

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 Handbook](#) and on the [NC State Policies, Rules and Regulations](#) web site.

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This Catalog is intended for informational purposes only and is subject to change.
Please see the online Graduate 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 2,400 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 \$75.00 (US) for U.S. citizens and Permanent Residents or \$85.00 (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 study at NCSU all international applicants, regardless of citizenship, 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 |
| | 23 points for TA appointment where TA has direct verbal interactions with students |
| | 26 points 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 |
| | 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.

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 immunizations prior to initial registration. Both forms are available online through [HealthWeb](#). 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 that document all prior degrees 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 (official translation required for non-English transcripts) from which the applicant had any degrees awarded, no later than the last day of classes of the first semester they are enrolled.

Full Graduate Status

To be considered for admission in full graduate standing, an applicant must have a four-year bachelor's degree (or equivalent) 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](#). A more complete discussion of the options for handling three-year bachelor's degrees can be found [here](#).

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 3.000. 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 [Registration and Records](#).
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.
4. 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.

5. The grade point average (GPA) of a graduate student who has credits in the PBS category will be based on all courses taken at the 400-800 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.
6. Registration is limited to a maximum of two courses per semester. Individuals who are employed full-time should limit their PBS registrations to one course per semester.
7. The PBS classification carries with it no implication that the student will be admitted to the Graduate School in any degree classification.
8. All course work accepted for degree credit must be approved by the student's advisory committee as being germane to the program. Requests for degree credit for courses completed in the PBS classification are considered after admission to a graduate degree program when the student's Plan of Graduate Work is filed with the Graduate School.
9. PBS students are expected to familiarize themselves with Graduate School 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.

(Note: There may be additional fees associated with student identity verification for distance education students who take remotely proctored exams.)

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 NC State 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 NC State. 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.

Also see [Teacher Licensure](#) programs offered through Distance Education.

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 [Graduate 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 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 Director of Graduate Programs (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.

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 POW is submitted online through *MyPack Portal*.

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 Director of the Graduate Program. 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.

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.

Co-Major

Students may co-major at the master's level in programs with identical degrees, although the degrees do not necessarily have to have identical requirements, e.g., two master of science programs, one with a thesis requirement and one without. Students must obtain the approval of both graduate programs as well as appropriate representation on the advisory committee, and must meet all requirements of both programs. Students who co-major are not required to declare a minor. Co-majors must meet all requirements for majors in both programs. One degree is awarded and the co-major is noted on the transcript.

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 Graduate 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 Director of Graduate Programs, and prepare a thesis. Information on form and organization of the thesis, in addition to other regulations, is presented in the Graduate School's [Electronic 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 [Graduate 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 approves Patent Agreement via Student Self-Service in the *MyPack* portal.
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 three copies of the thesis, signed by each member of his/her advisory committee, to the Graduate School.
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.

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

DGP submits requests for graduation checkout to the Graduate Dean 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 Plan of Work 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 Director of Graduate Programs 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 POW is submitted online through *MyPack Portal*. 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 Director of Graduate Programs 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. The co-chairs will have equal responsibilities for directing and mentoring the student. 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 Director of Graduate Programs 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 Graduate School's [Electronic 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 [Graduate 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 Director of Graduate Programs (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 approves Patent Agreement via Student Self-Service in the *MyPack* portal.
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.

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

NC State uses a uniform Academic Load Schedule of Full-Time Status of Graduate Students for Loan Deferment, Financial Aid, Visa Status, Payroll Tax Withholding, Graduate Student Support Plan Eligibility and Veteran's Benefits Purposes. This schedule will be the only resource used to determine a student's status for these purposes. These definitions apply to all graduate students, U.S. and international, participants and non-participants in the Graduate Student Support Plan. (updated on July 15, 2014)

Fall and Spring Semesters

Graduate students enrolled in degree plans requiring a thesis or dissertation

- **Full Time**
These students will be full time if they take at least 9 hours per semester until the semester in which a course load of less than 9 credit hours will reach an accumulated total equal to the minimum number of hours required by their program. They should then register for that number of credits, but not less than 3. From that point on, they will continue to be considered full time until they complete their thesis or dissertation, as long as they enroll for at least 3 credit hours.
- **Half Time**
Should a graduate student in a plan requiring a thesis or dissertation fail to maintain full-time status in any given term, as here defined, they are subject to the requirements governing students in non thesis or dissertation plans (as outlined below) in order to be certified as "Half Time".

Graduate students enrolled in degree plans not requiring a thesis or dissertation (1)

- **Full Time**
These students will be full time if they take at least 9 hours in a given semester.
- **Half Time**
These students will be half time if they take at least 4.5 hours per semester.
(1) Master's students enrolled in plans allowing both a thesis and a non-thesis option will be classified as "non-thesis" students and subject to these rules until such time as a graduate plan of work designating the thesis-option, is approved by the Graduate School.

Co-op Students

Co-op students registered for COP 500 will be considered full time. Students registered for only COP 501 will 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. Full time in the summer is a minimum of 1 hour.

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.

Waiver of Hours

Graduate students who meet certain prescribed special conditions, may be certified as either a full-time or half-time in cases where they do not meet the requirements for such as outlined above. A waiver of the uniform academic load rules requires attestation on behalf of the student by their committee chair, academic advisor or the Director of their graduate program and approval by the University.

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 (available in departmental office) 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 (available in departmental office) 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 Director of Graduate Programs 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 or 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 3.000 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 are not graduate courses and may not be counted in Plans of Work for graduate degrees |

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. "Accumulated" in all cases is defined as the total number of hours for which a grade has been issued.

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](#), [William Peace University](#), [St. Augustine's University](#), 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

Important Notice: As a result of the [General Assembly's Appropriations Act of 2011](#), North Carolina's participation in the ACM, as both a sender and a receiver of students, will be phased out beginning with academic year 2012-2013. Students certified for the ACM who are enrolled and begin study prior to the second summer session in 2012 may continue to pay in-state tuition as long as they remain enrolled in their specified degree program. (*Revised March 8, 2012*)

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.



[Graduate Degrees](#) | [Minors](#) | [Graduate Certificates](#) | [Courses or Other Support to Graduate Programs](#)

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, MAT) |
| Adult and Community College Education | - EdD, MS, MEd (GRE, MAT) |
| Aerospace Engineering | - PhD, MS (GRE) |
| Agricultural and Extension Education | - EdD (GRE) |
| Agricultural and Resource Economics | - MS (None) |
| Agricultural Education | - MS, MR (GRE) |
| Analytics | - MS (None) |
| Animal Science | - MS, MR (GRE) |
| Animal Science & Poultry Science | - PhD (GRE) |
| Anthropology | - MA (GRE) |
| Applied Mathematics | - PhD, MS (GRE) |
| Architecture | - MR (GRE) |
| Art and Design | - MR (GRE) |
| Biochemistry | - PhD, MS, MR (GRE) |
| Bioinformatics | - PhD, MR (GRE) |
| Biological and Agricultural Engineering | - PhD, MS, MR (GRE) |

| | |
|--|---|
| Biomanufacturing | - MS, MR (GRE) |
| Biomathematics | - PhD, MS, MR (GRE) |
| Biomedical Engineering | - PhD, MS (GRE) |
| Business Administration | - MR (GRE, GMAT, MAT) |
| Chemical Engineering | - PhD, MS, MR (GRE) |
| Chemistry | - PhD, MS (GRE) |
| Civil Engineering | - PhD, MS, MR (GRE) |
| Climate Change and Society | - MR (GRE) |
| Clinical Mental Health Counseling | - MS, MEd (GRE, MAT) |
| College Counseling and Student Development | - MS, MEd (GRE, MAT) |
| Communication | - MS (GRE) |
| Communication Rhetoric and Digital Media | - PhD (GRE) |
| Comparative Biomedical Sciences | - PhD, MS (GRE) |
| Computer Engineering | - PhD, MS (GRE) |
| Computer Networking | - MS (GRE) |
| Computer Science | - PhD, MS, MR (GRE) |
| Creative Writing | - MFA (GRE) |
| Crop Science | - PhD, MS, MR (GRE) |
| Curriculum and Instruction | - MS, MEd (GRE, MAT) |
| Design | - PhD, DDES (GRE) |
| Digital Learning and Teaching | - MS, MEd |
| Economics | - PhD, MR, MS (GRE (GRE is only required for doctoral applicants.)) |
| Educational Administration and Supervision | - EdD (GRE, MAT) |
| Educational Leadership, Policy and Human Development | - PhD (GRE) |

| | |
|---|---|
| Electric Power Systems Engineering | - MS (GRE) |
| Electrical Engineering | - PhD, MS (GRE) |
| Elementary Education | - MS, MEd (None) |
| Engineering | - MR |
| English | - MA (GRE) |
| Entomology | - PhD, MS, MR (GRE) |
| Environmental Assessment | - MR |
| Environmental Engineering | - MS, MR (GRE) |
| Extension Education | - MS, MR (GRE) |
| Fiber and Polymer Science | - PhD (GRE) |
| Financial Mathematics | - MR (GRE) |
| Fisheries, Wildlife, and Conservation Biology | - PhD, MS, MR (GRE) |
| Food Science | - PhD, MS, MR (GRE) |
| Foreign Languages and Literatures | - MA |
| Forest Biomaterials | - PhD, MS, MR (GRE) |
| Forestry and Environmental Resources | - PhD, MS, MR (GRE) |
| Functional Genomics | - PhD, MS, MR (GRE) |
| Genetics | - PhD, MS, MR (GRE) |
| Geospatial Analytics | - PhD |
| Geospatial Information Science and Technology | - MR |
| Global Innovation Management | - MR |
| Graphic Design | - MR (GRE (International students must submit English proficiency scores: TOEFL (minimum 100) or IELTS (minimum 7).)) |
| Higher Education Administration | - MS, Med (GRE) |
| History | - MA (GRE) |

