M. M. Magill, D. M. Marchi, J. Mari, J. P. Mertz, L. A. Mykyta, J. A. Pasten, A. N. Taj, E. L. Vilches; **Emeritus Associate Professors:** R. A. Alder, S. T. Alonso, M. L. Salstad; **Assistant Professors:** S. E. Garrigan, J. C. Michnowicz, S. S. Mody, J. O. Wipplinger, T. E. Wolford, V. A. Wust

The Master's degree in Foreign Languages and Literatures offers concentrations in both French Language and Literature and Spanish Language and Literature.

Admission Requirements:

- A baccalaureate degree from an accredited college or university
- Undergraduate GPA of 3.0 or above
- Narrative statement of professional and personal objectives (in English, 300 words).
- Language proficiency as determined by a writing sample and a speaking sample in the target language (French or Spanish). Follow the specific sample guidelines at <http://fll.chass.ncsu.edu/graduate/info-sample.php>.
- Some applicants may be given provisional admittance on condition of taking specific undergraduate courses conducted in the target language and passing with a B or better.
- 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.
- Visit the program's web site (<http://fll.chass.ncsu.edu/graduate>) for complete admissions information.

Degree Requirements: The program requires at least 30 hours of course work and a culminating project. Each student's program is tailored to enhance his or her career objectives. Students who plan to pursue a Ph.D. receive the requisite training and assistance. Students who plan to teach in community colleges or universities may complete the degree without a concentration or with a concentration in another discipline. K-12 teachers who already have "Initial" or "A" licensure may earn "M" licensure by taking 36 hours in specified disciplines. K-12 teachers who already hold "A" licensure can add-on English as a Second Language (ESL) licensure by taking 36 hours in specified disciplines. Visit the program web site for complete departmental course requirement information (<http://fll.chass.ncsu.edu/graduate/courses/index.php>).

Student Financial Support: Graduate assistantships and fellowships are available to students in both the French and Spanish concentrations and are awarded by open competition.

Other Relevant Information: Students are admitted for the fall semester only; deadlines for applications are February 15 for international students and May 1 for U.S. students. Students interested in a teaching assistantship indicate this interest on the Graduate School application and must have their application in by February 1 for full consideration.

Click on [Graduate Courses - General](#) for current course information.

Click on [Graduate Courses - French](#) for current course information.

Click on [Graduate Courses - Spanish](#) for current course information.

Forest Biomaterials

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Forest Biomaterials	Y		Y		Y		

GRADUATE FACULTY

S. S. Kelley, *Department Head*

Director of Graduate Programs:

I. M. Peszlen, Box 8001, 513-1265, Ilona_Peszlen@ncsu.edu, Wood and Paper Science

Alcoa Professor of Chemical and Biomolecular Engineering: S. A. Khan

Buckman Professor: M. A. Hubbe

Elis and Signe Olsson Professorship: H. Jameel

Jordan Family Distinguished Professorship for Natural Resources Innovation: V. C. Chiang

Professors: D. S. Argyropoulos, J. Denig, J. A. Heitmann, S. S. Kelley, M. W. Kelly, A. G. Kirkman, R. A. Venditti;

Research Professors: R. L. Lemaster; ***Adjunct Professors:*** L. L. Edwards, R. B. Phillips; ***Emeritus Professors:*** H.

Chang, E. B. Cowling, E. L. Deal, E. L. Ellwood, I. S. Goldstein, C. Hart, L. G. Jahn, M. J. Kocurek, H. G. Olf, R. G.

Pearson, R. J. Thomas, E. A. Wheeler; ***Associate Professors:*** L. A. Lucia, P. H. Mitchell, J. J. Pawlak, P. N. Peralta, I.

M. Peszlen, O. J. Rojas, E. O. Sills, D. C. Tilotta; ***Adjunct Associate Professors:*** E. A. Capanema, P. W. Hart; ***Assistant***

Professors: S. Dasmohapatra, S. Park, D. E. Saloni; ***Research Assistant Professors:*** Y. Habibi; ***Teaching Professors:*** S.

D. Jackson; ***Teaching Associate Professors:*** M. V. Byrd

Course offerings and research facilities are available in the following areas: wood chemistry, biopolymer chemistry, bio-materials, bio-energy, pulping chemistry, process analysis, polymer chemistry, paper physics, paper recycling, wood physics (especially wood liquid relations), wood anatomy, wood biology, wood mechanics and engineering, wood machining, manufacturing processes, wood-based industry economics and marketing, and forest-based life cycle analysis.

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 another suitable science or engineering degree. Students with a 3.0 GPA and with appropriate course backgrounds will be considered for admission. The GRE test scores are required except for the Master of Forest Biomaterials offered through Distance Education.

Master of Science Degree Requirements: The M.S. degree requires a minimum of 30 credit hours. In addition, there are WPS core course requirements, which vary depending on the field of study. Six hours of research (WPS 695) must be taken. Two hours of Seminar (WPS 591) must be passed. A qualifying exam must be passed.

Master of Forest Biomaterials Degree Requirements: The Master of Forest Biomaterials is a non-thesis, professional degree for students not interested in a thesis-based research program. The Master of Forest Biomaterials degree is offered both on campus and through Distance Education. For the on-campus program a minimum of 36 course credits is required. The regulations regarding credits are the same as for the M.S. degree except that no credit for WPS 695 is required or given and up to six 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.

In addition to Graduate School requirements, the Distance Education program requires that the student be employed professionally in a wood or paper science or allied field, have one year of professional experience, and take required WPS core courses, which vary depending on the field of study. A minimum of 30 course credits is required of students who have relevant professional experience, including one hour of Seminar (WPS 591) and five hours of an independent project (WPS 625). For distance students without relevant professional experience, 36 hours is required.

Doctoral Degree Requirements: In addition to Graduate School requirements, Ph.D. candidates must present two departmental seminars (WPS 791) before their final oral examination. Candidates must also write and defend a research proposal on their intended research (first proposition) and a research proposal on an area outside of their dissertation/thesis research (termed a second proposition) and pass qualifying exams.

Student Financial Support: A number of research assistantships and fellowships are available.

Other Relevant Information: Graduate students should select a committee chair and other advisory committee members and submit a plan of graduate work by the end of their first semester of residence. They are also required to take the qualifying examination as part of a Research Methods course. These examinations are to ensure that the student has the basic abilities to think independently as a scientist within the context of the forest biomaterials literature. The department believes M.S. and Ph.D. students should select a research topic and begin their dissertation or thesis research as early as possible.

As the field of forest biomaterials is a derived science, students are urged to develop a strong secondary area of excellence in 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.

Click on [Graduate Courses](#) for current course information.

Forestry and Environmental Resources

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Forestry and Environmental Resources	Y		Y		Y		

GRADUATE FACULTY

B. Goldfarb, *Department Head*

CARL ALWIN SCHENCK PROFESSOR EMERITUS: C. B. Davey

Edwin F. Conger Distinguished Professor of Forestry and Environmental Resources: R. R. Sederoff

Jordan Family Distinguished Professorship for Natural Resources Innovation: V. C. Chiang

Professors: R. C. Abt, V. P. Aneja, R. E. Bardon, R. R. Braham, R. I. Bruck, F. W. Cubbage, H. A. Devine, W. S. Dvorak, L. J. Frampton, M. Fuentes, B. Goldfarb, F. P. Hain, G. R. Hodge, S. Khorram, B. Li, S. E. McKeand, L. A. Nielsen, D. L. Osmond, D. J. Robison, J. P. Roise, T. A. Steelman, W. E. Winner; **USDA Professors:** F. E. Bridgwater, G. Sun; **USDI Professors:** T. R. Simons; **Adjunct Professors:** R. G. Campbell, P. M. Dougherty, T. P. Holmes, J. P. McTague, D. E. Mercer, U. J. Nilsson, M. Olsson, R. C. Purnell, K. H. Riitters, C. Trettin, D. N. Wear; **Emeritus Professors:** H. L. Allen, A. W. Cooper, E. B. Cowling, P. D. Doerr, E. C. Franklin, J. D. Gregory, A. E. Hassan, L. E. Hinesley, R. C. Kellison, E. A. Wheeler; **Emeritus Distinguished Professors:** S. W. Buol; **Associate Professors:** G. B. Blank, B. P. Bullock, C. S. DePerno, D. W. Hazel, G. R. Hess, J. S. King, C. E. Moorman, S. C. Nelson, E. G. Nichols, T. H. Shear, E. O. Sills, J. L. Stape, A. M. Stomp, S. T. Warren, R. W. Whetten; **Research Associate Professors:** F. Isik, A. Noormets; **USDA Associate Professors:** S. G. McNulty; **Adjunct Associate Professors:** K. L. Abt, B. A. Bergmann, M. C. Conner, W. G. Dorgeloh, C. H. Greenberg, D. L. Loftis, J. B. McCarter, S. Pattanayak, A. Pauchard, J. P. Prestemon; **Emeritus Associate Professors:** H. V. Amerson; **Assistant Professors:** R. E. Emanuel, B. A. Gardner, A. L. James, M. R. McHale, M. N. Peterson; **Research Assistant Professors:** K. K. Beratan, G. P. Catts, J. Domec, R. M. Jetton, K. M. Potter; **Adjunct Assistant Professors:** D. M. Amatya, J. W. Coulston, P. J. Donoso, J. A. Homyack, J. S. Iames, Z. H. Leggett, K. A. McGinley, J. N. Phelan, R. A. Rubilar, F. G. Sanchez, J. L. Schuler, L. M. Van Zyl, B. E. Washburn; **Extension Associate Professors:** S. E. Moore; **Teaching Associate Professors:** H. M. Cheshire

The department offers training in all of the major sub-disciplines of forest, natural resources, and environmental-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. For the M.S. degree, a minor is required.

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 require 36 to 54 credits of course work beyond the master's degree. A minor is required.

Student Financial Support: Merit-based research assistantships are available most years 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. Additional funding is available through a limited number of teaching assistantships.

Other Relevant Information: Every graduate student must meet the following requirements: (1) take a one-credit research methodology course, FOR 603 or 803, early in his/her program; (2) take a seminar course (typically FOR 601/801), for students starting in their program in Fall 2008 or later; and (3) begin the final oral exam with a seminar to the department based on work accomplished during the graduate program. Ph.D. students must meet a one-time teaching requirement by assisting a faculty member teach an undergraduate forestry or natural resources course.

Click on [Graduate Courses](#) for current course information.

Genetics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Genetics	Y		Y		Y		

GRADUATE FACULTY

D. W. Threadgill, *Department Head*

Director of Graduate Programs:

S. E. Curtis, Box 7614, 515-5747, securtis@ncsu.edu, Genetics

Edwin F. Conger Distinguished Professor of Forestry and Environmental Resources: R. R. Sederoff

University Research Professor: W. F. Thompson

William Neal Reynolds Distinguished Professor: W. F. Boss, F. L. Gould

William Neal Reynolds Distinguished University Professor: M. M. Goodman, T. R. Klaenhammer

William Neal Reynolds Professor: R. R. Anholt, R. S. Boston, R. A. Dean, L. K. Hanley, S. Lommel, T. F. MacKay, Z. Zeng

William Neal Reynolds Professor Emeritus: C. S. Levings

William Neal Reynolds Professor Emeritus: E. Eisen, E. A. Wernsman

Professors: S. E. Curtis, J. W. Mahaffey, C. H. Opperman, D. Robertson, S. L. Spiker, J. L. Thorne, D. W. Threadgill;

Adjunct Professors: M. D. Chilton, G. C. Gibson, M. D. Purugganan; ***Emeritus Professors:*** W. D. Hanson, W. E. Kloos, D. F. Matzinger, W. H. McKenzie, J. G. Scandalios, H. E. Schaffer, A. C. Triantaphyllou; ***Associate Professors:*** J. M.

Alonso, T. H. Emigh, R. G. Franks, M. J. Scott, E. A. Stone; ***Research Associate Professors:*** P. A. Estes, D. M. Nielsen;

Emeritus USDA Professors: C. W. Stuber; ***Adjunct Associate Professors:*** C. M. Grozinger; ***Assistant Professors:*** M.

T. Johnson, M. D. Lorenzen, L. D. Mathies, A. A. Motsinger, N. D. Singh; ***Adjunct Assistant Professors:*** R. E. Cannon,

M. A. Conkling, P. Hurban, S. J. Uknes

The department provides a well-balanced program of graduate course work and research training. The faculty conducts basic research in the genetics of a variety of model animal, and plant systems. The student has a choice of research projects in the broad areas of molecular, 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: The M.S. degree requires a minimum of 30 credit hours; the Master's of Genetics requires a minimum of 36 credit hours. A 12-hour sequence of five core courses is required of all majors; nine of these hours are required for minors. A minimum of two additional graduate genetics courses is required.

Doctoral Degree Requirements: A 14-hour sequence of six core courses is required of all majors; nine of these hours are required for minors. A minimum of four additional graduate genetics courses is required.

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 acceptance into the program.

Other Relevant Information: New students supported by fellowships or research assistantships will rotate through three 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.

Click on [Graduate Courses](#) for current course information.

Genomic Sciences

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Bioinformatics	Y				Y		
Functional Genomics	Y		Y		Y		

GRADUATE FACULTY

Directors of Graduate Programs:

D. M. Bird, Box 7616, 515-6813, david_bird@ncsu.edu, Plant Pathology

Z. Zeng, Box Rick, 515-1942, zeng@stat.ncsu.edu, Statistics

ALCOA Professor of Chemical Engineering: R. M. Kelly

Distinguished University Research Professor: D. L. Bitzer

Drexel Professor of Statistics: A. A. Tsiatis

Edwin F. Conger Distinguished Professor of Forestry and Environmental Resources: R. R. Sederoff

Jordan Family Distinguished Professorship for Natural Resources Innovation: V. C. Chiang

Philip Morris Professor: R. E. Dewey

University Research Professor: W. F. Thompson

William Neal Reynolds Distinguished Professor: W. F. Boss

William Neal Reynolds Distinguished University Professor: M. M. Goodman, T. R. Klaenhammer

William Neal Reynolds Professor: R. R. Anholt, R. S. Boston, J. Cavanagh, M. E. Daub, M. Davidian, R. A. Dean, L. K. Hanley, S. Lommel, T. F. MacKay, J. Odle, G. A. Payne, C. V. Sullivan, Z. Zeng

William Neal Reynolds Professor Emeritus: E. Eisen

Professors: K. B. Adler, P. Arasu, D. M. Bird, R. J. Borski, M. Breen, E. B. Breitschwerdt, D. T. Brown, A. C. Clark, S. D. Clouse, S. E. Curtis, G. A. Dean, C. E. Farin, F. J. Fuller, J. E. Gadsby, S. K. Ghosh, B. Goldfarb, J. M. Haugh, C. L. Hemenway, J. M. Hughes-Oliver, E. L. Kaltoven, S. Kathariou, S. Leath, D. H. Ley, B. Li, J. W. Mahaffey, C. Mattos, E. S. Maxwell, S. E. McKeand, E. S. Miller, J. W. Moyer, P. E. Mozdzia, D. C. Muddiman, S. V. Muse, C. H. Opperman, P. E. Orndorff, J. N. Petitte, R. M. Petters, J. A. Piedrahita, J. B. Ristaino, D. Robertson, M. C. Sagui, B. Sherry, R. C. Smart, J. L. Thorne, W. Tompkins, M. A. Vouk, B. M. Wiegmann, P. L. Wollenzien; **USDA Professors:** J. B. Holland; **Adjunct Professors:** G. C. Gibson, J. L. Gibson, N. L. Kaplan, M. S. McGinnis, M. D. Purugganan, R. D. Wolfinger; **Emeritus Professors:** T. H. Regan; **Associate Professors:** J. M. Alonso, C. M. Ashwell, M. S. Ashwell, J. W. Brown, I. Carbone, J. P. Cassady, R. G. Franks, J. R. Godwin, M. B. Goshe, A. M. Grunden, S. Heber, J. M. Horowitz, J. A. Knopp, D. S. Lalush, H. Liu, J. W. Olson, M. Rodriguez-Puebla, H. A. Sederoff, M. L. Sikes, C. E. Smith, J. L. Stape, E. A. Stone, R. W. Whetten, Q. Y. Xiang, D. Xie, J. A. Yoder, D. Zhang; **Research Associate Professors:** P. A. Estes, D. M. Nielsen; **Adjunct Associate Professors:** C. M. Grozinger, E. R. Hauser; **Emeritus Associate Professors:** H. V. Amerson; **Assistant Professors:** M. D. Koci, L. Li, L. D. Mathies, F. Meilleur, A. A. Motsinger, B. J. Reich, W. Sun, J. Tzeng, P. Veronese, H. Wang, Y. Wu; **USDA Assistant Professors:** I. M. Perez Diaz; **Adjunct Assistant Professors:** J. L. Stephenson; **Teaching Associate Professors:** J. A. Barnes; **Teaching Assistant Professors:** J. L. Lubischer, A. Y. Scales

Genomic sciences has two components. Functional genomics, the generation of large bodies of data relating to organism function, encompasses gene discovery, gene expression, protein and nucleic acid structure and function, gene and gene product interactions, and genomic approaches to breeding and comparative studies relevant to ecology and evolutionary biology. Bioinformatics is the analysis of these vast and complex data sets including methods to analyze extremely large sets of genomic information such as DNA sequences and expression from DNA

microarrays. Students register in either of these two fields but also receive a solid grounding in the other through core courses common to both programs. Unique and exceptional resources include the [Bioinformatics Research Center](#) and the [Genome Research Laboratory](#).

Admission Requirements: Students should have an undergraduate major in the biological or physical sciences, mathematics, statistics or computer science and have completed calculus and other comparable courses. In addition to the other application requirements, a student should submit a statement of interests and career goals.

Master's Degree Requirements: Students take a 15-credit core curriculum of courses common to both programs followed by courses specific to the degree and discipline. The Master's of Bioinformatics requires a minimum of 33 credit hours. The Master's of Functional Genomics requires a minimum of 30 credit hours, and the Master's of Science in Functional Genomics requires a minimum of 36 credit hours.

Doctoral Degree Requirements: The Ph.D. program requires a total of 72 credits, and all students participate in a journal club, monthly seminar series and research ethics training. A co-mentoring system exists between bioinformatics and functional genomics through which each student has advisors from both disciplines. Throughout the program they will have the opportunity to gain practical experience in the Genome Research Laboratory, Bioinformatics Research Center and DNA Sequencing Facility.

Student Financial Support: A significant number of fellowships are available through the genomics program, and students may also be supported by research grant funds awarded to genomics faculty members.

GRADUATE COURSES

Many courses are available and cross-listed through 25 participating departments in the Colleges of Agriculture & Life Sciences, Engineering, Natural Resources, Physical & Mathematical Sciences, and Veterinary Medicine.

Geospatial Information Science and Technology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Geospatial Information Science and Technology					Y		

GRADUATE FACULTY

Directors of Graduate Programs:

H. A. Devine, Box 7106, 515-3682, hugh_devine@ncsu.edu, Parks, Recreation and Tourism Management

M. F. Floyd, Box 8001, 513-8026, myron_floyd@ncsu.edu, Parks, Recreation and Tourism Management

Professors: E. H. Bressler, H. A. Devine, M. Fuentes, G. D. Garson, M. L. Gumpertz, R. W. Heiniger, J. E. Hummer, S. Khorram, H. Krim, D. K. Larick, J. F. Levine, M. F. Overton, W. J. Rasdorf, A. R. Rice, J. A. Rice, W. E. Snyder, J. R. Stone, H. J. Trussell; **USDA Professors:** G. Sun; **Associate Professors:** B. P. Bullock, D. A. Crouse, C. G. Healey, G. R. Hess, M. M. Kimberley, Y. Leung, H. Mitasova, S. C. Nelson, G. T. Roberson, W. R. Smith, R. A. St. Amant, M. L. Vasu, J. G. White, E. N. Wiebe, S. B. Wiley, S. E. Yuter; **Research Associate Professors:** P. K. Baran, H. S. Stubbs; **Adjunct Associate Professors:** J. E. Fels; **Research Assistant Professors:** G. P. Catts, L. G. Tateosian; **Adjunct Assistant Professors:** J. W. Coulston, M. R. Loomis; **Teaching Associate Professors:** H. M. Cheshire

The Master of Geospatial Information Science and Technology degree (MGIST) prepares high end professionals to lead North Carolina and the nation in the development of new spatial modeling technologies and GIS applications in a wide variety of disciplines (economic development, disease, emergency planning and response, environmental resources, sustainable tourism, etc.). The degree is centered on NC State's strengths in management of technology, computer engineering, and statistical analytics and builds on our successful Graduate Certificate in GIS. The program focuses on advanced skill development in computational modeling and management decision support and addresses the growing need for GIS developers, managers, and analysts. The National Council of Graduate Schools has designated the MGIST degree as part of its Professional Science Master's program in recognition of the curricula's innovative blend of science, technology, and management. The degree may be taken on campus or entirely online.

Admissions Requirements: Admission to the program requires an undergraduate GPA of 3.0 or better, a professional resume, and a letter describing the applicant's professional ambitions and experience. Students with less than a 3.0 undergraduate GPA may request admission on the basis of a B or better grade in six credit hours in the [GIS Certificate program](#).

Master's Degree Requirements: The MGIST degree requires 30 course credit hours including a 3-credit-hour final project. A grade of B- or better grade is required in all required core courses. In addition, graduates must prepare an acceptable professional digital portfolio highlighting their geospatial analytic skills and competencies. Specific course requirements are listed on the [MGIST web site](#).

Student Financial Support: Students in this program are eligible for financial aid and may compete for program assistantships and internships.

Other Relevant Information: The GIS program also offers a [Graduate Certificate in GIS](#) (15 credit hours). Certificate students may transfer up to 12 credits into the MGIST degree. Students enrolled in other NC State graduate programs may enroll in the Certificate program or in either of the two related minors ([GIS](#), [Environmental Remote Sensing](#)).

Click on [Graduate Courses](#) for current course information. See related graduate courses on the [GIS web site](#).

Global Innovation Management

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Global Innovation Management					Y		

GRADUATE FACULTY

Director of Graduate Programs:

J. K. McCreery, Box 7229, 5-4093, john_mccreery@ncsu.edu, Business Management

Professors: D. P. Pagach; **Associate Professors:** L. Aiman-Smith, E. A. Baker, D. H. Henard, S. K. Markham, J. K. McCreery, P. W. Mulvey, M. D. Walker; **Teaching Associate Professors:** S. J. Schanz

The Jenkins Graduate School of Management, part of the North Carolina State University College of Management, in partnership with the [Université Paul Cézanne Graduate School of Management](#) (IAE Aix-Marseille III) in Aix-en-Provence France, offers a Master's degree in Global Innovation Management. The curriculum is designed to give engineering, science and other technology-oriented students a strong exposure to core business management skills while providing in-depth exposure to a host of global innovation management issues. It was designed specifically for students who are looking to create a personal competitive advantage for today's global job market.

Students in the program come from around the world and classes will be held in both France and the United States. Students are taught by international professors who are leaders in their fields. Interactions with global firms will occur both in the classroom and via internships.

Admission Requirements: Applicants are required to complete the standard NC State Graduate School application process. Applicant assessments will be done on an individual-by-individual basis. Concurrent acceptance activities will be at both IAE and NC State. GMAT or GRE scores are required of all applicants. International applicants must complete the TOEFL or IELTS.

U.S. applicants will need a valid U.S. passport and visa for traveling to France. Upon acceptance to the program, students can apply for a visa. Applicants should also be prepared for additional program costs (airfare to and from Europe and travels within Europe, lodging and meals while in France).

Master's Degree Requirements: The MGIM degree requires 33 credit hours and can be completed in one year. It does not require courses in subject areas such as economics and operations management which are required in the MBA. This one-year program awards two master degrees: (1) a degree from NC State University and (2) a degree from the Université Paul Cézanne.

Core Courses:

MBA 550 Management of Technology and Innovation
MBA 554 Project Management
MBA 564 Business Relationship Management

Elective Courses:

MBA 563 Product and Brand Management
MBA 570 Entrepreneurship
MBA 585 Current Topics in BioSciences Management

MBA 586 Legal and Marketing Dynamics in Pharmaceutical and Biotechnology
MBA 590 Special Topics in Business Management (Services Innovation)

Other Relevant Information: After two years of full-time work experience, qualified students who earn the dual master degree in Global Innovation Management can receive their full-time MBA from NC State University's Jenkins Graduate School of Management after completing an additional 30 hours of study. Students must complete a separate application to the MBA program.

Graphic Design

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Graphic Design					Y		

GRADUATE FACULTY

S. J. Piedrafita Iglesias, *Department Head*

Director of Graduate Programs:

M. J. Davis, Box 7701, 515-8335, meredith_davis@ncsu.edu, Graphic Design

Professors: D. M. Crisp, M. J. Davis, M. Scotford; **Emeritus Professors:** A. S. Lowrey; **Associate Professors:** K. L. Bailey, S. J. Piedrafita Iglesias, S. Townsend

Recognizing that graphic design is both a social activity and a form of cultural production, faculty and students in the Master of Graphic Design Program 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 and strategies.

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.

Admissions Requirements: Students must make application to the Department of Graphic Design and Industrial Design by January 5. In addition to Graduate School requirements, the Department requires department personal data forms, a digital portfolio in CD/DVD format of design work, and a statement of intent. The GRE is required for students whose first degree is not in Graphic Design.

Master's Degree Requirements: The Master of Graphic Design degree requires a minimum of 48 credit hours. The program generally does not accept transfer credits in lieu of required coursework at NC State. Studio credits presented for elective 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 requests should be made to the Department of Graphic Design and Industrial Design and should be submitted with the application for admission (for incoming students) or by advertised deadline (for continuing students).

Click on [Graduate Courses](#) for current course information.

History

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
History				Y			
Public History				Y			

GRADUATE FACULTY

J. K. Ocko, *Department Head*

Director of Graduate Programs:

B. M. Kelley, Box 8108, 513-2225, blmkelley@ncsu.edu, History

Professors: W. Adler, H. Brewer, J. E. Crisp, C. T. Friend, D. P. Gilmartin, O. J. Kalinga, A. F. Khater, K. P. Luria, J. K. Ocko, S. T. Parker, R. H. Sack, R. W. Slatta, K. P. Vickery, K. S. Vincent, D. A. Zonderman; **Emeritus Professors:** J. R. Banker, B. F. Beers, M. L. Brown, C. H. Carlton, A. J. DeGrand, M. S. Downs, L. M. Edwards, W. C. Harris, J. P. Hobbs, D. E. King, A. J. Lavopa, G. W. O'Brien, J. M. Riddle, E. D. Sylla, M. E. Wheeler, B. W. Wishy; **Associate Professors:** D. R. Ambaras, R. K. Bassett, W. A. Jackson, B. M. Kelley, M. G. Kim, W. C. Kimler, K. Mellen Charron, A. W. Mitchell, S. L. Spencer, G. Surh, J. E. Swiss; **Assistant Professors:** M. M. Booker, R. S. Ellovich, S. M. Lee, J. L. Mell, L. N. Minsky, T. W. Ort, B. S. Sirota; **Teaching Assistant Professors:** J. C. Bonham, J. W. Caddell, H. C. Perros

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 a total of 30 semester hours, including six hours for the thesis. Each student's program is tailored to enhance his or her career objectives. Social studies teachers, for example, may earn advanced competency on completion of the M.A. in history with additional course work 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 program requires 36 credit hours of course work. Students may take a non-thesis or thesis option. Half the hours fall in historical studies, the rest in applied history classes, including innovative courses in archival and special collections management, paper conservation, documentary editing, and museum studies. Students may select practicums in their own special areas of interest -- including archival management, historic site administration, museology, historic preservation, and 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 1; 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.

Click on [Graduate Courses](#) for current course information.

Horticultural Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Horticultural Science	Y		Y		Y		

GRADUATE FACULTY

J. M. Dole, *Department Head*

Director of Graduate Programs:

J. L. Kornegay, Box 7609, 515-1193, julia_kornegay@ncsu.edu, Horticultural Science

Distinguished Professor of Sustainable Community Based Food Systems: N. G. Creamer

J.C. Raulston Distinguished Professor: D. J. Werner

Phillip Morris Professor: M. D. Boyette

Professors: J. R. Ballington, T. E. Bilderback, S. M. Blankenship, F. A. Blazich, W. G. Buhler, S. D. Clouse, J. M. Dole, G. E. Fernandez, W. C. Fonteno, W. E. Hooker, G. D. Hoyt, J. L. Kornegay, D. W. Monks, J. C. Neal, P. M. Perkins-Veazie, E. B. Poling, T. G. Ranney, J. R. Schultheis, S. E. Spayd, T. C. Wehner, B. E. Whipker, L. G. Wilson, F. H. Yelverton, G. C. Yench, E. Young; **Adjunct Professors:** J. L. Gibson, M. S. McGinnis; **Emeritus Professors:** W. E. Ballinger, A. A. DeHertogh, P. R. Fantz, R. G. Gardner, W. R. Henderson, L. E. Hinesley, T. R. Konsler, C. M. Mainland, T. J. Monaco, P. V. Nelson, M. A. Powell, W. A. Skroch, C. R. Unrath; **Associate Professors:** J. D. Burton, J. M. Davis, S. J. McCartney, M. L. Parker, B. R. Sosinski, A. M. Spafford, J. D. Williamson; **Research Associate Professors:** G. C. Allen; **Assistant Professors:** L. K. Bradley, A. F. Brown, B. Fair, C. Gunter, B. E. Jackson, H. T. Kraus, A. V. Lebude, D. R. Panthee, J. A. Pattison, J. T. Sherk; **Research Assistant Professors:** K. M. Jennings

The NCSU Horticultural Science Graduate Program offers one of the most comprehensive programs in the country – providing students with a broad selection of courses and projects ranging from applied industry-oriented studies to molecular biology. Studies may focus on such commodity areas as floriculture, ornamental and landscape horticulture, pomology (fruit crops) and olericulture (vegetables) or on cross-commodity topics such as plant physiology, breeding and genetics, herbicide physiology and weed control, nutrition, propagation, tissue culture, growth regulators, postharvest physiology, environmental control, landscape horticulture and biochemistry.

Admission Requirements: To be admitted, a student should have completed course work in physics, mathematics, chemistry, biochemistry, soils, plant pathology, genetics, plant physiology, 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. Applicants must provide the basic graduate record examination (GRE) scores, three letters of reference, one copy of transcript for each prior degree, and a statement of career goals.

Master's Degree Requirements: The Master's degree is a research-oriented degree requiring 30 credit hours and a written thesis. Four credits of core courses (HS 701-707, 717) and one credit of HS 601 must be completed. Up to 6 of the 30 credits may be research credits (HS 695), but there is no requirement to enroll for research credit. At least 20 semester hours must be 500, 600 or 700 level courses, and 6 of these credits must be at the 700 level.

For students wishing a more general educational background in horticultural science without the thesis requirement, the Master of Horticultural Science (M.H.S.) degree is offered. The M.H.S. requires 36 credit hours. Eighteen (18) credits must be at the 500-700 level. One credit of HS 601 and at least four and no more than six

credits of HS 693 are required. Up to 12 hours of 400-level courses can be taken as a part of the M.H.S. program, however, only six hours of HS 400-level courses are allowed. (The NCSU Graduate School does not allow any 400-level courses from the home department but only requires 30 credit hours for a Master's degree. We require 36 credits, of which 6 credits can be HS 400-level courses. Permission from the NCSU Graduate School is required for HS 400-level courses.) Students are encouraged, but not required, to fulfill the four credit Horticultural Science core course requirement (HS 701-707, 717). The M.H.S degree is also available through Distance Education.

Doctoral Degree Requirements: The Ph.D. program is designed for individuals desiring to pursue careers in research and teaching. A minimum of 54 credit hours beyond the Master of Science program is required. Three credits of the core courses (HS 701-707, 717) and one credit of HS 601 are required; HS 601 is not required if already taken during the M.S.

Student Financial Support: The department has a limited number of assistantships available on a competitive basis for promising students. Benefits include tuition and health insurance as covered under the Graduate School's Graduate Student Support Plan. Applicants are considered for assistantship support at time of application. Those interested should apply at least seven months prior to their anticipated enrollment date. Also, many faculty programs have research grant-funded assistantships; potential students should contact faculty directly whose programs are of interest.

Other Relevant Information: Facilities for graduate studies include 40,500 square feet of greenhouse space at the USTL and the nearby Horticultural Field Lab; the University Phytotron (available for controlled environmental studies on horticultural crops); 19 well-equipped laboratories; 14 controlled temperature storage rooms, an extensive collection of plant materials, both living and preserved; and a variety of climates and soils from coast to mountains in North Carolina on fifteen outlying research stations. North Carolina has a dynamic horticulture industry, ranking among the top ten in many of the commodity areas.

Click on [Graduate Courses](#) for current course information.

Immunology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Immunology	Y		Y				

GRADUATE FACULTY

Director of Graduate Programs:

S. M. Laster, Box 7615, 5-7958, Scott_Laster@ncsu.edu, Microbiology

Professors: G. W. Almond, E. B. Breitschwerdt, G. A. Dean, F. J. Fuller, B. Hammerberg, L. C. Hudson, S. L. Jones, S. M. Laster, K. M. Meurs, T. J. Olivry, B. Sherry, M. B. Tompkins, W. Tompkins; **Research Professors:** E. A. Havell; **Adjunct Professors:** J. N. Kornegay, M. K. Selgrade; **Associate Professors:** A. J. Birkenheuer, F. Scholle, M. L. Sikes, S. Tonkonogy, J. A. Yoder; **Assistant Professors:** P. R. Hess, M. D. Koci, J. C. Miller, S. E. Suter; **Research Assistant Professors:** J. E. Fogle, K. E. Howard, S. K. Nordone; **Adjunct Assistant Professors:** M. I. Gilmour; **Teaching Assistant Professors:** S. Trivedi

Course offerings or research facilities are available in the following areas: infectious disease immunology, mucosal immunology, immunotoxicology, immunoparasitology, environmental immunology, and immunology of non-vertebrate species.

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 prior experience in a research laboratory setting, especially in immunology, microbiology, biochemistry or genetics, or students who are completing strong clinical residency programs. Completed applications should be received by December 1 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.

Ph.D. and Master's students must take IMM 751 (Immunology) and at least one other 700-level immunology course, and a graduate-level biochemistry course (e.g. BCH 553 Biochemistry of Gene Expression). Also required are CBS 662 (Professional Conduct in Biomedical Research) and ST 511 (Experimental Statistics for Biological Sciences I). IMM 816 (Advanced Topics in Immunology) is required each semester. The remaining credit hours should include seminar (IMM 807) and research and teaching credits.

Students wishing to pursue a minor in Biotechnology should complete the core course in biotechnology (BIT 510) and two additional credit hours in the biotechnology series.

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.

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. For administrative purposes, all students accepted into the program will also have to be student members of one of the participating departments.

Click on [Graduate Courses](#) for current course information.

Industrial Design

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Industrial Design					Y		

GRADUATE FACULTY

H. Khachatourian, *Interim Department Head*

H. Khachatourian, Box 7701, 515-8331, haig_khachatourian@ncsu.edu, Industrial Design

Professors: S. D. Brandeis, C. E. Joyner, H. Khachatourian; **Emeritus Professors:** V. Foote; **Associate Professors:** C. D. Cox, L. M. Diaz, P. J. Fitzgerald, P. R. Hooper, B. Jin, B. W. Laffitte, S. J. Piedrafita Iglesias, V. K. Plume, D. G. Raymond; **Emeritus Associate Professors:** S. M. Toplikar; **Assistant Professors:** T. W. Buie, S. B. Joines; **Adjunct Assistant Professors:** E. C. Jordan

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: Students must make application to the Department of Graphic Design and Industrial Design by January 5. In addition to Graduate School requirements, the Department requires department personal data forms, a digital portfolio in CD/DVD format of design work, and a statement of intent. The GRE is required for students whose first degree is not in Industrial Design.

Master's Requirements: The Master of Industrial Design degree requires a minimum of

- 48 credit hours for applications with a bachelor's degree in Industrial Design (Track II), or
- 78 credit hours for applications with bachelor's degrees in an area other than Industrial Design (Track III).

The program generally does not accept transfer credits in lieu of required coursework at NC State. Studio credits presented for elective 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 requests should be

made to the Department of Graphic Design and Industrial Design and should be submitted with the application for admission (for incoming students) or by advertised deadline (for continuing students).

Click on [Graduate Courses](#) for current course information.

Industrial Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Industrial Engineering	Y		Y		Y		

GRADUATE FACULTY

P. Cohen, *Department Head*

Director of Graduate Programs:

Y. Fathi, Box 7906, 56417, fathi@ncsu.edu, Industrial Engineering

A. Doug Allison Distinguished Professor: S. D. Roberts

Clifton A. Anderson Distinguished Professor: R. Uzsoy

Edgar S. Woolard Distinguished Professor: P. Cohen

Henry A. Foscue Distinguished Professor: C. T. Culbreth Jr

James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing: T. J. Hodgson

NAMED PROF. EMERITUS, JAMES T. RYAN PROFESSOR: A. L. Prak

Walter Clark Professor of Industrial Engineering: S. C. Fang

Professors: R. H. Bernhard, G. D. Buckner, Y. Fathi, D. B. Kaber, R. E. King, Y. Lee, D. J. Marcellin, L. A. Martin, R. J. Narayan, J. R. Wilson, R. E. Young; **Adjunct Professors:** S. M. Hsiang; **Emeritus Professors:** M. A. Ayoub, T. Johnson, R. G. Pearson, W. A. Smith; **Emeritus Distinguished University Professors:** S. E. Elmaghraby; **Associate Professors:** B. Denton, O. A. Harrysson, T. L. Honeycutt, J. S. Ivy, M. G. Kay, D. P. Warsing; **Research Associate Professors:** J. Taheri; **Adjunct Associate Professors:** D. R. Cormier, N. J. Currie, R. Stoll; **Emeritus Associate Professors:** E. Sanii; **Assistant Professors:** J. Dong; **Adjunct Assistant Professors:** L. B. Davis, N. D. Shah, L. A. Tupler; **Teaching Professors:** S. D. Jackson, H. L. Nuttle; **Teaching Assistant Professors:** A. R. Vila-Parrish

The graduate faculty of the Edward P. Fitts Department of Industrial and Systems Engineering supports academic and research interests in four areas: (1) manufacturing systems (manufacturing processes, medical device manufacturing systems, CAM, CIM, robotics, automation, rapid prototyping and concurrent engineering); (2) production systems (logistics systems, supply chain management, scheduling, inventory control, materials handling, facility design, furniture manufacturing and management, quality control, and engineering economics); (3) systems analysis and optimization (health systems, stochastic processes, simulation, mathematical programming, and soft computing); and (4) ergonomics (human performance, occupational safety, and biomechanics). The department faculty actively supports independent graduate degree programs in operations research, integrated manufacturing systems engineering, textile technology and management, and financial mathematics.

Admission Requirements: Applications are accepted from undergraduate majors in engineering and in the behavioral, physical and mathematical sciences who meet prerequisites in calculus and linear algebra, computer science, and statistics.

Master's Degree Requirements: The M.S. degree requires 30 credit hours and 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 credit hours is required for the M.IE.

Doctoral Degree Requirements: This degree requires 72 credit hours of course and research 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 is required.

Student Financial Support: Research and teaching assistantships are available on a competitive basis to early applicants. Fellowships that supplement assistantship stipends are available to U.S. applicants with superior credentials. Award priority is given to Ph.D. and then to M.S. applicants.

Click on [Graduate Courses](#) for current course information.

Integrated Manufacturing Systems Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Integrated Manufacturing Systems Engineering					Y		

GRADUATE FACULTY

Director of Graduate Programs:

S. D. Jackson, Box 7906, 5-3808, steve_jackson@imsei.ncsu.edu, Integrated Manufacturing Systems Engineering

A. Doug Allison Distinguished Professor: S. D. Roberts

Bank of America Distinguished University Professor: R. B. Handfield

Burlington Industries Professorship of Textile Technology: R. L. Barker

Distinguished University Professor: M. A. Rappa

Dopaco Distinguished Professor: R. A. Wysk

Henry A. Foscue Distinguished Professor: C. T. Culbreth Jr

James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing: T. J. Hodgson

Phillip Morris Professor: M. D. Boyette

R.J. Reynolds Industries: C. F. Zorowski

Professors: G. D. Buckner, Y. A. Chen, M. Chow, M. Devetsikiotis, E. C. Dickey, B. L. Edge, Y. Fathi, T. K. Ghosh, W. J. Jasper, R. E. King, J. W. Leach, Y. Lee, T. J. Little, L. A. Martin, M. K. Ramasubramanian, W. J. Rasdorf, P. I. Ro, R. D. Rodman, J. P. Rust, A. M. Seyam, J. R. Wilson, R. E. Young; **Research Professors:** R. L. Lemaster; **Emeritus Professors:** R. E. Carawan, P. L. Grady, T. Johnson, W. A. Smith; **Associate Professors:** D. R. Bahler, P. Banks-Lee, K. A. Barletta, B. Denton, O. A. Harrysson, G. L. Hodge, J. S. Ivy, J. A. Joines, M. G. Kay, K. Mitchell, D. P. Warsing; **Research Associate Professors:** A. D. Batchelor, J. Taheri; **Adjunct Associate Professors:** D. R. Cormier, J. A. Janet; **Emeritus Associate Professors:** S. N. Chapman, E. Sanii; **Assistant Professors:** J. Dong, D. E. Saloni; **Adjunct Assistant Professors:** S. S. Ahiska; **Teaching Professors:** S. D. Jackson, H. L. Nuttle

The Integrated Manufacturing Systems Engineering (IMSE) Institute was established in 1984. IMSE provides multidisciplinary graduate-level education and practical training opportunities in the theory and practice of integrated manufacturing systems engineering at the masters level. IMSE focuses on providing a manufacturing presence and a program environment in the College of Engineering where faculty, graduate students and industry can engage cooperatively in multidisciplinary graduate education, basic and applied research, and technology transfer in areas of common interest related to modern manufacturing systems technology. The objective of the IMSE program is to offer students with traditional discipline backgrounds in engineering and the physical sciences an opportunity to broaden their understanding of the multidisciplinary area of manufacturing systems. Core areas of concentration are offered in manufacturing systems, logistics, mechatronics, and biomanufacturing.

Admission Requirements: Admission to the IMSE master's program requires a B.S. degree from an accredited institution in engineering, physics, mathematics, or computer science. Check with the Institute if your degree is in a field other than these listed.

Master's Degree Requirements: The IMSE program requires a minimum of 27 hours of graduate course work and six hours of research project. The graduate course work includes five required core courses that provide a multidisciplinary overview of subject materials basic to manufacturing systems, logistics, mechatronics, and biomanufacturing. Specialization is provided in the student's elective courses. The six hours of research project is performed either individually or in teams in areas that compliment and reinforce the graduate course work.

The IMSE degree is now available through Engineering Online as a distance program. Application to the IMSE Distance Education program is the same as the on-campus program: www2.acs.ncsu.edu/grad/applygrad.htm. More information is available via the IMSE Institute (Nancy.Evans@imsei.ncsu.edu, 919-515-3808).

Student Financial Support: Assistantships, fellowships and internships are available to qualified students. The full financial support package covers tuition and health insurance.

Fellowship/Internship: The IMSE internship program was established to provide a cooperative industrial and academic experience for some IMSE students and our industrial sponsors. Several Fellowship/Internships awards are made available every year for special training in IMSE member companies. Students who are selected to participate in the internship program receive financial support for four semesters and one summer. Typically, the student attends classes for two semesters (fall and spring), works at the sponsor company for the following summer and fall semester, and completes the IMSE course requirements the following spring semester. The student uses the experience at the sponsor company as the basis for their IMSE research project.

Other Relevant Information: The Institute is supported by an industrial affiliates group of member companies. They have included ABB, ABCO Automation, AIMS, Applied Materials, AT&T, Bayer, B/S/H, Biogen Idec, Bosch Tools, CDB Corporation, CP&L, Carver Machine Works, Castle Hill Technologies, Caterpillar, Closure Medical, Corning Cable Systems, CSX, Inc., Dupont, Elkay, Ford Motor, GE, GKN, IBM, Intel, John Deere Turf Care, Meadows Mills, Morganite, Nekton Technologies, Nortel, OdorSweep, Potters Industries, Rubbermaid, Rxmedic, Snap-on Incorporated, and Swift Water Industries. The Institute interacts with member companies through an Industry Advisory Board and internships.

Core areas of concentration are offered in manufacturing systems, logistics, mechatronics, and biomanufacturing.

I. Manufacturing Core (one from each area)

Area 1	CSC 510 - Software Engineering CSC 742 - Database Management Systems ISE(CSC,OR) 762 - Computer Simulation Techniques ISE(CSC) 441 - Introduction to Simulation ISE 719 - CIM System Design
Area 2	MBA 520 - Managerial Finance ISE 510 - Applied Engineering Economy ISE 711 - Capital Investment Economic Analysis
Area 3	ISE 514 - Manufacturing Product Engineering ISE 707 - Real-time Control of Automated Manufacturing ISE 715 - Manufacturing Process Engineering ISE 716 - Automated Systems Engineering
Area 4	ISE 723 - Production Planning, Scheduling and Inventory Control
Area 5	MAE(WPS) 534 - Mechatronic Design MAE 742 - Mechanical Design for Automated Assembly

II. Logistics Core (one from each area)

Area 1	CSC(ECE) 510 - Software Engineering CSC 742 - Database Management ISE(CSC,OR) 762 - Computer Simulation Techniques ISE 441 - Introduction to Simulation ISE 719 - CIM Systems Design
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Area 2	MBA 520 - Managerial Finance ISE 510 - Applied Engineering Economy ISE 711 - Capital Investment Economic Analysis
Area 3	MBA 541 - Supply Management MBA 542 - Supply Chain Logistics
Area 4	ISE 723 - Production Planning, Scheduling and Inventory Control
Area 5	ISE 754 - Logistics Engineering

III. Mechatronics Core (one from each area)

Area 1	MAE (WPS) 534 - Mechatronic Design ECE 556 - Agent-Based Mechatronics Systems
Area 2	MAE 513 - Principles of Structural Vibration MAE(ECE) 535 – Design of Electromechanical Systems MAE 742 - Mechanical Design for Automated Assembly
Area 3	ECE 511 - Analog Electronics ECE 555 - Computer Control of Robots ECE 755 – Advanced Robotics
Area 4	CSC(ECE) 517 - Object-oriented Languages and Systems ECE 561 – Embedded Systems Design ECE 742 – Artificial neural Networks ISE 719 - CIM System Design
Area 5	ECE 437 – Distribution Real-time Control Systems ECE 516 – System Control Engineering ISE 707 – Real-time Control of Automated Manufacturing ISE 716 – Automated Systems Engineering

IV. Biomanufacturing Core (one from each area)

Area 1	ISE/OR/CSC 762 – Computer Simulation ISE 719 - CIM Systems Design
Area 2	MBA 520 - Managerial Finance ISE 520 – Applied Engineering Economy
Area 3	ISE 514 - Manufacturing Product Engineering ISE 707 – Real-Time Control of Automated Manufacturing
Area 4	ISE 723 – Production Planning, Scheduling, and Inventory Control
Area 5	ISE 789 – Quality Control in Biomanufacturing Applications TE 589 – Six Sigma Quality

Click on [Graduate Courses](#) for current course information.

International Studies

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
International Studies					Y		

GRADUATE FACULTY

Director of Graduate Programs:

H. H. Hobbs, Box 8102, , heidi_hobbs@ncsu.edu, Political Science

William Neal Reynolds Professor: M. D. Schulman

Professors: F. W. Cabbage, D. M. Daley, A. F. Khater, J. K. Ocko, R. P. Patterson, M. A. Renkow, F. J. Smith, A. J. Taylor; **Adjunct Professors:** A. L. Schiller; **Emeritus Professors:** L. S. Bull, C. H. Carlton, E. W. Erickson, R. L. Moxley, J. C. Shih, M. S. Soroos, M. A. Witt; **Emeritus Distinguished Professors:** S. W. Buol; **Associate Professors:** W. A. Boettcher, J. C. Dutton, S. H. Greene, C. E. Griffin, H. H. Hobbs, M. A. Johnson, J. Kiwanuka-Tondo, R. C. Kochersberger, A. W. Mitchell, R. S. Moog, R. F. Stephen, J. M. Wallace, S. T. Warren, S. B. Wiley; **Emeritus Associate Professors:** L. D. Gustke, E. O'Sullivan, R. J. Thomson; **Assistant Professors:** L. V. Kochtcheeva, M. T. Nance, M. J. Struett; **Teaching Assistant Professors:** D. Mitin

The Master of International Studies (MIS) is a 36-hour, non-thesis professional degree program that prepares students for careers in government service, non-profit administration, international business, and program administration in international student services and study abroad. Located in the School of Public and International Affairs, the MIS degree draws upon faculty and courses from colleges and departments across the university. Approximately half of the course work for the degree is devoted to developing international knowledge and competencies. The remaining coursework is comprised of regional, topical, professional or technical specializations that are designed by students in consultation with their faculty advisors.

Admission Requirements: Applicants must provide GRE scores in addition to other application materials required by the Graduate School.

Degree Requirements: The requirements for the MIS degree are as follows:

1. 36 credit hours of course work;
2. Core Curriculum (15 hours). One course from each of the following five groups:
 - Group A - International Relations
 - Group B - Comparative Politics/Societies
 - Group C - International Law and Organization
 - Group D - International Economy/Development
 - Group E - Cross-cultural Communication
3. Individualized specialization (12-15 hours). The specialization may be in a geographical region (e.g., Latin America, South Asia), an international topic (e.g., security, environment, sustainable development), a professional field (e.g., business, public administration, non-profit management), or a technical specialty (e.g., agriculture, information technology);
4. Capstone seminar (3 hours) and oral presentation of work to faculty and peers;
5. International experience or study abroad; and

6. Competency in a foreign language as determined by the Department of Foreign Languages and Literatures (FLL).

Landscape Architecture

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Landscape Architecture					Y		

GRADUATE FACULTY

E. H. Bressler, *Department Head*

Director of Graduate Programs:

F. H. Magallanes, Box 7701, 515-8348, f_magallanes@ncsu.edu, Landscape Architecture

Professors: E. H. Bressler, A. R. Brown-Graham, H. A. Devine, R. C. Moore, A. R. Rice; **Emeritus Professors:** A. R. Abbate, R. R. Wilkinson; **Associate Professors:** K. M. Boone, F. H. Magallanes, T. H. Shear; **Research Associate Professors:** J. D. Tomlinson; **Assistant Professors:** A. A. Fox; **Adjunct Assistant Professors:** C. Van Der Wiele; **Teaching Assistant Professors:** C. F. Delcambre

Course offerings or research facilities are available in the following areas: site planning and design, landscape history, urban public spaces, community design, regional design, resource management, outdoor learning environments, international urban and rural landscapes, and specialized landscapes.

Admission Requirements: The best-qualified applicants are accepted up to the maximum 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.

I. Accredited First Professional Degree in Landscape Architecture: Candidates follow an 82-hour sequence of courses over a six-semester period. Three semesters of the program of study are determined by the required curriculum. The last three semesters of study are outlined by the student's Chair of the Department, Director of Graduate Programs, and/or advisor. Research and case studies lead to the final project and design application. The investigative direction is set in collaboration with the chair of the faculty committee. A formal presentation of findings to the faculty, student body and local professionals is required. The summary research and project report must be submitted to the College of Design faculty to meet the graduation requirements. *II. Advanced Studies in Landscape Architecture:* Candidates with an accredited undergraduate Landscape Architecture degree follow a 48-hour sequence of courses. Twenty-seven hours of electives are chosen through advising with the Director of Graduate Programs, advisors and faculty committee. Comprehensive research work is required for a final project with a final report is required. A formal presentation of findings to the faculty, student body and local professionals is also 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 NC State, UNC-CH and Duke University. Some examples of graduate minors are: natural resources, parks, recreation and tourism management, architecture, education, planning, civil engineering, and art and design. The College of Design includes the Center for Universal Design, the Office of Research, Extension & Engagement, and the Natural Learning Initiative.

Click on [Graduate Courses](#) for current course information.

Leadership, Policy, and Adult and Higher Education

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Adult and Community College Education		Y	Y			Y	
Educational Administration and Supervision		Y					
Educational Research and Policy Analysis	Y						
Higher Education Administration		Y	Y			Y	
Human Resource Development			Y				
School Administration					Y		
Training and Development						Y	

GRADUATE FACULTY

R. C. Serow, *Head*

Directors of Graduate Programs:

D. Akroyd, Box 7801, 515-1745, duane_akroyd@ncsu.edu, Leadership, Policy, and Adult and Higher Education

L. D. Fusarelli, Box 7801, 513-0507, lance_fusarelli@ncsu.edu, Leadership, Policy, and Adult and Higher Education

Goodnight-Glaxo Wellcome Endowed Chair: C. R. Tittle

JOSEPH D. MOORE DISTINGUISHED UNIVERSITY PROF EMERITUS: G. A. Baker

Professors: D. Akroyd, L. D. Fusarelli, C. E. Kasworm, B. M. Kirby, G. M. Kleiman, K. M. Moore, E. J. Sabornie, R. C. Serow, E. S. Vasu; **Adjunct Professors:** L. Gonzalez-Sullivan, D. G. Oblinger, R. S. Ralls; **Emeritus Professors:** E. J. Boone, G. L. Carter, J. C. Glass, T. Johnson, R. G. Taylor, G. B. Vaughan; **Associate Professors:** J. E. Bartlett, P. F. Bitting, S. J. Bracken, V. W. DeLuca, B. C. Fusarelli, J. G. Gayles, T. G. Hatcher, A. J. Jaeger, B. S. Mehlenbacher, S. S. Osborne, P. D. Umbach; **Adjunct Associate Professors:** B. I. Mallette, N. A. Overstreet; **Assistant Professors:** T. A. Bowles, K. P. Brady, A. N. Bryant, M. C. Militello, J. Storberg-Walker, T. V. Young; **Adjunct Assistant Professors:** D. W. Bailey, B. E. Brown, C. C. Figuers, J. E. Fleming, C. W. Geary, C. O. Grochowski, B. T. Honeycutt, L. D. Hunt, M. B. Jackowski, D. S. Jackson, L. D. Krute, K. D. Lohr, D. C. Luckadoo, T. R. Luckadoo, D. D. McGraw, L. Moneta, M. H. Nadelman, J. E. Odom, D. T. Petherbridge, C. D. Raubenheimer, R. S. Sutton, C. H. Thornton, P. B. Van Dyk, D. E. Wiese, S. W. Williams; **Emeritus Assistant Professors:** R. L. Haley; **Teaching Associate Professors:** D. D. Chapman; **Teaching Assistant Professors:** K. H. Brinson, P. A. Hessling, P. Lari, R. J. Lord, S. J. Wasiolek

The Department of Leadership, Policy and Adult and Higher Education offers graduate degrees in adult education, educational leadership, educational research and policy analysis, higher education administration, and human resource education.. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve both secondary education and higher education institutions.

Admissions Requirements: Specific information regarding admission, required application materials, and degree requirements for each program may be found on the department website at: <http://ced.ncsu.edu/lpahe>

Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: A minimum of 42 credit hours is required for the Master's of School Administration. Teaching experience in pK-12 public or private school is required with three years preferred. Undergraduate GPA of 3.0 or better is strongly preferred (2.5 GPA minimum). Please see the M.S.A. website (<http://ced.ncsu.edu/lpahe/el.php#msa>). Application deadline for the M.S.A. is March 31.

Master's programs in Adult and Community College Education, Human Resource Education, and Training and Development all require 36 semester hours. The master's programs in Higher Education Administration require 39 semester hours. See more detail about the individual programs at the department's website (<http://ced.ncsu.edu/lpahe>).

Ed.D. Program Requirements: A minimum of 54 credit hours beyond the Master's is required for the Ed.D. in Educational Administration and Supervision. Applicants are required to have a North Carolina's Principal's license or be eligible to receive one and to meet graduate school and program requirements. Please see the Ed.D. website (<http://ced.ncsu.edu/lpahe/el.php#edd>). The application deadline for the Ed.D. program is March 31.

Ph.D Program Requirements: The Ph.D. programs require a minimum of 72 credit hours, including up to 18 credits of graduate study previously completed. For detailed information on degree requirements and applications, please see department's website (<http://ced.ncsu.edu/lpahe>). The deadline for the receipt of all application materials for Fall 2011 is April 1 and December 1 for Fall 2012.

Click on [Graduate Courses - Adult and Higher Education](#) for current course information.

Click on [Graduate Courses - Educational Leadership](#) for current course information.

Liberal Studies

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Liberal Studies				Y			

GRADUATE FACULTY

Director of Graduate Programs:

R. C. Kochersberger, Box 8105, 515-4159, rckeg@unity.ncsu.edu, English

Distinguished University Professor: A. H. Harrison

SAS Institute Distinguished Professor of Rhetoric and Technical Communication: C. R. Miller

Professors: J. P. Braden, C. K. Coe, L. A. Guion, J. C. Leiter, L. H. MacKethan, R. P. Patterson, R. D. Safrit, R. W. Slatta, M. H. Thunte, K. S. Vincent, R. A. Waschka; **Emeritus Professors:** J. A. Gomez, J. S. Lapp, A. J. Lavopa; **Associate Professors:** P. F. Bitting, C. C. Brookins, D. H. Crumbley, S. M. Fitzpatrick, N. M. Haenn, P. W. Hamlett, W. A. Jackson, S. H. Kessler, D. M. Marchi, R. S. Moog, M. L. Vasu, J. M. Wallace, C. A. Warren, S. T. Warren; **Emeritus Associate Professors:** E. O'Sullivan, R. E. Peterson; **Assistant Professors:** A. O. Behnke, J. R. Brunet, A. de Souza e Silva, M. T. Leach; **Clinical Associate Professors:** B. L. Sherman; **Adjunct Assistant Professors:** T. R. Luckadoo; **Extension Assistant Professors:** S. K. Straus; **Teaching Professors:** J. C. Kramer

The Master of Arts in Liberal Studies (MALS) program is an interdisciplinary graduate program administered by the College of Humanities and Social Sciences. This is a broad, interdisciplinary program of part-time or full-time graduate study that integrates and expands the student's knowledge and 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 four to five page statement describing their objectives in doing a degree in liberal studies and a resume. GRE scores are not required. All applicants are interviewed.

Master's Degree Requirements: Thirty hours of course work made up of (1) three MALS seminars or two MALS seminars and a research methods course, (2) 18 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.

Click on [Graduate Courses](#) for current course information.

Marine, Earth and Atmospheric Sciences

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Marine, Earth, and Atmospheric Sciences	Y		Y				

GRADUATE FACULTY

J. C. Fountain, *Department Head*

Director of Graduate Programs:

G. M. Lackmann, Box 8208, 515-1439, gary@ncsu.edu, Marine, Earth and Atmospheric Sciences

William Neal Reynolds Professor: J. M. Burkholder

Professors: V. P. Aneja, D. J. DeMaster, D. B. Eggleston, R. V. Fodor, J. C. Fountain, D. P. Genereux, J. P. Hibbard, G. S. Janowitz, D. Kamykowski, G. M. Lackmann, E. L. Leithold, D. A. McConnell, L. J. Pietrafesa, W. A. Robinson, M. H. Schweitzer, F. H. Semazzi, W. J. Showers, M. K. Stoskopf, T. G. Wolcott, L. Xie, Y. Zhang; **Research Professors:** T. S. Hopkins, K. E. Kunkel, S. Rebach, R. H. Tolson; **Adjunct Professors:** K. V. Alapaty, N. E. Blair, S. W. Chang, T. F. Clark, W. J. Cooper, R. S. Harmon, S. E. Koch, S. K. Leduc, J. M. Morrison, S. T. Rao, R. W. Reynolds, R. Rotunno, C. R. Smith, C. L. Ziegler; **Emeritus Professors:** S. S. Arya, H. S. Brown, V. V. Cavaroc, B. J. Copeland, J. M. Davis, L. J. Langfelder, C. J. Leith, J. M. Miller, S. Raman, C. W. Welby, E. A. Wheeler; **Associate Professors:** S. Basu, D. R. Bohnenstiehl, R. He, M. M. Kimberley, J. Liu, H. Mitsova, M. D. Parker, P. Shaw, S. E. Yuter; **Research Associate Professors:** C. J. Thomas, P. W. Thorne; **Adjunct Associate Professors:** S. A. Braun, B. S. Ferrier, C. D. Harrington, C. Jang, C. E. Konrad, A. G. Laing, R. D. Nair, C. Nelson, J. C. Reid, J. Rudek, J. C. Warner, R. W. Wiener; **Emeritus Associate Professors:** A. J. Riordan, E. F. Stoddard, G. F. Watson, D. L. Wolcott; **Assistant Professors:** A. Aiyer, N. Meskhidze, C. L. Osburn, M. D. Petters, K. W. Wegmann; **Emeritus Research Professors:** D. A. Russell; **Adjunct Assistant Professors:** G. W. Bell, A. G. Carlton, J. J. Charney, D. R. Corbett, B. J. Etherton, S. Gasso, A. F. Hanna, G. J. Kirkpatrick, A. J. Lewitus, J. Lin, J. E. McNinch, D. B. Mechem, D. S. Niyogi, S. B. Phillips, R. E. Reed, P. A. Roelle, G. A. Sinclair, R. C. Tacker, Q. Tong; **Extension Assistant Professors:** R. P. Boyles

Graduate programs are offered in atmospheric science, earth science, and marine science. Within marine sciences the subdisciplines of biological, chemical, geological and physical oceanography are recognized by the profession.

Admission Requirements: A bachelor's degree with research experience or a master's degree is required for entry into the Ph.D. program. The GRE Subject Test scores are required only for applicants in biological oceanography. A bachelor's degree in a science, mathematics or engineering is required for entry into the M.S. program in atmospheric science, earth science, and biological, chemical, geological or physical oceanography. Undergraduate field camp is required of all students in the M.S. program in earth science; this requirement may be fulfilled before or after admission. An M.S. degree with a non-thesis option for students is available and admission to this option must be requested at the time of application.

Master's Degree Requirements: The M.S. degree requires a minimum of 30 credit hours. Specific course requirements are determined by the advisory committee of each student. However, MEA 601 Seminar is required of all thesis 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 student's advisory committee. Registration

in seminar, MEA 801, 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 initial advisors upon admission. It is the student's responsibility to secure the consent of a faculty member to serve as the permanent advisor who will chair or co-chair the advisory committee.

Click on [Graduate Courses](#) for current course information.

Materials Science and Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Materials Science and Engineering	Y		Y		Y		

GRADUATE FACULTY

J. Schwartz, *Department Head*

Director of Graduate Programs:

R. O. Scattergood, Box 7907, 515-7843, ron_scattergood@ncsu.edu, Materials Science and Engineering

Alcoa Professor of Chemical and Biomolecular Engineering: G. N. Parsons

Celanese Acetate Professorship in Chemical and Biomolecular Engineering: J. Genzer

Distinguished Research Professor: J. J. Cuomo

Distinguished University Professor of Physics: D. E. Aspnes, G. Lucovsky

John C. C. Fan Family Distinguished Professor of Materials Science and Engineering: J. Narayan

Kobe Steel Distinguished Emeritus Professor: R. F. Davis

Kobe Steel Distinguished Professor: D. W. Brenner, C. C. Koch, J. Schwartz, Z. Sitar

Professors: H. Ade, C. M. Balik, S. A. Bedair, E. C. Dickey, N. A. El-Masry, J. Krim, H. H. Lamb, K. L. Murty, R. J. Narayan, J. M. Rigsbee, G. A. Rozgonyi, R. O. Scattergood, R. J. Spontak, J. S. Strenkowski, Y. T. Zhu; **Research Professors:** M. O. Aboelfotoh, R. B. Benson, P. E. Russell; **Adjunct Professors:** J. T. Prater, R. R. Reeber, F. Shimura; **Emeritus Professors:** K. J. Bachmann, J. A. Bailey, H. Conrad, A. A. Fahmy, K. S. Havner, K. L. Moazed, H. Palmour, H. H. Stadelmaier; **Associate Professors:** R. E. Gorga, M. A. Johnson, J. Kasichainula, J. Maria, A. V. Melechko; **Research Associate Professors:** A. D. Batchelor, D. P. Griffis, A. Grouverman, T. P. Pearl; **Adjunct Associate Professors:** A. Karoui, P. G. Kotula, J. R. Piascik, V. Zhirnov; **Emeritus Associate Professors:** J. V. Hamme; **Assistant Professors:** F. L. Hunte, D. L. Irving, J. M. LeBeau, T. M. Luo, J. B. Tracy, Y. G. Yingling; **Research Assistant Professors:** R. R. Collazo, D. J. Lichtenwalner, T. A. Rawdanowicz; **Adjunct Assistant Professors:** S. N. Mathaudhu; **Teaching Professors:** K. Dawes; **Teaching Assistant Professors:** C. L. Reynolds Jr

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 that are critical links between the design and the realization of new systems for manufacturing nanotechnology, energy, and biomaterials.

Admission Requirements: In addition to the general admission requirements as set by the Graduate School, the department requires submission of GRE scores. Non-native English speakers also require a [minimum TOEFL score](#) as established by the Graduate School.

Master's Degrees Requirements: The Master of Materials Science and Engineering degree (M.M.S.E.) requires 30 credit hours of coursework only. The Master of Science degree (M.S.) requires 30 credit hours of coursework/research and a research thesis.

Doctoral Degree Requirements: The doctoral degree (Ph.D.) requires 72 credit hours of coursework/research, a qualifying exam, and a research dissertation.

Student Financial Support: Students in the graduate program normally receive financial support in the form of research or teaching assistantships or fellowships.

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 associated graduate faculty from other departments supervising thesis and dissertation research.

Click on [Graduate Courses](#) for current course information.

Mathematics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Applied Mathematics	Y		Y				
Mathematics	Y		Y				

GRADUATE FACULTY

A. G. Helminck, *Interim Department Head*

Director of Graduate Programs:

S. L. Campbell, Box 8205, 515-3300, s_campbell@ncsu.edu, Mathematics

Drexel Professor of Mathematics: H. T. Banks, C. T. Kelley

Professors: J. D. Brown, S. L. Campbell, M. T. Chu, L. Chung, J. D. Cohen, A. Fauntleroy, J. E. Franke, R. O. Fulp, P. A. Gremaud, R. E. Hartwig, A. G. Helminck, H. Hong, I. Ipsen, K. Ito, N. Jing, E. L. Kaltofen, A. Kheyfets, T. J. Lada, Z. Li, X. B. Lin, A. L. Lloyd, S. R. Lubkin, R. H. Martin, N. G. Medhin, C. Meyer, K. C. Misra, M. Paesler, M. S. Putcha, S. Schecter, J. F. Selgrade, F. H. Semazzi, M. Shearer, J. W. Silverstein, M. F. Singer, R. C. Smith, E. L. Stitzinger, H. T. Tran, R. E. White; **Adjunct Professors:** R. L. Ives, J. Lavery, E. M. Peck, P. M. Schlosser; **Emeritus Professors:** J. W. Bishir, E. E. Burniston, R. E. Chandler, E. N. Chukwu, J. C. Dunn, J. Luh, J. A. Marlin, C. V. Pao; **Emeritus Distinguished University Professors:** R. A. Struble; **Associate Professors:** B. N. Bakalov, A. E. Chertock, S. Ghoshal, M. A. Haider, P. L. Hersh, K. F. Hollebrands, M. J. Kang, I. A. Kogan, D. J. Lee, L. K. Norris, M. Olufsen, T. Pang, S. Paur, J. Rodriguez, J. S. Scroggs, S. M. Sullivan, A. Szanto, S. V. Tsynkov, D. V. Zenkov; **Emeritus Associate Professors:** G. D. Faulkner, D. E. Garoutte, L. B. Page, R. T. Ramsay, R. Silber, D. F. Ullrich; **Assistant Professors:** H. J. Charlton, J. Harlim, M. A. Hoefler, N. P. Reading; **Adjunct Assistant Professors:** R. T. Kuehn, V. Novak; **Emeritus Assistant Professors:** D. J. Hansen; **Teaching Assistant Professors:** A. N. Duca, M. A. Fenn, J. R. Griggs

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. The Concentration in Interdisciplinary Mathematics (MAI) is available to Ph.D. students in either Mathematics or Applied Mathematics. It is not available to Masters Students. 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 Master's 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. The GRE Subject Test in Mathematics is not required but a good score can be a positive factor in admission.

Master of Science Requirements: The M.S. degree requires a minimum of 30 credit hours. In addition to course requirements (27 credit hours), the M.S. degree requires a written Master's project for 3 hours credit.

Ph.D. Requirements: The Ph.D. requires a minimum of 72 credit hours. 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 areas of mathematics. These are chosen by the student from 14 possibilities. 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 a large number of workstations devoted exclusively to its graduate students.

Click on [Graduate Courses](#) for current course information.

Mechanical and Aerospace Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Aerospace Engineering	Y		Y				
Mechanical Engineering	Y		Y				

GRADUATE FACULTY

R. D. Gould, *Department Head*

Director of Graduate Programs:

R. T. Nagel, Box 7910, 515-5283, nagel@eos.ncsu.edu, Mechanical and Aerospace Engineering

Dean F. Duncan Distinguished University Professorship in Mechanical Engineering: T. A. Dow

R. J. Reynolds Professor in Mechanical and Aerospace Engineering: R. D. Gould

R.J. Reynolds Industries: C. F. Zorowski

Zan Prevost Smith Distinguished Professor: M. A. Zikry

Professors: G. D. Buckner, F. R. DeJarnette, T. Echehki, H. M. Eckerlin, J. R. Edwards, E. Grant, P. A. Gremaud, H. A. Hassan, R. F. Keltie, C. Kleinstreuer, A. V. Kuznetsov, J. W. Leach, K. M. Lyons, R. T. Nagel, M. K. Ramasubramanian, P. I. Ro, W. L. Roberts, R. O. Scattergood, L. M. Silverberg, J. S. Strenkowski, J. F. Tu, F. Wu, F. Yuan, Y. T. Zhu;

Research Professors: R. H. Tolson; **Adjunct Professors:** A. R. Johnson, C. S. Kim, W. Linak, S. Seelecke; **Emeritus**

Professors: E. M. Afify, J. A. Bailey, F. J. Hale, F. D. Hart, T. H. Hodgson, R. R. Johnson, D. S. McRae, J. C. Mulligan, J. N. Perkins, L. H. Royster, F. Y. Sorrell; **Associate Professors:** M. A. Boles, J. W. Eischen, A. Gopalarathnam, C. E. Hall, O. A. Harrysson, X. Jiang, E. C. Klang, H. Luo, A. P. Mazzoleni, P. L. Mente, G. Ngaile, K. J. Peters, A. Rabiei, A. V.

Saveliev; **Research Associate Professors:** Z. Zhang; **Assistant Professors:** T. Fang, S. M. Ferguson, H. S. Huang, B. T. O'Connor, T. Ward, Y. Zhu; **Adjunct Assistant Professors:** J. A. Cooke; **Extension Assistant Professors:** S. D. Terry;

Teaching Associate Professors: P. A. Cooper, P. B. Corson

The **Mechanical Engineering** graduate program prepares students in all aspects of mechanical and thermal systems design and manufacturing. Course offerings and research programs for mechanical engineering students are available in applied mechanics; biomechanics; combustion; design and manufacturing: dynamic systems and control; energy conversion and systems; experimental mechanics; fluid dynamics; heat transfer; mechanics of materials; micro, nano and MEMS; and vibration and acoustics. Sub-areas include adaptive and auto adaptive structures, controls and system identification, CFD, energy conversion and renewable energy, materials processing and tribology, mechatronics, precision engineering, and reactive and multiphase flows.

Graduate students in the **Aerospace Engineering** program focus on aircraft and space systems design, analysis, and manufacturing. Students can select course offerings and research programs in aerodynamics and applied aerodynamics; aerospace propulsion; computational fluid dynamics; dynamics and design of spacecraft and space systems; flight dynamics and control; and multifunctional materials and smart structures. Sub-areas include acoustics, aeroelasticity, atomization, sprays, composite materials, reactive and multiphase flows, stability, and transition to turbulence.

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. admissions requirements.

Master's Degree Requirements: The thesis-option M.S. degree programs in mechanical engineering and aerospace engineering require 24 hours of course credit and six hours of thesis research. The non-thesis M.S. degree programs in mechanical engineering and aerospace engineering require 27 hours of course credit and a three credit-hour project. The non-thesis M.S. degree programs in mechanical engineering and aerospace engineering are offered on campus and off campus through distance education.

Ph.D. Degree Requirements: A minimum of 54 hours of credit beyond the master's program is required. A direct path to the Ph.D. from the B.S. is also available with which the student is granted the M.S. degree "enroute" to the Ph.D. The enroute Ph.D. (direct to Ph.D. path) requires a minimum of 3.5 undergraduate GPA.

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.

Click on [Graduate Courses](#) for current course information.

Microbiology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Microbial Biotechnology					Y		
Microbiology	Y		Y		Y		

GRADUATE FACULTY

E. S. Miller, *Interim Department Head*

Director of Graduate Programs:

M. R. Hyman, Box 7615, 5-7814, michael_hyman@ncsu.edu, Microbiology

ALCOA Professor of Chemical Engineering: R. M. Kelly

William Neal Reynolds Distinguished University Professor: T. R. Klaenhammer

Professors: P. Arasu, D. T. Brown, M. C. Flickinger, F. J. Fuller, H. M. Hassan, M. R. Hyman, L. Jaykus, S. Kathariou, S. M. Laster, G. Luginbuhl, J. M. Mackenzie, E. S. Miller, P. E. Orndorff, I. T. Petty, B. Sherry; **USDA Professors:** F. Breidt; **Emeritus Professors:** W. J. Dobrogosz, G. H. Elkan, W. E. Kloos, L. W. Parks, J. J. Perry, J. C. Shih; **Associate Professors:** J. W. Brown, F. De Los Reyes, A. M. Grunden, J. W. Olson, F. Scholle, M. L. Sikes; **USDA Associate Professors:** R. G. Upchurch; **Emeritus USDA Professors:** P. E. Bishop; **Adjunct Associate Professors:** W. M. Casey, J. M. Ligon, S. H. Shore; **Assistant Professors:** J. M. Bruno-Barcena, P. T. Hamilton, J. C. Miller, D. S. Threadgill; **Adjunct Assistant Professors:** J. L. Stephenson; **Teaching Associate Professors:** L. Borbye

The Department of Microbiology is an integral part of the Life Science disciplines in the College of Agriculture and Life Sciences at North Carolina State University. The department offers courses of study and research leading to the Ph.D., M.S., Master of Microbiology (M.M.) and Master of Microbial Biotechnology (M.M.B.) degrees.