| | |
|--|---------------------|
| Horticultural Science | - PhD, MS, MR |
| Immunology | - PhD (GRE) |
| Industrial Design | - MR (GRE) |
| Industrial Engineering | - PhD, MS, MR (GRE) |
| Integrated Manufacturing Systems Engineering | - MR (GRE) |
| International Studies | - MR (GRE) |
| Landscape Architecture | - MR (GRE) |
| Learning and Teaching in STEM | - PhD (GRE) |
| Liberal Studies | - MA (None) |
| Marine, Earth, and Atmospheric Sciences | - PhD, MS (GRE) |
| Materials Science and Engineering | - PhD, MS, MR (GRE) |
| Mathematics | - PhD, MS (GRE) |
| Mathematics Education | - MS, Med (GRE) |
| Mechanical Engineering | - PhD, MS (GRE) |
| Microbial Biotechnology | - MR (GRE) |
| Microbiology | - PhD, MS, MR (GRE) |
| Nanoengineering | - MR |
| Natural Resources | - MS, MR (GRE) |
| Nuclear Engineering | - PhD, MS, MR (GRE) |
| Nutrition | - PhD, MS, MR (GRE) |
| Operations Research | - PhD, MS, MR (GRE) |
| Parks, Recreation, Tourism, and Sport Management | - PhD, MS, MR |
| Physics | - PhD, MS (GRE) |

| | |
|---|------------------------|
| Physiology | - MS, MR (GRE) |
| Plant Biology | - PhD, MS, MR (GRE) |
| Plant Pathology | - PhD, MS, MR (GRE) |
| Poultry Science | - MS, MR (GRE) |
| Psychology | - PhD, MS (GRE) |
| Public Administration | - PhD, MR (GRE) |
| Public History | - PhD, MA (GRE) |
| School Administration | - MR (GRE, MAT) |
| School Counseling | - MS, MEd (GRE, MAT) |
| Science Education | - MS, Med (GRE, MAT) |
| Social Work | - MR |
| Sociology | - PhD, MS, MR (GRE) |
| Soil Science | - PhD, MS, MR (GRE) |
| Special Education | - MS, MEd (GRE, MAT) |
| Specialized Veterinary Medicine | - MR (GRE) |
| Statistics | - PhD, MR (GRE) |
| Teacher Education and Learning Sciences | - PhD (GRE, MAT) |
| Teaching | - MA (GRE) |
| Technical Communication | - MS (GRE) |
| Technology Education | - MS, Med (GRE) |
| Textile Chemistry | - MS (GRE) |
| Textile Engineering | - MS (GRE) |
| Textile Technology Management | - PhD (GRE, GMAT, MAT) |
| Textiles | - MS, MR (GRE) |
| Toxicology | - PhD, MS, MR (GRE) |

Training and Development

- MEd (None)

Youth, Family, and Community Sciences

- MS, MR (GRE)

Zoology

- PhD, MS, MR (GRE)

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

Fields Offering Minors

The following fields and units, while not offering graduate degrees, support graduate education by offering graduate minors:

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

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

Fields Offering Graduate Certificates

The following fields and units, while not offering graduate degrees, support graduate education by offering graduate certificates:

Administration and Leadership - Family and Youth Program

Agricultural Education

| |
|--|
| Applied Statistics and Data Management |
| City Design |
| Climate Adaptation |
| Consumer Textile Product Design and Development |
| Counselor Education |
| Data Science Foundations |
| Digital Humanities |
| Downstream Biomanufacturing |
| Energy and Technology in Architecture |
| Environmental Assessment |
| Family Life Education and Coaching |
| Feed Science |
| Finance |
| Geographic Information Systems |
| Horticultural Science |
| Leadership and Volunteer Management |
| Marketing |
| Mathematics |
| Medical Devices |
| Molecular Biotechnology |
| Nano-Systems Engineering |
| Nanobiotechnology |
| Nonprofit Management |
| Nonwovens Science and Technology |
| Nuclear Nonproliferation Science and Policy |
| Operations and Supply Chain Management |
| Professional Communication and Management Skills |
| Program Development in Family Life Educ Grad Certificate |
| Public Policy |

| |
|--|
| Renewable Electric Energy Systems |
| Special Education: Multi-Tiered Systems of Support |
| Statistics Education |
| Teaching Training and Educational Technology |
| Technology Entrepreneurship and Commercialization |
| Textile Brand Management and Marketing |
| Textile Supply Chain Management |
| Upstream Biomanufacturing |
| Watershed Assessment and Restoration |
| Youth Development and Leadership |

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

Fields Offering Courses or Other Support to Graduate Programs

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

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

Directors of Graduate Programs:

K. Krawczyk, Box 8113, 919/515-4439, katherine_krawczyk@ncsu.edu, Accounting

S. G. Allen, Box 8114, 919/515-5584, steve_allen@ncsu.edu, Business Management

Named Professors: M. S. Beasley, F. A. Buckless; **Professors:** M. Bradford, B. C. Branson, J. F. Brazel, Y. A. Chen, K. Krawczyk, D. P. Pagach, R. B. Sawyers, P. F. Williams; **Emeritus Professors:** R. L. Peace; **Associate Professors:** R. Pennington, A. P. Schmidt, E. Z. Taylor, G. J. Zuckerman; **Emeritus Associate Professors:** R. L. Wright; **Teaching Professors:** D. S. Showalter

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" -- 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 GMAT 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 an 11-course sequence in one year that includes eight graduate-level Accounting courses and three 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), Enterprise Risk Management (ERM), or Tax Strategy.

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 three application deadlines - **December 1** for early admission and consideration in both the MAC Fellowship and Scholarship programs; **February 1** for final consideration in both the MAC Fellowship and Scholarship programs; **March 1** for all other applicants.

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

[NCSU Graduate Catalog](#)

Administration and Leadership - Family and Youth Programs (Certificate)

Director of Graduate Certificate Programs:

Kimberly Allen

Agricultural & Human Sciences

Phone:

Email: kiallen@ncsu.edu

Website: <http://distance.ncsu.edu/programs/graduate-certificate-programs.php>

The Administration and Leadership certificate is closed to new student enrollment. Please visit the Department of Youth, Family, and Community Sciences website for information on our current certificate offerings.

The Department of Youth, Family, and Community Sciences (YFCS) at North Carolina State University is proud to offer graduate distance education programs designed to prepare and strengthen current and future professionals. The Youth, Family, and Community Sciences online programs create and advance the careers of those who work with youth and/or families in community-based settings.

Admissions: Students apply online at <http://www.ncsu.edu/grad/applygrad.htm>.

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 offered online only.

Required Courses (9 credit hours)

FYD 550 Youth and Family Professionals as Leaders

FYD 554 Collaborations and Partnerships in Youth and Family Settings

FYD 556 Organizational Systems in Youth and Family Settings

Electives (3 credit hours)

Approved course in Family Life and Youth Development (FYD)

[NCSU Graduate Catalog](#)

Adult and Community College 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 | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: D. Akroyd, T. W. Cawthon, A. J. Jaeger, S. R. Porter, A. N. Rockenbach, P. D. Umbach; **Professors of the Practice:** R. G. Templin; **Adjunct Professors:** L. Gonzalez-Sullivan, J. L. Gwyer, D. G. Oblinger, B. A. Olson, R. S. Ralls; **Emeritus Named Professors:** C. E. Kasworm; **Emeritus Professors:** G. L. Carter, J. C. Glass, G. B. Vaughan; **Emeritus Named Distinguished Professors:** G. A. Baker; **Associate Professors:** S. J. Barcinas, J. E. Bartlett, T. A. Bowles, F. I. Chirino-Klevans, J. G. Gayles, B. S. Mehlenbacher, T. V. Young; **Adjunct Associate Professors:** S. C. Faircloth, B. I. Mallette; **Emeritus Associate Professors:** P. F. Bitting; **Assistant Professors:** L. R. Bass, A. B. Bowden, T. A. Drake, C. D. Hoggan, A. M. Jacob; **Adjunct Assistant Professors:** K. A. Boham, L. M. Chapman, D. K. Deardorff, K. G. Dixon, K. L. Ender, C. C. Figuers, J. E. Fleming, B. J. Frye, E. V. Griffin, C. O. Grochowski, L. D. Hunt, M. B. Jackowski, L. D. Krute, P. Lari, K. D. Lohr, D. D. McGraw, W. D. McInnis, W. D. Milheim, L. Moneta, S. E. Morrissey, M. H. Nadelman, A. B. Orders, R. R. Parker, D. L. Reichard, D. D. Richmond, M. E. Rittling, L. L. Rouse, S. C. Scott, M. A. Valek, J. W. Wescott, S. W. Williams, S. Williams, C. L. Zelna; **Teaching Professors:** D. D. Chapman; **Teaching Assistant Professors:** M. E. Bartlett, L. G. Hervey, F. P. Riddick, C. L. Warren, C. C. Williams; **Lecturers:** B. J. Frye, N. T. Smith, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

[NCSU Graduate Catalog](#)

Aerospace Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

P. I. Ro, Box 7910, 919/515-5235, paul_ro@ncsu.edu, Mechanical and Aerospace Engineering

Named Professors: R. D. Gould, F. Yuan, M. A. Zikry; **Named Distinguished University Professors:** T. A. Dow; **Professors:** G. D. Buckner, T. Echehki, J. R. Edwards, T. Fang, A. Gopalarathnam, P. A. Gremaud, H. A. Hassan, X. Jiang, R. F. Keltie, C. Kleinstreuer, A. V. Kuznetsov, J. W. Leach, H. Luo, K. M. Lyons, G. Ngaile, K. J. Peters, A. Rabiei, P. I. Ro, L. M. Silverberg, J. S. Strenkowski, J. F. Tu, F. Wu, Y. Zhu; **Adjunct Professors:** C. S. Kim, W. L. Roberts; **Emeritus Professors:** D. S. McRae, R. T. Nagel; **Associate Professors:** M. A. Boles, C. Chang, J. W. Eischen, S. M. Ferguson, C. E. Hall, H. Huang, Y. Jing, A. P. Mazzoleni, B. T. O'Connor, A. V. Saveliev; **Assistant Professors:** M. Bryant, K. Granlund, J. Liu, V. Narayanaswamy, M. R. Pankow, P. K. Subbareddy; **Adjunct Assistant Professors:** J. A. Cooke; **Teaching Associate Professors:** C. M. Tran

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 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 21 hours of course credit and nine 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 72 hours of credit are required to obtain the Ph.D. degree. 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.