The research-based degrees offered by the department (M.S and Ph.D.) are designed to prepare students for careers in academic, industrial or research institute settings. Course offerings for Microbiology research students focus on microbial genetics and physiology as well as virology, immunology and post-pathogen interactions. Research in the department emphasizes biotechnological, environmental and health-related aspects of microbiology. There are research opportunities for students in many areas of specialization including biofuels, bioremediation, extremophiles, bacterial pathogens (*Borelia*, *Campylobacter*, *Salmonella*), probiotics, developmental epigenetics, mycophages, inflammation modulation and flavivirus pathogenesis. Financial support for study towards Ph.D. and M.S. degrees is available in the form of teaching/research assistantships and competitive fellowships.

The non-research-based M.M.B. degree is a Professional Science Masters that combines concentrations in Microbiology, Business and Biotechnology. This degree is specifically designed to prepare students for positions in the biotechnology industry. This program includes courses that involve semester-long interactions with local biotechnology companies as well as foundational courses in microbiology, business management and molecular biology. The M.M. degree is a rigorous non-thesis-requiring degree that is designed for students who want a higher degree in microbiology but either do not want to conduct research or are unable to commit to the time demands of a research degree. Many students in the M.M. program either work for local employers or are interested in subsequent applications to professional schools. Financial support is generally not available for either M.M.B or M. M. students.

Admission Requirements: Applications are invited from individuals holding B.S. or M.S. degrees in the physical and life sciences. Applications should be received in the department before January 15 to be considered for Fall semester admission. The Graduate Record Exam (GRE) is required and should be taken sufficiently early so that scores can be submitted and evaluated along with the application. Other requirements include all relevant transcripts, three letters of recommendation and a personal statement that describes the applicant's academic and career goals as well as their area of interest.

Master's Degree Requirements: The Master of Science (M.S.) requires 30 credit hours, a written thesis and at least one semester of laboratory instruction. The Master of Microbial Biotechnology (M.M.B.) degree requires 40 credit hours and four semesters involvement in an Industry Case Studies course. This program also can be combined with a Master of Business Administration (M.B.A.) offered through the College of Management. The Master of Microbiology (M.M.) requires 36 credit hours but has no requirement for a written thesis or laboratory instruction.

Doctoral Degree Requirements: The Ph.D. program is designed for individuals desiring to pursue careers in research and/or teaching. During the first semester, participation in the laboratory rotation program is required of all Ph.D. (and M.S.) students so that they become acquainted with departmental research programs, faculty and other graduate students. A faculty thesis advisor and laboratory research program are usually selected by the end of the first semester. 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: All Ph.D. and M.S. applications to the department are automatically considered for available assistantships. For highly qualified students, supplemental funds are frequently available.

Click on [Graduate Courses](#) for current course information.

Natural Resources

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Natural Resources			Y		Y		

GRADUATE FACULTY

Directors of Graduate Programs:

F. H. Magallanes, Box 7701, 515-8348, f_magallanes@ncsu.edu, Landscape Architecture

M. F. Floyd, Box 8001, 513-8026, myron_floyd@ncsu.edu, Parks, Recreation and Tourism Management

T. J. Smyth, Box 7619, 515-2838, jot_smyth@ncsu.edu, Soil Science

William Neal Reynolds Professor: M. J. Vepraskas

Professors: R. C. Abt, A. Amoozegar, D. H. Anderson, F. W. Cubbage, H. A. Devine, W. S. Dvorak, M. F. Floyd, B. Goldfarb, J. L. Havlin, K. A. Henderson, S. Khorram, H. J. Kleiss, J. C. Peel, D. J. Robison, J. P. Roise, C. D. Siderelis, T. J. Smyth, T. A. Steelman, M. G. Waggoner, W. E. Winner; **Emeritus Professors:** J. D. Gregory; **Associate Professors:** A. Attarian, G. B. Blank, K. M. Boone, B. P. Bullock, G. R. Hess, Y. Leung, F. H. Magallanes, R. L. Moore, C. E. Moorman, S. C. Nelson, E. G. Nichols, T. H. Shear, E. O. Sills, J. L. Stape, C. G. Vick, S. T. Warren; **Emeritus Associate Professors:** L. D. Gustke; **Assistant Professors:** R. E. Emanuel, A. A. Fox, A. L. James, M. R. McHale, M. N. Peterson; **Research Assistant Professors:** G. P. Catts, L. G. Tateosian; **Extension Assistant Professors:** M. A. Megalos; **Teaching Associate Professors:** H. M. Cheshire

The natural resources program is an interdepartmental program designed to prepare students for positions in both private and public natural resource organizations. A selection of technical options couple core courses in natural resources issues and management with a series of related courses in a variety of related technical disciplines. The purpose of the natural resources core curriculum is to educate professionals at a Master's level who are well-versed in policy and regulation and who have skills in quantitative assessments. Currently approved technical options include: assessment and analysis, ecological restoration, economics and management, policy and administration, international resources, hydrology, and spatial information systems in the Department of Forestry and Environmental Resources; outdoor recreation management in the Department of Parks, Recreation and Tourism Management; landscape architecture in the Department of Landscape Architecture; and soil science in the Department of Soil Science. With one exception, each option is available as either the M.S. in NR or as the non-thesis Master of NR. 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 meeting departmental requirements and 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 NR degree requires a practical project which develops and demonstrates problem-solving skills. Students enrolled in the Department of Forestry and Environmental Resources must take FOR 603 in the first or second semester. The minimum number of credit hours varies by technical option, but is generally 36 credit hours including research or project credits and core courses.

CORE COURSES (10 credit hours)

NR 500 Natural Resource Management

NR 571 Current Issues in Natural Resource Policy
ST 5** Graduate-level statistics course
Departmental seminar

Click on [Graduate Courses](#) for current course information.

Nuclear Engineering

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Nuclear Engineering	Y		Y		Y		

GRADUATE FACULTY

Y. Y. Azmy, *Department Head*

Director of Graduate Programs:

K. L. Murty, Box 7909, 5-3657, murty@eos.ncsu.edu, Nuclear Engineering

Professors: Y. Y. Azmy, B. Bhattacharyya, M. A. Bourham, D. G. Cacuci, J. M. Doster, R. P. Gardner, J. G. Gilligan, T. Hassan, A. I. Hawari, V. C. Matzen, K. L. Murty, P. J. Turinsky; **Research Professors:** B. W. Wehring; **Adjunct Professors:** R. M. Lindstrom, D. N. McNelis, M. W. Mickael, M. S. Wechsler; **Emeritus Professors:** D. J. Dudziak, K. Verghese; **Associate Professors:** D. Y. Anistratov, A. Gupta, J. K. Mattingly, S. C. Shannon, M. Yim; **Adjunct Associate Professors:** M. H. Stokely, B. W. Wieland; **Assistant Professors:** H. S. Abdel Khalik, J. Eapen; **Adjunct Assistant Professors:** R. M. Ferrer, A. Sood

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 engineering 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 needed for on-campus graduate study.

Master's Degree Requirements: A total of 30 credit hours which includes a minor (at least nine semester hours) is required for both the M.S. and MNE degrees. An engineering project is required for the MNE degree and a formal thesis for the M.S. degree.

Doctoral Degree Requirements: A total of 72 credit hours which includes a minor (typically 12 hours) is required. Students must pass a departmental qualifying exam based on three graduate courses comprising radiation fundamentals, reactor engineering, and radiation detection.

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, ultra cold neutron source, neutron scattering facility, neutron radiography unit, neutron activation analysis laboratory, nuclear materials laboratory, plasma laboratories, instrumentation and controls equipment,

radiation analyzers and tomography systems, and access to extensive computer facilities ranging from workstations to a supercomputer.

Click on [Graduate Courses](#) for current course information.

Nutrition

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Nutrition	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

J. C. Allen, Box 7624, 3-2257, jon_allen@ncsu.edu, Food, Bioprocessing, and Nutrition Sciences

William Neal Reynolds Distinguished Professor: J. T. Brake

William Neal Reynolds Professor: P. R. Ferket, J. Odle

Professors: J. C. Allen, K. E. Anderson, S. L. Ash, G. L. Catignani, W. J. Croom, P. C. Dunn, J. Eisemann, J. L. Grimes, W. M. Hagler, B. A. Hopkins, G. B. Huntington, S. Kathariou, J. Luginbuhl, J. W. McClelland, P. E. Mozdziak, M. H. Poore, R. C. Smart, J. W. Spears, E. VanHeugten, L. W. Whitlow; **USDA Professors:** V. D. Truong; **Emeritus Professors:** B. P. Alston-Mills, L. W. Aurand, L. C. Boyd, L. S. Bull, E. V. Caruolo, J. D. Garlich, R. W. Harvey, W. L. Johnson, J. R. Jones, C. J. Lackey, R. D. Mochrie, S. J. Schwartz, J. C. Shih; **Emeritus Distinguished Professors:** H. E. Swaisgood; **Associate Professors:** V. Fellner, S. W. Kim, J. A. Knopp, J. A. Moore, P. D. Siciliano; **Adjunct Associate Professors:** R. J. Harrell; **Assistant Professors:** L. S. Goodell, G. K. Harris, M. D. Koci, M. P. Martin, E. O. Oviedo-Rondon, S. E. Phillips, C. R. Stark; **Teaching Assistant Professors:** C. V. Jordan

The interdepartmental nutrition program consists of faculty from four departments (animal science, family and consumer sciences, food science, and poultry science). 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 various levels, such as molecular, cell, whole animal, and human communities. Research programs are primarily in the area of nutritional biochemistry or experimental animal nutrition (e.g. horses, ruminants, swine, poultry, rodents, and other species).

Admission Requirement: To be considered for admission, a student should have a B.S. or M.S degree in a science-related area. Students for M.S. or Ph.D. should contact and be recommended by a prospective major faculty advisor in their area of interest prior to final admission.

Master's Degree Requirements: A minimum of 24 course credit hours and a thesis is required for M.S., 36 for Master of Nutrition. The Master of Nutrition has options for all course delivery by Distance Education, with emphases in Feed Science or Human Nutrition, Food and Bioprocessing, and an option for course work that qualifies as a Professional Science Master's degree.

Student Financial Support: Assistantships and fellowships are available on a competitive basis from the departments in which the advisor resides. Admission does not guarantee availability of financial support.

Click on [Graduate Courses](#) for current course information.

Operations Research

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Operations Research	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

T. J. Hodgson, Box 7906, 5-5194, hodgson@ncsu.edu, Industrial Engineering

A. Doug Allison Distinguished Professor: S. D. Roberts

Bank of America Distinguished University Professor: R. B. Handfield

Clifton A. Anderson Distinguished Professor: R. Uzsoy

Distinguished University Professor: M. A. Rappa

Drexel Professor of Mathematics: C. T. Kelley

James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing: T. J. Hodgson

Lampe Distinguished Professor of Electrical and Computer Engineering (4/15/2010): M. B. Steer

Walter Clark Professor of Industrial Engineering: S. C. Fang

William Neal Reynolds Professor: Z. Zeng

Professors: D. H. Anderson, J. W. Baugh, R. H. Bernhard, B. Bhattacharyya, E. D. Brill, S. L. Campbell, M. Devetsikiotis, B. L. Edge, Y. Fathi, R. E. Hartwig, I. Ipsen, K. Ito, R. E. King, Z. Li, G. F. List, L. A. Martin, N. G. Medhin, C. Meyer, A. Nilsson, H. G. Perros, K. H. Pollock, S. Ranjithan, J. P. Roise, G. Rouskas, C. D. Savage, M. P. Singh, R. C. Smith, M. F. Stallmann, W. J. Stewart, J. R. Stone, M. W. Suh, H. T. Tran, I. Viniotis, M. A. Vouk, J. R. Wilson, F. Wu, R. E. Young; **Adjunct Professors:** S. M. Hsiang; **Emeritus Professors:** J. W. Bishir, J. C. Dunn, H. J. Gold, D. M. Holthausen, D. F. McAllister; **Emeritus Distinguished University Professors:** S. E. Elmaghraby; **Associate Professors:** K. A. Barletta, R. Y. Chirkova, B. Denton, S. Ghoshal, P. L. Hersh, T. L. Honeycutt, J. S. Ivy, J. A. Joines, M. J. Kang, M. G. Kay, T. Pang, T. W. Reiland, J. S. Scroggs, C. E. Smith, J. L. Stape, W. Wang, D. P. Warsing, T. Yu, D. V. Zenkov; **Research Associate Professors:** J. Taheri; **Assistant Professors:** M. Liu, W. Sun; **Teaching Professors:** H. L. Nuttle

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 co-directors.

Admission Requirements: Applications are accepted from undergraduate majors in engineering and in physical and mathematical sciences who meet prerequisites in calculus and matrix-linear algebra, computer science, and statistics. GRE scores are required of all new applicants.

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. This degree requires 72 credit hours of course and research 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 is required. Please consult the [Operations Research website](#) for more details of degree requirements.

Student Financial Support: Both teaching and research assistantships are available to qualified applicants. Award priority is given to Ph.D. then M.S. 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.

Click on [Graduate Courses](#) for current course information.

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) 771, 772 Biomathematics I, II
CE 775 Modeling and Analysis of Environmental Systems
CHE 525 Chemical Process Control
CSC 505 Design and Analysis of Algorithms
CSC(MA) 580 Numerical Analysis I
CSC(ECE) 779 Advanced Computer Performance Modeling
CSC(MA) 780 Numerical Analysis II
ECE 516 System Control Engineering
ECE 521 Digital Computer Technology and Design
ECG (ST) 561 Intermediate Econometrics
ECG 750 Economic Decision Theory
ECG(ST) 751 Econometrics
ECG(ST) 752 Topics in Econometrics
ISE 723 Production Planning, Scheduling and Inventory Control
ISE 747 Reliability Engineering
ISE 748 Quality Engineering
ISE 861 The Design of Production Systems
MA 515 Analysis I
MA 523 Linear Transformations and Matrix Theory
MA(ST) 546 Theory of Probability
MA(CSC) 580, 780 Numerical Analysis I, II
MA 715 Functional Analysis I
MA 716 Advanced Functional Analysis
MA 723 Theory of Matrices and Applications
MA(ST) 746 Introduction to Stochastic Processes
MA(ST) 778, 779 Measure Theory and Advanced Probability
MA 798 Special Topics in Numerical Analysis
ST 515, 516 Experimental Statistics for Engineers I, II
ST 730 Applied Time Series Analysis
ST 782, 783 Time Series Analysis I, II
ST 785 Introduction to Statistical Decision Theory

Parks, Recreation and Tourism Management

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Parks, Recreation, and Tourism Management	Y		Y		Y		

GRADUATE FACULTY

D. H. Anderson, *Department Head*

Director of Graduate Programs:

M. F. Floyd, Box 8001, 513-8026, myron_floyd@ncsu.edu, Parks, Recreation and Tourism Management

Professors: D. H. Anderson, H. A. Devine, M. F. Floyd, K. A. Henderson, J. C. Peel, C. D. Siderelis, T. A. Steelman; **Emeritus Professors:** P. S. Rea, J. D. Wellman; **Associate Professors:** A. Attarian, J. N. Bocarro, G. L. Brothers, M. A. Kanters, Y. Leung, R. L. Moore, D. B. Morais, C. G. Vick; **Adjunct Associate Professors:** J. E. Fels; **Emeritus Associate Professors:** L. D. Gustke, B. E. Wilson; **Assistant Professors:** J. M. Casper, H. L. Grappendorf, M. G. Harrolle, S. A. Rich, S. R. Tomas; **Research Assistant Professors:** L. G. Tateosian; **Teaching Assistant Professors:** E. K. Lindsay, R. W. Wade

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, sport, 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.

Doctoral degree allows students to match their particular research interests and career aspirations with departmental research activities and faculty expertise. The primary areas of interest for students include parks, recreation, sport, tourism, spatial information systems with a substantive area of study in another discipline.

Master's Degree Requirements: The M.S. degree requires 30 credit hours, of which six hours is Master's thesis research. A minor is optional with the M.S. degree. The online M.P.R.T.M. requires a minimum of 30 hours of course work, of which three credit hours is a Master's project. The department offers a dual Master's option with Public Administration which includes 48 hours of course work. In addition, the department also administers a 30 hour [Masters of Geospatial Information Science and Technology \(MGIST\) degree](#), a [graduate Certificate in GIS](#), and a [graduate minor in GIS](#). A Master of Natural Resources degree is also available.

The online M.P.R.T.M. application deadline is March 15 for all students. The online degree program operates on a cohort model and only admits students in the fall semester. The application deadline for the M.S. degree is January 15. Students can elect to start in a Fall or Spring semester. However, the department does not offer financial aid that begins in the Spring semester.

Doctoral Degree Requirements: Although each doctoral course of study will be unique to the individual student, the usual course of study will include a minimum of 54 hours beyond the Master's. These credit hours are distributed among the core courses, statistics and research methods, a minor or substantive area consisting of 15 hours of course work approved by the student's faculty advisor, and the dissertation. Students are expected to

have completed a Master's degree, preferably one with a thesis. Students without research experience will have to demonstrate an ability to produce scholarly work in PRTM.

Doctoral application deadline is January 15 for both U.S. and international students.

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

Click on [Graduate Courses](#) for current course information.

Physics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Physics	Y		Y				

GRADUATE FACULTY

M. Paesler, *Department Head*

Director of Graduate Programs:

H. Ade, Box 8202, 515-8706, harald_ade@ncsu.edu, Physics

Distinguished University Professor of Physics: D. E. Aspnes, G. Lucovsky

Drexel Professor of Physics: J. Bernholc

Kobe Steel Distinguished Professor: Z. Sitar

Professors: H. Ade, R. J. Beichner, J. M. Blondin, J. D. Brown, M. Buongiorno-Nardelli, R. W. Chabay, M. T. Chu, S. R. Cotanch, D. C. Ellison, R. E. Fornes, R. Golub, C. R. Gould, D. G. Haase, H. D. Hallen, P. R. Huffman, C. R. Ji, R. M. Kolbas, J. Krim, G. C. McLaughlin, L. Mitas, J. R. Mowat, R. J. Nemanich, M. Paesler, S. P. Reynolds, J. S. Risley, C. M. Roland, M. C. Sagui, T. M. Schaefer, J. F. Schetzina, A. R. Young; **Research Professors:** B. Fortner, G. E. Mitchell, C. R. Philbrick, J. E. Rowe, B. A. Sherwood, J. W. York; **Adjunct Professors:** U. Agvaanluvsan, N. C. Fuller, J. L. Hubisz, E. A. Joseph, P. J. Reynolds; **Emeritus Professors:** K. T. Chung, J. W. Cook, W. R. Davis, W. O. Doggett, G. L. Hall, K. L. Johnston, G. H. Katzin, F. Lado, J. D. Memory, R. R. Patty, L. W. Seagondollar, P. J. Stiles, D. R. Tilley; **Associate Professors:** L. I. Clarke, D. J. Lee, J. C. Park, K. R. Weninger; **Research Associate Professors:** K. Borkowski, A. Grouverman, J. H. Kelley, W. Lu, T. P. Pearl; **Adjunct Associate Professors:** P. E. Garrett; **Emeritus Associate Professors:** G. C. Cobb, G. W. Parker; **Assistant Professors:** K. E. Daniels, D. B. Dougherty, C. Frohlich, K. Gundogdu, J. P. Kneller, D. Lazzati, R. Riehn; **Research Assistant Professors:** J. R. Bochinski, S. Lim

Theoretical/computational research opportunities are available in the following areas: astrophysics and relativity, nanoscience/materials and biomolecular simulations, and nuclear/particle physics. Experimental research opportunities are available in the following areas: astronomy, biophysics and soft-condensed matter physics, emergent phenomena and non-linear systems, nuclear physics, optics, physics education, materials physics and nanoscale science and technology, and synchrotron radiation research.

Admission Requirements: Bachelor's degree in physics (or the equivalent), GRE, and the GRE Advanced test in physics.

Master's Degree Requirements: A minimum of 30 credit hours beyond the Bachelor's degree; demonstrated mastery of aspects of the physics curriculum: PY 781, 782. Thesis and non-thesis options.

Doctoral Degree Requirements: Seventy-two (72) credit hours beyond the Bachelor's degree; demonstrated mastery of core physics curriculum: PY 721, 781, 782, 783, 785, 786; passing of written and oral preliminary exam and final oral defense.

Student Financial Support: Graduate teaching assistantships are available for new and continuing students; research assistantships are available to continuing students and occasionally to new students. More than 95% of students are supported by assistantships.

Click on [Graduate Courses](#) for current course information.

Physiology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Physiology	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

P. E. Mozdziak, Box 7608, 515-5544, paul_mozdziak@ncsu.edu, Poultry Science

William Neal Reynolds Distinguished Professor: J. T. Brake, R. M. Roe

William Neal Reynolds Professor: C. V. Sullivan

Professors: G. W. Almond, K. E. Anderson, B. L. Black, A. T. Blikslager, R. J. Borski, T. T. Brown, W. J. Croom, D. C. Dorman, F. W. Edens, K. L. Esbenshade, C. E. Farin, W. L. Flowers, J. E. Gadsby, R. M. Grossfeld, H. F. Heatwole, S. L. Jones, K. M. Meurs, P. E. Mozdziak, S. L. Pardue, J. N. Petite, R. M. Petters, M. C. Roberts, D. W. Threadgill, H. A. Underwood, S. P. Washburn, T. G. Wolcott; **Adjunct Professors:** J. N. Kornegay; **Emeritus Professors:** T. E. Levere, J. F. Roberts, T. D. Siopes, E. C. Sisler; **Associate Professors:** C. M. Ashwell, B. A. Breuhaus, P. W. Farin, S. W. Kim, H. Liu, M. Niedzlek-Feaver, M. Rodriguez-Puebla, G. W. Smith, C. H. Stahl, C. S. Whisnant, M. D. Whitacre; **Assistant Professors:** L. B. Borst, J. M. Bruno-Barcena, T. Ghashghaei, J. L. Gookin, J. B. Hoffman, M. D. Koci, A. J. Moeser, H. B. Patisaul, S. E. Phillips; **Teaching Assistant Professors:** J. L. Lubischer, S. Trivedi

The Physiology Graduate Program is an interdisciplinary and interdepartmental program comprising faculty drawn from the College of Veterinary Medicine and the College of Agriculture and Life Sciences (including departments of animal science, biochemistry, clinical sciences, entomology, molecular and biomedical sciences, population health and pathobiology, poultry science, psychology, and zoology [biology]). An advanced degree in physiology is highly valued by the scientific community and can lead to careers in research and teaching in academia, industry and government laboratories, public policy and consulting. Research is carried out using a variety of model organisms, laboratory and companion and agriculturally important species.

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. Each application package will be screened by the Admissions Committee. Factors considered for admission include: grade point average (3.0 is required for regular admission), GRE scores (at least 1000; combined verbal and quantitative), undergraduate courses, letters of recommendation, and the willingness of a member of the Graduate Physiology faculty to serve as the applicant's advisor. Some prior research experience is highly recommended.

Master's Degree Requirements: All Master's students are required to complete PHY 503, PHY 504, BCH 553, and a one-credit hour course in research ethics. **Master of Science Degree:** For a Master of Science degree a minimum of 30 semester hours of graduate work in the degree program is required including a minimum of 20 hours of course work at the 500-800 level. On average, the M.S. degree takes two to three years. **Master of Physiology Degree:** The non-thesis Master's degree (Master of Physiology) requires a total of 36 credits. On average, the MOP degree takes two years to complete.

Doctoral Degree Requirements: A doctoral degree requires a minimum of 72 graduate credit hours beyond the Bachelor's degree in accordance with the requirements of the Graduate School. All Ph.D. students are required to complete PHY 503, PHY 504, BCH 553, PHY 801, one additional course in biochemistry or an alternative 800-level

course, and a one-credit hour course in research ethics. On average, completion of the Ph.D. degree takes five years.

Student Financial Support: Financial assistance for qualified students in the form of research assistantships, fellowships and traineeships is available through participating departments only and not through the physiology program. Stipends will be offered to qualified applicants admitted to the program with advisors in the College of Veterinary Medicine. There is no financial support for students in the Master of Physiology program.

Other Relevant Information: The physiology program is jointly administered by the College of Agriculture and Life Sciences and the College of Veterinary Medicine. Graduate students enrolled as physiology majors are housed in the department of their major professor and may participate in departmental activities.

Click on [Graduate Courses](#) for current course information.

Recommended Courses Normally Included in Programs of Study for the M.S. and Ph.D. Degrees and the Non-Thesis MOP Program: Other recommended/supporting courses are available through many departments, e.g. animal science, biochemistry, biomathematics, biotechnology, cell biology, comparative biomedical sciences, entomology, genetics, immunology, microbiology, nutrition, pharmacology, poultry science, psychology, statistics, toxicology, and zoology, and may be included for consideration in the plan of work.

Plant Biology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Plant Biology	Y		Y		Y		

GRADUATE FACULTY

M. E. Daub, *Department Head*

Director of Graduate Programs:

R. L. Blanton, Box 7105, 513-4074, larry_blanton@ncsu.edu, Plant Biology

Bayer Environmental Science Professor of Sustainable Development: T. W. Rufty

Philip Morris Professor: R. E. Dewey

University Research Professor: W. F. Thompson

William Neal Reynolds Distinguished Professor: W. F. Boss

William Neal Reynolds Professor: R. S. Boston, J. M. Burkholder, M. E. Daub, L. K. Hanley

Professors: R. L. Blanton, C. S. Brown, C. H. Haigler, T. L. Lomax, J. B. Ristaino, D. Robertson, J. M. Stucky, T. R. Wentworth; ***USDA Professors:*** K. O. Burkey; ***Emeritus Professors:*** N. S. Allen, U. Blum, E. Davies, R. J. Downs, R. C. Fites, J. W. Hardin, R. L. Mott, E. D. Seneca, J. F. Thomas, J. R. Troyer, C. G. VanDyke; ***Associate Professors:*** J. M. Alonso, R. L. Beckmann, R. G. Franks, A. M. Grunden, W. A. Hoffmann, S. Hu, J. E. Mickle, H. A. Sederoff, R. W. Whetten, Q. Y. Xiang, D. Xie; ***Research Associate Professors:*** I. Y. Perera; ***Emeritus USDA Professors:*** W. W. Heck; ***Assistant Professors:*** M. T. Johnson, M. Pierce; ***Research Assistant Professors:*** C. H. Saravitz; ***Extension Assistant Professors:*** A. Krings; ***Teaching Assistant Professors:*** C. V. Jordan

Course offerings or research facilities are available in the following areas: plant cell biology, cellular imaging, membrane biochemistry, seed biology, cellulose biology, cellular signaling, plant development, plant genetic engineering, transgene regulation and silencing, stress biology, plant gravitational genomics, phytochemistry, metabolic engineering, plant fungal interactions, aquatic ecology, toxic dinoflagellates, wetlands ecology, endangered species, plant community ecology, physiological ecology, tropical ecology, evolutionary ecology, paleobotany, plant systematics, evolution of flowering plants, chemical genomics.

Admission Requirements: Students entering the graduate program in plant biology should have a bachelor's degree in plant biology or a related undergraduate program that includes biological, physical and mathematical science training including undergraduate courses in organic chemistry, calculus and genetics, as well as biology. All applications are screened by a departmental committee, and the best qualified applicants will be accepted until all available spaces are filled.

Master's and Doctoral Degree Requirements: The M.S. requires a total of 30 credit hours (20 of the 30 credit hours must be from 500-, 600-, 700/800-level courses; 18 credit hours must be letter graded); the Master of Plant Biology requires a total of 36 credit hours. The Ph.D. requires a total of 72 credit hours. Two core courses (Functional Plant Biology and either Plant Functional Ecology or Systematic Botany) are required. Other requirements include: a Plant Biology Colloquium, Plant Anatomy, an additional plant biology course, a graduate statistics course, a graduate ethics course, a thesis (for the Ph.D. and M.S., but not the Master of Plant Biology), a comprehensive examination (Ph.D.), oral thesis defense and a one-semester teaching responsibility per degree. Students must maintain a "B" average in all course work.

Other Relevant Information: Graduate research and teaching assistantships and tuition remission information are available from the department. New students supported by departmental research/teaching assistantships may elect to rotate through three 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 cooperative research in more than one laboratory. Graduate students are expected to attend and participate in the seminar program every semester they are in residence. The department participates in training grants in biotechnology and genomics.

Click on [Graduate Courses](#) for current course information.

Plant Pathology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Plant Pathology	Y		Y		Y		

GRADUATE FACULTY

J. W. Moyer, *Department Head*

Director of Graduate Programs:

E. L. Davis, Box 7616, 5-6692, rick@unity.ncsu.edu, Plant Pathology

Philip Morris Professor: H. D. Shew

Philip Morris Professor: T. A. Melton

Philip Morris Professor Emeritus: N. T. Powell

William Neal Reynolds Distinguished Professor: G. G. Kennedy

William Neal Reynolds Professor: R. S. Boston, M. E. Daub, E. L. Davis, R. A. Dean, L. K. Hanley, S. Lommel, G. A. Payne

Professors: D. M. Benson, D. M. Bird, R. I. Bruck, M. A. Cubeta, S. Franzen, L. F. Grand, W. M. Hagler, H. M. Hassan, C. L. Hemenway, J. S. Huang, S. Leath, F. J. Louws, J. W. Moyer, C. H. Opperman, C. H. Peacock, J. B. Ristaino, D. F. Ritchie, R. C. Rufty, T. B. Sutton; ***USDA Professors:*** J. B. Holland, D. S. Marshall; ***Adjunct Professors:*** B. K. Clarke; ***Emeritus Professors:*** J. L. Apple, C. W. Averre, D. F. Bateman, M. K. Beute, E. B. Cowling, G. V. Gooding, R. K. Jones, L. T. Lucas, C. E. Main, R. D. Milholland, J. P. Ross, P. B. Shoemaker, H. H. Triantaphyllou, C. G. VanDyke, J. C. Wells; ***Associate Professors:*** I. Carbone, S. Hu, K. L. Ivors, L. P. Tredway; ***Research Associate Professors:*** S. R. Koenning; ***USDA Associate Professors:*** P. J. Balint-Kurti, C. Cowger, R. G. Upchurch; ***Emeritus USDA Professors:*** H. W. Spurr; ***Adjunct Associate Professors:*** Y. Lee; ***Assistant Professors:*** A. L. Mila, P. Ojiambo, P. Veronese; ***Research Assistant Professors:*** B. B. Shew

Plant pathology is committed 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, bioinformatics, functional genomics, mycology, nematology, virology, soil-borne pathogens and mechanisms of pathogenesis, and host resistance.

Admission Requirements: The general application procedures of the Graduate School noted at the beginning of this section are followed. 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: There is a core curriculum of a minimum of 12 credit hours that includes PP 501, PP 502, PP 506, PP 707, and PP 601. The core should be supplemented with a minimum of 18 credit hours in courses at the 500 or higher level, which support the focus of the study. Students serve as teaching assistants for one course.

Doctoral Degree Requirements: Students entering the Ph.D. degree program are expected to take the core curriculum outlined for the Master's degree or have had the equivalent at another institution. Additionally, Ph.D. students must include a departmental-approved ethics course, two credits PP 801, and at least two other 700-level

Plant Pathology courses. Ph.D. students serve as teaching assistants for two courses.

Student Financial Support: A limited number of half-time assistantships are available on a competitive basis. Benefits include in-state tuition, out-of-state tuition and health insurance as covered under the Graduate School's Graduate Student Support Plan. Applicants are considered for assistantship support at time of application. Special supplements to assistantships are available on a competitive basis for outstanding students. Also, many faculty programs have research grant-funded or training grant-funded assistantships.

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 University-related locations throughout the state. Genomics facilities, microcomputers, library, mycological herbarium, digital imaging/graphics equipment programs, and an interdepartmental electron microscopy center are additional features available for the department.

Click on [Graduate Courses](#) for current course information.

Poultry Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Poultry Science			Y		Y		

GRADUATE FACULTY

S. L. Pardue, *Department Head*

Director of Graduate Programs:

J. T. Brake, Box 7608, 515-5060, jbrake@ncsu.edu, Poultry Science

William Neal Reynolds Distinguished Professor: J. T. Brake

William Neal Reynolds Professor: P. R. Ferket

Professors: K. E. Anderson, W. J. Croom, F. W. Edens, J. L. Grimes, W. M. Hagler, P. E. Mozdziak, S. L. Pardue, J. N. Petitte, D. P. Wages, C. M. Williams, M. J. Wineland; **Adjunct Professors:** M. Choct, K. K. Krueger, W. B. Roush, S. M. Shane, Z. Uni; **Emeritus Professors:** T. A. Carter, V. L. Christensen, J. D. Garlich, E. W. Glazener, J. R. Harris, G. B. Havenstein, C. R. Parkhurst, B. W. Sheldon, J. C. Shih, T. D. Siopes; **Associate Professors:** C. M. Ashwell, D. K. Carver, D. P. Smith; **Assistant Professors:** J. B. Hoffman, M. D. Koci, E. O. Oviedo-Rondon, C. R. Stark; **Adjunct Assistant Professors:** D. S. Casey, J. V. Felts, A. G. Gernat, C. L. Heggen-Peay, R. O. Maguire, T. F. Middleton, C. J. Williams

Course offerings and research programs are comprehensive in the areas of physiology, nutrition, microbiology, molecular biology, biotechnology, food science, 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: Factors considered for admission include grade point average, strength of prior academic program, experience, letters of recommendation, and special skills or interests. GRE scores are required.

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: See [Animal Science and Poultry Science](#).

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 Catalog. Other financial support may be available in the form of graduate stipend supplementation, research grant support, or out-of-state tuition waivers in accordance with the University's Graduate Student Support Plan.

Other Relevant Information: The Department of Poultry Science occupies modern facilities in Scott Hall, a three-story building on the main campus adjacent to the D.H. Hill Library. The department consists of about 20 faculty, approximately 40 support staff, 25 graduate students and postdoctoral associates, and 100 undergraduate students.

For more information, visit the [Department of Poultry Science](#) website.

Click on [Graduate Courses](#) for current course information.

Psychology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Psychology	Y		Y				

GRADUATE FACULTY

D. J. Gillan, *Department Head*

Director of Graduate Programs:

L. E. Baker-Ward, Box 7801, 51731, lynne_baker_ward@ncsu.edu, Psychology

Professors: L. E. Baker-Ward, J. P. Braden, D. W. Drewes, W. P. Erchul, D. J. Gillan, D. O. Gray, A. G. Halberstadt, M. E. Haskett, T. M. Hess, D. B. Kaber, J. W. Kalat, D. W. Martin, D. H. Mershon, J. J. Michael, R. W. Nacoste, A. C. Schulte, F. J. Smith, M. S. Wogalter; **Adjunct Professors:** A. D. Hall; **Emeritus Professors:** J. W. Cunningham, K. B. DeBord, T. E. Levere, J. E. Luginbuhl, H. G. Miller, S. E. Newman, P. W. Thayer; **Associate Professors:** J. C. Allaire, C. C. Brookins, S. B. Craig, S. A. Lane, P. P. Martin, C. B. Mayhorn, A. W. Meade, B. S. Mehlenbacher, R. E. Mitchell, S. B. Pond, S. S. Snyder, S. A. Stage, L. F. Thompson, E. N. Wiebe, M. A. Wilson, M. B. Wyer; **Adjunct Associate Professors:** J. W. Fleenor; **Emeritus Associate Professors:** J. L. Cole, K. W. Klein; **Assistant Professors:** J. C. Begeny, D. Gruehn, A. C. McLaughlin, S. D. Neupert; **Clinical Assistant Professors:** P. W. Collins; **Adjunct Assistant Professors:** T. E. Ray

The Department of Psychology offers five courses of study leading to the Ph.D.: lifespan developmental psychology, human factors and ergonomics, psychology in the public interest, industrial-organizational psychology, and school 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 (General Test) and three satisfactory letters of recommendation. The GRE Subject Test is no longer required, but is encouraged, especially for non-psychology majors. Faculty will examine transcripts for evidence of basic psychology competence. Match of applicants' research interests with current faculty research is usually an important consideration.

Master's Degree Requirements: Specific course requirements vary by concentration. Typical programs will include from 36 to 55 hours. 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.

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. Students can expect to take from 36 to 54 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. Applicants should request such support when they apply to the program.

Click on [Graduate Courses](#) for current course information.

Public Administration

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Public Administration	Y				Y		

GRADUATE FACULTY

Director of Graduate Programs:

R. M. Berry-James, Box 8102, , rmberryj@ncsu.edu, Political Science

William T. Kretzer Distinguished Professor: T. A. Birkland

Professors: C. K. Coe, J. D. Coggburn, D. M. Daley, G. D. Garson, R. C. Kearney, A. J. Taylor, M. Tschirhart; **Associate Professors:** R. M. Berry-James, J. K. Jameson, J. E. Swiss, M. L. Vasu; **Emeritus Associate Professors:** E. O'Sullivan; **Assistant Professors:** H. Bae, J. R. Brunet, R. M. Clerkin, B. L. Nowell; **Extension Assistant Professors:** S. K. Straus; **Teaching Assistant Professors:** A. O. Ozturk

Administrative specialties include: non-profit management, and urban/local government management. Specialized courses are offered in environmental policy, financial management, and human resource management. The only doctoral program in public administration in N.C., the Ph.D. prepares students for teaching and research positions in public management and related fields. The program offers graduate certificates in non-profit management and public policy, both of which may be included as part of the M.P.A., another graduate degree program, or taken independently.