[NCSU Graduate Catalog](#)

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 | | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

M. J. Kistler, Box 7607, 919/513-2349, mark_kistler@ncsu.edu, Agricultural and Human Sciences

Professors: J. L. Flowers, G. E. Moore, R. W. Shearon, E. B. Wilson; **Adjunct Professors:** M. M. Baker; **Emeritus Professors:** B. Croom, D. M. Jenkins, T. T. McKinney, R. D. Mustian; **Associate Professors:** J. A. Bruce, K. S. Jayaratne, D. W. Jones, M. J. Kistler, T. D. Park, W. J. Warner; **Emeritus Associate Professors:** R. M. Stewart; **Assistant Professors:** J. Morgan; **Adjunct Assistant Professors:** M. L. Addor

The Agricultural and Human Sciences Department provides advanced study for professionals in agricultural education, extension education, and 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 with the Cooperative Extension Service. Additional specialization is provided through a minor and/or advised elective courses. The following graduate programs in Agricultural and Extension Education are available in the Department:

- Graduate Certificate in Agricultural and Extension Education (requires 15 hours)
- Master of Science in Agricultural and Extension Education (requires 36 hours including a thesis)
- Master of Agricultural and Extension Education (requires 36 hours)
- Master of Agricultural and Extension 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 Agricultural and Extension Education graduate program requires for full admission a minimum undergraduate GPA of 3.0 (“B” average); a minimum GRE combined General Test score of 300 (Verbal Reasoning plus Quantitative Reasoning) and 3.0 or better on the GRE Analytical Writing Test; three positive references; and a statement of career goals and/or research interests. An interview (personal or by telephone) may also 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 (AEE 695), and a Master of Agricultural and Extension Education as a non-thesis track. All Master's degree programs require a total of 36 credit hours. The Master of Science in Agricultural and Extension Education require a core of five courses in addition to the thesis (AEE 501, 521 or 524 or 529, 523 or 535, 578, and 579 or 777). The Master of Agricultural and Extension Education requires the above except the students will take AEE 620 or 693 as part of completing a culminating project instead of writing a thesis, and is not required to take AEE 579 or 777). 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 and extension education. This certificate program involves completion of 15 credit hours and preparation of a professional portfolio. Based on the student's focus, they will choose from AEE 500, 501, 503, 522, 524, 529, 535, 641, and 735 for the Agricultural Education focus, and AEE 501, 521, 523, 533, 560, 577, 705, and 641 for the Extension Education focus.

Sixth-Year Certificate: The Department offers an array of courses that are recognized by the NC 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 (Ed.D.) 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 (AEE 895).

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.

[NCSU Graduate Catalog](#)

Agricultural and Resource Economics

Degrees Offered:

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

GRADUATE FACULTY

Professors: P. L. Fackler, R. M. Rejesus, L. O. Taylor; **Emeritus Professors:** H. J. Kleiss; **Associate Professors:** I. T. Kandilov; **Assistant Professors:** K. A. Boys; **Teaching Assistant Professors:** J. Treme

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 Poole College of Management. Emphasis is placed on economic theory and quantitative economic analysis and their application to economic problems. Master's students can choose between the terminal master's track and the PhD-prep track. In both tracks, they may further tailor their experience by choosing to concentrate in one or multiple of the four fields: financial/macro econometrics; international trade and development; natural resource and environmental economics and economic policy. Students can also choose between engaging in a research project culminating in a thesis (the Master of Science in economics degree) and simply pursuing a coursework only option (the Master of Economics degree). The major fields of specialization for doctoral students are: agricultural economics, development economics, econometrics, environmental/resource economics, industrial organization, international economics, labor economics, macro-monetary economics and microeconomic theory and experimental/behavioral economics.

Admission Requirements: Minimum background for admission for Master's study includes intermediate microeconomics and intermediate macroeconomics, calculus I and calculus II, and one semester of statistics (econometrics courses included). For doctoral study, prerequisites are intermediate microeconomics, intermediate macroeconomics, calculus I-III, linear algebra, and a course in mathematical statistics. GRE scores are required for doctoral applicants only.

Master's Degree Requirements: Both the Master of Science in economics and the Master of Economics degrees require core courses in microeconomics, macroeconomics and econometrics. Each degree also carries additional elective requirements. The M.S. degree requires a thesis. Both degrees offer two tracks: a terminal master's track and a PhD-prep track. Specific course requirements for both the Master of Science and the Master of Economics can be found on the Graduate Program in Economics [website](#). Both 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 microeconomics and macroeconomics. 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.

Agricultural Education (Certificate)

Director of Graduate Certificate Programs:

Mark Kistler

Agricultural & Human Sciences

Phone: 919/513-2349

Email: mark_kistler@ncsu.edu

Website: <http://harvest.cals.ncsu.edu/agscience/>

The Department of Agricultural and Extension Education offers a Graduate Certificate in Agricultural and Extension Education. The program focuses on developing knowledge and skills needed to be effective teachers of agriculture in the public schools and community colleges or to work as an educator with the Cooperative Extension Service or in other non-formal educational settings such as public gardens, nature centers and in international development.

Admissions: Students apply online by visiting the Graduate School's website and completing an ApplyYourself online application. Students currently in a graduate degree program should contact the program director for information regarding adding the certificate program to an existing degree program.

Requirements: The certificate program involves completion of 15 credit hours and the preparation of a professional portfolio. The career goals of the student will determine which sequence of courses to take.

| Agricultural Education Focus | Extension Education Focus |
|--|--|
| AEE 500 Agricultural Education, Schools and Society | AEE 501 Foundations of Agricultural and Extension Education |
| AEE 501 Foundations of Agricultural and Extension Education | AEE 521 Program Planning in Agricultural and Extension Education |
| AEE 503 Youth Program Management | AEE 523 Adult Education in Agriculture |
| AEE 522 Occupational Experience in Agriculture | AEE 533 Leadership and Management of Volunteers in Agricultural and Extension Education |
| AEE 524 Coordinating the High School Agricultural Education Program | AEE 560 Organizational and Administrative Leadership in Agricultural and Extension Education |
| AEE 529 Curriculum Development in Agricultural and Extension Education | AEE 577 Evaluation in Agricultural and Extension Education |
| AEE 535 Teaching Agriculture in Secondary Schools | AEE 705 International Agricultural Development |
| AEE 641 Practicum in Agricultural and Extension Education | AEE 641 Practicum in Agricultural and Extension Education |
| AEE 735 Effective Teaching in Agriculture and Life Sciences | |

Students who are are interesting in obtaining teacher licensure from the state of North Carolina should make their intentions known to the program director so that specific state requirements are met. Directions for preparing the professional portfolio can be obtained from the program director.

Agricultural Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Agricultural Education | | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

M. J. Kistler, Box 7607, 919/513-2349, mark_kistler@ncsu.edu, Agricultural and Human Sciences

Named Distinguished Professors: D. J. Werner; **Professors:** J. L. Flowers, G. E. Moore, R. W. Shearon, E. B. Wilson; **Emeritus Professors:** B. Croom, D. M. Jenkins, R. D. Mustian; **Associate Professors:** J. A. Bruce, K. S. Jayaratne, D. W. Jones, M. J. Kistler, T. D. Park, W. J. Warner; **Adjunct Associate Professors:** D. A. Boone, R. J. Harrell

The Agricultural and Human Sciences Department provides advanced study for professionals in agricultural education, extension education, and 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 with the Cooperative Extension Service. Additional specialization is provided through a minor and/or advised elective courses. The following graduate programs in Agricultural and Extension Education are available in the Department:

- Graduate Certificate in Agricultural and Extension Education (requires 15 hours)
- Master of Science in Agricultural and Extension Education (requires 36 hours including a thesis)
- Master of Agricultural and Extension Education (requires 36 hours)
- Master of Agricultural and Extension 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 Agricultural and Extension Education graduate program requires for full admission a minimum undergraduate GPA of 3.0 (“B” average); a minimum GRE combined General Test score of 300 (Verbal Reasoning plus Quantitative Reasoning) and 3.0 or better on the GRE Analytical Writing Test; three positive references; and a statement of career goals and/or research interests. An interview (personal or by telephone) may also 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 (AEE 695), and a Master of Agricultural and Extension Education as a non-thesis track. All Master's degree programs require a total of 36 credit hours. The Master of Science in Agricultural and Extension Education require a core of five courses in addition to the thesis (AEE 501, 521 or 524 or 529, 523 or 535, 578, and 579 or 777). The Master of Agricultural and Extension Education requires the above except the students will take AEE 620 or 693 as part of completing a culminating project instead of writing a thesis, and is not required to take AEE 579 or 777). 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 and extension education. This certificate program involves completion of 15 credit hours and preparation of a professional portfolio. Based on the student's focus, they will choose from AEE 500, 501, 503, 522, 524, 529, 535, 641, and 735 for the Agricultural Education focus, and AEE 501, 521, 523, 533, 560, 577, 705, and 641 for the Extension Education focus.

Sixth-Year Certificate: The Department offers an array of courses that are recognized by the NC 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 (Ed.D.) 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 (AEE 895).

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.

[NCSU Graduate Catalog](#)

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. Rappa, Box 7293, 919/513-0480, michael_rappa@ncsu.edu, Analytics

Named Professors: D. A. Dickey; **Named Distinguished University Professors:** M. Rappa; **Professors:** C. G. Healey, C. Meyer, S. J. Simmons, R. S. Warr, L. A. Williams; **Adjunct Professors:** S. M. Hsiang; **Emeritus Named Professors:** C. P. Jones; **Emeritus Professors:** H. A. Devine; **Associate Professors:** R. Y. Chirkova, S. Dasmohapatra, J. B. Earp, B. A. Watson; **Adjunct Associate Professors:** T. Xie

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 using real data 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 II 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 II) 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 & 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. Eisemann, Box 7621, 919/515-4044, joan_eisemann@ncsu.edu, Animal Science

J. L. Grimes, Box 7608, 919/515-5406, jesse_grimes@ncsu.edu, Poultry Science

Named Professors: W. L. Flowers; **Named Distinguished Professors:** J. T. Brake, P. R. Ferket, J. Odle, C. J. Schal; **Professors:** G. W. Almond, K. E. Anderson, C. M. Ashwell, D. K. Carver, F. W. Edens, J. Eisemann, K. L. Esbenshade, C. E. Farin, V. Fellner, J. L. Grimes, S. W. Kim, D. K. Larick, H. Liu, M. S. Merrill, J. A. Moore, P. E. Mozdziak, E. O. Oviedo-Rondon, J. N. Petite, R. M. Petters, J. A. Piedrahita, M. H. Poore, M. T. See, P. D. Siciliano, E. VanHeugten, D. P. Wages, S. P. Washburn; **Adjunct Professors:** R. D. Boyd, J. B. Golden, W. O. Herring, E. A. Koutsos, S. M. Shane, Z. Uni; **Emeritus Named Professors:** E. Eisen; **Emeritus Professors:** B. P. Alston-Mills, G. A. Benson, L. S. Bull, T. A. Carter, V. L. Christensen, R. G. Crickenberger, J. D. Garlich, E. W. Glazener, W. M. Hagler, R. W. Harvey, G. B. Havenstein, W. L. Johnson, J. R. Jones, C. A. Lassiter, J. Luginbuhl, R. L. McCraw, R. D. Mochrie, W. M. Morrow, R. M. Myers, C. R. Parkhurst, O. W. Robison, F. D. Sargent, B. W. Sheldon, J. C. Shih, T. D. Siopes, L. W. Whitlow, J. C. Wilk, C. M. Williams; **Associate Professors:** D. J. Hanson, M. T. Knauer, M. D. Koci, C. Maltecca, S. E. Phillips, D. H. Poole, K. E. Saker, G. Valacchi; **Adjunct Associate Professors:** R. J. Harrell, C. R. Stark; **Emeritus Associate Professors:** E. U. Dillard, M. D. Whitacre; **Assistant Professors:** D. A. Esposito, A. C. Fahrenholz, K. A. Livingston, C. C. Nestor, S. H. Ward; **Research Assistant Professors:** F. Tiezzi Mazzoni Della Stella Ma; **Adjunct Assistant Professors:** K. A. Gray, C. L. Heggen-Peay, T. F. Middleton, D. W. Newcom, C. J. Williams; **Teaching Associate Professors:** S. Trivedi; **Teaching Assistant Professors:** K. D. Ange-Van Heugten

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 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 programs in [Animal Science](#) or 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 Department of Animal Science or Department of Poultry Science faculty serves 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 January 31 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 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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

J. Eisemann, Box 7621, 919/515-4044, joan_eisemann@ncsu.edu, Animal Science

Named Professors: W. L. Flowers; **Named Distinguished Professors:** J. Odle; **Professors:** G. W. Almond, J. Eisemann, K. L. Esbenshade, C. E. Farin, V. Fellner, F. Isik, S. W. Kim, D. K. Larick, H. Liu, M. S. Merrill, J. A. Moore, R. M. Petters, J. A. Piedrahita, M. H. Poore, M. T. See, P. D. Siciliano, E. VanHeugten, S. P. Washburn, E. B. Wilson; **USDA Professors:** J. B. Holland; **Adjunct Professors:** R. D. Boyd, M. Choct, J. A. Hansen, E. A. Koutsos, W. B. Roush, T. A. van Kempen; **Emeritus Named Professors:** E. Eisen; **Emeritus Professors:** B. P. Alston-Mills, G. A. Benson, L. S. Bull, E. V. Caruolo, R. G. Crickenberger, W. J. Croom, W. M. Hagler, R. W. Harvey, W. L. Johnson, J. R. Jones, C. A. Lassiter, J. Luginbuhl, R. L. McCraw, R. D. Mochrie, W. M. Morrow, R. M. Myers, C. R. Parkhurst, O. W. Robison, F. D. Sargent, L. W. Whitlow, J. C. Wilk, C. M. Williams; **Associate Professors:** D. J. Hanson, M. T. Knauer, C. Maltecca, S. E. Phillips, D. H. Poole, K. E. Saker, G. Valacchi; **Research Associate Professors:** L. Xi; **Adjunct Associate Professors:** R. J. Harrell; **Emeritus Associate Professors:** E. U. Dillard, M. D. Whitacre; **Assistant Professors:** D. A. Esposito, C. C. Nestor, C. L. Pickworth, S. H. Ward; **Research Assistant Professors:** F. Tiezzi Mazzoni Della Stella Ma; **Adjunct Assistant Professors:** D. S. Casey, J. V. Felts, A. G. Gernat, K. A. Gray, C. L. Heggen-Peay, J. W. Holl, R. O. Maguire, T. F. Middleton, D. W. Newcom; **Teaching Associate Professors:** S. Trivedi; **Teaching Assistant Professors:** K. D. Ange-Van Heugten

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, undergraduate courses, and letters of recommendation. In addition, a member of the Animal Science Department faculty must be willing to serve as the applicant's advisor.

Master of Science: A minimum of 30 credit hours, including 18 hours of graduate level course 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 (MAS) 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. The MAS degree program is also offered through distance education.

Doctoral Degree Requirements: The department offers a Ph.D. program in [Animal Science and Poultry Science](#) with a concentration in Animal Science. A minimum of 72 graduate credit hours are required. For a student who already holds a Master's degree, upon initial admission a maximum of 18 credit hours from the Master's degree may be applied to this minimum.

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 January 31 for fall admission.⁵⁶

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.

[NCSU Graduate Catalog](#)

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:

N. M. Haenn, Box 8101, nmhaenn@ncsu.edu, Sociology and Anthropology

Professors: A. H. Ross; **Associate Professors:** D. T. Case, K. L. Ebert, N. M. Haenn, A. Manzoni, J. M. Wallace;

Adjunct Associate Professors: W. E. Wormsley; **Assistant Professors:** M. A. DeSoucey, C. A. Juarez, S. C. McManus, J. K. Millhauser; **Adjunct Assistant Professors:** B. L. Clark; **Teaching Assistant Professors:** C. A. Lewald

The graduate degree in Anthropology is a 30-hour, two-year long Master of Arts program which will enable students to gain a deeper understanding of the behavior, beliefs, and evolutionary legacy of the human species. Students normally select a specialty area in which to focus their studies, such as archaeology, biological anthropology, or cultural 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 research and educational institutions, 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, a personal statement, and a writing sample. CV or resume is optional but encouraged. The deadline for completed applications is January 1. 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 three hours of theory and select a specialty area, such as archaeology, bioarchaeology, or cultural anthropology. Students who write a master's thesis will take six hours of thesis research credit (ANT 695). Students completing a non-thesis (Option B) program take additional coursework in place of the six hours of ANT 695 credit.

Student Financial Support: A limited number of teaching and research assistantships are available on a competitive basis.