Admission Requirements: Applicants to the M.P.A. should submit all materials by May 15 (for fall admission) and by November 1 (for spring admission). Ph.D. students are admitted only for the Fall semester; the Ph.D. application deadline is March 15. Applicants to either program are encouraged to submit all materials as soon as possible to assure consideration for fellowships and assistantships. Completed applications received by February 1 will receive consideration for all available university and department scholarships and assistantships. Admission to the doctoral program normally requires the completion of the M.P.A. or other relevant graduate degree.

Master's Degree Requirements: The M.P.A. degree is a 40-semester-hour program consisting of: (1) a core curriculum of 18 credit hours; (2) a choice of administrative specialties, or an individualized program, drawing on courses in public administration and other departments; and (3) an internship requirement for pre-service students. It is an option B Master's degree with a one-person committee and no final oral examination. Students who do not have at least two political science courses, including at least one American government course, a micro-economics course, and an intermediate-level statistics course must successfully complete equivalent coursework prior to graduation.

Doctoral Degree Requirements: The Ph.D. prerequisites are a graduate course in intermediate statistics, a course in methodology (covering research design, internal and external validity, sampling, and measurement), and at least two courses in American government or public policy. Students are required to complete M.P.A. core courses in (a) budgeting or management systems, and (b) policy analysis or micro-economics unless they have equivalent courses from other institutions. Fifty-four hours beyond the Master's degree including research seminars (including PA 761, PA 762, PA 763, PA 803), four courses in methodology/statistics (including PA 715, PA 765, PA 766), and dissertation research are required.

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 Catalog.

Click on [Graduate Courses](#) for current course information.

Science, Technology, Engineering, and Mathematics Education

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Mathematics Education	Y		Y			Y	
Science Education	Y		Y			Y	
Technology Education		Y	Y			Y	

GRADUATE FACULTY

P. E. Simmons, *Department Head*

Director of Graduate Programs:

A. Clark, Box 7801, 51771, aaron_clark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education

Joseph D. Moore Distinguished Professor: J. Confrey

Professors: S. B. Berenson, W. J. Haynie, M. G. Jones, P. E. Simmons, L. V. Stiff, P. Sztajn; **Emeritus Professors:** N. D. Anderson, L. M. Clark, J. K. Coster, D. M. Hanson, J. R. Kolb, J. E. Penick; **Associate Professors:** T. J. Branoff, G. S. Carter, A. Clark, V. W. DeLuca, K. F. Hollebrands, H. S. Lee, K. S. Norwood, J. C. Park, E. N. Wiebe; **Research Associate Professors:** H. S. Stubbs; **Emeritus Associate Professors:** R. E. Peterson, W. M. Waters, L. W. Watson, R. E. Wenig, J. H. Wheatley; **Assistant Professors:** M. R. Blanchard, S. J. Carrier, J. V. Ernst, S. Y. Holmes, K. A. Keene, A. W. McCulloch, J. Minogue, T. E. Varnado; **Adjunct Assistant Professors:** P. P. Carpenter, G. L. Holley; **Emeritus Assistant Professors:** W. J. VanDerWall; **Teaching Assistant Professors:** J. R. Busby, B. Matthews, A. Y. Scales

The Department of Science, Technology, Engineering and Mathematics (STEM) Education offers graduate programs that lead to the degrees of Master of Science, Master of Education, Doctor of Education, and Doctor of Philosophy. We prepare educators for positions as teachers, as leaders, and as university faculty of the highest quality. We are particularly proud of our emphasis on the use of technology to enhance teaching. Students take courses in their educational specialty, in general professional education, and in mathematics, science, or technology cognate areas including: biological sciences, chemistry, computer science, earth science, interdisciplinary science, mathematics, physics, or statistics.

Master's programs are offered leading to North Carolina M-licensure as a teacher of mathematics, science, or technology at grades 6-9 and/or 9-12 for those who have an initial license. Programs are also available for those seeking advanced graduate-level certification as a teacher. Students may choose a program to prepare for teaching careers in post-secondary education.

Doctoral programs enroll students who are knowledge-seekers and are eager to pursue educational problems and develop critical thinking skills in a collaborative environment. The programs prepare individuals to be knowledgeable about and prepared to accept positions related to:

1. scholarly inquiry and discourse in their discipline,
2. preparation of K-12 teachers,
3. instruction and development issues in K-16, and
4. leadership positions.

Admission Requirements: Applicants for all of the M.S., M.Ed., Ed.D., and Ph.D. degrees in mathematics, science or technology education must submit a completed application specific to the program. Please see the [Science, Technology, Engineering and Mathematics \(STEM\) Education](#) website for details. The deadlines for submission of an application, and academic and professional background necessary for admission differ by specific program.

Master's Degree Requirements: The Master's Degree programs require a minimum of 36 semester hours of graduate work. Students who choose the M.S. degree may be able to substitute up to six semester hours of thesis research for part of the course load.

Doctoral Degree Requirements: The Ed.D. program in Technology Education requires a minimum of 90 semester hours of graduate work beyond the Baccalaureate degree including a minimum of 12 semester hours of dissertation research. The Ph.D. program in Mathematics Education requires a minimum of 50 semester hours of course work and 12 semester hours of dissertation research beyond the Master's Degree requirements. The Ph.D. program in Science Education requires a minimum of 48 semester hours of course work and 9 semester hours of dissertation research 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 for students on assistantships. Please discuss these opportunities directly with program area faculty.

Click on [Graduate Courses - Math and Science Education](#) for current course information.

Click on [Graduate Courses - Technology Education](#) for current course information.

Social Work

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Social Work					Y		

GRADUATE FACULTY

Director of Graduate Programs:

J. D. Taliaferro, Box 7639, 919-513-1990, jocelyn_taliaferro@ncsu.edu, Social Work

Professors: J. T. Pennell; **Associate Professors:** N. R. Ames, K. Bullock, J. D. Taliaferro; **Assistant Professors:** W. J. Casstevens, M. T. Leach, J. G. Wells; **Clinical Associate Professors:** L. R. Williams; **Clinical Assistant Professors:** J. K. Hall, K. M. Osborne

The mission of the MSW program is to prepare students for practice that is sensitive to the social, economic, cultural, demographic and political contexts that shape our state and beyond. Within a framework emphasizing professional ethics, social justice, diversity, strengths and community engagement, the Department seeks to equip students for leadership roles and effective practice.

Admission Requirements:

1. Bachelor's degree from an accredited liberal arts college or university
2. Cumulative undergraduate GPA of 3.0 or higher for the last 60 hours of academic work or a GPA of 3.0 or above in previous graduate work; students with a GPA less than 3.0 but greater than 2.5 for the last 60 hours of academic course work must also submit a Graduate Record Exam (GRE) score or a Miller Analogies Test (MAT) score
3. Liberal arts course work in the social sciences, humanities, human biology and statistics
4. Experience in human services (post baccalaureate, paid or volunteer)

Master's Degree Requirements: The MSW Program provides two options: The Traditional 60-credit program, and the 39-credit Advanced Standing Program, which is designed for BSW graduates only.

We do not offer a part-time curriculum at this time.

Other Relevant Information: The Council on Social Work Education, Commission of Accreditation has granted accredited status to our MSW program.

Click on [Graduate Courses](#) for current course information.

Sociology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Sociology	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

T. N. Greenstein, Box 8107, 515-9006, Ted_Greenstein@ncsu.edu, Sociology

Distinguished Professor: V. M. Aldige

Goodnight-Glaxo Wellcome Endowed Chair: C. R. Tittle

William C. Friday Distinguished University Professorship: W. A. Wolfram

William Neal Reynolds Distinguished Professor: R. C. Wimberley

William Neal Reynolds Professor: M. D. Schulman

Professors: M. P. Atkinson, L. R. Dellafave, T. N. Greenstein, E. L. Kick, J. C. Leiter, P. L. McCall, T. L. Parcel, M. L. Schwalbe, E. M. Woodrum, M. A. Zahn, J. J. Zuiches; **Adjunct Professors:** A. L. Schiller; **Emeritus Professors:** W. B. Clifford, E. M. Crawford, T. N. Hobgood, R. L. Moxley, R. D. Mustian, M. M. Sawhney; **Emeritus Distinguished Professors:** L. B. Otto; **Associate Professors:** D. T. Case, S. M. De Coster, S. M. Fitzpatrick, N. M. Haenn, A. H. Ross, W. R. Smith, M. E. Thomas, M. S. Thompson, J. M. Wallace; **Adjunct Associate Professors:** R. L. Engen, J. F. Thigpen; **Emeritus Associate Professors:** R. C. Brisson, R. F. Czaja, A. C. Davis, R. J. Thomson, M. L. Walek; **Assistant Professors:** S. K. Bowen, B. L. Clark, M. L. Crowley, K. L. Ebert, S. G. Elliott, R. S. Ellovich, A. K. Jorgenson, S. J. McDonald; **Teaching Associate Professors:** W. E. Wormsley

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 and should be intending to complete the Ph.D. degree in sociology. We routinely accept applications only for the fall semester. The completed application should be received no later than January 1 to ensure full consideration for assistantship support. Applications for spring admission are considered only under special circumstances (for example, when the student has already completed some graduate course work in sociology).

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 six semester credit hours of practicum (supervised field placement in an organization or agency) and a research paper. A minor for both degrees is optional. Thirty (30) hours of credit is required to obtain a Master's degree.

Doctoral Degree Requirements: The Ph.D. requires a total of 72 credit hours. The degree normally requires a Master's in sociology. Doctoral students take core courses in theory and methods/analysis and at least three courses each in two substantive areas of specialization. Some course work from the Master's may be applied. A minor is optional.

Student Financial Support: Teaching and research assistantships are available on a competitive basis.

Click on [Graduate Courses](#) for current course information.

Soil Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Soil Science	Y		Y		Y		

GRADUATE FACULTY

M. G. Waggoner, *Department Head*

Director of Graduate Programs:

T. J. Smyth, Box 7619, 515-2838, tjot_smyth@ncsu.edu, Soil Science

William Neal Reynolds Distinguished Professor: J. T. Brake

William Neal Reynolds Distinguished Professor of Biological and Agricultural Engineering: R. W. Skaggs

William Neal Reynolds Professor: M. J. Vepraskas

WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS: J. W. Gilliam, E. J. Kamprath

Professors: A. Amoozegar, S. W. Broome, C. R. Crozier, J. L. Havlin, D. L. Hesterberg, M. T. Hoover, G. D. Hoyt, M. R. Hyman, H. J. Kleiss, D. L. Lindbo, R. A. McLaughlin, D. L. Osmond, W. P. Robarge, T. J. Smyth, M. G. Waggoner;

Emeritus Professors: D. K. Cassel, D. W. Israel; **Emeritus Distinguished Professors:** S. W. Buol; **Associate Professors:** D. A. Crouse, W. Shi, J. G. White; **Emeritus Associate Professors:** J. P. Lilly, G. C. Naderman; **Assistant Professors:** O. W. Duckworth, R. J. Gehl, A. K. Graves, J. M. Grossman, J. L. Heitman, M. L. Polizzotto; **Adjunct Assistant Professors:** D. H. Hardy, R. O. Maguire, J. T. Walker

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; soil mineralogy.

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 of Science Degree Requirements: Requirements include a minimum of 30 semester hours of course work, including at least one credit, but not more than two credit hours, of seminar (SSC 601) and a minimum of two, but not more than six, credit hours of research (SSC 693 or SSC 695), successful completion of a research problem, submittal of a written thesis that documents the research, a comprehensive oral examination and presentation of a non-credit exit seminar.

Master of Soil Science Degree Requirements (non-thesis distance education program): Requirements include a minimum of 36 semester credit hours of graduate work with a minimum of six credit hours of a Master's project. One credit hour of seminar (SSC 601) is required.

Master of Soil Science Degree Requirements (non-thesis program): Requirements include a minimum of 36 semester credit hours of graduate work with a minimum of four, but not more than six, credit hours of Special Problems (SSC 620). One credit hour of seminar (SSC 601) is required and a maximum of two credit hours is acceptable.

Master of Natural Resources Requirements (non-thesis program): Requirements include a minimum of 32 semester credit hours consisting of 15 hours in core courses, 17 hours in Soil Science courses, and the completion of a Master's project. One credit hour of seminar (SSC 601) is also required. A minor is optional, although one-third of the credits should usually be in courses outside of the department.

Doctoral Degree Requirements: Ph.D. candidates must demonstrate the ability to undertake original research with minimal supervision and write a dissertation reporting the results of this research. There are no definite course requirements for the Ph.D. degree; however, a minimum of 72 graduate credit hours is required beyond the Bachelor's degree. The Plan of Graduate Work must contain at least one credit hour of seminar (SSC 801) and at least two credit hours of research (SSC 893 or SSC 895). The candidate must also pass a preliminary examination (written and oral components) and a final oral examination. A non-credit exit seminar is required. 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. All of the graduate assistantships are half time.

Click on [Graduate Courses](#) for current course information.

Specialized Veterinary Medicine

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Specialized Veterinary Medicine					Y		

GRADUATE FACULTY

Directors of Graduate Programs:

K. M. Meurs, Box 8401, 513-6413, , College of Veterinary Medicine

S. L. Jones, Box 8401, 3-6459, sam_jones@ncsu.edu, Clinical Sciences

Jane Lewis Seaks Distinguished Professor: C. E. Atkins

Burroughs Wellcome Professor of Pharmacology: J. E. Riviere

Drexel Professor of Statistics: A. A. Tsiatis

Professors: G. W. Almond, K. L. Anderson, P. Arasu, H. J. Barnes, A. T. Blikslager, M. Breen, E. B. Breitschwerdt, D. G. Bristol, T. T. Brown, J. M. Cullen, M. G. Davidson, G. A. Dean, H. A. Devine, D. C. Dorman, L. N. Fleisher, O. J. Fletcher, R. B. Ford, F. J. Fuller, J. E. Gadsby, B. C. Gilger, C. B. Grindem, J. S. Guy, B. Hammerberg, E. M. Hardie, E. C. Hawkins, J. M. Hinshaw, L. C. Hudson, S. L. Jones, B. W. Keene, S. M. Laster, J. M. Law, J. F. Levine, M. G. Levy, G. A. Lewbart, D. H. Ley, D. J. Marcellin, K. G. Mathews, M. C. McGahan, K. M. Meurs, D. J. Meuten, N. Monteiro, W. M. Morrow, T. J. Olivry, P. E. Orndorff, M. G. Papich, J. A. Piedrahita, M. C. Roberts, S. C. Roe, P. L. Sannes, D. Shea, B. Sherry, W. J. Showers, J. E. Smallwood, L. P. Tate, D. E. Thrall, M. B. Tompkins, W. Tompkins, S. L. Vaden, D. P. Wages, D. W. Watson; **Research Professors:** M. J. Dykstra, E. A. Havell, S. Kennedy-Stoskopf; **Adjunct Professors:** G. R. Burleson, R. L. Cooper, M. W. Dewhirst, K. L. Dreher, J. N. Kornegay, R. B. Meeker, J. A. Raleigh, M. K. Selgrade, F. Welsch; **Emeritus Professors:** J. F. Roberts; **Associate Professors:** R. E. Baynes, J. C. Bonner, B. A. Breuhaus, D. K. Carver, M. T. Correa, P. Cowen, T. C. DeFrancesco, L. A. Degernes, P. W. Farin, R. E. Fish, S. Y. Gardner, B. Hansen, C. A. Harms, M. L. Hauck, J. M. Horowitz, D. X. Lascelles, K. R. Munana, S. C. Nelson, N. J. Olby, B. D. Slenning, G. W. Smith, C. R. Swanson, S. Tonkonogy, M. D. Whitacre, L. E. Williams; **Adjunct Associate Professors:** D. Dixon, T. E. Eling, R. C. Sills, R. J. Smialowicz; **Assistant Professors:** J. L. Gookin, P. R. Hess, M. P. Martin; **Clinical Associate Professors:** M. P. Gerard, K. E. Linder, W. R. Redding; **Clinical Assistant Professors:** M. L. Alley, A. L. Cannedy; **Visiting Assistant Professors:** R. Linnehan; **Adjunct Assistant Professors:** A. E. Bogan, M. R. Loomis, D. E. Malarkey, P. Ren; **Teaching Associate Professors:** J. A. Barnes

The creation of the non-thesis Master's degree track (MSPVM) for the Veterinary Medicine Graduate Program was proposed to enhance scholarship and competitiveness of veterinarians completing advanced specialty training at the College. These programs are designed to provide experiences appropriate for certification in the specialty College related to their area of study. Clinical and diagnostic material handled through the Veterinary Teaching Hospital and affiliated units will provide the basis for this training. Courses will incorporate seminars, rounds and journal club activities; individual supervised training; independent study programs; and basic statistics and ethics. Many of the programs will require a project, publication, and oral exam to be completed as part of the requirements.

This *optional* track features an *interdepartmental, multidisciplinary* approach to graduate training with participating graduate faculty from all four departments of the College of Veterinary Medicine. These faculty represent [17 discipline areas](#) and will offer advanced training leading to the Master of Specialized Veterinary Medicine.

Each MSpVM student will have a unique graduate training program focused in his/her clinical specialty area and directed by a graduate committee comprising faculty experts from this clinical specialty and other specialty areas. Creation of the track will permit the College to document more clearly the effort that faculty commit to advanced training in 17 different veterinary specialties. The graduate track will help sustain the outstanding success the College has achieved in attracting the top national and international veterinary graduates for post-graduate clinical training.

Admission Requirements: Applicants must have a DVM/VMD degree from an accredited program and have a documented history of academic excellence. All applicants must meet minimum criteria for both the program and the NC State University Graduate School and be selected for participation in the track by the faculty of the specialty area identified by the applicant. Graduate Record Examination (GRE) scores may be required by specific specialty areas. Committee decisions will be based on academic performance while enrolled in a DVM/VMD program, letters of recommendation, professional experience, and perceived ability of the individual to complement the needs of our training program.

Specialty Areas: Each enrolled student will concentrate his/her studies in one of the existing [clinical specialty training areas](#) at the College of Veterinary Medicine. Additional training specialties may be created as warranted by demographic, economic and social changes that impact the profession.

Course Requirements: Students will complete 2 or 3 years of training depending on the requirements in the specific specialty area. The first year will predominately be spent participating in specialty training in the Veterinary Teaching Hospital, where students will receive supervised specialty training in the various clinical services offered by the VTH. During the first year, out of state students may enroll for fewer than 9 credits for the fall and spring semesters. Subsequently, students will complete the required 36 credit hours during the second and third year of their studies.

All students are required to complete 25 credit hours of general course requirements as well as additional elective course requirements in his/her specialty area. The general course requirements consist of:

- Seminar/clinical rounds - 4 credit hours
- Research - 4 credit hours
- Supervised teaching (including rounds) - 1 credit hours
- Supervised specialty training - 12 credit hours
- Biostatistics - 3 credit hours
- Professional ethics - 1 credit hour

The courses selected to complete the balance of the required 36 credit hours will be determined by the student and his/her advisory committee. The following courses represent those that could be used by MSpVM students to complete the credit hour requirements for their degree.

Click on [Graduate Courses](#) for current course information.

Statistics

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Statistics	Y		Y		Y		

GRADUATE FACULTY

M. Fuentes, *Department Head*

Directors of Graduate Programs:

J. F. Monahan, Box 8203, 5-1917, monahan@stat.ncsu.edu, Statistics

S. K. Ghosh, Box 8203, 515-1950, sujit_ghosh@ncsu.edu, Statistics

Burroughs Wellcome Professor of Pharmacology: J. E. Riviere

Drexel Professor of Statistics: A. A. Tsiatis

Joseph D. Moore Professorship of Textile and Apparel Management and Technology: A. B. Godfrey

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

William Neal Reynolds Professor: M. Davidian, D. A. Dickey, Z. Zeng

Professors: B. Bhattacharyya, P. Bloomfield, D. D. Boos, M. A. Bourham, C. Brownie, M. Fuentes, S. K. Ghosh, M. L. Gumpertz, A. R. Hall, J. M. Hughes-Oliver, J. F. Monahan, S. V. Muse, S. G. Pantula, K. H. Pollock, D. L. Solomon, L. A. Stefanski, M. W. Suh, J. L. Thorne; **Research Professors:** N. Sedransk; **Visiting Professors:** E. A. Thompson; **Adjunct Professors:** J. R. Chromy, R. B. Conolly, J. H. Goodnight, P. D. Haaland, J. M. Hoenig, N. L. Kaplan, P. H. Morgan, D. W. Nychka, R. W. Setzer, R. D. Wolfinger, S. S. Young; **Emeritus Professors:** T. M. Gerig, F. G. Giesbrecht, H. J. Gold, A. H. Grandage, T. Johnson, L. A. Nelson, C. H. Proctor, C. P. Quesenberry, J. O. Rawlings, D. L. Ridgeway, R. G. Steel, W. H. Swallow, J. L. Wasik, O. Wesler; **Associate Professors:** T. H. Emigh, S. Ghoshal, K. Gross, A. E. Headen, W. Lu, D. E. Martin, J. A. Osborne, T. W. Reiland, C. E. Smith, E. A. Stone, D. Zhang; **Adjunct Associate Professors:** H. X. Barnhart, E. R. Hauser, A. S. Kosinski; **Emeritus Associate Professors:** A. C. Linnerud; **Assistant Professors:** H. D. Bondell, L. Li, A. Maity, H. M. McGowan, M. C. Militello, A. A. Motsinger, B. J. Reich, A. Staicu, W. Sun, J. Tzeng, H. Wang, Y. Wu, H. Zhang, H. Zhou; **Research Assistant Professors:** C. Arellano; **Adjunct Assistant Professors:** G. Bobashev, M. G. Ehm, J. S. Kimbell, Y. Li, M. W. Lutz, E. R. Martin, M. O'Connell; **Teaching Associate Professors:** K. S. Weems, R. Woodard; **Teaching Assistant Professors:** A. D. LaBarr

Admission Requirements: 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. Students may apply to either the Master's or PhD program directly from a Bachelor's degree. GRE General Test scores are required, but Subject Test scores are not.

The written statement should not exceed two pages and should describe the applicant's academic and career goals as well as special interests in the area of statistics. Applicants may also submit a resume. Individuals applying for fall enrollment and who wish to be considered for financial aid should have their completed applications in by no later than December 15 of the preceding year. Applications arriving after that will be considered but may be assigned lower priority. Students are not normally admitted for spring or summer enrollment.

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, ST 522, ST 552 and their labs), one is supervised consulting (ST 641). The

remainder are statistics and/or supporting electives.

Doctoral Degree Requirements: The Ph.D. program in statistics requires 22 course credit hours beyond the Master's, of which 9 are Ph.D. core courses (ST 779, ST 793, and ST 758), one is supervised consulting (ST 841), and 12 are Ph.D.-level statistics electives.

Student Financial Support: Departmental assistantships and fellowships are awarded each year on a competitive basis.

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.

Click on [Graduate Courses](#) for current course information.

Teaching

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Teaching				Y			

GRADUATE FACULTY

Director of Graduate Programs:

G. L. Holley, Box 7801, 513-0083, grant_holley@ncsu.edu, College of Education Dean's Office

Professors: E. McIntyre, R. J. Pritchard, E. J. Sabornie; **Associate Professors:** V. W. DeLuca, H. S. Lee, J. K. Lee, S. S. Osborne; **Assistant Professors:** M. R. Blanchard, M. J. Jeffries, M. M. Pop; **Adjunct Assistant Professors:** G. L. Holley; **Teaching Assistant Professors:** D. E. Bengé

The Master of Arts in Teaching (MAT) program is an accelerated teacher licensure program that leads students to both an initial teaching license and a master's degree in as little as a year and a half of full-time study. The program is distinct in its focus on practice and by conducting some face-to-face classes in a public school facility. The content areas being served by the MAT program are Secondary Math, Science, Social Studies, and English; Middle Grades (Language Arts or Social Studies); Technology Education; English as a Second Language; K-12 Reading; Special Education; and Elementary Education.

Admission Requirements: Applicants must have (1) a four-year degree from a college or university that holds regional accreditation, such as SACS; (2) a minimum combined score of 1000 on the GRE; (3) 3.00 GPA or higher in prior work, as required by the Graduate School; (4) an undergraduate degree in the content area/discipline or 24 semester hours/credits in content relevant to the area in which you wish to teach (if you have fewer than 24 hours in a relevant content field, or if your course work does not prepare you adequately to teach the North Carolina curriculum, you may be assigned additional course work to overcome the deficiency).

Applications require original transcripts, 3 letters of recommendation (one of which should speak to teaching potential), a personal essay stating applicant's background and goals, GRE scores (and TOEFL if you have international citizenship), and a completed online application.

Master's Degree Requirements: A total of 30-33 credit hours must be earned for completion of the degree, depending on the particular licensure area. These hours include student teaching for non-lateral entry students.

Student Financial Support: Financial aid is available. Interested students should complete a [Financial Aid Federal Student Aid \(FAFSA\)](#) form.

Click on [Graduate Courses](#) for current course information.

Textile Engineering, Chemistry and Science

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Textile Chemistry			Y				
Textile Engineering			Y				

GRADUATE FACULTY

J. P. Rust, *Department Head*

Director of Graduate Programs:

P. J. Hauser, Box 8301, 513-1899, peter_hauser@ncsu.edu, Textile Engineering, Chemistry and Science

Burlington Industries Professorship of Textile Technology: R. L. Barker

CHARLES A CANNON PROFESSOR EMERITUS: S. P. Hersh

Ciba-Geigy Distinguished Professor: H. S. Freeman

Cone Mills Professorship of Textile Chemistry: C. B. Smith

INVISTA Professor of Fiber and Polymer Chemistry: A. E. Tonelli

Lineberger Chair in Yarn Manufacturing: W. Oxenham

William A. Klopman Distinguished Professor: B. Pourdeyehimi

Professors: K. R. Beck, T. K. Ghosh, H. Hamouda, P. J. Hauser, D. Hinks, S. M. Hudson, W. J. Jasper, M. W. King, J. P. Rust, A. M. Seyam, R. J. Spontak; **Adjunct Professors:** A. E. Bogdanovich, L. D. Claxton, W. G. O'Neal; **Emeritus Professors:** R. A. Barnhardt, D. R. Buchanan, A. H. El-Shiekh, P. L. Grady, G. N. Mock, M. H. Theil, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** P. Banks-Lee, L. I. Clarke, R. E. Gorga, G. L. Hodge, J. A. Joines, R. Kotek, W. E. Krause, M. G. McCord, S. Michielsen, R. Shamey; **Research Associate Professors:** D. B. Thompson; **Adjunct Associate Professors:** K. F. El-Tahlawy, T. G. Montgomery; **Assistant Professors:** P. D. Bradford, A. M. El-Shafei, M. Pasquinelli, J. A. Willoughby, X. Zhang; **Research Assistant Professors:** N. Anantharamaiah, L. F. Fryer, J. S. Jur, B. Maze, E. Shim, B. Yeom; **Adjunct Assistant Professors:** H. A. Boyter, R. F. Moore

Master of Science in Textile Chemistry (MS/TC): The Master of Science in Textile Chemistry degree program emphasizes the fundamental principles of chemistry, physics, and mathematical sciences and applies those to polymer science, dyeing and finishing technology, color science, dye chemistry, and fiber analysis and formation. Some of the active research projects in textile chemistry include study of toxicity and mutagenicity of dyes and pigments, biomedical applications of polymers, surface treatment and finishing of polymers using plasma, color perception and imaging, dye activated solar cells, dyebath modeling and control, polymer and fiber science, and environmental sustainability including pollution prevention. Some of our students opt to co-major in other programs including chemical engineering, chemistry, and biomedical engineering. Our program is highly relevant to many in the chemical, medical, polymer, retail and textile industries, as well as environmental and forensic science. Graduates of Textile Chemistry are recruited by a broad range of employers, such as DuPont, Proctor & Gamble, Nike, Wyeth, and even the State and Federal Bureaus of Investigation.

Master of Science in Textile Engineering (MS/TE): The Master of Science in Textile Engineering degree program offers unique educational and research opportunities within the domain of textile materials, structures, and technologies, as well as machine and process design. The program is interdisciplinary in nature, drawing upon mathematical sciences, other engineering disciplines, and the physical sciences. Current research activities in

textile engineering include electro-mechanical design, inventory and supply chain control, molecular modeling, nonwoven thermal and fluid sciences, polymer and fiber science, biomedical applications of textiles, electro-textiles, textile composites, and pollution prevention. Since this program encompasses such diverse fields of study, many of our students opt to co-major in other programs at NC State. Examples of these co-majors are statistics, bio-medical engineering, chemical engineering, and industrial engineering. Graduates of Textile Engineering are recruited by a broad range of employers, such as Milliken and Co., Kimberly-Clark, Russell Corporation, Secant Medical, and even the United States Patent and Trademark Office.

Admission Requirements (MS/TC): Applicants must have a physical science, engineering, mathematical, or technology background, preferably including higher math and physical chemistry. Applicants are also expected to meet the following minimum requirements: a GPA of **3.0** or First Class Honors in the Bachelor's degree; GRE scores in the 65th percentile; a TOEFL score of **213** for the computer-based, and **80** for internet-based (international students) OR IELTS scores with an overall band score of at least **6.5**; and three letters of reference.

Admission Requirements (MS/TE): Applicants must have an undergraduate engineering degree or demonstrated proficiency in the appropriate calculus-based math and core technical competencies. If these requirements are not met, additional coursework may be required prior to admission into the program. A background in engineering mechanics, control theory, statistics, or material science is highly recommended. Formal education in textile engineering or materials science is desired but not required. Applicants are also expected to meet the following minimum requirements: a GPA of **3.0** or First Class Honors in the bachelor's degree; GRE scores in the 65th percentile; a TOEFL score of **213** for the computer-based, and **80** for internet-based (international students) OR IELTS scores with an overall band score of at least **6.5**; and three letters of reference

Degree Requirements Master of Science in Textile Chemistry (MS/TC): A minimum of 30 credit hours is required to fulfill the degree requirements. Normally, this degree requires 15 credit hours in approved textile chemistry/textile material science/textile technology offerings, 9 credit hours in a supporting area (minor), 6 credit hours of thesis research, and two semester credits from the College Seminar (TC 601). Additional course work may be substituted for part of the research credits. A minimum of 33 credit hours is required for off-campus (TOP) students, Option B (non-thesis) students, and students earning a M.S. on the way to the Ph.D. degree in Fiber and Polymer Science (FPS).

Degree Requirements Master of Science in Textile Engineering (MS/TE): A minimum of 30 credit hours is required to fulfill the degree requirements. Normally, this degree requires 15 credit hours in approved textile engineering/textile material science/textile technology offerings, 9 credit hours in a supporting area (minor), 6 credit hours of thesis research, and two semester credits from the College Seminar (TE 601). Additional course work may be substituted for part of the research credits. A minimum of 30 credit hours is required for off-campus (TOP) students, Option B (non-thesis) students, and students earning a M.S. on the way to the Ph.D. degree in Fiber and Polymer Science (FPS).

Student Financial Support: Financial aid in the form of research assistantships or fellowships is typically available for all full-time US students who apply early. Either through research projects of faculty or through centers and institutes within the College of Textiles. Students who seek funding must acquire this through individual faculty members who have research projects that require a graduate student. While students can typically find support by their second semester, they should be prepared to cover all expenses for at least the first semester.

Other Relevant Information: The department either houses or has access to all major analytical tools necessary to conduct 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.

Click on [Graduate Courses -Textile Chemistry](#) for current course information.

Click on [Graduate Courses -Textile Engineering](#) for current course information.

Click on [Graduate Courses -Textile Materials Science](#) for current course information.

Click on [Graduate Courses -Textile Technology](#) for current course information.

Textile Technology Management

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
<u>Textile Technology Management</u>	Y						

GRADUATE FACULTY

Director of Graduate Programs:

W. Oxenham, Box 8301, 515-6573, william_oxenham@ncsu.edu, College of Textiles

Bank of America Distinguished University Professor: R. B. Handfield

Burlington Industries Professorship of Textile Technology: R. L. Barker

CHARLES A CANNON PROFESSOR EMERITUS: S. P. Hersh

Charles A. Cannon Professor: S. K. Batra

Ciba-Geigy Distinguished Professor: H. S. Freeman

Cone Mills Professorship of Textile Chemistry: C. B. Smith

Distinguished University Professor: M. A. Rappa

INVISTA Professor of Fiber and Polymer Chemistry: A. E. Tonelli

James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing: T. J. Hodgson

Joseph D. Moore Professorship of Textile and Apparel Management and Technology: A. B. Godfrey

Lineberger Chair in Yarn Manufacturing: W. Oxenham

Walter Clark Professor of Industrial Engineering: S. C. Fang

William A. Klopman Distinguished Professor: B. Pourdeyhimi

Professors: K. R. Beck, C. C. Bozarth, N. L. Cassill, R. A. Donaldson, T. K. Ghosh, H. Hamouda, P. J. Hauser, D. Hinks, W. J. Jasper, M. W. King, R. E. King, T. J. Little, S. E. Margolis, J. P. Rust, A. M. Seyam, M. W. Suh, J. R. Wilson;

Emeritus Named Professors: S. C. Winchester; **Emeritus Professors:** R. A. Barnhardt, D. R. Buchanan, A. H. El-Shiekh, P. L. Grady, D. M. Holthausen, G. N. Mock, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Emeritus Distinguished University Professors:** S. E. Elmaghraby; **Associate Professors:** E. A.

Baker, P. Banks-Lee, K. A. Barletta, R. E. Gorga, H. H. Hergeth, G. L. Hodge, C. L. Istook, J. A. Joines, R. Kotek, W. E. Krause, T. A. Lamar, J. K. McCreery, S. Michielsen, M. M. Moore, N. C. Powell, R. Shamey, G. W. Smith; **Emeritus Associate Professors:** S. N. Chapman; **Assistant Professors:** P. D. Bradford, K. E. Carroll, A. M. El-Shafei, H. Lee, M. Pasquinelli, J. A. Willoughby; **Research Assistant Professors:** N. Anantharamaiah, B. Maze, E. Shim, B. Yeom;

Teaching Professors: H. L. Nuttle

Textile Technology Management is a multidisciplinary program designed to educate students for research and management careers in technology management 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 an average in their undergraduate studies of 3.5/4.0 and a Master's degree will normally qualify for admission. Exceptionally qualified students (3.75/4.0 undergraduate GPA) may be admitted directly without a Master's degree.

Doctoral Degree Requirements: Fixed credit-hour requirements for the Doctor of Philosophy degree are 72. (Up to 18 hours from an M.S. may be applied against the 72.) 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 U.S. full-time students. Financial aid in the form of Graduate Research/Teaching Assistantships may be available to a limited number of international students.

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.

Click on [Graduate Courses - Textile Technology Management](#) for current course information.

Click on [Graduate Courses - Textile Technology](#) for current course information.

Textile and Apparel Management

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Textiles			Y		Y		

GRADUATE FACULTY

N. L. Cassill, *Department Head*

Director of Graduate Programs:

A. M. Seyam, Box 8301, 515-6583, a_seyam@ncsu.edu, Textile and Apparel Management

Burlington Industries Professorship of Textile Technology: R. L. Barker

Charles A. Cannon Professor: S. K. Batra

Joseph D. Moore Professorship of Textile and Apparel Management and Technology: A. B. Godfrey

Lineberger Chair in Yarn Manufacturing: W. Oxenham

William A. Klopman Distinguished Professor: B. Pourdeyghi

Professors: N. L. Cassill, R. A. Donaldson, T. K. Ghosh, D. Hinks, M. W. King, T. J. Little, A. M. Seyam, M. W. Suh;
Adjunct Professors: M. A. Messura, W. G. O'Neal, T. W. Theyson; **Emeritus Named Professors:** S. C. Winchester;
Emeritus Professors: R. A. Barnhardt, A. H. El-Shiekh, W. C. Stuckey; **Emeritus Distinguished Professors:** M. H. Mohamed;
Associate Professors: P. Banks-Lee, K. A. Barletta, H. H. Hergeth, G. L. Hodge, C. L. Istook, J. A. Joines, R. Kotek, T. A. Lamar, S. Michielsen, M. M. Moore, N. C. Powell, R. Shamey, G. W. Smith, Y. Xu; **Research Associate Professors:** D. A. Shiffler; **Adjunct Associate Professors:** W. D. Harazin, E. D. Parrish; **Emeritus Associate Professors:** H. A. Davis, P. B. Hudson, M. L. Robinson; **Assistant Professors:** K. E. Carroll, H. Lee, L. L. Parrillo-Chapman, X. Zhang; **Research Assistant Professors:** E. Shim; **Adjunct Assistant Professors:** H. Vahedi Tafreshi; **Extension Associate Professors:** L. F. Rothenberg

The Department of Textile and Apparel, Technology and Management offers the Master of Science in Textiles and the Master of Textiles degrees. Textiles include the design, management, and technology of fiber-based products and processes. Textile design students explore issues in new product development, body scanning, direct digital printing, computer animation, and computer aided design (CAD). Textile management includes such topics as business intelligence, branding, business finance, information systems, global marketing, global competitiveness, supply chain management, and total quality management. Medical textiles, performance textiles, three-dimensional textile structures, aerospace applications, and smart textiles and nonwovens are examples of new areas for textile technology.