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

[NCSU Graduate Catalog](#)

Applied Mathematics

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-------------------------------------|-------|-------|------|------|-----------|-------|-----|
| Applied Mathematics | Y | | Y | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

P. A. Gremaud, Box 8205, 919/515-3085, gremaud@ncsu.edu, Mathematics

Named Professors: C. T. Kelley; **Named Distinguished University Professors:** H. T. Banks; **Professors:** S. L. Campbell, A. E. Chertock, M. T. Chu, P. L. Combettes, R. O. Fulp, P. A. Gremaud, M. Haider, A. G. Helminck, P. L. Hersh, H. Hong, I. Ipsen, K. Ito, E. L. Kaltofen, A. Kheyfets, D. J. Lee, Z. Li, X. Lin, A. L. Lloyd, S. R. Lubkin, N. G. Medhin, C. Meyer, K. C. Misra, M. Olufsen, J. Rodriguez, M. Shearer, J. W. Silverstein, M. F. Singer, R. C. Smith, E. L. Stitzinger, S. M. Sullivant, H. T. Tran, S. V. Tsynkov, D. V. Zenkov; **Adjunct Professors:** J. T. Betts, M. V. Evans, S. P. Hamilton, C. L. Hughes; **Emeritus Professors:** J. E. Franke, R. O. Fulp, J. F. Selgrade; **Associate Professors:** L. V. Bociu, S. Ghoshal, M. J. Kang, I. A. Kogan, L. K. Norris, T. Pang, N. P. Reading, J. S. Scroggs, A. Szanto; **Adjunct Associate Professors:** R. W. Ellson; **Assistant Professors:** A. Alexanderian, K. B. Flores, R. Ke, T. Lidman, R. I. Liu, T. Nguyen, D. Papp, A. Saibaba, C. L. Vinzant; **Adjunct Assistant Professors:** S. Bhattacharya, W. Chen, P. Drineas, J. D. Hauenstein, S. E. Howington, D. A. Knoll, J. E. Massad, J. L. Matthews, Q. Zhang; **Teaching Associate Professors:** A. N. Duca, M. A. Fenn, J. R. Griggs; **Teaching Assistant Professors:** B. L. Maultsby; **Lecturers:** R. W. Ellson, J. E. Franke, R. O. Fulp

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. Joint research endeavors with industrial and governmental partners are facilitated and encouraged. The Department of Mathematics also offers a Certificate.

Admissions Requirements: Applicants for admission should have an undergraduate or Master's degree in mathematics or 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. GRE general scores are required. 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 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.

[NCSU Graduate Catalog](#)

Applied Statistics and Data Management (Certificate)

[NCSU Graduate Catalog](#)

Architecture

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

D. K. Gulling, Box 7701, 919/515-8362, dkgullin@ncsu.edu, Architecture

R. F. Abrams, Box 7701, 919/513-4841, rfabrams@ncsu.edu, Architecture

Professors: R. F. Abrams, T. M. Barrie, D. B. Hill, W. Place, J. P. Rand; **Professors of the Practice:** M. E. Purnell; **Emeritus Professors:** P. Batchelor, G. Bizios, M. J. Malecha, F. A. Rifki, H. Sanoff; **Associate Professors:** B. Bell, S. Cho, J. Coll-Barreu, D. K. Gulling, J. Hu, B. W. Laffitte, P. E. Morgado, S. G. Queen, K. J. Schaffer, J. O. Tector; **Adjunct Associate Professors:** M. Kentgens-Craig; **Assistant Professors:** T. L. Allen, B. Erdim; **Research Assistant Professors:** T. R. Rider; **Assistant Professors of the Practice:** G. D. Hallowell

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 undergraduate 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 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 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate

degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

The NC State University School of Architecture offers the following NAAB accredited degree programs:

- B.Arch (pre-professional degree + 30 graduate credits)
- M.Arch Track 1 (pre-professional degree + 48 graduate credits)
- M.Arch Track 3 (non-pre-professional degree + 96 credits)

Next Accreditation Visit for All Programs: 2018

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

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

C. Mouat Croxatto, Box 7701, 919/515-2089, cmouatc@ncsu.edu, Art and Design

Professors: S. D. Brandeis, C. D. Cox, H. P. Marchant Montenegro, J. M. Searce; ***Emeritus Professors:*** C. E. Joyner;

Associate Professors: L. M. Diaz, P. J. Fitzgerald, R. A. Flinchum, S. G. Queen, K. C. Rieder, M. E. Russo; ***Emeritus***

Associate Professors: V. K. Plume, D. G. Raymond, S. M. Toplikar; **Assistant Professors:** T. L. Allen, T. M. Berreth,

K. A. Diuguid, J. D. LeBlanc, C. Mouat Croxatto, E. Polyak; **Teaching Assistant Professors:** T. L. Temple

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 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.

[NCSU Graduate Catalog](#)

Biochemistry

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

M. B. Goshe, Box 7622, michael_goshe@ncsu.edu, Biochemistry

Named Distinguished Professors: L. K. Hanley-Bowdoin; **Professors:** D. T. Brown, J. W. Brown, H. M. Hassan, C. L. Hemenway, J. M. Horowitz, J. A. Knopp, J. M. Mackenzie, E. S. Maxwell, E. S. Miller, K. R. Weninger, P. L. Wollenzien; **Adjunct Professors:** R. E. Cannon, J. Cavanagh, J. D. Otvos; **Emeritus Professors:** J. S. Kahn, W. L. Miller, J. W. Moyer, E. C. Theil; **Emeritus Named Distinguished Professors:** H. R. Horton; **Emeritus Distinguished Professors:** R. R. Sederoff, H. E. Swaisgood; **Associate Professors:** M. B. Goshe, C. C. Hardin, F. Meilleur, R. B. Rose; **Research Associate Professors:** H. Gracz, R. Hernandez; **Adjunct Associate Professors:** D. F. Ferreira; **Assistant Professors:** C. J. Doherty, G. Xu; **Research Assistant Professors:** P. D. Swartz; **Adjunct Assistant Professors:** R. E. Cannon; **Teaching Assistant Professors:** J. T. Ascencio-Ibanez, D. G. Presutti

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.

Bioinformatics

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--------------------------------|-------|-------|------|------|-----------|-------|-----|
| Bioinformatics | Y | | | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

D. M. Bird, Box 7253, 919/515-1967, david_bird@ncsu.edu, Entomology and Plant Pathology

S. V. Muse, Box 7566, 919/515-1948, muse@ncsu.edu, Statistics

Named Professors: J. M. Alonso, D. M. Bird, M. Davidian, A. M. Grunden, R. M. Kelly, A. A. Tsiatis; **Named Distinguished Professors:** R. S. Boston, V. C. Chiang, J. Doyle, Z. Zeng; **Named Distinguished University Professors:** T. F. MacKay; **Distinguished Professors:** M. A. Vouk; **Distinguished University Professors:** D. L. Bitzer; **Professors:** C. M. Ashwell, R. J. Borski, M. Breen, D. T. Brown, J. W. Brown, I. Carbone, R. G. Franks, S. K. Ghosh, J. M. Haugh, J. M. Hughes-Oliver, E. L. Kaltofen, B. Li, H. Liu, E. S. Maxwell, M. S. Merrill, D. C. Muddiman, S. V. Muse, C. H. Opperman, J. N. Petite, R. M. Petters, J. A. Piedrahita, M. C. Sagui, B. Sherry, S. M. Sullivant, J. L. Thorne, J. Tzeng, R. W. Whetten, P. L. Wollenzien, F. A. Wright, Q. Xiang, D. Zhang; **Adjunct Professors:** J. Cavanagh, J. L. Gibson, E. A. Koutsos, M. S. McGinnis, E. A. Stone, R. D. Wolfinger; **Emeritus Named Professors:** W. F. Boss, E. Eisen, T. R. Klaenhammer; **Emeritus Professors:** W. Tompkins; **Emeritus Named Distinguished Professors:** W. R. Atchley; **Associate Professors:** G. C. Conant, M. B. Goshe, S. Heber, M. D. Koci, S. Komarnytsky, D. S. Lalush, T. A. Long, A. Maity, C. Maltecca, F. Meilleur, A. A. Motsinger-Reif, D. M. Nielsen, J. W. Olson, X. Peng, B. J. Reich, D. M. Reif, M. L. Sikes, N. D. Singh, C. E. Smith, L. J. Unruh Snyder, Y. Wu; **Research Associate Professors:** P. A. Estes; **Adjunct Associate Professors:** L. Li, W. O. McMillan; **Assistant Professors:** H. Ashrafi, D. L. Aylor, C. J. Doherty, S. A. Faith, D. Fourches; **Research Assistant Professors:** Y. Zhou; **USDA Assistant Professors:** A. M. Hulse-Kemp; **Adjunct Assistant Professors:** J. L. Stephenson; **Teaching Associate Professors:** J. L. Lubischer

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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

J. J. Classen, Box 7625, 919/515-6755, john_classen@ncsu.edu, Biological and Agricultural Engineering

Named Professors: M. D. Boyette, W. F. Hunt; **Professors:** J. J. Cheng, M. S. Chinn, R. O. Evans, G. A. Fox, G. L. Grabow, S. A. Hale, L. W. Li, T. M. Losordo, K. P. Sandeep, S. B. Shah, L. F. Stikeleather, W. Yuan; **Adjunct Professors:** B. E. Farkas; **Emeritus Professors:** G. D. Jennings, D. H. Willits; **Emeritus Named Distinguished Professors:** R. W. Skaggs; **Associate Professors:** F. P. Birgand, M. R. Burchell, J. J. Classen, S. G. Hall, R. L. Huffman, P. Kolar, G. T. Roberson, M. A. Youssef; **Adjunct Associate Professors:** D. M. Amatya, P. N. Dugba, R. R. Sharma-Shivappa; **Assistant Professors:** C. F. Castro Bolinaga, C. Sayde; **Research Assistant Professors:** C. D. Simmons; **Adjunct Assistant Professors:** E. Z. Bean, K. B. Cantrell, J. M. Hathaway, P. R. Puckett; **Extension Associate Professors:** B. A. Doll; **Extension Assistant Professors:** G. H. Ellington; **Emeritus 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.

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 [Department of Biology](#).

Bio manufacturing

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|----------------------------------|-------|-------|------|------|-----------|-------|-----|
| Biomanufacturing | | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

M. C. Flickinger, Box 7928, 919/515-0175, mcflicki@ncsu.edu, Microbiology

Named Professors: A. M. Grunden; **Named Distinguished Professors:** R. G. Carbonell; **Professors:** M. C. Flickinger, H. H. Lamb, P. E. Mozdziak, H. A. Sederoff, J. D. Sheppard; **Research Professors:** I. Y. Perera; **Associate Professors:** P. T. Hamilton, G. J. Williams; **Research Associate Professors:** K. Efimenko; **Assistant Professors:** S. Menegatti; **Teaching Associate Professors:** G. L. Gilleskie; **Teaching Assistant Professors:** J. H. van Zanten

The Golden LEAF Biomanufacturing Training and Education Center (BTEC) has established two new graduate degrees -- a Master of Biomanufacturing (MR) and a Master of Science (MS) in Biomanufacturing. These degrees may be taken full-time or part-time. The MS in Biomanufacturing requires completion of advanced hands-on courses in the BTEC simulated cGMP facility, global regulatory affairs training and is a research-based degree which requires a written thesis in addition to selected bioscience-focused MBA coursework. The Master of Biomanufacturing (non-thesis) combines advanced biomanufacturing cGMP BTEC courses, global regulatory affairs training with additional bioscience-focused MBA courses taught by faculty from the Jenkins Graduate School of Management, and is designed to prepare program graduates to work as managers and for leadership positions in the biomanufacturing industries. Both the MR and MS degrees include professional skills training in effective oral, electronic and written communication for both technical and business careers. Most coursework and required laboratory courses are offered in the evenings at BTEC to accommodate working professionals.

Admission Requirements: Admission to the BIOM program requires completion of an undergraduate degree in engineering, life science or physical sciences, letters of recommendation, and a statement of career goals. A minimum overall grade point average of 3.0 and GRE scores in the 80th percentile are also required. Applicants with previous industry experience or working professionals are strongly encouraged to apply.

Master's Degree Requirements

Master of Biomanufacturing. BIOM students will complete a minimum of 36 total credit hours including 3 credit hours of biomanufacturing industry internship, 6 credits of industry practicum case studies, 2 credit hours of process-focused research experience under the direction of a graduate advisor, 3 credits of global regulatory affairs and 9 credits of MBA courses in project management, biosciences management and business foundations. Students will submit final written reports that summarize their internship as well as their research experience and will make a presentation to the BIOM graduate faculty.

Master of Science. The Master of Science degree also requires a minimum of 36 credit hours. Similar to the MR, the BIOM Master of Science curriculum will combine interdisciplinary coursework with 6 MBA credits including a course in project management. In addition, the BIOM Master of Science program will provide more experience in bioprocess development research to familiarize students with the methods, ideals and goals of independent investigation, the concepts of quality by design (QbD), and methods used in industry for design of experiments (DoE) to define design space for industrial processes. As a consequence of the stronger focus on research, BIOM Master of Science students will complete 4 credit hours of industry-focused process research mentored by their BIOM graduate advisor. Each student will submit a written thesis, which will be presented to the student's BIOM graduate advisory committee.

Student Financial Support: A limited number of full-time participants in the Master of Biomanufacturing program

may be eligible for industry-sponsored graduate scholarships.

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Other Relevant Information: BIOM accepts students in Spring and Fall Semesters. A 10 credit hour graduate minor is also available for NCSU students currently enrolled in other graduate programs. Two unique 12 credit Graduate Certificates: Upstream Biomanufacturing and Downstream Biomanufacturing are also offered for MR students currently enrolled in other graduate programs. Individuals interested in the BIOM program looking for more information should contact: Chris Smith, BIOM Academic Program Coordinator. (919) 513-2195, chris_smith4@ncsu.edu.

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

[NCSU Graduate Catalog](#)

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 8213, 919/515-1910, allloyd@ncsu.edu, Mathematics

Named Professors: N. M. Haddad; **Named Distinguished Professors:** Z. Zeng; **Named Distinguished University Professors:** H. T. Banks, C. K. Hall; **Professors:** K. Gross, M. Haider, J. M. Haugh, G. R. Hess, A. L. Lloyd, S. R. Lubkin, G. G. McRae, S. V. Muse, M. Olufsen, S. M. Sullivant, J. L. Thorne, H. T. Tran; **Adjunct Professors:** J. T. Betts, M. A. Coffin, R. B. Conolly, C. L. Hughes, P. H. Morgan, J. T. Ottesen, R. W. Setzer, E. A. Stone; **Emeritus Professors:** J. W. Bishir, M. L. Hauck, K. H. Pollock, H. E. Schaffer, J. F. Selgrade, R. E. Stinner; **Emeritus Named Distinguished Professors:** W. R. Atchley, J. E. Riviere; **Associate Professors:** R. B. Langerhans, B. J. Reich, C. E. Smith; **Adjunct Associate Professors:** W. O. McMillan; **Assistant Professors:** B. S. Akpa, K. B. Flores, R. Ke, R. Sozzani; **Adjunct Assistant Professors:** S. Bhattacharya, G. Bobashev, J. S. Kimbell, A. Mokhtari, Q. Zhang

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 [NCSU Graduate Catalog \(2017-2018\)](#) for current course information.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

C. M. Gallippi, Box 7115, cmgallip@email.unc.edu, Biomedical Engineering

Named Professors: A. E. Tonelli; **Named Distinguished Professors:** F. S. Ligler; **Distinguished Professors:** O. A. Harrysson, H. T. Nagle, M. A. Vouk; **Distinguished University Professors:** D. L. Bitzer; **Professors:** N. L. Allbritton, G. D. Buckner, M. Chow, M. G. Forest, R. P. Gardner, R. E. Gorga, E. Grant, M. Haider, S. A. Hale, H. Huang, A. Ivanisevic, C. Kleinstreuer, H. Krim, A. V. Kuznetsov, W. Lin, S. R. Lubkin, D. J. Marcellin, M. G. McCord, J. F. Muth, R. J. Narayan, M. Olufsen, H. C. Pillsbury, A. Rabiei, J. M. Ramsey, S. C. Roe, L. F. Stikeleather, M. K. Stoskopf; **Adjunct Professors:** J. Cavanagh, W. C. Holton, G. Lazzi, E. G. Loba-Polefka; **Emeritus Professors:** C. F. Abrams, R. M. Grossfeld, N. A. Monteiro-Riviere, S. A. Rajala, W. E. Snyder, D. E. Thrall; **Associate Professors:** K. Cheng, P. A. Dayton, R. G. Dennis, M. Gamcsik, Z. Gu, H. Huang, D. G. Kamper, D. S. Lalush, J. M. Macdonald, C. S. Nam, K. Saul, C. E. Smith, M. A. Tommerdahl, G. M. Walker, D. A. Zaharoff; **Research Associate Professors:** O. V. Favorov, R. L. Goldberg, G. S. McCarty; **Associate Professors of the Practice:** A. J. DiMeo; **Assistant Professors:** A. C. Brown, Y. Brudno, J. Cole-Husseini, M. Daniele, M. B. Fisher, J. R. Franz, D. O. Freytes, C. M. Gallippi, S. M. Gomez, G. F. Pinton; **Adjunct Assistant Professors:** M. Mohiti Asli; **Teaching Associate Professors:** L. A. Cartee, H. O. Ozturk

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 five primary research directions: rehabilitation engineering, regenerative medicine, biomedical imaging, microsystems engineering, and pharmacoengineering. 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

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](#).

[NCSU Graduate Catalog](#)

Biotechnology (Minor Program)

Professor R. M. Kelly, Director

Box 7512

919.515.4230

Email: rmkelly@ncsu.edu

Home page: <http://biotech.ncsu.edu>

The Biotechnology Program includes faculty from over 20 departments in the Colleges of Agriculture and Life Sciences, Science, Engineering, Natural Resources and Veterinary Medicine Courses in the program provide hands-on experience in cutting-edge research techniques, as well as experimental design and analysis. The graduate minor is available to students who successfully complete six to eight credit hours in selected laboratory core courses described below and conduct their graduate thesis research in an area of biotechnology. Graduate students must include the minor in their Plan of Work, and at least one member of the student's thesis committee must be a member of the [Biotechnology faculty](#).

REQUIRED (4 credits)

BIT 510 Core Technologies in Molecular and Cellular Biotechnology (4 credits)

BIOTECHNOLOGY LABORATORY ELECTIVES (2 credits each)

For a complete listing of all elective courses, please visit the [BIT website](#). Some of these include:

BIT 564 Protein Purification

BIT 566 Animal Cell Culture

BIT 567 PCR and DNA Fingerprinting

BIT 571 RNA interference and model organisms

BIT 572 Proteomics

BIT 574 Plant Genetic Engineering

Students may be approved by an [Academic Coordinator](#) of the BIT Program to place out of BIT 510 if they have substantial practical experience and conceptual knowledge of the material covered, and can then instead take one additional 2-credit BIT advanced laboratory elective course (completing the minor requirements with 6 credits of coursework rather than 8).