Master of Science: The objective of the Master of Science (MS) in Textiles is to develop the student's potential for research and the technical and analytical skills needed for the design and marketing of new products, processes and for careers in the textile supply chain, marketing organizations, design and development programs, research laboratories, government agencies, and in higher education. The MS degree is a thesis-based 36-credit-hour program where students conduct independent investigation. Students may conduct research in the following areas: brand management and marketing, fashion and textile design, textile supply chain and textile technology. Students interested in continuing with a Ph.D. are encouraged to pursue the MS degree.

Master of Textiles-Option B: The objective of the Master of Textiles Option B is to provide on- and off-campus students with an opportunity to strengthen their educational background and prepare them for productive careers

in the textile supply chain, in marketing organizations, research laboratories, government agencies, and in higher education. The Master of Textiles Option B is a non-thesis degree. The program is flexible to accommodate a breadth of student needs. The program can be completed in only two semesters of full-time on-campus study. The program is also available entirely via distance education (Textile Off-Campus Programs: TOP) and may be completed on a part-time basis. The university residency requirement is waived for this distance education program. The degree requires 30 credit hours of study to complete.

Students should have 20 credit hours from mathematics and natural sciences in their undergraduate degree. Students with a Bachelor of Science or a Bachelor of Arts degree may apply to either of the degree programs. Students apply with undergraduate degrees in textiles, engineering, management, merchandising and/or design.

Student Financial Support: Financial aid in the form of assistantships may be available for full-time Master of Science students.

Other Relevant Information: The Department of Textile and Apparel, Technology and Management, houses a Digital Design lab which specializes in 3D Body Scanning, Direct Digital Printing, Whole Body Knitted Garments, and Computer Aided Apparel and Fabric Design. Additionally, the department includes the Fashion Studio, The Textile Management Sciences Lab, Textile Design Studio, Braiding Lab, Three-Dimensional Weaving Lab, and an Advanced Testing Lab that will allow students to experience hands-on advanced textile technology and management.

Click on [Graduate Courses - Textile Technology](#) for current course information.

Click on [Graduate Courses - Textile Technology Management](#) for current course information.

Toxicology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Toxicology	Y		Y		Y		

GRADUATE FACULTY

Director of Graduate Programs:

R. C. Smart, Box 7633, 5-7245, rcsmart@unity.ncsu.edu, Toxicology

William Neal Reynolds Distinguished Professor: R. M. Roe

Professors: K. B. Adler, J. M. Cullen, H. M. Hassan, M. R. Hyman, S. M. Laster, J. M. Law, G. A. LeBlanc, N. Monteiro, P. L. Sannes, D. Shea, R. C. Smart, M. K. Stoskopf, D. W. Threadgill; **Research Professors:** A. R. Brody; **Adjunct Professors:** J. A. Goldstein, L. E. Gray, W. F. Greenlee, J. A. Hoppin, K. S. Korach, J. N. Kornegay, R. J. Langenbach, R. L. Langley, R. J. Preston, M. K. Selgrade, D. C. Zeldin; **Emeritus Professors:** E. Hodgson, R. B. Leidy, J. F. Roberts, T. J. Sheets; **Associate Professors:** R. E. Baynes, J. C. Bonner, W. G. Cope, J. M. Horowitz, E. G. Nichols, M. Rodriguez-Puebla, J. Tsuji, Y. Tsuji; **Adjunct Associate Professors:** K. M. Crofton, T. E. Eling, B. A. Merrick; **Assistant Professors:** D. B. Buchwalter, S. W. Kullman, S. D. McCulloch, N. M. Nascone-Yoder, H. B. Patisaul, A. D. Wallace; **Research Assistant Professors:** P. D. McClellan-Green; **Adjunct Assistant Professors:** M. F. Oleksiak, V. S. Wilson; **Teaching Assistant Professors:** C. S. Hofelt

The Department of Environmental and Molecular Toxicology provides a comprehensive program in course work and research training to prepare prospective toxicologists for careers in academia, government, and industry. Research in the department spans an array of topics ranging from the molecular to population level consequences of toxicant exposure. A common research theme in the department involves the elucidation of toxicant induced alterations in cell signaling and resultant changes in gene expression as it relates to toxicity at the cellular, organ and organism level. Linkage of adverse biological endpoints to toxicant exposure is a mechanistic goal. Specific research areas include: endocrine disruption, oxidative stress, cellular signaling pathways, transcriptional regulation, toxicogenomics, regulation and expression of xenobiotic metabolizing enzymes, molecular carcinogenesis, cell cycle regulation, apoptosis, chemical exposure assessment, analytical toxicology, ecotoxicology and risk assessment. Examples of types of environmental agents that are being investigated include environmental carcinogens, pesticides, particulates metals, endocrine disruptors, nanoparticles and radiation.

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) and a minimum GRE score of 1100 (combined Verbal and Quantitative scores). GRE subject tests are not required. International students whose primary language is not English must submit TOEFL scores. A written statement should describe the applicants academic and career goals as well as their area of interest. All applications are reviewed by a departmental committee and the best applicants will be accepted until all available spaces are filled. Students are encouraged to submit applications in early January for Fall admission.

Master of Science Degree Requirements: The M.S. is a research-oriented degree requiring a minimum of 30 credit hours and a written thesis. At least 20 credit hours must be graduate-level courses and a core curriculum is required.

Master of Toxicology Degree Requirements: The MTOX degree is a non-research degree designed for those not

intending to pursue a career in research, part-time students, and/or working professionals seeking to further their education and advance their careers. A minimum of 30 credit hours is required, with at least 14 credit hours in toxicology courses. While a thesis is not required, at the discretion of the student's advisor, a review paper focusing on the student's interest in some aspect of toxicology might be required. Unlike the M.S. degree, the MTOX degree is an Option B degree program and does not require a thesis, an advisory committee or a final oral comprehensive exam.

Doctoral Degree Requirements: The Ph.D. program is designed to train students to become independent scholars capable of conducting unsupervised and original research. Students enroll in a core curriculum similar to that of the M.S. degree and additional courses as determined by his/her advisory committee. Normally a total of 72 credit hours is required, with the majority of these credits being dissertation research. Students must pass both a written and oral preliminary exam prior to advancing to Ph.D. candidacy. A doctoral dissertation presenting the student's original research is written and defended in a final oral examination.

Student Financial Support: Financial assistance is available for qualified applicants through traineeships, fellowships, teaching assistantships and research assistantships.

Other Relevant Information: Students pursuing either the M.S. or Ph.D. degree may elect to specialize in General Toxicology, Environmental Toxicology, or Molecular and Cellular Toxicology. More details can be obtained on the [Department of Environmental and Molecular Toxicology website](#).

Click on [Graduate Courses](#) for current course information.

Courses from Associated Departments

BCH 553 Biochemistry of Gene Expression
BCH 701 Macromolecular Structure
BCH 703 Macromolecular Synthesis and Regulation
BCH 705 Molecular Biology of the Cell
BCH 761 Advanced Molecular Biology of the Cell
BIT 510 Core Technologies in Molecular and Cellular Biology
BIT 567 PCR and DNA Fingerprinting
BIT 568 Genome Mapping
BIT 569 RNA Purification and Analysis
CBS 754 Principles of Analytical Epidemiology
CBS 762 Principles of Pharmacology
CBS 770 Cell Biology
CBS 787 Pharmacokinetics
CBS 795A Special Topics: Veterinary Pathology I. General Pathology
FW 585 Advanced Wildlife Habitat Management
FW 707 Environmental Stress Physiology
GN 701 Molecular Genetics
HS 707 Environmental Stress Physiology
MB 751 Immunology
MEA 540 Principles of Physical Oceanography
MEA 750 Marine Benthic Ecology
MEA 756 Ecology of Fishes
PHY 503 General Physiology I
PHY 504 General Physiology II
PHY 780 Mammalian Endocrinology
ST 511 Experimental Statistics for Biological Sciences I
ZO 509 Ecology of Stream Invertebrates
ZO 513 Comparative Physiology

ZO 515 Fish Physiology
ZO 524 Comparative Endocrinology
ZO 714 Advanced Cell Biology
ZO 760 Principles of Ecology

Courses not listed above but approved by the students advisory committee can also be included toward the 6 credit hour elective requirement. Course descriptions can be found at the [Registration and Records website](#).

Veterinary Public Health

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Veterinary Public Health					Y		

GRADUATE FACULTY

Director of Graduate Programs:

J. F. Levine, Box 8401, 3-6397, jay_levine@ncsu.edu, Population, Health, and Pathobiology

Burroughs Wellcome Professor of Pharmacology: J. E. Riviere

Drexel Professor of Statistics: A. A. Tsiatis

Professors: G. W. Almond, K. L. Anderson, P. Arasu, H. J. Barnes, E. B. Breitschwerdt, H. A. Devine, J. S. Guy, B. Hammerberg, J. M. Law, J. F. Levine, M. G. Levy, D. H. Ley, K. M. Meurs, W. M. Morrow, M. G. Papich, M. C. Roberts, D. Shea, W. J. Showers, M. K. Stoskopf, D. P. Wages, D. W. Watson; **Research Professors:** S. Kennedy-Stoskopf; **USDA Professors:** D. S. Marshall; **Adjunct Professors:** J. N. Kornegay; **Associate Professors:** R. E. Baynes, D. K. Carver, M. T. Correa, P. Cowen, P. W. Farin, C. A. Harms, S. C. Nelson, B. D. Slenning; **Assistant Professors:** M. P. Martin

The Master of Veterinary Public Health (MVPH) program is designed to provide graduate training for veterinarians interested in pursuing animal and public health service-oriented careers. The two-year non-thesis MVPH program provides advanced graduate training in: veterinary epidemiology and biostatistics; infection control and biosecurity; outbreak investigation, disease eradication; emergency program management, veterinary public health and the identification and control of zoonotic pathogens; food safety and security; geographic information systems, spatial analysis; and livestock health management and trade policy. The program's base of activity is focused at the NCSU College of Veterinary Medicine, however, enrolled students benefit from enrollment in classes at UNC-Chapel Hill and the breadth of additional public health expertise in the Research Triangle.

Admission Requirements: An applicant to the Master's program must have a degree in veterinary medicine or an equivalent degree from a college or school of veterinary medicine. The MVPH program admissions committee sometimes grants exceptions for students with prior public health experience (contact the program directory before applying). Applicants are accepted based on the recommendation of the MVPH program admissions committee and program director after a review of their prior academic performance, work experience, and letters of recommendation. No graduate record examination scores are required for graduates of U.S. accredited colleges of veterinary medicine; graduate record examination scores are required for applicants who are from non-U.S. accredited colleges of veterinary medicine. International applicants must meet the minimum TOEFL examination requirements of the [NCSU graduate program](#) and submit GRE examination scores.

Degree Requirements: Candidates for the Master of Public Health degree must complete 48 credit hours of core and elective courses, which includes a practicum/project (five credits) related to some aspect of epidemiology, public health, biosecurity, food safety, or other relevant topic identified by the student and their faculty mentors.

Other Relevant Information: Students can enroll full time or part time.

Click on [Graduate Courses - Veterinary Public Health](#) for current course information.

Other Graduate Courses: MVPH program students have the opportunity to take a wealth of classes offered by program faculty as well as faculty from numerous other NCSU departments, the [UNC Chapel Hill School of Public Health](#), and other [North Carolina University Systems campuses](#). Numerous online elective course options complement classroom instruction. Each student is assigned two faculty mentors who assist with course selection and career planning.

CORE CLASSES

VPH 554 Trade and Agricultural Health
VPH 650 Population Medicine Forum
VPH 675 Supervised Public Health Research
VPH 713 Zoonoses and Public Health
VPH/CBS 760 Molecular technologies for Epidemiologic Investigation
EPI 710 Fundamentals of Epidemiology
CBS 784 Principles of Analytic Epidemiology
FS 520 Pre-Harvest Food Safety
FS 540 Food Safety and Public Health
GIS 510 Introduction to Geographic Information Systems
ST 505 Applied Nonparametric Biostatistics
ST 511 Experimental Statistics for Biological Sciences
ST 512 Experimental Statistics for Biological Sciences II

VPH ELECTIVE CLASSES (NCSU)

VPH 555 Public Health, Sustainable Development and Gender in Global Context
VPH 580 Veterinary Production Epidemiology
VPH 649 Issues in Preventive Medicine and Public Health
VPS/FW 720 Epidemiology of Wildlife Diseases

ELECTIVE EPIDEMIOLOGY CLASSES (UNC)

EPI 715 Theory and Quantitative Methods In Epidemiology
EPI 718 Epidemiologic Analysis of Binary Data
EPI 722 Epidemiologic Analysis of Time-to-Event Data
EPI 733 Clinical Trials in Epidemiology
EPI 735 Cardiovascular Disease Epidemiology
EPI 743 Genetic Epidemiology: Methods and Applications
EPI 745 Molecular Techniques for Public Health Research
EPI 751 Emerging and Re-Emerging Infectious Diseases
EPI 752 Introduction to Methods in Infectious Disease Epidemiology
EPI 753 Prevention and Control of Infectious Diseases at the Community Level
EPI 754 Mathematical Modeling of Infectious Diseases
EPI 756 Control of Infectious Diseases on Developing Countries
EPI 757 Epidemiology of HIV/Aids in Developing Countries
EPI 758 Methods and Principles of Applied Infectious Disease Epidemiology
EPI 759 Methods in Field Epidemiology
EPI 780 Occupational Injury and Violence as a Public Health Problem
EPI 785 Environmental Epidemiology
EPI 786 Community-Driven Epidemiology and Environmental Justice

COMMUNITY PREPAREDNESS AND DISASTER MANAGEMENT (UNC ONLINE)

HPAA 420 Community and Public Health Security
HPAA 421 Community and Public Health
HPAA 422 Analytic Methods
HPAA 423 Disaster Management Issues

ELECTIVE GIS CLASSES (NCSU)

FOR 554 Principles of Spatial Analysis
FOR 753 Environmental Remote Sensing
GIS 515 Computer Cartography
GIS 530 Principles of Geographic Information Science
GIS/MEA 582 Geospatial Modeling and Analysis
GIS 540 Geospatial Programming Fundamentals
GIS 590 Geospatial Data Structures and Web Services
PRT 555 Environmental Impacts of Recreation and Tourism
PRT 563 Technical Issues In Geographic Information Systems
PRT 764 Advanced Study In Geographic Information Systems

ELECTIVE STATISTICS CLASSES (NCSU)

BMA 722 Decision Analytic Modeling
BMA 773 Stochastic Modeling
BMA 567 Modeling of Biological Systems
ST 506 Sampling Animal Populations
ST 535 Statistical Process Control
ST 546 Probability and Stochastic Processes I
ST 552 Linear Models and Variance Components
ST 708 Applied Least Squares
ST 711 Design of Experiments
ST 714 Life-Testing and Reliability
ST 715 Theory of Sampling Applied to Survey Design
ST 721 Genetic Data Analysis
ST 722 Decision Analytic Modeling
ST 730 Applied Time Series Analysis
ST 731 Applied Multivariate Statistical Analysis
ST 732 Applied Longitudinal Data Analysis
ST 733 Applied Spatial Statistics
ST 740 Bayesian Inference and Analysis
ST 744 Categorical and Censored Data Analysis
ST 745 Analysis of Survival Data
ST 746 Introduction to Stochastic Processes

ADDITIONAL ELECTIVE CLASSES

BUS 541 Strategic Information Technology
FS 530 Post-Harvest Food Safety
FS 553 Food Laws and Regulations
FS 722 Microbial Food Safety
MIS 601 Colloquium in International Development
SOC 758 Rural Sociology
SOC 762 Urban Ecology
TOX 704 Chemical Risk Assessment
ZO 582 Medical and Veterinary Entomology

Zoology

Degrees Offered:

Program Title	Ph.D.	Ed.D.	M.S.	M.A.	Master of	M.Ed.	MFA
Zoology	Y		Y		Y		

GRADUATE FACULTY

D. Shea, *Department Head*

Director of Graduate Programs:

H. V. Daniels, Box 7617, 515-4589, harry.daniels@ncsu.edu, Zoology

William Neal Reynolds Professor: R. R. Anholt, T. F. MacKay, C. V. Sullivan

Professors: B. L. Black, R. J. Borski, H. V. Daniels, D. B. Eggleston, J. F. Gilliam, W. C. Grant, R. M. Grossfeld, N. M. Haddad, H. F. Heatwole, J. M. Hinshaw, T. M. Losordo, K. H. Pollock, J. A. Rice, D. Shea, H. A. Underwood, T. G. Wolcott; **USDI Professors:** J. A. Collazo, J. E. Hightower, T. J. Kwak, T. R. Simons; **Adjunct Professors:** J. G. Boreman, J. J. Govoni, L. E. Gray, J. Rogers, P. A. Tester; **Emeritus Professors:** G. T. Barthalmus, P. T. Bromley, B. J. Copeland, F. T. Corbin, P. D. Doerr, T. L. Grove, C. F. Lytle, G. C. Miller, J. M. Miller, R. L. Noble, R. A. Powell, T. L. Quay, J. F. Roberts, D. E. Smith, J. G. Vandenberg; **Associate Professors:** D. D. Aday, J. A. Buckel, W. G. Cope, R. R. Dunn, J. R. Godwin, K. Gross, M. Niedzlek-Feaver; **Adjunct Associate Professors:** R. M. Shelley, M. P. Voiland; **Assistant Professors:** R. B. Langerhans, H. B. Patisaul; **Adjunct Assistant Professors:** E. M. Bennett, A. E. Bogan, D. R. Chalcraft, D. T. Cobb, L. B. Daniel, R. J. Heise, R. W. Laney, A. J. McKerrow, M. E. Raley, K. W. Shertzer, W. C. Starnes, B. L. Stuart; **Teaching Associate Professors:** L. D. Parks; **Teaching Assistant Professors:** J. L. Campbell, M. D. Engell, M. G. Ferzli, A. P. Flick, G. P. Gurgel, M. B. Hawkins, J. L. Lubischer

Areas of study include: cell biology and physiology, ecology, behavior, and fisheries and wildlife biology.

Specializations within these areas include developmental biology, neurobiology, genomics, invertebrate biology, animal reproduction, biorhythms, behavioral ecology, community ecology, population ecology, conservation biology, fisheries ecology, wildlife field studies, aquaculture and others.

Application Deadlines: To guarantee consideration for funding, applications should be complete by the following dates: for Fall Semester admission both U.S. and international applicants should have their application materials completed by March 1; for Spring Semester the deadline is July 15 for U.S. applicants and international applicants. Please note that it typically requires four to six weeks from the date of your request until transcripts, letters of recommendation, and GRE scores reach us. Applications received after the dates listed above will still be considered until the Graduate School deadlines (June 25 and November 25 for U.S. applicants, March 1 and July 15 for international applicants), however, opportunities for funding may be limited (note that the Biology Department does not accept M.S. and Ph.D. students without support).

Admission Requirements: GRE scores (general) are required for admission. M.S. students are expected to have a GRE score of at least 1000, calculated as the Verbal score plus the Quantitative score. Ph.D. students are expected to have a GRE score of at least 1200. Regular admission for a Master's degree requires an undergraduate grade point average of 3.0 in an appropriate biological discipline; an undergraduate GPA of at least 3.2 is expected for Ph.D. students. Some research experience is highly recommended.

Master's Degree Requirements: *M.S.:* No more than six hours of temporary courses (ZO 624, ZO 824) or two hours

of departmental seminar can be included in the 30-hour requirement for the M.S. Six hours of research credits (ZO 695) resulting in a thesis are required. A minor (usually 9-10 hours) is optional. *Master of Zoology*: Of the 36 credit hours required, 20 must be regular courses at the 500-800 level, and four to six must be special problems (ZO 631). Other requirements may be imposed by the advisor.

Doctoral Degree Requirements: A student's advisory committee recommends appropriate courses which will provide a strong foundation in the student's area of interest. A minimum of 10 hours of research (ZO 895) leading to a dissertation is required. A minor (usually 9-10 hours) is optional.

Student Financial Support: Graduate teaching and research assistantships are available to well-qualified M.S. and Ph.D. students.

Other Relevant Information: Students may also pursue degrees in interdepartmental programs in Biomathematics, Physiology, and Fisheries and Wildlife Sciences. Excellent research facilities, equipment and computers are available. Off-campus research is conducted at the Pamlico Aquaculture Field Laboratory, research and extension centers in Eastern and Western North Carolina, the Center for Marine Science and Technology in Morehead City, and at facilities of state and federal agencies and private organizations. Field work can be conducted at nearby natural areas and laboratory work at various state and federal laboratories associated with the department. For additional information see the Biology Department web page:
www.harvest.cals.ncsu.edu/biology.

Click on [Graduate Courses](#) for current course information.

Biomanufacturing (Minor Program)

Dr. Michael Flickinger, Director
Biomanufacturing Training
BTEC-Golden Leaf Training Center

NCSU Box 7928

Phone: 919.515.0175

Email: michael_flickinger@ncsu.edu

Website: http://www.btec.ncsu.edu/academic/graduate/graduate_minor.php

Professors: Jose Bruno-Barcena (Microbiology), Ruben Carbonell (Chemical and Biomolecular Engineering), Kirill Effimenko (Chemical and Biomolecular Engineering), Michael Flickinger (Microbiology/Chemical and Biomolecular Engineering), Henry Lamb (Chemical and Biomolecular Engineering), Paul Mozdzia (Poultry Science), Gisele Passador-Gurgel (Golden LEAF Biomanufacturing Training and Education Center/Biology), John Sheppard (Food, Bioprocessing and Nutrition Sciences), John van Zanten (Golden LEAF Biomanufacturing Training and Education)

The graduate minor in biomanufacturing is designed to provide master's and Ph.D. students from a range of disciplines (e.g. biochemistry, biological and agricultural engineering, biology, biomedical engineering, chemical engineering, food science, genetics, mechanical engineering, microbial biotechnology, microbiology, and textiles engineering) with the knowledge base and hands-on skills that will allow them to conduct research and development studies in biomanufacturing processes or to quickly contribute to a cGMP biomanufacturing process development or production operations. Students admitted to the graduate minor in biomanufacturing will choose a member of the graduate faculty in biomanufacturing as a minor representative on their graduate committee.

Admissions: Students may apply for admission to the minor in biomanufacturing program after enrollment in the Graduate School and after at least one semester of their graduate program has been completed.

Requirements: To earn the minor in biomanufacturing, students must complete at least 10 credit hours as indicated below with a grade of B or better in each course.

All students must complete at least two (2) credit hours by enrolling in either BEC 595 Special Topics, or BEC 669 Biomanufacturing Research Projects.

The remaining eight (8) credit hours must be completed by enrolling in courses from the following list:

BEC 532 Biological Processing Science (2 credits)
BEC 536 Introduction to Downstream Process Development (2 credits)
BEC 542 Insect Cells Protein Expression (2 credits)
BEC 555 Microbial Biotechnology (3 credits)
BEC 562 Fundamentals of Bio-Nanotechnology (3 credits)
BEC 580 cGMP Fermentation Operations (2 credits)
BEC 583 Tissue Engineering Technologies (pending) (2 credits)
BEC 585 cGMP Downstream Operations (2 credits)
BEC 590 Industry Practicum in Biomanufacturing (3 credits)
BEC 595 Special Topics in Biomanufacturing (2 credits)
or BEC 669 Biomanufacturing Research Projects (2 credits)
BBS 526 Industrial Microbiology & Biomanufacturing Laboratory (2 credits)
BIT 510 Core Technologies in Molecular and Cellular Biology (4 credits)
BIT 566 Animal Cell Culture Techniques (2 credits)
CHE 563 Fermentation of Recombinant Microorganisms (2 credits)

Biotechnology (Minor Program)

Professor R. M. Kelly, Director
Box 7512
919.515.4230
919.515.4231 (fax)
Email: biotech@ncsu.edu

Dr. Sue Carson, Academic Coordinator
919.513.0330
Email: sue_carson@ncsu.edu
Home page: <http://www.ncsu.edu/biotechnology/>

The Biotechnology Program includes faculty from over 20 departments in the Colleges of Agriculture and Life Sciences, Engineering, Natural Resources, Physical and Mathematical Sciences, and Veterinary Medicine. Graduate study leading to either an M.S. minor or a Ph.D. minor in biotechnology may be taken by students who reside and conduct their research in an area of biotechnology.

To obtain a minor in biotechnology, the student must successfully complete at least eight credit hours in the laboratory core courses selected from the list below (BIT 510 plus two additional 2-credit courses), must conduct graduate thesis research in an area of biotechnology, and must have a Biotechnology Representative on his or her committee.

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 genetics and associated research in molecular biology, protein purification, cell culture techniques, and microarray technology.

See the [biotechnology home page](#) for a current listing of faculty.

REQUIRED (4 credits)

BIT 510 and BIT 510L Core Technologies in Molecular and Cellular Biotechnology (4 credits)

BIOTECHNOLOGY LABORATORY ELECTIVES (4 credits)

Two of the following courses and their laboratories (2 credits each):

- BIT 562 Microarrays
- BIT 564 Protein Purification
- BIT 565 Real-time PCR Techniques
- BIT 566 Animal Cell Culture
- BIT 567 PCR and DNA Fingerprinting
- BIT 568 Genome Mapping
- BIT 571 RNA interference and model organisms
- BIT 572 Proteomics
- BIT 573 Protein-Protein Interactions
- BIT 574 Plant Genetic Engineering
- BIT 576 Computation Analysis of Biomolecular Sequences
- Other BIT laboratory courses (2 credits) by permission

Cognitive Science (Minor Program)

Dr. Ronald P. Endicott, Program Director
Department of Philosophy and Religious Studies
NCSU Box 8103
Phone: 919.515.6195
Email: ron_endicott@ncsu.edu

Cognitive Science is an area of interdisciplinary research that seeks to understand the nature, processes, and evolution of mind. The Cognitive Science Program is administered by the Department of Philosophy and Religious Studies and supported by a strong faculty drawn from the fields of Psychology, Neurobiology, Computer Science, Linguistics, and Philosophy. The program thus fosters development of ideas and theories within the disciplines of Cognitive Science, for example, theories of rational agency, logical reasoning, cognitive processing, computational psychology, artificial intelligence, neurobiology, and the evolution of cognitive systems.

Requirements: Graduate students who minor in Cognitive Science must complete a minimum of nine hours of courses (or more as determined by the student's committee), with a grade of B or better, distributed as follows.

One core courses (3 hrs):

PHI/PSY 525 Introduction to Cognitive Science

Two additional courses (6 hrs) outside the degree-granting program from the following:

PSY 500 Visual Perception
PSY 502 Physiological Psychology
PSY 508 Cognitive Processes
PHI 540 The Scientific Method
CSC 520 Artificial Intelligence I
CSC 522 Automated Learning and Data Analysis
CSC 523 Computational Linguistics
CSC 707 Automata, Languages and Computability Theory
CSC 720 Artificial Intelligence II
ENG 524 Introduction to Linguistics
ENG 584 Studies in Linguistics
ZO 588 Neurobiology

Any student who has previously completed the equivalent of the above core course for credit toward another degree (e.g., PHI/PSY 425 as an undergraduate) is required to complete an additional course (3 hours) from the above list.

Up to three credits of equivalent graduate course work may be accepted in the place of one course on the list above, subject to the approval of the Director for the Cognitive Science Program.

Up to three credits of other course work relevant to cognitive science may be accepted in the place of one course on the list, subject to approval of the Director of Cognitive Science.

Graduate Students must also indicate the minor on their Graduate Plan of Work and send a copy to the Director of the Cognitive Science Program.

Computational Engineering and Sciences (Minor Program)

GRADUATE FACULTY

Professor P. J. Turinsky, Program Coordinator

Camille Dreyfus Professor: C. K. Hall

Graduate Alumni Distinguished Professor: G. E. Mitchell

University Professor and Drexel Professor: H. T. Banks

Professors: W. E. Alexander, J. W. Baugh, J. Bernholc, D. W. Brenner, S. R. Cotanch, J. M. Doster, J. E. Franke, , E. F. Gehringer, C. Kleinstreuer, C. R. Ji, D. F. McAllister, T. K. Miller III, J. F. Monahan, H. G. Perros, R. O. Scattergood, W. J. Stewart, M. A. Vouk, M. H. Whangbo, R. E. White, J. L. Whitten; **Associate Professors:** H. Luo, G. Mahinthakumar

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 modeling. 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. 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.

Ecology (Minor Program)

Stephen W. Broome, Coordinator
NCSU Box 7619
Phone: 919.513.2555
Fax: 919.515.2167
E-mail: stephen_broome@ncsu.edu

Ecology is the science concerned with the interactions of organisms with each other and with their environment. It is an integrative science through which one gains an understanding of biological and physical interrelationships and predicts the consequences of altering one or several components. Students in a number of basic and applied curricula may elect to minor in ecology at the M. S. and Ph.D. levels. The minor provides an opportunity for a broad overview of the science of ecology.

The ecology minor is an interdepartmental program drawing faculty from the Departments of Botany, Crop Science, Entomology, Forestry, Marine, Earth and Atmospheric Sciences, Parks, Recreation and Tourism Management, Plant Pathology, Soil Science, Statistics, and Zoology. The Ecology Advisory Committee administers the program.

Requirements for a Minor in Ecology

A graduate student's advisory committee must include one member of the Ecology Advisory Committee from a department other than that of the chairman of the student's committee.

M.S. minor: at least one course must be selected from the list of Ecology Core Courses, at least two additional courses selected from the list of Approved Ecology Courses or the Core Courses, and Ecology seminar (ECO 601), totaling a minimum of 9 semester hours. Courses selected from the list of Approved Ecology Courses must be from outside the student's major discipline.

Ph.D. minor: at least one course must be selected from the list of Ecology Core Courses, at least three additional courses selected from the list of Approved Ecology Courses or the Core Courses, and Ecology seminar (ECO 601), totaling a minimum of 12 semester hours. Courses selected from the list of Approved Ecology Courses must be from outside the student's major discipline. No courses used to meet the Ecology minor requirements for the M.S. degree may be used to meet the Ph.D. minor requirements.

GRADUATE COURSES

ECO 601 Seminar
ECO 620 Special Problems

Environmental Remote Sensing and Image Analysis (Minor Program)

Dr. Siamak Khorram
NCSU Box 7106
Phone: 919.515.2868
Email: khorram@ncsu.edu

This graduate minor provides graduate students the opportunity to develop a recognized academic credential in remote sensing and image analysis in conjunction with their major program of graduate study. A minimum of 12 credit hours, 6 credit hours of required courses and 6 credit hours of elective courses, is required to complete the minor. Students can select coursework from the following list.

GRADUATE COURSES

REQUIRED COURSES (6 credit hours)

FOR 753 Environmental Remote Sensing
ECE 759 Pattern Recognition, **OR**
ST 733 Applied Spatial Statistics

ELECTIVES (6 credit hours)

ECE 751 Detection and Estimation Theory
ECE 758 Digital Image Processing
FOR 510 Introduction to GPS
FOR 554 Principles of Spatial Analysis
NR 531 Introduction to Geographic Information Science
NR 532 Principles of Geographic Information Science
NR 533 Application Issues in Geographic Information Systems
ST 733 Applied Spatial Statistics

Food Safety (Minor Program)

GRADUATE FACULTY

Professor Lee-Ann Jaykus, Director

Email: ljaykus@unity.ncsu.edu

Professors: K. Anderson, S. M. Blankenship, F. Breidt, M. A. Drake, S. A. Hale, H. M. Hassan, T. G. Isleib, L. Jaykus, S. Kathariou, T. R. Klaenhammer, J. Levine, G. Luginbuhl, W. E. M. Morrow, J. Riviere, D. Shea, C. E. Sorenson;

Associate Professors: R. E. Baynes, D.K. Carver, M. Correa, P. Cowen, J. W. Olson; **Assistant Professors:** F.M. Arritt III, J.M. Bruno-Barcena, B.J. Chapman, C. Gunter, T.G. Phister, I.M. Perez-Diaz

The primary objective of the Food Safety minor is to prepare science professionals with the depth and breadth of training necessary to understand and to control food safety challenges. The interdisciplinary minor includes departments in the Colleges of Agriculture and Life Sciences and Veterinary Medicine with the occasional participation of other NCSU colleges. Participating graduate students are required to have, or to develop during the early part of their training, appropriate knowledge in the basic scientific disciplines of chemistry, biochemistry and microbiology. Further, it is highly desirable that formal course training in genetics and statistics be part of each student's academic program. Students in a master's program are required to have 10 credits from the core courses to earn the food safety minor. Students in a doctoral program are required to have, as a minimum, 10 credits from the core courses.

CORE COURSES

FSA 520 Pre-harvest Food Safety

FSA (FS) 530 Post-harvest Food Safety

FSA (FS) 540 Food Safety and Public Health

FSA (FS) 580 Professional Development and Ethics in Food Safety

Geographic Information Systems (Minor Program)

Dr. Hugh A. Devine

NCSU Box 7106

Phone: 919.515.3682

Email: hugh_devine@ncsu.edu

Website: www.gis.ncsu.edu/academic/programs/minor/graduate_minor.php

GRADUATE FACULTY

Professors: E. H. Bressler, H. A. Devine, M. Fuentes, G. D. Garson, M. L. Gumpertz, R. W. Heiniger, J. E. Hummer, S. Khorram, H. Krim, D. K. Larick, J. F. Levine, M. F. Overton, W. J. Rasdorf, A. R. Rice, J. A. Rice, W. E. Snyder, J. R. Stone, H. J. Trussell; **Associate Professors:** L. Annetta, B. Bullock, D. A. Crouse, C. G. Healey, G. R. Hess, M. M. Kimberley, Y. Leung, S. C. Lilley, H. Mitasova, S. C. Nelson, G. T. Roberson, W. R. Smith, R. A. St. Amant, M. L. Vasu, J. G. White, E. N. Wiebe, S. B. Wiley, S. E. Yuter; **Research Associate Professors:** P. K. Baran, H. S. Stubbs; **Adjunct Associate Professors:** J. W. Coulston, J. E. Fels, G. Sun; **Research Assistant Professors:** F. H. Koch Jr; **Adjunct Assistant Professors:** M. R. Loomis; **Teaching Associate Professors:** H. M. Cheshire

The Geographic Information Systems (GIS) minor provides an academic credential for students who have developed some GIS application skills while pursuing a graduate degree in another discipline. It is designed for students who wish to master the basics of GIS analysis and to develop more advanced skills in a particular application area.

Prerequisite: Graduate status.

Course Requirements: Students must complete a total of 9 credit hours (six required courses and three electives). See [GIS minor website](#).

Other Requirements: A GIS faculty member must be on the student's graduate committee. If no graduate committee is required by the student's program, the student must obtain approval of his or her minor program from the GIS Faculty Chair (Dr. Hugh Devine).

Interdisciplinary Minor

The interdisciplinary minor requires two or more areas of coursework to be represented with a faculty member representing one of the areas of coursework. Students who are interested in an interdisciplinary minor should contact their Directors of Graduate Programs for more information.

Life Science Ethics (Minor Program)

The graduate minor in Life Science Ethics is not currently available.

Plant Physiology (Minor Program)

GRADUATE FACULTY

Professor T. W. Rufty Jr., Coordinator
NCSU Box 7620
919.515.3660
Email: tom_rufty@ncsu.edu

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, biochemistry, mathematics and physics. Some formal training in genetics 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 purpose of the plant physiology curriculum is to ensure that students obtain substantive understanding of the physiological processes controlling plant behavior. The course requirements for graduate students are set by each graduate committee. Advanced knowledge is expected in biochemistry, plant physiology, plant structure and function, and molecular biology.

Water Resources (Minor Program)

David Genereux, Chair
Marine, Earth, and Atmospheric Sciences
5135 Jordan Hall
NCSU Box 8208
Phone: 919.515.6017
Email: genereux@ncsu.edu

Water Resources Committee: François Birgand (Biological and Agricultural Engineering), Robert C. Borden (Civil, Construction, and Environmental Engineering), Ryan E. Emanuel (Forestry and Environmental Resources), David P. Genereux (Marine, Earth, and Atmospheric Sciences), Joshua L. Heitman (Soil Science), Raymond B. Palmquist (Economics), Damian Shea (Biology)

The interdisciplinary, interdepartmental graduate minor in water resources is designed for students majoring in the many disciplines of natural resources, science, engineering, technology, and social sciences that are relevant to water resources. The minor exposes students to water resources courses and faculty members within and outside their major fields of study.

The graduate minor in water resources (WR) requires successful completion (“B-” or better in each individual WR course, GPA of 3.0 or better across all WR courses counted toward the minor) of at least 9 credits of WR courses chosen from the lists below. At least 3 of the 9 credits (for M.S. students) or 6 of the 9 credits (for Ph.D. students) must be from outside the student’s major department. For M.S. students (not Ph.D. students), up to 3 credits at the 400-level may be included if these credits are from outside the student’s major department. For students earning an M.S. before enrolling in a Ph.D. program, courses taken to satisfy a WR minor in the M.S. program can not be counted toward a WR minor in the subsequent Ph.D. program. However, WR courses taken during the M.S. program may count toward a WR minor in the subsequent Ph.D. program if the M.S. program did not include a WR minor.

WATER RESOURCES COURSES

Hydrological and Meteorological Aspects of Water Resources

BAE 502 Instrumentation for Hydrologic Applications
BAE 570 Soil Water Movement
BAE 576 Watershed Monitoring and Assessment
BAE 577 Introduction to the Total Maximum Daily Load Program
BAE 579 Stream Channel Assessment and Restoration
BAE 581 Open Channel Hydraulics for Natural Systems
BAE 583 Ecohydraulics and River Corridor Function
BAE(SSC) 771 Theory of Drainage-Saturated Flow
CE 584 Hydraulics of Ground Water
CE 586 Engineering Hydrology
CE 607 Water Resource and Environmental Engineering Seminar
FOR(NR) 420/520 Watershed and Wetlands Hydrology
MEA 455 Micrometeorology
MEA 481 Principles of Geomorphology
MEA 485 Introduction to Hydrogeology
MEA 513 Radar Meteorology
MEA 585 Physical Hydrogeology
MEA 706 Meteorology of the Biosphere
MEA 715 Dynamics of Mesoscale Precipitation System
SSC 470/570 Wetland Soils

SSC 511 Soil Physics**Water Quality Aspects of Water Resources**

BAE 473 Introduction to Surface/Water Quality Modeling
BAE(SSC) 573 Introduction to Surface Hydrologic/Water Quality Modeling
MEA 760 Biogeochemistry
MEA 763 Geochemistry
MEA 785 Chemical Hydrogeology
SSC 442 Soil and Environmental Biogeochemistry
SSC 521 Soil Chemistry
SSC 722 Advanced Soil Chemistry

Water Engineering and Management Aspects of Water Resources

BAE 471 Land Resources Environmental Engineering
BAE 472/572 Irrigation and Drainage
BAE 574 DRAINMOD: Theory and Application
BAE 575 Design of Structural Stormwater Best Management Practices
BAE 578 Agricultural Waste Management
BAE 580 Introduction to Land and Water Engineering
CE 484 Water Supply and Waste Water Systems
CE 571 Physical Principles of Environmental Engineering
CE 574 Chemical Principles of Environmental Engineering
CHE 575 Advances in Pollution Prevention: Environmental Management
CS(HS,SSC,TOX) 725 Pesticide Chemistry
CS(HS,SSC,TOX) 727 Pesticide Behavior and Fate in the Environment
NR 521 Wetland Assessment, Delineation, and Regulation
PCC 401 Manufacturing and its Impact on Safety, the Environment, and Society
SSC 562 Environmental Applications of Soil Science
WPS 725 Pollution Abatement in Forest Products Industries
WPS 750 Wastewater Treatment in the Paper Industry

Biological and Ecological Aspects of Water Resources

BIO 441 Biology of Fishes
BIO 442 Biology of Fishes Laboratory
FOR 595 Mountain Ecohydrology
FW(BIO) 420 Introduction to Fisheries Science
FW(ZO) 586 Aquaculture I
FW(ZO) 587 Aquaculture I Laboratory
MEA 756 Ecology of Fishes
PB(ZO) 760 Principles of Ecology
PB(MB) 774 Phycology
SSC 461 Soil Physical Properties and Plant Growth
ZO 519 Limnology

Legal, Institutional, and Economic Aspects of Water Resources

EC(ARE) 436 Environmental Economics
ECG 515 Environmental and Resource Policy
ET 460 Practice of Environmental Technology
LAR 430 Site Planning
LAR 512 Landscape Resource Management
NR 460 Renewable Natural Resource Management and Policy
NR 571 Current Issues in Natural Resource Policy

NR 484 Environmental Impact Assessment
PA 550 Environmental Policy

Women's and Gender Studies (Minor Program)

Dr. Deborah A. Hooker, Director
Women's and Gender Studies Program
Department of English
NCSU Box 8105
Phone: 919.515.4169
Email: dahooker@gw.ncsu.edu
Website: wgs.chass.ncsu.edu/grad.html

The minor provides graduate students in the humanities, social sciences and sciences with the theories and the methodologies to study women and gender relations. The minor is intended to support and further students' research in their own field.

Nine hours of graduate credit are required. No more than three hours of course work may overlap between the major department coursework requirement and the Women's and Gender Studies minor. Students may choose from the courses listed on the website and/or a list of approved special topics courses.

For more information about the program, please visit the [Women's and Gender Studies](http://wgs.chass.ncsu.edu/grad.html) website.

Administration and Leadership - Family and Youth Programs (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Administration and Leadership – Family and Youth Programs requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance based.

Required Courses (3 credit hours)

FYD 554 Collaborations and Partnerships in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 559 Administration and Supervision of Youth and Family Programs

Electives (minimum of 3 credit hours)

FYD 501 Theories in Child and Youth Development

FYD 502 Theories in Family Systems

FYD 523 Family Relationships Over the Life Course

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 535 Family Health and Well-being

FYD 540 Environmental Influences in the Family

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 545 Family Communication and Coaching

FYD 550 Family and Youth Professionals as Leaders

FYD 552 Program Development & Evaluation in Family & Youth Settings

FYD 553 Applied Concepts in Child and Youth Development

FYD 554 Collaborations and Partnership in Youth & Family Settings

FYD 555 Applied Research Methods in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

FYD 559 Administration and Supervision in Family and Youth Settings

FYD 585 Contemporary Issues in Community Youth Development

Agricultural Education (Certificate)

Director of Graduate Certificate Programs:

Gary Moore

Agricultural & Extension Educa

Phone: 515-1756

Email: gary_moore@ncsu.edu

Website: <http://www.cals.ncsu.edu/agexed/>

The Department of Agricultural and Extension Education offers a Certificate in Agricultural Education.

Requirements: The certificate program involves completion of 15 credit hours. Students are to choose from AEE 500, 503, 521, 522, 528, 529, 535, 641, and 735.

Community College Teaching (Certificate)

Director of Graduate Certificate Programs:

Ramo Lord

Ldshp Plcy & Adult & Higher Ed

Phone: 515-6290

Email: rjlord@ncsu.edu

Website: <http://ced.ncsu.edu/ccteach/index.php>

The department of Adult and Higher Education (AHE) within the College of Education at North Carolina State University offers a graduate certificate program in Community College Teaching.

The program focuses on developing the knowledge and skills necessary to design and deliver course-related content through technology-enhanced learning environments for faculty who teach in community colleges and other post secondary settings or plan on teaching in the near future. The courses developed for the graduate certificate will enhance faculty abilities in both online and classroom environments. The key goal for the online Graduate Certificate Program in Community College Teaching is to provide high quality content and instruction for the systematic development of instructional expertise for community college and other post-secondary faculty.

Curriculum. The Graduate Certificate Program in Community College Teaching consists of 15 credit hours of coursework (five courses, three credits each). The sequence of the program is displayed at <http://ced.ncsu.edu/ccteach/curriculum.php>. The courses are listed below.

Required:

EAC 559 The Adult Learner

EAC 538 Instructional Strategies in Adult and Community College Education

EAC 580 Designing Instructional Systems in Training and Development

EAC 560 Assessment and Evaluation in Adult and Higher Education

EAC 539 Teaching in an Online Environment

Elective:

EAC 700 Community College and Two-year Postsecondary Education

For more information about the program and for application procedures, please see the [CCTeach Online](#) website.

Consumer Textile Product Design and Development (Certificate)

Director of Graduate Certificate Programs:

Cynthia Istook

Textile & Apparel, Technology

Phone: 919/515-6584

Email: cistook@tx.ncsu.edu

Website: <http://www.tx.ncsu.edu/tatm/docs/consumer-design-certificate.pdf>

The Graduate Certificate in Consumer Textile Product Design and Development (GCCTPDD), offered by the Department of Textile and Apparel, Technology and Management, will provide NC State graduate students the opportunity to develop recognized academic credentials in Consumer Textile Product Design and Development in addition to their major area of graduate study. Also it will offer non-degree graduate-level students the opportunity to develop recognized advanced expertise in Consumer Textile Product Design and Development.

Applications: New applicants to the university must submit a Program Application, a resume identifying educational preparation and work experiences, and official transcripts of all undergraduate and graduate course work. You must apply online through the Graduate School [application portal](#). Prior to completing the first course after being accepted into the program, students prepare and submit two copies of a contract using the Certificate Contract Application. The contract includes a statement of career goals, a rationale for completing the certificate program, and a timeline for certificate completion. Students can always elect to review their application with the Certificate Coordinator prior to contract preparation.

Academic Requirements: Applicants must meet one of the three following requirements:

- Be a graduate of an accredited four-year college or university, and have a GPA of at least 3.0 on a 4-point scale in their last 60 credit hours of undergraduate study;
- Be a degree student in good standing in an NC State University graduate program;
- Have a Master's degree.

Program of Study: The Graduate Certificate in Consumer Textile Product Design and Development requires a minimum of 15 hours, and includes the following courses:

Core Courses (6 hours)

TTM 573 Management of Textile Product Development (3 hours)

TTM 585 Market Research in Textiles (3 hours)

Advanced Courses (minimum 9 hours)

TTM 515 Apparel Production (3 hours)

TTM 517 Advanced Computer-Aided-Design for Fashion (3 hours)

TT 570 Textile Digital Design and Technology (3 hours)

TT 571 Professional Practices in Textile Design and Technology (3 hours)

TTM 510 Apparel Technology Management (3 hours)

TTM 632 Independent Study in Consumer Textile Product Design and Development (3 hours)

For more details about the Graduate Certificate in Consumer Textile Product Design and Development, please visit the [program website](#).

Design and Analysis of Environmental Systems: Watershed Assessment and Restoration (Certificate)

Director of Graduate Certificate Programs:

John Classen

Biological And Agricultural En

Phone: 5-6800

Email: john_classen@ncsu.edu

Website: <http://www.bae.ncsu.edu/grad/certificate/index.html>

The Department of Biological and Agricultural Engineering offers a Graduate Certificate Program in Design and Analysis of Environmental Systems: Watershed Assessment and Restoration.

Objectives

1. Provide a focus and formal program for students from many disciplines to pursue training in the technical and engineering aspects of designing and analyzing environmental systems with an emphasis on the watershed-scale.
2. Provide students the opportunity to develop a solid foundation in engineering systems targeted at environmental issues, particularly related to non-point sources and their impact on water quality at the watershed-scale.
3. Provide practicing engineers and other professionals a source of graduate level engineering education in the environmental field.

Admission Requirements: Applicants must have successfully completed an accredited undergraduate engineering program with a GPA of 3.0 (based on a 4.0 scale), or with an overall undergraduate GPA of at least 2.8 coupled with a 3.0 or higher in the undergraduate major, or be currently enrolled in a graduate engineering program. Applicants with a four-year undergraduate science degree who have successfully completed (with a C or better) calculus, differential equations, physics and chemistry will also be considered. A program that includes fluid mechanics or hydraulics is highly recommended. Environmental professionals who do not meet the above criteria may also qualify if appropriate experience can be demonstrated.

Program Requirements: A minimum of 12 hours of coursework selected from the list below. One course can be selected from outside of BAE (up to 2 credit hours), but at least 9 credit hours must be BAE courses.

At least 9 hours from the following:

BAE 502 Instrumentation for Hydrologic Applications
BAE 528 Biomass to Renewable Energy Processes
BAE 535 Precision Agriculture Technology
BAE 573 Hydrologic and Water Quality Modeling
BAE 575 Design of Structural Stormwater Best Management Practices
BAE 576 Watershed Monitoring and Assessment
BAE 577 Introduction to the Total Maximum Daily Load Program
BAE 578 Agricultural Waste Management
BAE 579 Stream Channel Assessment and Restoration
BAE 581 Open Channel Hydraulics for Natural Systems
BAE 583 Ecohydraulics and River Corridor Function
BAE 590 Drainmod
BAE 590 Integrating AutoCAD, Civil3D, and GIS
BAE 590 Introduction to Fluvial Geomorphology
BAE 590 Introduction to Land and Water Engineering

BAE 771 Theory of Drainage – Saturated Flow
BAE 774 Theory of Drainage – Unsaturated Flow

Up to 3 credit hours can be selected from the following:

CE 580 Flow in Open Channels
CE 584 Hydraulics of Groundwater
CE 586 Engineering Hydrology
CE 775 Modeling and Analysis of Environmental Systems
CE 776 Advanced Water Management Systems
CE 784 Ground Water Contaminant Transport
CE 785 Urban Stormwater Management
SSC 511 Soil Physics
SSC 562 Environmental Applications of Soils
SSC 570 Wetland Soils

E-Learning (Certificate)

Directors of Graduate Certificate Programs:

Ramo Lord

Ldshp Plcy & Adult & Higher Ed

Phone: 515-6290

Email: rjlord@ncsu.edu

Website: <http://ced.ncsu.edu/ahe/elearning/>

Sophia Stone

Friday Institute

Phone: 9193685961

Email: sophia_stone@ncsu.edu

Website: <http://ced.ncsu.edu/ahe/elearning/>

The Graduate Certificate in E-Learning (online) represents a response to increased interest toward e-learning design and teaching competencies in K-12, post secondary, government and corporate sectors. The program is designed to prepare graduates with the knowledge and skills necessary to assume roles in integrating e-learning into the curriculum or teaching entirely online. All certificate courses are offered online and students are required to select a focus area of either K-12 or adult education.

Admissions: Applicants must meet at least one of the following criteria: (1) graduate of an accredited four year college and have a GPA of at least 3.0 on a four-point scale in their last 60 credit hours of undergraduate study; (2) degree student in good standing in an NC State graduate program; or (3) have a Master's degree.

Requirements: The Graduate Certificate in E-Learning requires a minimum of 15 hours, including 12 hours of core courses and 3 hours of electives. Students must maintain a minimum overall GPA of B (3.0).

Other Information: The program is offered jointly by the Department of Policy, Leadership, and Adult and Higher Education and the Department of Curriculum and Instruction.

For more information, see <http://ced.ncsu.edu/lpahe/elearning>

Environmental Assessment (Certificate)

Director of Graduate Certificate Programs:

Linda Taylor
For & Envir Res Acad Research
Phone: 9195133972
Email: lr_taylor@ncsu.edu

The graduate certificate program in Environmental Assessment provides students and professionals the opportunity to develop recognized academic credentials and advanced expertise in Environmental Assessment. The certificate program provides excellent opportunities for practicing environmental professionals to stay abreast of new technologies and current government regulations.

The curriculum consists of 12 credit hours selected from the required course listing for the MEA degree. Students may transfer up to 12 credit hours from the Certificate into the Masters of Environmental Assessment (MEA). Students may earn the Certificate as a stand-alone credential or as part of a graduate degree and may apply for entry into the MEA degree while in the Certificate program.

Admission Requirements: Baccalaureate degree. Application information and requirements for award of a certificate are listed on the [Environmental Assessment Certificate website](#).

Certificate Requirements: Award of a certificate requires a GPA of 3.0 or better for the certificate courses (required and elective) and a grade of B- or better in all of the certificate courses. See the [Environmental Assessment Certificate website](#) for a detailed list of courses

Other Relevant Information: The Certificate is entirely online.

Family Life and Parent Education (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Family Life & Parent Education requires a total of 12 credit hours. All courses are distance-based.

Required Courses (3 credit hours)

FYD 554 Collaborations and Partnerships in Youth and Family Settings

FYD 523 Family Relationships Over the Life Course **OR**

FYD 533 Complex Family Issues

FYD 531 Effective Management of Family Resources **OR**

FYD 540 Environmental Influences in the Family

FYD 535 Family Health and Well-being **OR**

FYD 545 Family Communication and Coaching

Family Life Coaching (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Family Life Coaching requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance-based.

Required Courses (3 credit hours)

FYD 535 Family Health and Well-being

FYD 545 Family Communication and Coaching

FYD 559 Administration and Supervision of Youth and Family Programs

Electives (minimum of 3 credit hours)

FYD 501 Theories in Child and Youth Development

FYD 502 Theories in Family Systems

FYD 523 Family Relationships Over the Life Course

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 535 Family Health and Well-being

FYD 540 Environmental Influences in the Family

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 545 Family Communication and Coaching

FYD 550 Family and Youth Professionals as Leaders

FYD 552 Program Development & Evaluation in Family & Youth Settings

FYD 553 Applied Concepts in Child and Youth Development

FYD 554 Collaborations and Partnership in Youth & Family Settings

FYD 555 Applied Research Methods in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

FYD 559 Administration and Supervision in Family and Youth Settings

FYD 585 Contemporary Issues in Community Youth Development

Feed Science (Certificate)

Director of Graduate Certificate Programs:

John Brake

Poultry Science

Phone: 515-5060

Email: jbrake@ncsu.edu

Website: <http://www.ncsu.edu/project/feedmill/>

The Graduate Certificate Program in Feed Science is designed to prepare professionals or current degree program students to work in the feed industry. The program will provide an advanced foundation in feed science technology, animal nutrition and feed formulation, and feed industry leadership. All courses can be delivered by distance education methods.

The objectives of this program are for the student to acquire an understanding of the technical aspects of modern feed and pet food manufacturing, feed mill operations and leadership, feed and ingredient quality assurance, food chain safety, feed industry regulations, animal nutrition and feed formulation, feed product marketing and strategic planning, and how to apply technical and academic skills to the challenges of the global feed industry.

Admission Requirements: Applicants must have a BS/BA degree or equivalent four year degree in order to apply to the program. Individuals interested in this certificate program must complete the admissions form and send it to the Director of Graduate Programs in Poultry Science.

Program Requirements: A minimum of 12 credit hours from the prescribed list of courses and a grade of 'C-' or better in these courses is required to receive credit for the certificate. To receive a Graduate Certificate in Feed Science, a student must have a minimum 3.0 grade point average on all certificate course work. All course work must be registered through NC State University, transfer credit from other universities is not allowed. All work must be completed in four (4) calendar years, beginning from the time the application is approved by the Director of Graduate Programs.

Required Courses

PO/NTR 515 Advanced Comparative Nutrition (3 cr.)

FM/NTR 525 Advanced Feed Science and Technology (3 cr.)

FM 580 Feed and Ingredient Quality Assurance (3 cr.)

Optional Courses

FM 460 Feed Mill Operations and Leadership (2 cr.)

NTR/FM 790 Advanced Feed Formulation (3 cr.)

FM 594 Advanced Feed Mill Practicum (1 cr.)

FM 601 Feed Science Seminar (1 cr.)

Geographic Information Systems (Certificate)

Director of Graduate Certificate Programs:

Hugh Devine
Parks, Recreation & Tourism Mg
Phone: 515-3682
Email: hugh_devine@ncsu.edu
Website: <http://www.gis.ncsu.edu>

GRADUATE FACULTY

Professors: E. H. Bressler, H. A. Devine, M. Fuentes, G. D. Garson, M. L. Gumpertz, R. W. Heiniger, J. E. Hummer, S. Khorram, H. Krim, D. K. Larick, J. F. Levine, M. F. Overton, W. J. Rasdorf, A. R. Rice, J. A. Rice, W. E. Snyder, J. R. Stone, H. J. Trussell; **Associate Professors:** L. Annetta, B. Bullock, D. A. Crouse, C. G. Healey, G. R. Hess, M. M. Kimberley, Y. Leung, S. C. Lilley, H. Mitsova, S. C. Nelson, G. T. Roberson, W. R. Smith, R. A. St. Amant, M. L. Vasu, J. G. White, E. N. Wiebe, S. B. Wiley, S. E. Yuter; **Research Associate Professors:** P. K. Baran, H. S. Stubbs; **Adjunct Associate Professors:** J. W. Coulston, J. E. Fels, G. Sun; **Research Assistant Professors:** F. H. Koch Jr; **Adjunct Assistant Professors:** M. R. Loomis; **Teaching Associate Professors:** H. M. Cheshire

The Geographic Information Systems (GIS) Graduate Certificate provides an efficient academic credential for students who wish to develop advanced skills in the application of geospatial analytics and modeling. The program is designed to add GIS competencies to an existing professional portfolio and to allow the initial exploration of graduate level geospatial studies. The curriculum consists entirely of graduate level GIS courses and students may transfer up to 12 credit hours from the Certificate into the Masters of Geospatial Information Science and Technology degree (MGIST). Students may earn the Certificate as a stand-alone credential or as part of a graduate degree and may apply for entry into the MGIST degree while in the Certificate program.

Admission Requirements: Baccalaureate degree. Application information and requirements for award of a certificate are listed on the [GIS Certificate website](#).

Certificate Requirements: Award of a certificate requires a GPA of 3.0 or better for the certificate courses (required and elective) and a grade of B- or better in all of the certificate courses. See the [GIS Certificate website](#) for a detailed list of courses

Other Relevant Information: The Certificate may be taken on campus or entirely online.

Gerontology (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Gerontology requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance-based.

Required Courses (3 credit hours)

FYD 524 Applications of Gerontology in Family Life Education

FYD 554 Collaborations and Partnerships in Youth and Family Settings

FYD 523 Family Relationships Over the Life Course **OR**

FYD 533 Complex Family Issues

Electives (minimum of 3 credit hours)

FYD 501 Theories in Child and Youth Development

FYD 502 Theories in Family Systems

FYD 523 Family Relationships Over the Life Course

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 535 Family Health and Well-being

FYD 540 Environmental Influences in the Family

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 545 Family Communication and Coaching

FYD 550 Family and Youth Professionals as Leaders

FYD 552 Program Development & Evaluation in Family & Youth Settings

FYD 553 Applied Concepts in Child and Youth Development

FYD 554 Collaborations and Partnership in Youth & Family Settings

FYD 555 Applied Research Methods in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

FYD 559 Administration and Supervision in Family and Youth Settings

FYD 585 Contemporary Issues in Community Youth Development

Horticultural Science (Certificate)

Director of Graduate Certificate Programs:

Helen Kraus

Horticultural Science

Phone: 515-1208

Email: helen_kraus@ncsu.edu

Website: http://cals.ncsu.edu/hort_sci/teaching/degrees/grad-cert/index.php

The [Certificate in Horticultural Science](#) is a non-degree program offered through the Department of Horticultural Science at North Carolina State University. The Certificate program is designed to increase personal knowledge and skills for current or future employment in the Horticultural Industry. Students may concentrate in one of three areas: General Horticulture, Food Horticulture and Ornamental Horticulture.

Requirements: The Certificate program requires a minimum of five courses resulting in at least 15 credits to be completed within 4 years. The courses will constitute a cohesive continuing education in Horticultural Science and will be selected by the candidate and the advisor.

Applicant must have a B.S. or higher degree from an accredited four-year college or university and have a GPA of at least 3.0 on a 4.0-point scale.

It is highly recommended that candidates have a major in horticulture, crop science, plant science, plant biology or agricultural education with a plant science emphasis. Applicants who do not meet the GPA requirement may be admitted provisionally based on past work experience as a professional in horticulture or a related field. Supporting documentation of professional experience in horticulture or a related field must be submitted for provisional admission. Students who are admitted provisionally must earn at least a 3.0 GPA average in the first two courses of the certificate program in order to obtain full admission into the program. Certificate students must maintain an average GPA of 3.0 and a minimum grade of C (2.00) in any of the Horticulture Graduate Certificate courses.

Curriculum: The following courses can be used for credit in the Horticultural Science Certificate Program. Please note: Not all courses are offered each semester. Students should consult their advisor and the course catalog for the most up-to-date course listings.

Horticultural Science (DE and on-campus sections)

HS 541 Plant Breeding Methods

HS 542 Advanced Vegetable Crop Management

HS 543 Greenhouse and High Tunnel Food Production

HS 562 Post Harvest Physiology

HS 590 Special Problems in Horticultural Science (Environmental Nursery Production)

HS 590 Special Problems in Horticultural Science (Fruit Quality)

HS 590 Special Problems in Horticultural Science (Introduction to Permaculture)

HS 590 Special Problems in Horticultural Science (General Viticulture)

HS 707 Environmental Stress Physiology

HS 717 Weed Management Systems

HS 722 Mineral Nutrition in Plants

Horticultural Science (On-campus sections only)

HS 502 Plant Disease: Methods and Diagnosis

HS 525 Advanced Plant Propagation

HS 590 Special Problems in Horticultural Science (Horticultural Substrates and Urban Soils)

HS 701 Carbohydrate Metabolism and Transport
HS 704 Plant Nomenclature
HS 705 Physiology of Flowering
HS 706 Fruit Development and Postharvest Physiology
HS 715 Weed Science Research Techniques
HS 716 Weed Biology
HS 718 Biological Control of Weeds
HS 720 Molecular Biology in Plant Breeding
HS 725 Pesticide Chemistry
HS 727 Pesticide Behavior and Fate in the Environment
HS 731 Physiology of Landscape Plants
HS 732 Vegetable Crop Physiology
HS 745 Quantitative Genetics in Plant Breeding
HS 746 Breeding Methods
HS 748 Breeding for Pest Resistance

Any other graduate-level Horticultural Science courses.

Plant Pathology

PP 502 Plant Disease: Methods and Diagnosis

Entomology

ENT 591 Insect Pest Management

Soil Science

SSC 440 Geographic Information
SSC 470/570 Wetland Soils
SSC 532 Soil Microbiology
SSC 551 Soil Morphology, Genesis and Classification
SSC 562 Environmental Applications of Soil Science

Food Science

FS 495 Special Topics in Food Science (Good Manufacturing Practices)
FS 495 Special Topics in Food Science (Sanitation Standard Opt. Proc.)
FS 495 Special Topics in Food Science (Sanitation)
FS 495 Special Topics in Food Science (Hazard Analysis/ Risk Assess.)
FS 495 Special Topics in Food Science (Microbiology / Microbial Hazards)

Agriculture & Extension Education

AEE 501 Foundations of Agriculture & Extension Education
AEE 521 Program Planning in Agriculture & Extension Education
AEE 523 Adult Education in Agriculture

For more information about the Certificate Program and applications materials, please see the [Department of Horticultural Science](#) website.

Mathematics (Certificate)

Director of Graduate Certificate Programs:

Stephen Campbell

Mathematics

Phone: 515-3300

Email: s_campbell@ncsu.edu

The Graduate Certificate in Mathematics is a one-year program that focuses on two groups of students. It is designed for students who have some mathematical training but do not have a full bachelor's degree in mathematics. It also targets students who have a bachelor's degree in mathematics but do not feel they are ready for graduate school.

The goal of the certificate is to prepare and motivate students through courses and careful mentoring. The program will deepen and broaden students' understanding of mathematics, the mathematics profession, and the mathematical community. Students will learn how the mathematics discipline can solve significant problems for government, industry, other scientists, and ultimately, society at large.

Admissions: Application to the program requires an online application form, three (3) letters of recommendation (two need to be academic), transcripts of all academic work after high school, and a written statement. GREs are highly desirable but not required for admission. Admission will be on a competitive basis.

Requirements: Students take a combination of graduate and undergraduate mathematics courses that are tailored to the individual student. The certificate requires 12 hours of mathematics courses, taken for a grade, and to be taken at NC State. There is no specific list of courses for the certificate.

Of the 12 hours, three (3) hours may be at the 400 level with prior approval of the Director of Graduate Programs. The other nine (9) hours will be at the 500 level or above. Students must take at least two (2) courses per semester to remain in good standing. A grade of C- is required for a course to count toward the certificate. A 3.00 GPA is required to earn the certificate.

Other Information: There is financial support through grant funding for four new PBS students per year. Students receive a stipend and tuition support for six courses.

Medical Devices (Certificate)

Director of Graduate Certificate Programs:

H Nagle

Electrical & Computer Engr.

Phone: 515-3578

Email: t.nagle@ncsu.edu

Website: <http://www.bme.ncsu.edu/>

The Graduate Certificate in Medical Devices is a joint program that links NC State's College of Engineering with the University of North Carolina School of Medicine. The program prepares graduates to conceive and design prototypes for new medical devices, write patent applications, as well as training in market assessment, financing options, etc.

Admissions: Enrolled NCSU and UNC graduate students, doctoral candidates and post-docs, as well as part-time and full-time faculty and staff, may apply online at the Certificate's website. Professionals from the local MedTech sector may also apply online through the NCSU Graduate School. A bachelor's degree is required. Preference is given to applicants with scientific and/or engineering backgrounds.

Requirements: The program requires a total of 12 credit hours from an approved course list, including two BME advanced medical devices courses (BME/BMME 551 and 552), two related business courses, and participation in ten medical seminars.

For more information, see the [Certificate's website](#) or contact the Director.

Molecular Biotechnology (Certificate)

Director of Graduate Certificate Programs:

Susan Carson

Plant Biology

Phone: 919/513-0330

Email: sue_carson@ncsu.edu

Website: <http://www.ncsu.edu/biotechnology/>

Training in molecular biotechnology is essential for an expanding list of disciplines that have found modern biology-based skills of critical importance in pursuing research goals in areas ranging from microbiology to plant and animal sciences to chemical engineering. The Graduate Certificate Program in Molecular Biotechnology offers an opportunity for individuals educated in the life sciences and related disciplines to gain laboratory-based, hands-on training in many aspects of molecular biotechnology. NCSU graduate students with career interests that involve molecular biotechnology, but are not eligible for the minor, are eligible to apply for the certificate.

The Graduate Certificate Program in Molecular Biotechnology will require a minimum of 12 hours of required and elective courses as listed below:

REQUIRED (5 credits)

BIT 510 and BIT 510L Core Technologies in Molecular and Cellular Biotechnology (4 credits)
BIT 501 Ethical Issues in Biotechnology (1 credit) or an approved research ethics or bioethics course

BIOTECHNOLOGY LABORATORY ELECTIVES (4 credits)

Two of the following courses and their laboratories (2 credits each):

BIT 562 Microarrays
BIT 564 Protein Purification
BIT 565 Real-time PCR Techniques
BIT 566 Animal Cell Culture
BIT 567 PCR and DNA Fingerprinting
BIT 568 Genome Mapping
BIT 571 RNA Interference and Model Organisms
BIT 572 Proteomics
BIT 573 Protein-Protein Interactions
BIT 574 Plant Genetic Engineering
BIT 576 Computation Analysis of Biomolecular Sequences
Other BIT laboratory courses (2 credits) by permission

OTHER ELECTIVES -- CHOOSE ONE (3 credits)

GN 513 Advanced Genetics
MB 714 Microbial Metabolic Regulation
MB(GN) 758 Prokaryotic Molecular Genetics
BO 780 Plant Molecular Biology
BCH 553 Biochemistry of Gene Expression
FS(MB) 725 Fermentation Microbiology
ST(GN) 721 Genetic Data Analysis
GN 701 Molecular Genetics

GN 735 Functional Genomics

CHE 551 Biochemical Engineering

Other courses (400-level or higher) may be considered by special request.

Nonprofit Management (Certificate)

Director of Graduate Certificate Programs:

Richard Clerkin

Public & International Affairs

Phone: 515-5037

Email: rmclerki@ncsu.edu

Website: <http://www.chass.ncsu.edu/pa/certificateNonProfit.htm>

A Graduate Certificate in Nonprofit Management is available to students, including NC State degree students, who have a Bachelor's degree from an accredited university. The Certificate requires 15 credit hours of course work. The courses are designed to provide the basic management knowledge and skills needed in nonprofit organizations. For applications and a description of program requirements go to <http://pa.chass.ncsu.edu/prosStud/gradCert/non-profit.php>

Nonwovens Science and Technology (Certificate)

Director of Graduate Certificate Programs:

Pamela Banks-Lee

Textile Engineering, Chemistry

Phone: 5-6581

Email: pbanks-l@tx.ncsu.edu

Website: <http://www.tx.ncsu.edu/departments/tatm/index.html>

The certificate program in Nonwovens Science and Technology provides NC State graduate students the opportunity to develop recognized academic credentials in Nonwovens Science and Technology in addition to their major area of graduate study. Provide non-degree graduate level students the opportunity to develop recognized advanced expertise in Nonwovens Science and Technology.

Required Coursework: The Graduate Certificate Program in Nonwovens Science and Technology requires a minimum of 15 hours and includes the following courses:

Core Courses (6 hours):

TT(NW) 503	Materials, Polymers and Fibers Used in Nonwovens (3 hours) OR
TMS 762	Physical Properties of Fiber Forming Polymers, Fibers and Fibrous Structures (3 hours)
TT(NW) 504	Introduction to Nonwovens Products and Processes (3 hours)

Advanced Courses (minimum 9 hours)*:

TT(NW) 505	Advanced Nonwovens Processing (3 hours)
TT(NW) 506	Bonding Principles in Nonwovens (3 hours)
TT(NW) 507	Nonwoven Characterization Methods (3 hours)
TT(NW) 508	Nonwoven Product Development (3 hours)

*One NC State course (400-level or higher) may be substituted for one of the advanced courses into the program upon agreement between the Certificate Coordinator and the student. The Certificate Coordinator will maintain a list of graduate-level courses appropriate to use as substitutions.

Program Development in Family Life Education (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Program Development in Family Life Education requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance-based.

Required Courses (3 credit hours)

FYD 552 Program Development and Evaluation in Family and Youth Settings

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 554 Collaborations and Partnerships in Youth and Family Settings

Electives (minimum of 3 credit hours)

FYD 523 Family Relationships Across the Lifespan

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 540 Environmental Influences in the Family

FYD 545 Family Communication and Coaching

Public Policy (Certificate)

Director of Graduate Certificate Programs:

Rajade Berry-James

Public & International Affairs

Phone:

Email: rmberryj@ncsu.edu

Website: <http://pa.chass.ncsu.edu/prosStud/gradCert/publicPolicy.php>

Public policy -- the actions of government and its partners in the non-profit and private sectors -- is the keystone of politics and public administration. The creation, adoption, and implementation of public policy is a complex process. It requires skills in analysis, reasoning, and argumentation -- what we call evidence-based policy advocacy. The Graduate Certificate in Public Policy helps you make the most of your skills by providing you with the tools you need to be an effective advocate for realistic, effective, and responsible public policy.

Admissions: Students not attending NC State are required to apply through the usual application process (see <http://www.ncsu.edu/grad/applygrad.htm>). A minimum undergraduate GPA of 3.0 is generally required for admission to the program; performance in graduate work will also be considered. Provisional admission may be granted for applicants whose GPA is below 3.0.

Students currently in a degree program at NC State may add the certificate program to their program by completing the application for currently enrolled graduate students.

For applications and description of program requirements, go to

<http://pa.chass.ncsu.edu/prosStud/gradCert/publicPolicy.php>.

Curriculum: The certificate requires a total of 12 credit hours consisting of Applied Political Economy (PA 509), Public Policy Analysis (PA 511), Public Policy Process (PA 507), and an elective policy or managerial course approved by the program coordinator. Electives may be from virtually any graduate program at NC State, such as history, social sciences, natural resources, agriculture, health, business, or engineering.

Other Information: Students who do not have course work in social science statistics will be required to take a statistics course either at the School of Public and International Affairs or a department of the student's choosing, with approval of the program coordinator.

Renewable Electric Energy Systems (Certificate)

Director of Graduate Certificate Programs:

Mesut Baran

Electrical & Computer Engr.

Phone: 55081

Email: baran@eos.ncsu.edu

Website: <http://www.freedom.ncsu.edu/index.php?s=5&p=82#graduate>

The Graduate Certificate in Renewable Electric Energy Systems provides graduate students with the opportunity to develop expertise in renewable electric energy systems and advanced electric power grid technology in addition to their major area of graduate study.

Admissions: Applicants with appropriate background must meet one of the three following requirements:

- be a graduate of an accredited four-year college or university, and have a GPA of at least 3.0 on a 4-point scale in their last 60 credit hours of undergraduate study;
- be a degree student in good standing in an NC State University graduate program; and
- have a Master's degree.

A student may obtain more than one graduate certificate in a different field. Each certificate must have at least nine (9) credit hours that are unique to it.

Requirements: The Graduate Certificate in Renewable Electric Energy Systems requires a minimum of 12 hours, including one 3-hour core course and 9 credit hours of electives to be selected from a list that contains relevant courses for the certificate. Students must maintain a minimum overall GPA of B (3.0).

For course and enrollment information please visit the [FREEDM Systems Center website](#) or the [Department of Electrical and Computer Engineering website](#).

Technology Entrepreneurship and Commercialization (Certificate)

Director of Graduate Certificate Programs:

Edward Baker

Mgmt, Innovation&Entrepreneur

Phone: 919/513-7943

Email: ted_baker@ncsu.edu

Website: <http://www.mgt.ncsu.edu/mba/concentrations/entrepreneurship-technology-commercialization/>

The certificate in Technology Entrepreneurship and Commercialization (TEC) is a hands-on, project-based practicum in creating and growing technology-intensive businesses. Graduate students develop knowledge, skills and tools useful for engaging in technology entrepreneurship. We focus on capabilities that are equally relevant to the creation and growth of new ventures or to the creation of innovation within established firms. Students learn and apply a proven structured process (developed at NC State but adopted by many universities and taught on four continents) to evaluate technologies, create and develop product ideas, and construct business proposals to bring technology-based products to market. Students with primarily technical backgrounds and those with primarily business backgrounds gain essential skills in working together productively.

Admissions Requirements: Graduate students at NC State must be in good standing. Students not enrolled at NC State must have completed a baccalaureate degree. All students must submit an application to the certificate program which will be reviewed and evaluated by the coordinator. A minimum GPA of 3.0 (in undergraduate and/or prior graduate work) is required for admission to the program. Those with less than a 3.0 may be admitted provisionally. Provisionally admitted students must initially take MBA 570 and earn a grade of B (3.0).