Business Administration

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

S. G. Allen, Box 8114, 919/515-5584, steve.allen@ncsu.edu, Business Management

Named Distinguished Professors: J. Carr, H. S. Heese; ***Named Distinguished University Professors:*** R. B. Handfield; ***Distinguished Professors:*** S. W. King; ***Professors:*** S. G. Allen, P. Arasu, S. H. Barr, J. W. Bartley, J. D. Bohlmann, C. C. Bozarth, M. Bradford, J. F. Brazel, Y. A. Chen, R. L. Clark, D. H. Henard, B. L. Kirkman, S. E. Margolis, S. K. Markham, R. C. Mayer, A. Padilla, D. P. Pagach, F. C. Payton, B. B. Tyler, M. D. Walker, R. S. Warr, I. R. Weiss; ***Professors of the Practice:*** L. Shamblin; ***Adjunct Professors:*** R. E. Kouri; ***Emeritus Named Professors:*** C. P. Jones; ***Emeritus Professors:*** D. L. Baumer, G. W. Dickson, D. M. Holthausen; ***Associate Professors:*** B. R. Danielsen, J. B. Earp, J. A. Ellis, R. Garcia, E. Kemahlioglu-Ziya, S. Krishnamurthy, K. Mitchell, P. W. Mulvey, J. M. Pollack, M. A. Stanko, J. S. Stonebraker, D. P. Warsing, G. S. Young, G. J. Zuckerman; ***Adjunct Associate Professors:*** C. M. Newmark; ***Emeritus Associate Professors:*** S. N. Chapman, K. S. Davis, C. W. Harrell, J. K. McCreery, E. A. McDermed, J. C. Poindexter; ***Assistant Professors:*** N. M. Bhawe, H. J. Dretsch, S. M. Robinson, J. D. Smith, Q. Wu; ***Adjunct Assistant Professors:*** M. D. Kowolenko

The Master of Business Administration (MBA) program develops business leaders for tomorrow's global markets and technologies. The Jenkins MBA program provides students with the requisite foundation in general business management, while also allowing time to focus on an area of particular interest. In pairing academic excellence with real-world experience, Jenkins MBA students are ready to meet global challenges head-on with practical, technology-driven solutions.

Students may choose to pursue an MBA through one of four platforms: the Full-time program on NC State's main campus; the Professional Evening program with locations on NC State's main campus as well as a RTP location; or the Online program.

Admission Requirements: In addition to the basic Graduate School admission requirements, MBA applicants must submit recent GMAT or GRE scores. Admission decisions are based on academic performance and potential, GMAT or GRE scores, essays, recommendations, relevant work experience and an interview. Students must have previous coursework in statistics before entering the program. For further information, please visit the MBA website at www.mba.ncsu.edu.

Master of Business Administration: The MBA program requires every student to complete the core curriculum that includes coursework in accounting, economics, finance, marketing, operations / supply chain, organizational behavior, statistics and strategy, as well as communications and critical thinking and writing. Full-time students must complete a minimum of 56 credit hours; Professional Evening and Online students must complete a minimum of 40 credit hours.

Additional Requirements

Full-time: In addition to the core curriculum, students must complete a minimum of 12 elective hours within a concentration; an advanced analytics course; and a practicum. Students then have the opportunity to choose from a variety of elective courses to meet the 56 credit hour minimum.

Professional Evening and Online: In addition to the core curriculum, students must complete a minimum of 6 elective hours within an area of emphasis; an advanced analytics course; and a practicum. Students then choose from a variety of elective courses to meet the 40 credit hour minimum.

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

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

[NCSU Graduate Catalog](#)

Chemical 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

Director of Graduate Programs:

S. A. Khan, Box 7905, 919/515-4519, khan@ncsu.edu, Chemical and Biomolecular Engineering

Named Professors: H. Jameel, R. M. Kelly, S. A. Khan, G. N. Parsons, O. D. Velez; **Named Distinguished Professors:** R. G. Carbonell, J. M. DeSimone, B. Pourdeyhi; **Named Distinguished University Professors:** K. E. Gubbins, C. K. Hall; **Distinguished Professors:** J. Genzer, R. J. Spontak; **Distinguished University Professors:** D. F. Ollis; **Professors:** C. M. Balik, M. D. Dickey, P. S. Fedkiw, M. C. Flickinger, R. E. Gorga, C. S. Grant, J. M. Haugh, H. H. Lamb, P. K. Lim, P. R. Westmoreland; **Adjunct Professors:** M. Schoen, M. Sliwinski-Bartowiak; **Emeritus Named Professors:** R. M. Felder, H. B. Hopfenberg; **Associate Professors:** C. Beisel, J. S. Jur, F. Li, S. W. Peretti, B. M. Rao; **Research Associate Professors:** K. Efimenko, J. Srogl; **Adjunct Associate Professors:** J. Srogl; **Assistant Professors:** M. Abolhasani, L. C. Hsiao, A. J. Keung, S. Menegatti, G. T. Reeves, A. San Miguel Delgadillo, E. E. Santiso, Q. Wei; **Adjunct Assistant Professors:** P. V. Gurgel; **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

Director of Graduate Programs:

D. A. Shultz, Box 8204, 919/515-6972, shultz@ncsu.edu, Chemistry

Named Distinguished Professors: D. W. Brenner; **Named Distinguished University Professors:** J. S. Lindsey, B. M. Novak; **Professors:** E. F. Bowden, C. L. Bumgardner, F. N. Castellano, S. Franzen, C. B. Gorman, J. D. Martin, C. C. Melander, D. C. Muddiman, M. T. Oliver-Hoyo, D. A. Shultz, A. I. Smirnov, M. H. Whangbo; **Adjunct Professors:** A. Deiters, M. Khaledi; **Emeritus Professors:** R. D. Bereman, H. H. Carmichael, D. L. Comins, L. D. Freedman, F. W. Getzen, K. W. Hanck, F. C. Hentz, R. H. Loeppert, C. G. Moreland, S. T. Purrington, A. F. Schreiner, W. P. Tucker, J. L. Whitten; **Associate Professors:** C. B. Boss, R. A. Ghiladi, T. B. Gunnoe, E. A. Ison, E. Jakubikova, P. A. Maggard, A. A. Nevzorov, T. I. Smirnova, L. A. Sombers, W. L. Switzer, D. W. Wertz, G. J. Williams; **Research Associate Professors:** G. S. McCarty; **Adjunct Associate Professors:** L. He; **Assistant Professors:** W. Chang, D. Fourches, V. Lindsay, J. G. Pierce, C. Proulx, G. Wang, W. W. Weare

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 chemical/synthetic biology, biophysics/physics, computational science, informatics, photonics/photophysics and materials science 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(both domestic and international students).

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, as well as department-funded Chemistry Scholars Graduate Research Assistantships.

Other Relevant Information: The Chemistry Department forms part of the College of Sciences. More than one dozen 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.

City Design (Certificate)

Directors of Graduate Certificate Programs:

Arthur Rice

Landscape Architecture

Phone: 919/515-8347

Email: art_rice@ncsu.edu

Website: <https://design.ncsu.edu/academics/architecture/graduate-programs/graduate-certificates>

Robin Abrams

Architecture

Phone: 919/513-4841

Email: rfabrams@ncsu.edu

Website: <https://design.ncsu.edu/academics/architecture/graduate-programs/graduate-certificates>

The Graduate Certificate in City Design is a joint program between the School of Architecture and the Department of Landscape Architecture. In addition, the Graduate Certificate in City Design is an interdisciplinary and inter-university initiative, reflecting the nature of city design practice. The program aims to bring together students and faculty from landscape architecture, architecture, and city and regional planning into an interactive and team-based learning context.

The City Design program promotes design inquiry and application at the scale of the city for students and practitioners of architecture, landscape architecture, and city and regional planning. The program's objectives are to consider the human condition, particularly in making significant urban places; design integrated system of movement with increased accessibility; promote a greater mix of uses and amenities within a well-scaled urban fabric; foster new opportunities for energy production, collection and saving at the local scale; define new means of 'greening' the city; and capture greater senses of identity, meaning, and quality within the city fabric.

Admissions: Applicants must complete an application form to be considered for the certificate program. To qualify for admission to the certificate program, students must be enrolled in (or have completed) a professional program in architecture. At the time of application, students must have a 3.00 grade point average (GPA) in their professional degree program.

Requirements: Students must complete 15 hours of coursework from the course menu, as specified in the certificate application, and have a minimum of 3.00 GPA on all certificate coursework. All grades on courses taken towards the certificate program in courses numbered 400 and above are included in the GPA. Courses at the 300 level and below are not eligible for certificate credit and subsequently do not affect the graduate GPA.

The minimum grade to receive certificate credit can be no lower than B-. Students who take letter-graded 400-, 500-, and 700-level courses do not have the option of taking the courses for 'credit only' if they intend for the course to be part of the graduate certificate. Transfer credit from other institutions is not allowed for the graduate certificate. All course work must be registered through NC State University.

All certificate requirements must be completed within four (4) calendar years, beginning with the date that the student commences courses applicable to the certificate, unless a more restrictive time limit has been established by the program or academic college/school.

A student may obtain more than one certificate. Each certificate must have a least nine (9) credit hours that are unique to it.

Other Information: Students in City Design certificate program will join an academic and professional community that

offers a broad range of extracurricular activities, including the College of Design annual Urban Design Conference, visiting lecturers, colloquia, and *City Forum*, a regularly scheduled series of brown bag discussions coordinated by the City of Raleigh Urban Design Center.

Note that academic success might have a strong bearing on admission to a degree program, but completion of the certificate program in no way guarantees entry into a graduate degree program. For more information regarding course requirements and the application process, please contact the certificate program coordinator.