Program Requirements: The certificate program requires students to complete twelve (12) credit hours with an overall 3.0 GPA in all certificate courses. Credit toward the certificate in a particular course will be given only if a grade of B- or better is earned in that course. Currently, the three required courses are MBA 570 and MBA/MSE 576 and 577, each of which carries four credit hours. The recommended sequence is 570, 576, 577. All courses in the program must be taken for a letter grade. No transfer credits will be accepted in the program and it must be completed within three years.

Textile Brand Management and Marketing (Certificate)

The Graduate Certificate Program in Textile Brand Management and Marketing provides graduate students with the opportunity to develop academic credentials in branding fundamentals and theories for a globalized industry and market research while complementing this knowledge with topics of strategic management, product development, supply chain management and technology management. The program also provides non-degree graduate-level students with the opportunity to develop recognized advanced expertise in Textile Brand Management and Marketing.

Admission: Applications must meet one of the following three requirements:

- Be a graduate of an accredited four-year college or university and have a grade point average of at least 3.0 on a 4-point scale in their last 60 credit hours of undergraduate study;
- Be a degree student in good standing in an NC State University graduate program; or
- Have a Master's degree.

Applicants who do not meet the GPA requirements may be admitted professionally based on past work experience as a professional in textiles or a textile related field. Supporting documentation of professional experience in textile should be submitted for provisional admission. Students who are admitted provisionally must earn at least a "B" average in the first three courses of the certificate program in order to obtain full admission into the certificate program.

Requirements: A minimum of 15 credit hours is required to complete the certificate program and student must have a minimum 3.0 grade point average on all certificate course work. Transfer credit from other universities is not allowed. All work must be completed in four (4) calendar years, beginning from the time the student begins course work for the Certificate .

For more information, please visit the [Textile Technology and Management](#) website.

Textile Supply Chain Management (Certificate)

Director of Graduate Certificate Programs:

George Hodge

Textile Engineering, Chemistry

Phone: 919 513 1636

Email: george_hodge@ncsu.edu

The Certificate in Textile Supply Chain Management provides NC State graduate students the opportunity to develop recognized academic credentials in this concentration in addition to their major area of graduate study. The Certificate also provides non-degree graduate-level students the opportunity to develop recognized advanced expertise in Textile Supply Chain Management.

Admission: Applicants must meet one of the 3 following requirements:

- Be a graduate of an accredited four-year college or university, and have a GPA of at least 3.0 on a 4-point scale in their last 60 credit hours of undergraduate study;
- Be a degree student in good standing in a NC State University graduate program; and
- Have a Master's degree.

Provisional Admission: Applicants who do not meet the GPA requirements may be admitted provisionally based on past work experiences as a professional in textiles or a textile related field. Supporting documentation of professional experience in textiles should be submitted for provisional admission. Students who are admitted provisionally must earn at least a "B" average in the first three courses of the certificate program in order obtain full admission into the certificate program.

Program Requirements: The Graduate Certificate in Textile Supply Chain Management requires a minimum of 15 hours, and includes the following courses:

Core Courses (9 credit hours)

TTM 501 Textile Enterprise Integration (3)

TTM 761 Supply Chain Management and Information Technology (3)

TE 533 Lean Six Sigma (3) OR

TE 540 Computer Information Systems

Advanced Courses (6 credit hours)

TTM 530 Textile Quality and Process Control (3)

TTM 531 Total Quality Management (3)

TTM 583 Strategic Planning for Textile Firms (3)

TTM 588A Global Perspectives in Textile Supply Chain Management: USA (3)

TE 533 Lean Six Sigma (3) OR

TE 540 Computer Information Systems

One NC State course (400 level or higher) may be substituted for one of the advanced courses into the program upon agreement between the Certificate Coordinator and the student. The Certificate Coordinator maintains a list of appropriate graduate level courses.

Academic Performance:

- Award of a Graduate Certificate in Textile Supply Chain Management (GCTSCM) requires a minimum overall GPA of 3.0.

- None of the required 15 hours may be taken for S/U or “credit only”.
- No transfer credits from other institutions are allowed for the certificate.
- All students must be registered through NC State University.
- All GCTSCM requirements must be completed within the first four (4) calendar years beginning with the date the students begins the course work for the certificate.
- All Certificate students are expected to maintain continuous enrollment every semester (excluding summer sessions) until all course work is completed. Under unusual circumstances, a one-semester leave of absence will be granted if the student is unable to enroll in a course. Written approval from the certificate coordinator must be obtained before the beginning of the semester.

Training and Development (Certificate)

Director of Graduate Certificate Programs:

Diane Chapman

Ldshp Plcy & Adult & Higher Ed

Phone: 513-4872

Email: diane_chapman@ncsu.edu

Website: <http://tdonline.ncsu.edu/programs/tdcertificate.html>

The Certificate in Training and Development is a non-degree graduate program for lifelong learning students offered through the Department of Leadership, Policy, and Adult and Higher Education at North Carolina State University. Lifelong learning students are those students who are classified by the University as NDS (Non-Degree Studies) for purposes of registration.

The Graduate Certificate program consists of a selected set of for-credit courses that are offered in an online format. The courses are selected to offer a cohesive continuing education opportunity for people in training roles in business, government, military, and not-for-profit sectors. This program is designed for the person who has recently advanced into a training position and is without the academic preparation needed or for those choosing to increase their knowledge and skills in training for current or future jobs. The program is not intended for career exploration nor is it a prerequisite for or part of a graduate degree program. The program is made up of a minimum of five 3-credit courses. The student will complete the identified Certificate courses through continuous enrollment (excluding summer sessions) until contract requirements are met. Participants must hold a baccalaureate degree to enroll in the Certificate Program.

Curriculum: The program requires completion on the following five courses.

EAC 580 Designing Instructional Systems in Training and Development

EAC 583 Needs Assessment and Task Analysis in Training and Development

EAC 584 Evaluating Training Transfer and Effectiveness

EAC 586 Methods and Techniques of Training and Development

EAC 559 The Adult Learner

For course descriptions, please refer to the NCSU [listing of courses](#).

For further information, see the [Certificate in Training and Development](#) website or the [Leadership, Policy, and Adult and Higher Education](#) website.

Volunteer Management and Administration (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Volunteer Management and Administration requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance-based.

Required Courses (3 credit hours)

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

Electives (minimum of 3 credit hours)

FYD 501 Theories in Child and Youth Development

FYD 502 Theories in Family Systems

FYD 523 Family Relationships Over the Life Course

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 535 Family Health and Well-being

FYD 540 Environmental Influences in the Family

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 545 Family Communication and Coaching

FYD 550 Family and Youth Professionals as Leaders

FYD 552 Program Development & Evaluation in Family & Youth Settings

FYD 553 Applied Concepts in Child and Youth Development

FYD 554 Collaborations and Partnership in Youth & Family Settings

FYD 555 Applied Research Methods in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

FYD 559 Administration and Supervision in Family and Youth Settings

FYD 585 Contemporary Issues in Community Youth Development

Youth Development and Leadership (Certificate)

Director of Graduate Certificate Programs:

Kate Guerdat

4-H Youth Dev & Fam & Cons Sci

Phone: 515-9568

Email: kate_guerdat@ncsu.edu

Website: <http://www.ces.ncsu.edu/depts/4hfcs/academics/cert/>

The Department of 4H Youth Development and Family & Consumer Sciences offers a total of seven graduate certificates. The graduate certificate programs are designed to prepare professionals to better serve in their roles as family life and parent educators and youth professionals.

Admissions: Students apply online by visiting the Graduate School's website and completing an *ApplyYourself* online application. Applications are evaluated based on criteria published on the program website.

Requirements: A Graduate Certificate in Youth Development Leadership requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining 3 credit hours of electives. All courses are distance-based.

Required Courses (3 credit hours)

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 585 Contemporary Issues in Community Youth Development

Electives (minimum of 3 credit hours)

FYD 501 Theories in Child and Youth Development

FYD 502 Theories in Family Systems

FYD 523 Family Relationships Over the Life Course

FYD 524 Applications of Gerontology in Family Life Education

FYD 531 Effective Management of Family Resources

FYD 533 Complex Family Issues

FYD 535 Family Health and Well-being

FYD 540 Environmental Influences in the Family

FYD 543 Applied Concepts in Parenting and Family Life Education

FYD 545 Family Communication and Coaching

FYD 550 Family and Youth Professionals as Leaders

FYD 552 Program Development & Evaluation in Family & Youth Settings

FYD 553 Applied Concepts in Child and Youth Development

FYD 554 Collaborations and Partnership in Youth & Family Settings

FYD 555 Applied Research Methods in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

FYD 557 Volunteerism in Youth and Family Settings

FYD 558 Contemporary Issues in Volunteer Resource Management

FYD 559 Administration and Supervision in Family and Youth Settings

FYD 585 Contemporary Issues in Community Youth Development

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. Interdisciplinary courses applicable to several graduate programs are offered by the Biological Sciences Interdepartmental Program.

GRADUATE COURSE

BIO 510 Advanced Biology for Secondary Teachers

BIO(ZO) 518 Experience and the Brain

Education [General Courses]

GRADUATE COURSES

ED(AEE) 501 Foundations of Agricultural and Extension Education

ED(AEE) 530 Priority Management in Agricultural and Extension Education

ED(AEE) 641 Practicum in Agricultural and Extension Education

ED(AEE) 735 Effective Teaching in Agriculture and Life Sciences

ED(AEE) 841 Practicum in Agricultural and Extension Education

Multidisciplinary Studies

GRADUATE COURSES

MDS 515 Peruvian Amazon Ecology and Ethnology

MDS 595 Special Topics in Multidisciplinary Studies

MDS 610 Special Topics

MDS 685 Master's Supervised Teaching

Philosophy and Religious Studies

Dr. Michael Pendlebury

Professor and Department Head

NC State Box 8103

Phone: 919.515.6103

Fax: 919.513.4351

Email: mjpendle@ncsu.edu

Website: <http://www.ncsu.edu/chass/philo/>

There are no graduate degrees in Philosophy or Religious Studies, but the Department offers a variety of graduate courses in Logic, Philosophy, and Religious Studies. One or more of these courses can be used to enhance many graduate degree programs.

GRADUATE COURSES**LOGIC**

LOG 535 Advanced Logic and Metamathematics

LOG 537 Model Theoretic Semantics

PHILOSOPHY

PHI 501 Kant's Critique of Pure Reason

PHI 515 Life Science Ethics

PHI 520 Global Justice

PHI 522 Philosophical Issues in Environmental ethics

PHI(PSY) 525 Introduction to Cognitive Science

PHI 540 The Scientific Method

PHI 545 Philosophy of Biology

PHI 547 Philosophy, Evolution and Human Nature

PHI 575 Ethical Theory

PHI 598 Special Topics in Philosophy

PHI 635 Advanced Independent Study in Philosophy

PHI 798 Advanced Topics in Philosophy

PHI 816 Introduction to Research Ethics

RELIGIOUS STUDIES

REL 571 Darwinism and Christianity

REL 573 Religion, Gender, and Reproductive Technologies

The Department also administers the [Graduate Minor in Cognitive Science](#).

Graduate Faculty

Abbate, Angelo R, Emeritus Professor, Landscape Architecture
 Abdel Khalik, Hany Samy, Assistant Professor, Nuclear Engineering
 Abney, Mark Ray, Assistant Professor, Entomology
 Aboelfotoh, M. Osama, Research Professor, Materials Sci Engr-Grads&Temps
 Abrams, Charlie F., Professor, Biological And Agricultural En
 Abrams, Robin Fran, Professor, Architecture
 Abt, Karen L, Adjunct Associate Professor, For & Envir Res Acad Research
 Abt, Robert Carroll, Professor, For & Envir Res Acad Research
 Aday, David Derek, Associate Professor, Biology
 Ade, Harald, Professor, Physics
 Adler, Kenneth B., Professor, Dept Molecular Biomedical Scie
 Adler, William, Professor, Philosophy & Religious Studies
 Afify, Elsayed M., Emeritus Professor, Mechanical & Aerospace Engr
 Agarwal, Anant Kumar, Adjunct Professor, Electrical & Computer Engr.
 Agvaanluvsan, Undraa, Adjunct Professor, Physics
 Ahiska, Semra Sebnem, Adjunct Assistant Professor, Fitts Dept Indust & Syst Engr
 Aiman-Smith, Lynda, Associate Professor, Mgmt, Innovation&Entrepreneur
 Aiyyer, Anantha, Assistant Professor, Marine, Earth And Atmospheric
 Akers, Anne TriceThompson, Adjunct Assistant Professor, Instructional Material Product
 Akroyd, Duane, Professor, Ldshp Plcy & Adult & Higher Ed
 Alapaty, Kirankumar V, Adjunct Professor, Marine, Earth And Atmospheric
 Albada-Jelgersma, Kelly, Associate Professor, Communication
 Alder, Ruth A., Emeritus Associate Professor, Foreign Languages And Literatu
 Aldige, Virginia M, Distinguished Professor, Sociology & Anthropology
 Alexander, Samuel T., Associate Professor, Electrical & Computer Engr.
 Alexander, Winsor E., Professor, Electrical & Computer Engr.
 Allaire, Jason Christopher, Associate Professor, Psychology
 Allbritton, Nancy Lynn, Professor, Biomedical Program - ENG
 Allen, George C, Research Associate Professor, Horticultural Science
 Allen, Howard Lee, Emeritus Professor, The Forest Nutrition Cooperati
 Allen, Jonathan C., Professor, Food,Bioprocess & Nutrition Sc
 Allen, Kimberly I., Assistant Professor, 4-H Youth Dev & Fam & Cons Sci
 Allen, Nina S, Emeritus Professor, Plant Biology
 Allen, Steven G., Professor, Economics-college Of Managemen
 Alley, Mark L, Clinical Assistant Professor, Dept-Population,Health,Pathobi
 Almond, Glen William, Professor, Dept-Population,Health,Pathobi
 Alonso, Jose Miguel, Associate Professor, Genetics
 Alonso, Silvia T., Emeritus Associate Professor, Foreign Languages And Literatu
 Alston-Mills, Brenda P, Emeritus Professor, Animal Science
 Amatya, Devendra M, Adjunct Assistant Professor, Biological And Agricultural En
 Ambaras, David R, Associate Professor, History
 Ambrose, John T., Professor, Undergraduate Academic Program
 Amein, Michael, Emeritus Professor, Civil Const & Environ Engineer
 Amendum, Steven J., Assistant Professor, Elementary Education
 Amerson, Henry Van, Emeritus Associate Professor, Forest Biotech Program
 Ames, Natalie R., Associate Professor, Social Work
 Amezquita, Alejandro, Adjunct Assistant Professor, Food,Bioprocess & Nutrition Sc
 Amoozegar, Aziz, Professor, Soil Science
 Anantharamaiah, Nagendra, Research Assistant Professor, Textile Engineering, Chemistry
 Anderson, Dorothy H, Professor, Parks, Recreation & Tourism Mg
 Anderson, Kenneth E, Professor, Poultry Science
 Anderson, Kevin L., Professor, Dept-Population,Health,Pathobi
 Anderson, Norman Dean, Emeritus Professor, Depart Of Math, Science, And T
 Andrady, Anthony L, Adjunct Professor, Chemical & Biomolecular Engr
 Andrews, Janice M, Adjunct Associate Professor, Dept-Population,Health,Pathobi
 Aneja, Viney Pal, Professor, Marine, Earth And Atmospheric

Anholt, Robert R, William Neal Reynolds Professor, Biology
 Anistratov, Dmitriy Y, Associate Professor, Nuclear Engineering
 Anson, Christopher M, Distinguished University Professor, English
 Anton, Ana I, Professor, Computer Science-engr
 Apperson, Charles S., William Neal Reynolds Professor Emeritus 10/1/10, Entomology
 Apple, J Lawrence, Emeritus Professor, Administration - Research Serv
 Arasu, Prema, Professor, Dept Molecular Biomedical Scie
 Archer, Trevor Keith, Adjunct Professor, Dept-Population,Health,Pathobi
 Arellano, Consuelo, Research Assistant Professor, Statistics
 Arends, James J., Adjunct Professor, Entomology
 Argyropoulos, Dimitris S, Professor, Forest Biomaterials
 Arnold, John F., Emeritus Associate Professor, Curr, Instruc & Counselor Educ
 Arritt, Fletcher M, Assistant Professor, Food,Bioprocess & Nutrition Sc
 Arumugam, Sankarasubramanian, Assistant Professor, Civil Const & Environ Engineer
 Arya, Satya Pal Singh, Emeritus Professor, Marine, Earth And Atmospheric
 Ash, Sarah L, Professor, Food,Bioprocess & Nutrition Sc
 Ashwell, Christopher M., Associate Professor, Poultry Science
 Ashwell, Melissa Schuster, Associate Professor, Animal Science
 Aspnes, David E, Distinguished University Professor of Physics, Physics
 Atkins, Clarke E., Jane Lewis Seaks Distinguished Professor, Dept of Clinical Sciences
 Atkinson, Maxine P., Professor, Sociology & Anthropology
 Atkinson, Simon D, Adjunct Professor, Architecture
 Attarian, Aram, Associate Professor, Parks, Recreation & Tourism Mg
 Auerbach, David D., Assistant Professor, Philosophy & Religious Studies
 Aurand, Leonard W., Emeritus Professor, Food,Bioprocess & Nutrition Sc
 Austin, David Franklin, Associate Professor, Philosophy & Religious Studies
 Averre, Charles W, Emeritus Professor, Plant Pathology
 Axtell, Richard C., Emeritus Professor, Entomology
 Ayoub, Mahmoud A., Emeritus Professor, Fitts Dept Indust & Syst Engr
 Aziz, Tarek, Teaching Assistant Professor, Civil Const & Environ Engineer
 Azmy, Yousry Y, Professor, Nuclear Engineering
 Bacheler, Jack S., Professor, Entomology
 Bachmann, Klaus J., Emeritus Professor, Materials Science &Engineering
 Bae, Hyun Hoe, Assistant Professor, Public & International Affairs
 Bahler, Dennis R, Associate Professor, Computer Science-engr
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Dellafave, L. Richard, Professor, Sociology & Anthropology
 DeLuca, V. William, Associate Professor, Depart Of Math, Science, And T
 DeMaster, David John, Professor, Marine, Earth And Atmospheric
 Denig, Joseph, Professor, Forest Biomaterials
 Dennis, Robert G, Associate Professor, Biomedical Program - ENG
 Denton, Brian, Associate Professor, Fitts Dept Indust & Syst Engr
 DePerno, Christopher S, Associate Professor, Fisheries and Wildlife Program
 DeSimone, Joseph M, William R. Kenan, Jr. Distinguished Professor of Chemistry, Chemical & Biomolecular Engr
 Despain, Jeffrey Scott, Associate Professor, Foreign Languages And Literatu
 Devetsikiotis, Mihail, Professor, MS Comp Networking-ECE
 Devine, Hugh A., Professor, Parks, Recreation & Tourism Mg
 Devorshak, Christina, Adjunct Assistant Professor, Plant Pathology
 Dewey, Ralph E, Philip Morris Professor, Crop Science
 Dewhirst, Mark W., Adjunct Professor, Dept Molecular Biomedical Scie
 DeWoskin, Robert S, Adjunct Associate Professor, Dept-Population,Health,Pathobi
 Diaz, Lope Max, Associate Professor, Art and Design
 Dickens, James William, USDA Professor, Biological And Agricultural En
 Dickey, David Alan, William Neal Reynolds Professor, Statistics
 Dickey, Elizabeth Carol, Professor, Materials Science & Engineering
 Dickey, Michael David, Assistant Professor, Chemical & Biomolecular Engr
 Dicks, Robert S, Associate Professor, English
 Dickson, Gary W, Emeritus Professor, Business Management-coll Of Mg
 Dillard, Emmett Urcey, Emeritus Associate Professor, Animal Science
 DiMeo, Andrew J, Teaching Assistant Professor, Biomedical Program - ENG
 Dixon, Darlene, Adjunct Associate Professor, Dept Molecular Biomedical Scie
 Dobrogosz, Walter J., Emeritus Professor, Microbiology
 Dodsworth, Robin M, Assistant Professor, English
 Doerr, Phillip David, Emeritus Professor, For & Envir Res Acad Research
 Doggett, Wesley Osborne, Emeritus Professor, Physics
 Dole, John M., Professor, Horticultural Science
 Domec, Jean-Christophe, Research Assistant Professor, FER Tree Physiology
 Donaldson, Robert Alan, Professor, Textile & Apparel, Technology
 Dong, Jingyan, Assistant Professor, Fitts Dept Indust & Syst Engr
 Donoso, Pablo Jorge, Adjunct Assistant Professor, For & Envir Res Acad Research
 Dorgeloh, Werner Gunther, Adjunct Associate Professor, For & Envir Res Acad Research
 Dorman, David C, Professor, Dept Molecular Biomedical Scie
 Doster, Joseph M., Professor, Nuclear Engineering
 Dougherty, Daniel B., Assistant Professor, Physics
 Dougherty, Phillip M, Adjunct Professor, For & Envir Res Acad Research
 Dow, Thomas A., Dean F. Duncan Distinguished University Professorship in Mechanical Engineering, Mechanical & Aerospace Engr
 Downs, Murray S., Emeritus Professor, Provost's Office
 Downs, Robert Jack, Emeritus Professor, Phytotron
 Doyle, Jon, SAS Institute Distinguished Professor of Computer Science, Computer Science-engr
 Drake, Mary Anne, Professor, Food,Bioprocess & Nutrition Sc
 Dreher, Kevin L, Adjunct Professor, Dept Molecular Biomedical Scie
 Drewes, Donald William, Professor, Psychology
 Driggers, Louis B., Emeritus Professor, Biological And Agricultural En
 Driscoll, Catherine M, Associate Professor, Philosophy & Religious Studies
 Duca, Alina Nicoleta, Teaching Assistant Professor, Mathematics
 Duckworth, Owen W, Assistant Professor, Soil Science
 Ducoste, Joel, Professor, Civil Const & Environ Engineer
 Dudley, Marc K., Assistant Professor, English
 Dudziak, Donald J., Emeritus Professor, Nuclear Engineering
 Duel-Hallen, Alexandra, Professor, Electrical & Computer Engr.
 Dunn, Joseph C., Emeritus Professor, Mathematics
 Dunn, Patricia C, Professor, 4-H Youth Dev & Fam & Cons Sci
 Dunn, Robert R., Associate Professor, Biology

Dunning, Dianne, Clinical Associate Professor, College Of Veterinary Medicine
 Dunphy, Edward James, Professor, Crop Science
 Durant, Jack D., Emeritus Professor, English
 Dutta, Rudra, Associate Professor, Computer Science-engr
 Dutton, John C, Associate Professor, Business Management-coll Of Mg
 Dvorak, William Stephen, Professor, CAMCORE-Cooperative
 Dye, Janice A, Adjunct Associate Professor, Dept of Clinical Sciences
 Dykstra, Michael Jack, Research Professor, Dept-Population,Health,Pathobi
 Eapen, Jacob, Assistant Professor, Nuclear Engineering
 Early, Peter Joseph, Clinical Assistant Professor, Dept of Clinical Sciences
 Earp, Julia B, Associate Professor, Business Management-coll Of Mg
 Easley, James E, Emeritus Professor, Ag & Resource Economics
 Ebert, Kimberly Lynn, Assistant Professor, Sociology & Anthropology
 Echehki, Tarek, Professor, Mechanical & Aerospace Engr
 Eckerlin, Herbert Martin, Professor, Mechanical & Aerospace Engr
 Edens, Frank W., Professor, Poultry Science
 Edge, Billy L, Professor, Civil Const & Environ Engineer
 Edmisten, Keith L, Professor, Crop Science
 Edmonson, William W., Adjunct Associate Professor, Electrical & Computer Engr.
 Edwards, Harriett C, Assistant Professor, 4-H Youth Dev & Fam & Cons Sci
 Edwards, Jack Ray, Professor, Mechanical & Aerospace Engr
 Edwards, Linda McMurry, Emeritus Professor, History
 Edwards, Louis Laird, Adjunct Professor, Forest Biomaterials
 Efimenko, Kirill, Research Assistant Professor, Chemical & Biomolecular Engr
 Eggleston, David B, Professor, Marine, Earth And Atmospheric
 Ehm, Margaret G, Adjunct Assistant Professor, Statistics
 Eischen, Jeffrey W., Associate Professor, Mechanical & Aerospace Engr
 Eisemann, Joan, Professor, Animal Science
 Eisen, Eugene, WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS, Animal Science
 El-Masry, Nadia A, Professor, Materials Science &Engineering
 El-Shafei, Ahmed Mohamed, Assistant Professor, Textile Engineering, Chemistry
 El-Shiekh, Aly H, Emeritus Professor, Textile & Apparel, Technology
 El-Tahlawy, Khaled Fathy, Adjunct Associate Professor, Textile Engineering, Chemistry
 Eling, Thomas Edward, Adjunct Associate Professor, Dept Molecular Biomedical Scie
 Elkan, Gerald Hugh, Emeritus Professor, Park Scholars
 Elliott, Sinikka G, Assistant Professor, Sociology & Anthropology
 Ellison, Donald C, Professor, Physics
 Ellovich, Risa S., Assistant Professor, Sociology & Anthropology
 Ellwood, Eric L., Emeritus Professor, College of Natural Resources
 Elmaghraby, Salah E., Emeritus Distinguished University Professor, Operations Research-engr
 Ely, John F., Emeritus Professor, Civil Const & Environ Engineer
 Emanuel, Ryan E, Assistant Professor, For & Envir Res Acad Research
 Emery, Donald Allen, Emeritus Professor, Graduate School-Dean's Office
 Emigh, Ted H., Associate Professor, Genetics
 Endicott, Ronald P, Associate Professor, Philosophy & Religious Studies
 Engell, Miles Dean, Teaching Assistant Professor, Biology
 Engen, Rodney L, Adjunct Associate Professor, Sociology & Anthropology
 Enslin, Johan H.R., Adjunct Associate Professor, Electrical & Computer Engr.
 Erchul, William P., Professor, Psychology
 Erickson, Edward W., Emeritus Professor, Economics-college Of Managemen
 Ernst, Jeremy Vaughn, Assistant Professor, Depart Of Math, Science, And T
 Esbenshade, Kenneth L., Professor, CALS - Academic Programs
 Escuti, Michael James, Associate Professor, Electrical & Computer Engr.
 Estes, Edmund A., Emeritus Professor, Ag & Resource Economics
 Estes, Patricia A, Research Associate Professor, Genetics
 Etherton, Brian John, Adjunct Assistant Professor, Marine, Earth And Atmospheric
 Eun, Do Young, Associate Professor, Electrical & Computer Engr.
 Evans, Robert J, Adjunct Assistant Professor, Electrical & Computer Engr.

Evans, Robert O, Professor, Biological And Agricultural En
 Evans, Timothy Matthew, Assistant Professor, Civil Const & Environ Engineer
 Everman, Wesley J, Assistant Professor, Crop Science
 Fackler, Paul L., Professor, Ag & Resource Economics
 Fahmy, Abdel A., Emeritus Professor, Materials Science & Engineering
 Fair, Barbara, Assistant Professor, Horticultural Science
 Fang, Shu C., Walter Clark Professor of Industrial Engineering, Fitts Dept Indust & Syst Engr
 Fang, Tiegang, Assistant Professor, Mechanical & Aerospace Engr
 Fantz, Paul R., Emeritus Professor, Horticultural Science
 Farin, Charlotte E, Professor, Animal Science
 Farin, Peter W, Associate Professor, Dept-Population,Health,Pathobi
 Farkas, Brian E, Professor, Food,Bioprocess & Nutrition Sc
 Farrier, Maurice H., Emeritus Professor, Entomology
 Fathi, Yahya, Professor, Fitts Dept Indust & Syst Engr
 Faulkner, Gary Doyle, Emeritus Associate Professor, Mathematics
 Fauntleroy, Amassa, Professor, Mathematics
 Favorov, Oleg V, Research Associate Professor, Biomedical Program - ENG
 Fedkiw, Peter S., Professor, Chemical & Biomolecular Engr
 Feeny, Thomas P., Professor, Foreign Languages And Literatu
 Felder, Richard M., Emeritus Named Professor, Chemical & Biomolecular Engr
 Fellner, Vivek, Associate Professor, Animal Science
 Fels, John E, Adjunct Associate Professor, Parks, Recreation & Tourism Mg
 Felts, James Vernon, Adjunct Assistant Professor, Poultry Science
 Fenn, Molly A., Teaching Assistant Professor, Mathematics
 Ferguson, Scott M, Assistant Professor, Mechanical & Aerospace Engr
 Ferket, Peter R., William Neal Reynolds Professor, Poultry Science
 Fernandez, Gina E, Professor, Horticultural Science
 Ferreira, Davis Fernandes, Adjunct Associate Professor, Biochemistry
 Ferrer, Rodolfo M, Adjunct Assistant Professor, Nuclear Engineering
 Ferrier, Brad S, Adjunct Associate Professor, Marine, Earth And Atmospheric
 Ferzli, Miriam G, Teaching Assistant Professor, Biology
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 Findenegg, Gerhard H, Adjunct Professor, Chemical & Biomolecular Engr
 Fine, Howard A, Adjunct Professor, Dept-Population,Health,Pathobi
 Finley, Charles C, Adjunct Associate Professor, Biomedical Program - ENG
 Fiscus, Edwin L., USDA Professor, Crop Science
 Fish, Richard E, Associate Professor, Dept of Clinical Sciences
 Fisher, Douglas, Emeritus Professor, Economics-college Of Managemen
 Fisher, John S., Emeritus Professor, Civil Const & Environ Engineer
 Fisher, Loren R, Philip Morris Professorship (Named Associate Professor), Crop Science
 Fites, Roger C., Emeritus Professor, Plant Biology
 Fitzgerald, Patrick J, Associate Professor, Art and Design
 Fitzpatrick, Scott Michael, Associate Professor, Sociology & Anthropology
 Flammer, Keven, Professor, Dept of Clinical Sciences
 Flath, David Joseph, Professor, Economics-college Of Managemen
 Fleenor, John W, Adjunct Associate Professor, Psychology
 Fleisher, Lloyd Norman, Professor, Dept Molecular Biomedical Scie
 Fleming, Henry Pridgen, Emeritus USDA Professor, Food,Bioprocess & Nutrition Sc
 Fleming, Jean E., Adjunct Assistant Professor, Ldshp Plcy & Adult & Higher Ed
 Fletcher, Oscar J, Professor, Dept-Population,Health,Pathobi
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 Flowers, James R, Clinical Associate Professor, Dept-Population,Health,Pathobi
 Flowers, William Lucas, Professor, Animal Science
 Floyd, Brian Allan, Associate Professor, Electrical & Computer Engr.
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 Fodor, Ronald Victor, Professor, Marine, Earth And Atmospheric

Foegeding, Edward Allen, William Neal Reynolds Distinguished Professor, Food, Bioprocess & Nutrition Sc
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 Fonteno, William Carl, Professor, Horticultural Science
 Foote, Vincent, Emeritus Professor, Industrial Design
 Ford, Richard Banbury, Professor, Dept of Clinical Sciences
 Forest, M. Gregory, Professor, Biomedical Program - ENG
 Fornaro, Robert Joseph, Professor, Computer Science-engr
 Fornes, Raymond Earl, Professor, College Of Phy & Math Sciences
 Fortner, Brand, Research Professor, Physics
 Fountain, John Crothers, Professor, Marine, Earth And Atmospheric
 Fox, Andrew Alan, Assistant Professor, Landscape Architecture
 Frampton, Lewis John, Professor, For & Envir Res Acad Research
 Frank, Steven D, Assistant Professor, Entomology
 Franke, John E., Professor, Mathematics
 Franklin, E. Carlyle, Emeritus Professor, For & Envir Res Acad Research
 Franks, Robert Graham, Associate Professor, Genetics
 Franzen, Stefan, Professor, Chemistry
 Franzon, Paul D., Professor, Electrical & Computer Engr.
 Frederick, Douglas J., Professor, For & Envir Res Acad Research
 Freedman, Leon D., Emeritus Professor, Chemistry
 Freeh, Vincent W, Associate Professor, Computer Science-engr
 Freeman, Harold S., Ciba-Geigy Distinguished Professor, College Of Textiles-dean's Off
 Freeman, McArthur, Assistant Professor, Art and Design
 Frey, Henry C, Professor, Civil Const & Environ Engineer
 Friend, Craig T, Professor, History
 Frohlich, Carla, Assistant Professor, Physics
 Fryer, Liana Faith, Research Assistant Professor, Ofc of Research & Innovation
 Fuentes, Montserrat, Professor, Statistics
 Fuller, Frederick J., Professor, Dept-Population, Health, Pathobi
 Fuller, Nicholas Colvin Masi, Adjunct Professor, Physics
 Fulp, Ronald O., Professor, Mathematics
 Funkhouser, Edward T., Associate Professor, Communication
 Fusarelli, Bonnie C, Associate Professor, Ldshp Plcy & Adult & Higher Ed
 Fusarelli, Lance D., Professor, Ldshp Plcy & Adult & Higher Ed
 Gabr, Mohammed Awad, Professor, Civil Const & Environ Engineer
 Gadsby, John E., Professor, Dept Molecular Biomedical Scie
 Gallagher, Victoria J, Professor, College Of Humanities & Soc SC
 Gallippi, Caterina M, Assistant Professor, Biomedical Program - ENG
 Gamcsik, Michael, Associate Professor, Biomedical Program - ENG
 Gard, Kevin, Adjunct Assistant Professor, Electrical & Computer Engr.
 Gardner, Beth Ann, Assistant Professor, Fisheries and Wildlife Program
 Gardner, Randolph G., Emeritus Professor, Horticultural Science
 Gardner, Robin Pierce, Professor, Nuclear Engineering
 Gardner, Sarah Y., Associate Professor, Dept of Clinical Sciences
 Garlich, Jimmy Dale, Emeritus Professor, Poultry Science
 Garoutte, Dennis E., Emeritus Associate Professor, Mathematics
 Garrett, Paul E, Adjunct Associate Professor, Physics
 Garrigan, Shelley E., Assistant Professor, Foreign Languages And Literatu
 Garson, George D, Professor, Public & International Affairs
 Garval, Michael D, Associate Professor, Foreign Languages And Literatu
 Gasso, Santiago, Adjunct Assistant Professor, Marine, Earth And Atmospheric
 Gayles, Joy Gaston, Associate Professor, Ldshp Plcy & Adult & Higher Ed
 Geary, Cynthia Waszak, Adjunct Assistant Professor, Ldshp Plcy & Adult & Higher Ed
 Gebreyes, Wondwossen A, Associate Professor, Dept-Population, Health, Pathobi
 Gehl, Ronald J, Assistant Professor, Soil Science
 Gehringer, Edward F., Associate Professor, Computer Science-engr
 Gelley, Ora, Assistant Professor, English
 Genereux, David Paul, Professor, Marine, Earth And Atmospheric

Genzer, Jan, Celanese Acetate Professorship in Chemical and Biomolecular Engineering, Chemical & Biomolecular Engr
Gerard, Mathew P., Clinical Associate Professor, Dept of Clinical Sciences
Gerig, Thomas Michael, Emeritus Professor, Statistics
Gerler, Edwin R, Professor, Curr, Instruc & Counselor Educ
Gernat, Abel G., Adjunct Assistant Professor, Poultry Science
Getsinger, Kurt D, Adjunct Professor, Crop Science
Getzen, Forrest W, Emeritus Professor, Chemistry
Ghashghaei, Troy, Assistant Professor, Dept Molecular Biomedical Scie
Ghiladi, Reza A, Assistant Professor, Chemistry
Ghosh, Sujit K, Professor, Statistics
Ghosh, Tushar K., Professor, Textile Engineering, Chemistry
Ghoshal, Subhashis, Associate Professor, Statistics
Gibson, Gregory C, Adjunct Professor, Genetics
Gibson, James L, Adjunct Professor, Horticultural Science
Giesbrecht, Francis Gerhard, Emeritus Professor, Statistics
Gilbert, John H., Emeritus Associate Professor, Public & International Affairs
Gilger, Brian C, Professor, Dept of Clinical Sciences
Gillan, Douglas J, Professor, Psychology
Gilleskie, Gary Louis, Teaching Associate Professor, BTEC-Biomfg Training Ed Ctr
Gilliam, James F, Professor, Biology
Gilliam, James W., WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS, Soil Science
Gilligan, John G., Professor, Nuclear Engineering
Gilmartin, David P., Professor, History
Gilmour, Matthew Ian, Adjunct Assistant Professor, Dept-Population,Health,Pathobi
Gimeno, Isabel M, Assistant Professor, Dept-Population,Health,Pathobi
Giraudel, Jerome M, Adjunct Assistant Professor, Dept-Population,Health,Pathobi
Glass, Joseph Conrad, Emeritus Professor, Adult & Higher Education
Glazener, Edward Walker, Emeritus Professor, CALS - Academic Programs
Glisson, Tildon H, Emeritus Professor, Electrical & Computer Engr.
Godfrey, A. Blanton, Joseph D. Moore Professorship of Textile and Apparel Management and Technology, College Of Textiles-dean's Off
Godwin, John R, Associate Professor, Biology
Goetze, Alfred John, Emeritus Professor, Electrical & Computer Engr.
Gold, Harvey J., Emeritus Professor, Statistics
Goldberg, Richard L., Research Associate Professor, Biomedical Program - ENG
Goldfarb, Barry, Professor, For & Envir Res Acad Research
Goldstein, Irving S., Emeritus Professor, Forest Biomaterials
Goldstein, Joyce Allene, Adjunct Professor, Toxicology
Golub, Robert, Professor, Physics
Gomez, Joseph A., Emeritus Professor, English
Gomez, Shawn M., Assistant Professor, Biomedical Program - ENG
Gonzalez-Sullivan, Leila, Adjunct Professor, Adult & Higher Education
Goode, Larry Richard, Adjunct Associate Professor, Civil Const & Environ Engineer
Goodell, Lora Suzanne, Assistant Professor, Food,Bioprocess & Nutrition Sc
Gooding, Guy V, Emeritus Professor, Plant Pathology
Goodman, Major M., William Neal Reynolds Distinguished University Professor, Crop Science
Goodnight, James Howard, Adjunct Professor, Statistics
Goodwin, Barry K, William Neal Reynolds Professor, Ag & Resource Economics
Gookin, Jody L, Assistant Professor, Dept of Clinical Sciences
Gopalarathnam, Ashok, Associate Professor, Mechanical & Aerospace Engr
Gordh, Gordon, Adjunct Professor, Entomology
Gorga, Russell E., Associate Professor, Textile Engineering, Chemistry
Gorham, Bertha M, Adjunct Associate Professor, Curr, Instruc & Counselor Educ
Gorman, Christopher B, Professor, Chemistry
Goshe, Michael B., Associate Professor, Biochemistry
Gould, Christopher R., Professor, College Of Phy & Math Sciences
Gould, Fred L., William Neal Reynolds Distinguished Professor, Entomology
Gould, Richard David, R. J. Reynolds Professor in Mechanical and Aerospace Engineering, Mechanical & Aerospace Engr

Govoni, John Jeffrey, Adjunct Professor, Biology
Grable, Lisa L, Adjunct Assistant Professor, The Science House - PAMS
Grabow, Garry L, Associate Professor, Biological And Agricultural En
Gracz, Hanna, Research Associate Professor, Biochemistry
Grady, Perry L., Emeritus Professor, Textile Engineering, Chemistry
Grainger, John J., Professor, Electrical & Computer Engr.
Grand, Larry Frank, Professor, Plant Pathology
Grandage, Arnold H., Emeritus Professor, Statistics
Grant, Christine S., Professor, College Of Engineering-dean's
Grant, Edward, Professor, Electrical & Computer Engr.
Grant, William Cullen, Professor, Biology
Grappendorf, Heidi L, Assistant Professor, Parks, Recreation & Tourism Mg
Graves, Alexandria K, Assistant Professor, Soil Science
Gray, Denis O., Professor, Psychology
Gray, Leon Earl, Adjunct Professor, Toxicology
Green, David Patrick, Professor, Food,Bioprocess & Nutrition Sc
Green, James T, Professor, Crop Science
Greenberg, Cathryn Hoben, Adjunct Associate Professor, For & Envir Res Acad Research
Greene, Steven H, Associate Professor, Public & International Affairs
Greenfield, Derek Franklin, Teaching Assistant Professor, College Of Education
Greenlee, William F, Adjunct Professor, Toxicology
Greenstein, Theodore Neuman, Professor, Sociology & Anthropology
Gregory, James D, Emeritus Professor, For & Envir Res Acad Research
Gregory, Max E., Emeritus Professor, Food,Bioprocess & Nutrition Sc
Gremaud, Pierre Alain, Professor, Mathematics
Grennes, Thomas J., Professor, Economics-college Of Managemen
Griffin, Clifford E, Associate Professor, Public & International Affairs
Griffis, Dieter P., Research Associate Professor, Engineering Research
Griggs, John Richard, Teaching Assistant Professor, Mathematics
Grimes, Jesse Lee, Professor, Poultry Science
Grimmett, Marc Anderson, Assistant Professor, Curr, Instruc & Counselor Educ
Grimwood, James M., Alumni Distinguished Undergraduate Professor, English
Grindem, Carol B., Professor, Dept-Population,Health,Pathobi
Grochowski, Colleen O'Connor, Adjunct Assistant Professor, Ldshp Plcy & Adult & Higher Ed
Gross, Charlotte, Professor, English
Gross, Harry D., Emeritus Professor, Crop Science
Gross, Kevin, Associate Professor, Statistics
Gross, Ruth Vera, Professor, Foreign Languages And Literatu
Grossfeld, Robert M., Professor, Biology
Grossman, Julie Marie, Assistant Professor, Soil Science
Grouverman, Alexei, Research Associate Professor, Materials Sci Engr-Grads&Temps
Grove, Thurman L, Emeritus Professor, Biology
Grozinger, Christina M., Adjunct Associate Professor, Entomology
Gruehn, Daniel, Assistant Professor, Psychology
Grunden, Amy Michele, Associate Professor, Microbiology
Gu, Xiaohui, Assistant Professor, Computer Science-engr
Gubbins, Keith E, Worley H. Clark Distinguished University Professor, Chemical & Biomolecular Engr
Guddati, Murthy N., Associate Professor, Civil Const & Environ Engineer
Guion, Lisa A, Professor, Administration - Research Serv
Gumpertz, Marcia Lynn, Professor, Office Inst Equity & Diversity
Gundogdu, Kenan, Assistant Professor, Physics
Gunnoe, Thomas Brent, Associate Professor, Chemistry
Gunter, Christopher, Assistant Professor, Horticultural Science
Gupta, Abhinav, Associate Professor, Civil Const & Environ Engineer
Gupta, Ajaya K., Emeritus Professor, Civil Const & Environ Engineer
Gurgel, Gisele Candia Passador, Teaching Assistant Professor, BTEC-Biomfg Training Ed Ctr
Gurgel, Patrick V, Adjunct Assistant Professor, Chemical & Biomolecular C&G
Gurley, Edward D., Emeritus Associate Professor, Civil Const & Environ Engineer

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 Guy, James S., Professor, Dept-Population,Health,Pathobi
 Gwynn, George Richard, Emeritus USDA Professor, Crop Science
 Haaland, Perry D, Adjunct Professor, Statistics
 Haase, David G., Professor, Physics
 Habibi, Youssef, Research Assistant Professor, Forest Biomaterials
 Haddad, Nicholas M, Professor, Biology
 Haenn, Nora M, Associate Professor, Interdisciplinary Studies
 Hafner, Johannes, Assistant Professor, Philosophy & Religious Studies
 Hagler, Winston Murry, Professor, Poultry Science
 Haider, Mansoor Abbas, Associate Professor, Mathematics
 Haigler, Candace Hope, Professor, Crop Science
 Hain, Fred P., Professor, Entomology
 Halberstadt, Amy G., Professor, Psychology
 Hale, Francis J., Emeritus Professor, Mechanical & Aerospace Engr
 Hale, Scott A, Professor, Biological And Agricultural En
 Haley, Richard L, Emeritus Assistant Professor, Ldshp Plcy & Adult & Higher Ed
 Hall, Alastair R., Professor, Economics-college Of Managemen
 Hall, Anthony Douglas, Adjunct Professor, Psychology
 Hall, Carol K., Camille Dreyfus Distinguished University Professor, Chemical & Biomolecular Engr
 Hall, Charles Edward, Associate Professor, Mechanical & Aerospace Engr
 Hall, George L., Emeritus Professor, Physics
 Hall, Jodi K, Clinical Assistant Professor, Social Work
 Hallen, Hans D, Professor, Physics
 Halperen, Max, Emeritus Professor, Interdisciplinary Studies
 Halpern, Nicholas, Associate Professor, English
 Hamilton, Paul T, Assistant Professor, Microbiology
 Hamlett, Patrick W, Associate Professor, Interdisciplinary Studies
 Hamme, John Valentine, Emeritus Associate Professor, Materials Science & Engineering
 Hammerberg, Bruce, Professor, Dept-Population,Health,Pathobi
 Hammond, Robert Guthrie, Assistant Professor, Economics-college Of Managemen
 Hamon, Nicholas M., Adjunct Professor, Entomology
 Hamouda, Hechmi, Professor, Textile Engineering, Chemistry
 Hanck, Kenneth W., Professor, Chemistry
 Handfield, Robert B, Bank of America Distinguished University Professor, Business Management-coll Of Mg
 Hanel, Rita M, Clinical Assistant Professor, Dept of Clinical Sciences
 Hanley, Linda Kay, William Neal Reynolds Professor, Biochemistry
 Hanna, Adel F, Adjunct Assistant Professor, Marine, Earth And Atmospheric
 Hansen, Arthur P., Emeritus Professor, Food,Bioprocess & Nutrition Sc
 Hansen, Bernard, Associate Professor, Dept of Clinical Sciences
 Hansen, Donald Joseph, Emeritus Assistant Professor, Mathematics
 Hansen, Gary R, Assistant Professor, Animal Science
 Hanson, Dana J., Associate Professor, Food,Bioprocess & Nutrition Sc
 Hanson, Durwin M., Emeritus Professor, CED General Support
 Hanson, John M, Emeritus Distinguished University Professor, Civil Const & Environ Engineer
 Hanson, Warren D., Emeritus Professor, Genetics
 Harazin, William Dennis, Adjunct Associate Professor, Textile & Apparel, Technology
 Hardie, Elizabeth Mills, Professor, Dept of Clinical Sciences
 Hardin, Charles C., Associate Professor, Biochemistry
 Hardin, James W, Emeritus Professor, Plant Biology
 Hardy, David H, Adjunct Assistant Professor, Soil Science
 Harfoush, Khaled Abdel Hamid, Associate Professor, Computer Science-engr
 Harlim, John, Assistant Professor, Mathematics
 Harmon, Frank C., Associate Professor, Architecture
 Harmon, Russell S, Adjunct Professor, Marine, Earth And Atmospheric
 Harms, Craig A, Associate Professor, Dept of Clinical Sciences
 Harper, Craig Andrew, Adjunct Associate Professor, For & Envir Res Acad Research
 Harper, James D, Emeritus Professor, Entomology

Harrell, Cleon W, Emeritus Associate Professor, Economics-college Of Managemen
 Harrell, Robert J, Adjunct Associate Professor, Animal Science
 Harrington, Charles D, Adjunct Associate Professor, Marine, Earth And Atmospheric
 Harris, Gabriel Keith, Assistant Professor, Food,Bioprocess & Nutrition Sc
 Harris, James R., Emeritus Professor, Poultry Science
 Harris, William C., Emeritus Professor, History
 Harrison, Antony Howard, Distinguished University Professor, English
 Harrolle, Michelle G, Assistant Professor, Parks, Recreation & Tourism Mg
 Harrysson, Ola Lars Anders, Associate Professor, Fitts Dept Indust & Syst Engr
 Hart, Clarence, Emeritus Professor, Forest Biomaterials
 Hart, Franklin D., Emeritus Professor, Ofc of Research & Innovation
 Hart, Peter Wayne, Adjunct Associate Professor, Forest Biomaterials
 Hartwig, Robert E., Professor, Mathematics
 Harvey, Raymond W., Emeritus Professor, Animal Science
 Harwood, Karey Alison, Associate Professor, Philosophy & Religious Studies
 Haskett, Mary E, Professor, Psychology
 Hassan, Awatif E, Emeritus Professor, For & Envir Res Acad Research
 Hassan, Hassan A., Professor, Mechanical & Aerospace Engr
 Hassan, Hosni Moustafa, Professor, Microbiology
 Hassan, Tasnim, Professor, Civil Const & Environ Engineer
 Hatch, Luther Upton, Research Professor, Ag & Resource Economics
 Hatcher, Timothy G, Associate Professor, Ldshp Plcy & Adult & Higher Ed
 Hauck, Marlene L, Associate Professor, Dept of Clinical Sciences
 Haugh, Jason M, Professor, Chemical & Biomolecular Engr
 Hauser, Elizabeth R, Adjunct Associate Professor, Statistics
 Hauser, John R., Distinguished Professor of Electronic Devices and Materials, Electrical & Computer Engr.
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 Havenstein, Gerald B., Emeritus Professor, Poultry Science
 Havlin, John L, Professor, Soil Science
 Havner, Kerry S., Emeritus Professor, Civil Const & Environ Engineer
 Hawari, Ayman I, Professor, Nuclear Engineering
 Hawkins, Eleanor C, Professor, Dept of Clinical Sciences
 Hawkins, Mary Beth, Teaching Assistant Professor, Biology
 Haynie, William J, Professor, Depart Of Math, Science, And T
 Hazel, Dennis W., Associate Professor, Forestry Extension
 He, Lin, Assistant Professor, Chemistry
 He, Ruoying, Associate Professor, Marine, Earth And Atmospheric
 Headen, Alvin E., Associate Professor, Economics-college Of Managemen
 Healey, Christopher Graham, Associate Professor, Computer Science-engr
 Heatwole, Harold F, Professor, Biology
 Heber, Steffen, Associate Professor, Computer Science-engr
 Heck, Walter Webb, Emeritus USDA Professor, Administration - Research Serv
 Heggen-Peay, Cherilyn L, Adjunct Assistant Professor, Poultry Science
 Heimbach, Clinton L., Emeritus Professor, Civil Const & Environ Engineer
 Heiniger, Ronnie William, Professor, Crop Science
 Heise, Ryan J, Adjunct Assistant Professor, Biology
 Heitman, Joshua L, Assistant Professor, Soil Science
 Heitmann, John A, Professor, Forest Biomaterials
 Helminck, Aloysius G, Professor, Mathematics
 Hemenway, Cynthia L, Professor, Biochemistry
 Henard, David H, Associate Professor, Business Management-coll Of Mg
 Henderson, Karla Ann, Professor, Parks, Recreation & Tourism Mg
 Henderson, Warren R., Emeritus Professor, Horticultural Science
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 Hentz, Forrest Clyde, Professor, Chemistry
 Herbert, David A, Adjunct Professor, Entomology
 Hergeth, Helmut H, Associate Professor, Textile & Apparel, Technology

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Hester, M Thomas, Distinguished Professor, English
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Hightower, Joseph E, USDI Professor, Biology
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Hillmann, Ruediger C., Emeritus Associate Professor, Entomology
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Hinks, David, Professor, Textile Engineering, Chemistry
Hinshaw, Jeffrey M., Professor, Biology
Hobbs, Heidi H, Associate Professor, Public & International Affairs
Hobbs, Joseph Patrick, Emeritus Professor, History
Hobgood, Thomas N, Emeritus Professor, Administration - Extension Ser
Hodge, Gary Ray, Professor, CAMCORE-Cooperative
Hodge, George Lawrence, Associate Professor, Textile Engineering, Chemistry
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Hodgson, Thom Joel, James T. Ryan Distinguished Professor of Industrial Engineering and Furniture Manufacturing, Fitts Dept
Indust & Syst Engr
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Hoefer, Mark Alan, Assistant Professor, Mathematics
Hoenig, John M, Adjunct Professor, Statistics
Hofelt, Christopher Scott, Teaching Assistant Professor, Toxicology
Hoffman, Jacquelyn Beth, Assistant Professor, Poultry Science
Hoffmann, William A, Associate Professor, Plant Biology
Hoit, Marc I, Professor, VC for Off of Info Technology
Holcomb, Lori B., Assistant Professor, Curr, Instruc & Counselor Educ
Holl, Justin W, Adjunct Assistant Professor, Animal Science
Holland, James B, USDA Professor, Crop Science
Hollebrands, Karen Flanagan, Associate Professor, Depart Of Math, Science, And T
Holley, Grant L, Adjunct Assistant Professor, College Of Education
Holley, Linda T., Emeritus Professor, English
Hollmann, Thomas, Assistant Professor, Business Management-coll Of Mg
Holmes, Shawn Yvette, Assistant Professor, Depart Of Math, Science, And T
Holmes, Thomas P, Adjunct Professor, For & Envir Res Acad Research
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Holton, William C., Adjunct Professor, Electrical & Computer Engr.
Homyack, Jessica Anne, Adjunct Assistant Professor, For & Envir Res Acad Research
Honeycutt, Barbi Tart, Adjunct Assistant Professor, Graduate School-Dean's Office
Honeycutt, Thomas Lynn, Associate Professor, Computer Science-engr
Hong, Hoon, Professor, Mathematics
Hooker, Deborah A., Teaching Associate Professor, English
Hooker, Willard E., Professor, Horticultural Science
Hooper, Percy Rivera, Associate Professor, Industrial Design
Hoover, Maurice William, Emeritus Professor, Food,Bioprocess & Nutrition Sc
Hoover, Michael T., Professor, Soil Science
Hopfenberg, Harold B., Camille Dreyfus Professor Emeritus, Chemical & Biomolecular Engr
Hopkins, Brinton Alden, Professor, Animal Science
Hopkins, Thomas Sawyer, Research Professor, Marine, Earth And Atmospheric
Hoppin, Jane A, Adjunct Professor, Toxicology
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Horne, Erin Thomas, Clinical Assistant Professor, College Of Education

Horowitz, Jonathan M, Associate Professor, Dept Molecular Biomedical Scie
 Horton, Horace R, WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS, Biochemistry
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 Hren, John Joseph, Emeritus Professor, Materials Science & Engineering
 Hsiang, Simon M, Adjunct Professor, Fitts Dept Indust & Syst Engr
 Hu, Jianxin, Assistant Professor, Architecture
 Hu, Shuijin, Associate Professor, Plant Pathology
 Huang, Alex Qin, Progress Energy Distinguished Professor in Electrical and Computer Engineering, Electrical & Computer Engr.
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 Huang, Jeng Sheng, Professor, Plant Pathology
 Hubbe, Martin A, Buckman Professor, Forest Biomaterials
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 Hubisz, John L, Adjunct Professor, Physics
 Hudson, Lola C., Professor, Dept Molecular Biomedical Scie
 Hudson, Peyton B, Emeritus Associate Professor, Textile & Apparel, Technology
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 Huffman, Paul R, Professor, Physics
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 Hughes, Brian L, Professor, Electrical & Computer Engr.
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 Jameel, Hasan, Elis and Signe Olsson Professorship, Forest Biomaterials
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Knowles, Charles Ernest, Emeritus Associate Professor, Mar, Earth & Atmos Sci Grad-Tm

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Koci, Matthew D., Assistant Professor, Poultry Science

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Kogan, Irina Aleksandrovna, Associate Professor, Mathematics

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Kraus, Helen Tyler, Assistant Professor, Horticultural Science

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Krim, Hamid, Professor, Electrical & Computer Engr.

Krim, Jacqueline, Professor, Physical Sciences Research

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Krishnamurthy, Srinivasan, Associate Professor, MBA Program

Kriz, George James, Emeritus Professor, Administration - Research Serv

Krotee, March Lee, Professor, Physical Education
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Krute, Linda D, Adjunct Assistant Professor, College Of Engineering-dean's
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Kullman, Seth William, Assistant Professor, Toxicology
Kunkel, Kenneth E, Research Professor, Marine, Earth And Atmospheric
Kuraparthi, Vasu, Assistant Professor, Crop Science
Kuznetsov, Andrey Valerevich, Professor, Mechanical & Aerospace Engr
Kwak, Thomas J, USDI Professor, Biology
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Lado, Fred, Emeritus Professor, Physics
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Lamar, Traci Ann May, Associate Professor, Textile & Apparel, Technology
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Laney, Reid W, Adjunct Assistant Professor, Biology
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Laux, Dorianne Louise, Professor, English
Lavery, John, Adjunct Professor, Mathematics
Lavopa, Anthony J., Emeritus Professor, History
Law, Jerry M, Professor, Dept-Population,Health,Pathobi
Lazzati, Davide, Assistant Professor, Physics
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Leath, Steven, Professor, Plant Pathology
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Lee, Dean J., Associate Professor, Physics
Lee, Hollylynne Stohl, Associate Professor, Depart Of Math, Science, And T
Lee, Hoon Joo, Assistant Professor, Textile & Apparel, Technology
Lee, John Kelly, Associate Professor, Curr, Instruc & Counselor Educ
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 Lee, Yong-Hwan, Adjunct Associate Professor, Plant Pathology
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 Leith, Carlton James, Emeritus Professor, Marine, Earth And Atmospheric
 Leithold, Elana L., Professor, Marine, Earth And Atmospheric
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 Leonard, Rebecca, Emeritus Associate Professor, Communication
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 Levenbook, Barbara B., Associate Professor, Philosophy & Religious Studies
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 Li, Yi-Ju, Adjunct Assistant Professor, Statistics
 Li, Zhilin, Professor, Mathematics
 Lichtenwalner, Dan J, Research Assistant Professor, Materials Science &Engineering
 Liebl, Rex, Adjunct Professor, Crop Science
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 Lila, Mary Ann, David H. Murdock Distinguished Professor approved by Provost & Chancellor 8/4/2010., Kannapolis Research
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Weare, Walter Warren, Assistant Professor, Chemistry
Weber, Jerome B., Emeritus Professor, Crop Science
Wechsler, Monroe S, Adjunct Professor, Nuclear Engineering
Weeks, Willard Wesley, Emeritus Professor, Crop Science
Weems, Kimberly S., Teaching Associate Professor, Statistics
Wegmann, Karl William, Assistant Professor, Marine, Earth And Atmospheric
Wehner, Todd Craig, Professor, Horticultural Science
Wehring, Bernard William, Research Professor, Nuclear Reactor Program
Weinhold, Paul S, Research Associate Professor, Biomedical Program - ENG
Weisel, Deborah Lamm, Teaching Assistant Professor, Public & Internt'l Affairs Res
Weiss, Ira R, Professor, Dean's Office-college Of Manag
Weissinger, Arthur K., Emeritus Professor, Crop Science
Weisz, P Randall, Professor, Crop Science
Welby, Charles W., Emeritus Professor, Marine, Earth And Atmospheric
Welch, Milton Lamont, Assistant Professor, English
Wellman, J D, Emeritus Professor, Parks, Recreation & Tourism Mg
Wells, J C, Emeritus Professor, Plant Pathology
Wells, Janice G, Assistant Professor, Social Work
Wells, Randy, Professor, Crop Science
Welsch, Frank, Adjunct Professor, Dept Molecular Biomedical Scie
Wenig, Robert E., Emeritus Associate Professor, Depart Of Math, Science, And T
Weninger, Keith R., Associate Professor, Physics
Wentworth, Thomas R., Professor, Plant Biology

Werner, Dennis J., J.C. Raulston Distinguished Professor, Horticultural Science
Wernsman, Earl A., WILLIAM NEAL REYNOLDS PROFESSOR EMERITUS, Crop Science
Wertz, Dennis W., Associate Professor, Chemistry
Wesler, Oscar, Emeritus Professor, Statistics
Wessels, Walter J., Professor, Economics-college Of Managemen
West, Harry C., Emeritus Associate Professor, English
Westerman, Philip W., Emeritus Professor, Biological And Agricultural En
Westmoreland, Phillip R, Professor, Chemical & Biomolecular Engr
Whangbo, Myung H., Professor, Chemistry
Wheatley, John H., Emeritus Associate Professor, Depart Of Math, Science, And T
Wheeler, Elisabeth A., Emeritus Professor, Forest Biomaterials
Wheeler, Mary Elizabeth, Emeritus Professor, History
Whetten, Ross W., Associate Professor, Tree Improvement Cooperative
Whipker, Brian E, Professor, Horticultural Science
Whisnant, Charles S, Associate Professor, Animal Science
Whitacre, Michael David, Associate Professor, Dept of Clinical Sciences
Whitaker, Thomas B., Emeritus Professor, Biological And Agricultural En
White, Jeffery L., Associate Professor, Chemistry
White, Jeffrey G., Associate Professor, Soil Science
White, Raymond Cyrus, Emeritus Professor, Chemistry
White, Robert E., Professor, Mathematics
Whitlow, Lon Weidner, Professor, Animal Science
Whitten, Jerry Lynn, Professor, Chemistry
Wiebe, Eric N, Associate Professor, Depart Of Math, Science, And T
Wiegmann, Brian M, Professor, Entomology
Wieland, Bruce W, Adjunct Associate Professor, Nuclear Engineering
Wiener, Russell W, Adjunct Associate Professor, Marine, Earth And Atmospheric
Wiese, Dennis Eugene, Adjunct Assistant Professor, Ldshp Plcy & Adult & Higher Ed
Wiley, Stephen B, Associate Professor, Communication
Wilk, John C, Emeritus Professor, Animal Science
Wilkerson, Gail G., Professor, Crop Science
Wilkinson, Richard R., Emeritus Professor, Landscape Architecture
Williams, Billy M, Associate Professor, Civil Const & Environ Engineer
Williams, Charles Michael, Professor, Dept Of Poultry Science
Williams, Christopher J., Adjunct Assistant Professor, Poultry Science
Williams, Cranos M, Assistant Professor, Electrical & Computer Engr.
Williams, Gavin John, Assistant Professor, Chemistry
Williams, James O., Emeritus Professor, Public & International Affairs
Williams, Laurel E, Associate Professor, Dept of Clinical Sciences
Williams, Laurie A, Associate Professor, Computer Science-engr
Williams, Linda R., Clinical Associate Professor, Social Work
Williams, Mary Camero, Emeritus Professor, English
Williams, Paul F., Professor, Accounting-college Of Manageme
Williams, Porter, Emeritus Professor, English
Williams, Sandra W, Adjunct Assistant Professor, Ldshp Plcy & Adult & Higher Ed
Williamson, John D, Associate Professor, Horticultural Science
Willits, Daniel H., Professor, Graduate School-Dean's Office
Willoughby, Julie Ann, Assistant Professor, Textile Engineering, Chemistry
Wilson, Beth Evelyn, Emeritus Associate Professor, Parks, Recreation & Tourism Mg
Wilson, Elizabeth B, Associate Professor, Agricultural & Extension Educa
Wilson, James Reed, Professor, Fitts Dept Indust & Syst Engr
Wilson, John Michael, Adjunct Assistant Professor, Electrical & Computer Engr.
Wilson, Lorenzo G., Professor, Horticultural Science
Wilson, Mark A, Associate Professor, Psychology
Wilson, Richard Ferrol, USDA Professor, Crop Science
Wilson, Vickie S, Adjunct Assistant Professor, Toxicology
Wimberley, Ronald C., William Neal Reynolds Distinguished Professor, Sociology And Anthropology
Winchester, Samuel Clyde, Emeritus Named Professor, Textile & Apparel, Technology

Wineland, Michael J., Professor, Poultry Science
 Winner, William E, Professor, Environmental Sci & Nat Res
 Winston, Hubert, Extension Associate Professor, Chemical & Biomolecular G&T
 Wipplinger, Jonathan Otto, Assistant Professor, Foreign Languages And Literatu
 Wiseman, Angela Michelle, Assistant Professor, Elementary Education
 Wishy, Bernard W., Emeritus Professor, History
 Witt, Mary Ann, Emeritus Professor, Foreign Languages And Literatu
 Wogalter, Michael S, Professor, Psychology
 Wohlgenant, Michael K., William Neal Reynolds Distinguished Professor, Ag & Resource Economics
 Wolcott, Donna Lee, Emeritus Associate Professor, Marine, Earth And Atmospheric
 Wolcott, Thomas G., Professor, Marine, Earth And Atmospheric
 Wolfe, Barbara A., Adjunct Assistant Professor, Dept of Clinical Sciences
 Wolfinger, Russell D., Adjunct Professor, Statistics
 Wolford, Tonya E, Assistant Professor, Foreign Languages And Literatu
 Wolfram, Walter A, William C. Friday Distinguished University Professorship, English
 Wollenzien, Paul L, Professor, Biochemistry
 Woodard, Roger, Teaching Associate Professor, Statistics
 Woodrum, Eric M., Professor, Sociology & Anthropology
 Woolard, Dwight L, Adjunct Professor, Electrical & Computer Engr.
 Wormsley, William E, Teaching Associate Professor, Sociology & Anthropology
 Worsham, Arch D., Emeritus Professor, Crop Science
 Wortman, Jimmie J, Emeritus Professor, Electrical & Computer Engr.
 Wright, Charles Gerald, Emeritus Professor, Entomology
 Wright, Ruth Lorraine, Associate Professor, Accounting-college Of Manageme
 Wu, Fen, Professor, Mechanical & Aerospace Engr
 Wu, Yichao, Assistant Professor, Statistics
 Wust, Valerie Ann, Assistant Professor, Foreign Languages And Literatu
 Wyer, Mary B, Associate Professor, Psychology
 Wynne, Johnny Calvin, R. J. Reynolds Tobacco Company Professor, Dean's Office - CALS
 Wysk, Richard A, Dopaco Distinguished Professor, Fitts Dept Indust & Syst Engr
 Xi, Lin, Research Assistant Professor, Animal Science
 Xia, Xin Rui, Research Assistant Professor, Dept-Population,Health,Pathobi
 Xiang, Qiu Yun, Associate Professor, Plant Biology
 Xie, Deyu, Associate Professor, Plant Biology
 Xie, Lian, Professor, Marine, Earth And Atmospheric
 Xie, Tao, Associate Professor, Computer Science-engr
 Xu, Yingjiao, Associate Professor, Textile & Apparel, Technology
 Yadav, Meeta, Teaching Assistant Professor, Electrl & Comp Engr Grad &Temp
 Yamamoto, Yuri Takeshima, Adjunct Assistant Professor, For & Envir Res Acad Research
 Yelverton, Fred H., Professor, Crop Science
 Yencho, George C, Professor, Horticultural Science
 Yeom, Bong-Yeol, Research Assistant Professor, Textile Engineering, Chemistry
 Yim, Man-Sung, Associate Professor, Nuclear Engineering
 Yingling, Yaroslava G, Assistant Professor, Materials Science &Engineering
 Yoder, Jeffrey A., Associate Professor, Dept Molecular Biomedical Scie
 York, Alan Clarence, William Neal Reynolds Emeritus Distinguished Professor, Crop Science
 York, James W, Research Professor, Physics
 Young, Albert R., Professor, Physics
 Young, Carl A, Associate Professor, Curr, Instruc & Counselor Educ
 Young, Eric, Professor, Administration - Research Serv
 Young, Greggry S, Associate Professor, Mgmt, Innovation&Entrepreneur
 Young, James H., Emeritus Professor, Biological And Agricultural En
 Young, Robert E., Professor, Fitts Dept Indust & Syst Engr
 Young, Robert M, Associate Professor, Computer Science-engr
 Young, Robert V., Professor, English
 Young, Sidney S, Adjunct Professor, Statistics
 Young, Tamara V., Assistant Professor, Ldshp Plcy & Adult & Higher Ed
 Youssef, Mohamed A, Assistant Professor, Biological And Agricultural En

Yu, Donna G, Teaching Associate Professor, Electrical & Computer Engr.
Yu, Jie, Assistant Professor, Civil Const & Environ Engineer
Yu, Ting, Associate Professor, Computer Science-engr
Yuan, Fuh-Gwo, Professor, Mechanical & Aerospace Engr
Yuter, Sandra E., Associate Professor, Marine, Earth And Atmospheric
Zagacki, Kenneth S., Professor, Communication
Zahn, Margaret A, Professor, Sociology & Anthropology
Zavada, John M, Research Professor, Electrl & Comp Engr Grad &Temp
Zeldin, Darryl C, Adjunct Professor, Toxicology
Zeng, Zhaobang, William Neal Reynolds Professor, Statistics
Zenkov, Dmitry Valerievich, Associate Professor, Mathematics
Zering, Kelly D., Associate Professor, Ag & Resource Economics
Zhang, Daowen, Associate Professor, Statistics
Zhang, Hao, Assistant Professor, Statistics
Zhang, Xiangwu, Assistant Professor, Textile Engineering, Chemistry
Zhang, Yang, Professor, Marine, Earth And Atmospheric
Zhang, Zhe, Research Associate Professor, Mech & Aerospace Engr Contract
Zhao, Jing, Assistant Professor, Business Management-coll Of Mg
Zheng, Xiaoyong, Associate Professor, Ag & Resource Economics
Zhirnov, Victor, Adjunct Associate Professor, Materials Science &Engineering
Zhou, Hua, Assistant Professor, Statistics
Zhou, Huiyang, Associate Professor, Electrical & Computer Engr.
Zhu, Yong, Assistant Professor, Mechanical & Aerospace Engr
Zhu, Yuntian T, Professor, Materials Science &Engineering
Zia, Paul Z, Emeritus Distinguished University Professor, Civil Const & Environ Engineer
Ziegler, Conrad Lawrence, Adjunct Professor, Marine, Earth And Atmospheric
Zikry, Mohammed A, Zan Prevost Smith Distinguished Professor, Mechanical & Aerospace Engr
Zonderman, David Aaron, Professor, History
Zorowski, Carl F., R.J. Reynolds Industries, Engineering Online
Zublena, Joseph P.J., Professor, Administration - Extension Ser
Zuckerman, Gilroy J., Associate Professor, Accounting-college Of Manageme
Zuiches, James J, Professor, Ext, Engagement & Econ Develop

NC State Policies

North Carolina State University is committed to academic integrity, and all students are required to adhere to the [NC State Code of Student Conduct](#). Individual policies on conduct, including those listed below, are posted on [University Policies, Regulations, and Rules \(PRRs\)](#).

[University Patent Procedures](#)

[Grievance Procedures for Graduate Students](#)

[Code of Student Conduct](#)

[Academic Integrity](#)

[Policy on Illegal Drugs](#)

[Sexual Harassment Policy](#)

[Racial Harassment Policy](#)

[University Copyright Procedures](#)

Equal Opportunity and Non-Discrimination

It is the policy of the State of North Carolina to provide equality of opportunity in education and employment for all students and employees. Accordingly, the university does not practice or condone unlawful discrimination in any form against students, employees or applicants on the basis of race, color, religion, creed, sex, national origin, age, disability or veteran status. Nor does the university allow discrimination on the basis of sexual orientation with respect to internal university matters that do not contravene federal or state law and that do not interfere with the University's relationships with outside organizations, including the federal government, the military, ROTC, and private employers. [NOTE: The NC State University equal opportunity and nondiscrimination policy includes transsexual individuals within the policy's prohibitions against discrimination on the basis of sex. This includes actual or perceived gender identity and gender expression. See [Price Waterhouse v. Hopkins](#), 490 U.S. 228 (1989); [Smith v. City of Salem](#), 378 F.3d 566 (6th Circ. 2004).] Retaliation against any person complaining of discrimination is in violation of federal and state law and North Carolina State University policy, and will not be tolerated.

Unlawful Harassment

Harassment based upon race, color, religion, creed, sex, national origin, veteran status, age, or disability is a form of discrimination in violation of federal and state law and North Carolina State University policy and will not be tolerated. It is the internal policy of North Carolina State University to prohibit harassment on the basis of sexual orientation. Retaliation against any person complaining of harassment is in violation of federal and state law and North Carolina State University policy, and will not be tolerated. North Carolina State University will respond promptly to all complaints of harassment and retaliation. Violation of this policy can result in serious disciplinary action up to and including expulsion for students or discharge for employees.

Every individual is encouraged, and should feel free, to seek assistance, information and guidance from his/her supervisor, the [Office for Equal Opportunity](#), the [Office of Student Conduct](#) or the [Employees Relations](#) section of Human Resources. For additional information, contact: Office for Equal Opportunity, 1 Holladay Hall, Box 7530, North Carolina State University, Raleigh, NC 27695-7530, Phone: (919) 513-1234 or 515-3148.

Disability Services Office

Individuals desiring reasonable accommodations for their documented disabilities should contact the [Disability Services Office](#) (DSO), 2751 Cates Avenue, Third Floor-First Year College Commons, (919) 515-7653 (Voice), (919) 515-8830 (TTY). Services and accommodations are provided based on an individual's documented needs and are determined in consultation with the individual and a DSO representative. For students, such requests should be

made far in advance of registration deadlines to ensure timely services and accommodations. DSO will maintain appropriate confidentiality of records and communication regarding disability.

Other Resources

The following resources are not only essential components of graduate education at NC State, but can also enhance the graduate experience. Each college has a wealth of material about their specific facilities. Additional information is also available in the [New Student Survival Guide](#).

[Graduate Calendar](#)

[Graduate Student Association](#)

[Health Services](#)

[Housing](#)

[Information Technology Division](#)

[NCSU Libraries](#)

[Map of the Campus](#)

[Office of Faculty Development](#)

[Preparing Future Leaders Programs](#)

[Professional Science Master's](#)

[Research Centers](#)

[Schedule of Required Documents](#)

Archives

Incoming students are governed by the rules and regulations in force the semester they are accepted into a program. Previous Graduate Catalogs can be downloaded in PDF format here.

[Graduate Catalog \(2010-2011\)](#)

[Graduate Catalog \(2009-2010\)](#)

[Graduate Catalog \(2008-2009\)](#)

[Graduate Catalog \(2007-2008\)](#)

[Graduate Catalog \(Spring 2007\)](#)

[Graduate Catalog \(Fall 2006\)](#)

[Graduate Catalog \(Spring 2006\)](#)

[Graduate Catalog \(Fall 2005\)](#)

[Graduate Catalog \(Spring 2005\)](#)

[Graduate Catalog \(Fall 2004\)](#)

[Graduate Catalog \(Spring 2004\)](#)

[Graduate Catalog \(Fall 2003\)](#)