[NCSU Graduate Catalog](#)

Civil Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

S. Ranjithan, Box 7908, 919/515-6979, ranji@ncsu.edu, Civil, Construction, and Environmental Engineering

Distinguished Professors: E. J. Jaselskis, S. Rizkalla; **Distinguished University Professors:** M. A. Barlaz, H. C. Frey, Y. R. Kim; **Named Distinguished Professor:** M. Liu; **Professors:** S. Arumugam, J. W. Baugh, E. D. Brill, F. De Los Reyes, J. Ducoste, M. A. Gabr, M. N. Guddati, A. Gupta, T. Hassan, M. I. Hoit, D. R. Knappe, M. J. Kowalsky, G. F. List, G. Mahinthakumar, J. M. Nau, M. F. Overton, M. S. Rahman, S. Ranjithan, W. J. Rasdorf, N. M. Roupail, R. Seracino, A. A. Tayebali, J. V. Veliadis, B. M. Williams; **Research Professors:** B. L. Edge; **Adjunct Professors:** M. G. Calvi, B. Kasal; **Emeritus Professors:** M. Amein, R. C. Borden, R. H. Borden, J. F. Ely, J. S. Fisher, A. K. Gupta, K. S. Havner, C. L. Heimbach, Y. Horie, N. P. Khosla, M. L. Leming, V. C. Matzen, S. W. Nunnally, J. R. Stone, C. C. Tung, H. E. Wahls; **Emeritus Distinguished Professors:** D. W. Johnston; **Emeritus Distinguished University Professors:** J. M. Hanson, P. Z. Zia; **Associate Professors:** E. Z. Berglund, J. F. DeCarolis, M. Pour-Ghaz; **Adjunct Associate Professors:** C. P. Bobko, L. R. Goode, B. J. Schroeder; **Emeritus Associate Professors:** W. L. Bingham, A. C. Chao, J. C. Smith; **Assistant Professors:** A. Albert, T. Aziz, E. Bardaka, A. M. Cabas Mijares, D. F. Call, C. A. Castorena, J. C. Dietrich, F. Garcia Menendez, A. P. Grieshop, K. Han, B. M. Montoya, D. R. Obenour, A. C. Ortiz; **Research Assistant Professors:** A. R. de Queiroz, J. W. Levis, G. W. Lucier, E. J. Sciaudone; **Adjunct Assistant Professors:** T. M. Evans, D. J. Findley, T. Sinha

Graduate programs are offered in coastal and water resources engineering, computing and systems, construction engineering and management, environmental engineering, geotechnical and geoenvironmental engineering, mechanics and materials, structural engineering and mechanics, transportation engineering and materials.

Admission Requirements: Normal minimum GPA requirements include 3.0 overall and in the major. Students who do not meet these academic requirements may take graduate courses through the [Non Degree Studies](#) program to demonstrate academic ability, but consultation with the Director of Graduate Programs is strongly 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 is required for all international applicants and all applicants to the MSCE or MENE degree programs.

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 MCE 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 MCE is available both on-campus and through distance education. The MSCE degree requires a thesis and a formal minor is optional. Requirements for the MENE and MENE 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 -- full or supplemental to an assistantship -- 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.

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

[NCSU Graduate Catalog](#)

Climate Adaptation (Certificate)

Director of Graduate Certificate Programs:

Jay Levine

Marine, Earth And Atmospheric

Phone: 919/513-6397

Email: jflevine@ncsu.edu

Website: <http://ccs.sciences.ncsu.edu>

The Graduate Certificate in Climate Adaptation program at NC State University provides accredited, academic training in the emerging field of climate adaptation. The online, twelve credit program is designed to provide mid-career professionals and entry-level students with technological skills and specialization in climate adaptation. The certificate is a fully accredited credential and a potential path toward the Climate Adaptation degree program. Coursework includes Fundamentals of Climate Change Science, Climate Risk Analysis, Climate Communication and Introduction to Geographic Information Systems.

Admission Requirements: 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.
- Have a Master's degree.
- Be a degree student in good standing in a NC State University graduate program.

We recommend that students in a NC State University graduate program may apply after completing two of the courses required for the graduate certificate program with at least B grades. The graduate certificate program Director will manage the admissions process in consultation with the MEAS Director of Graduate Programs.

Provisional Admission: Applicants who do not meet the graduate certificate program requirements for full admission may be admitted provisionally based on the quality of their letters of recommendation and other criteria at the discretion of the Certificate Program Director and MEAS Director of Graduate Programs. Students who are admitted provisionally must maintain a 3.0 GPA in order to obtain full admission into the certificate program.

Program of Study: The graduate certificate requires a minimum of 12 hours, and includes the following courses:

- MEA 517 Fundamentals of Climate Change Science
- MEA 518 Climate Risk Analysis
- MEA 519 Barriers to Climate Change Literacy
- GIS 510 Introduction to Geographic Information Science

[NCSU Graduate Catalog](#)

Climate Change and Society

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Climate Change and Society | | | | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

E. L. Leithold, Box 8208, 919/515-7282, leithold@ncsu.edu, Marine, Earth and Atmospheric Sciences

V. P. Aneja, Box 8208, 919/515-7808, viney_aneja@ncsu.edu, Marine, Earth and Atmospheric Sciences

Professors: J. F. Levine, W. A. Robinson, F. H. Semazzi; **Adjunct Professors:** J. J. Bates, R. P. Dziak, P. Hamilton, D. E. Kingsmill, S. Yu; **Associate Professors:** A. Schnetzer; **Adjunct Associate Professors:** S. Bulusu, B. Kosovic; **Adjunct Assistant Professors:** M. Brennan, A. L. Holder, H. Liu

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. 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.

[NCSU Graduate Catalog](#)

Clinical Mental Health Counseling

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Clinical Mental Health Counseling | | | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: G. M. Kleiman, S. C. Nassar-McMillan, K. M. Oliver, J. A. Picart, S. Ting; **Associate Professors:** M. A. Grimmett, M. M. Manfra, M. M. Thomson; **Assistant Professors:** A. S. Dunbar, D. L. Gray; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher, M. G. Maxwell, M. B. Sumerel, R. E. Tyler-Walker; **Teaching Associate Professors:** A. C. Smith; **Teaching Assistant Professors:** C. Braga, N. M. Childs, H. S. Lupton-Smith; **Lecturers:** N. M. Childs

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

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 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.

Graduate Students who wish to minor in cognitive science must declare the minor on their Graduate Plan of Work, which they develop with their graduate advisory committee. This committee must include a representative of the minor, and the student must send a copy of the Plan of Work to the Director of the Cognitive Science Program.

College Counseling and Student Development

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| College Counseling and Student Development | | | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: G. M. Kleiman, S. C. Nassar-McMillan, K. M. Oliver, J. A. Picart, S. Ting; **Emeritus Professors:** C. Brownie; **Associate Professors:** R. C. Kochersberger, M. M. Manfra, M. M. Thomson; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Emeritus Associate Professors:** R. C. Kochersberger; **Assistant Professors:** A. S. Dunbar, D. L. Gray; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher, M. G. Maxwell, M. B. Sumerel, R. E. Tyler-Walker; **Teaching Associate Professors:** A. C. Smith; **Teaching Assistant Professors:** C. Braga, N. M. Childs; **Lecturers:** N. M. Childs

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

[NCSU Graduate Catalog](#)

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:

D. M. Rieder, Box 8105, 919/247-7506, dmrieder@ncsu.edu, English

Distinguished University Professors: C. M. Anson; ***Professors:*** D. M. Berube, M. P. Carter, D. P. Dannels, V. J. Gallagher, J. Goodwin, M. G. Gordon, J. K. Jameson, M. A. Johnson, H. D. Kellner, W. J. Kinsella, A. M. Penrose, R. L. Schrag, J. Swarts, J. N. Wall, K. S. Zagacki; ***Emeritus Professors:*** W. J. Jordan, C. R. Miller; ***Associate Professors:*** A. R. Binder, H. J. Burgess, D. H. Covington, E. A. Craig, A. A. de Souza e Silva, R. S. Dicks, H. Ding, C. J. Fedukovich, P. C. Fyfe, O. Gelley, S. M. Katz, J. Kiwanuka-Tondo, K. A. Kosenko, D. A. Orgeron, D. M. Rieder, S. R. Stein, T. L. Stinson, R. A. Walsh, S. B. Wiley; ***Emeritus Associate Professors:*** D. H. Covington, R. S. Dicks; ***Assistant Professors:*** G. Bollmer, F. D. Cason, C. Ingraham, A. R. Johnston, N. M. Lee, S. L. Pigg, N. T. Taylor, E. M. Winderman; ***Teaching Assistant Professors:*** D. C. Gierdowski

The Ph.D. Program in Communication, Rhetoric, and Digital Media prepares doctoral students to analyze the social, cultural, rhetorical, philosophical, and political dimensions of information technologies, new communication media, and digital texts and to actively engage digital media through research, criticism, production, and practice.

Students work with program faculty from the departments of Communication and English and with affiliated faculty from departments across the university to study oral, written, visual, computational, and multimodal forms of communication and rhetoric and digital media; to examine the transformation of communication in the context of converging digital media and communication networks; and to address the theoretical challenges of innovative, interdisciplinary research.

Students can create programs of study in areas such as Social Networks and Social Media, Interpersonal Communication, Environmental Communication, Emerging Digital Genres, Multimedia Research in Digital Media, Digital Humanities, Digital Rhetoric, Visual Rhetoric, Digital Media Production, STS and Risk Communication; Organizational Communication, Mobile Communication, Technology and Pedagogy, Game Studies, Online Information Design, Public Relations, Digital Literacies and Composition, Transcultural Communication, Visual Communication, and Cultural Studies.

Faculty guide students in this work by using a broad range of social scientific and humanistic methods in which they specialize. The program offers comprehensive mentoring for professional development, diverse opportunities for teaching experience, and research assistantships associated with grant-funded faculty projects. CRDM faculty and students collaborate with colleagues in science and technology fields across the university and the Research Triangle.

Our graduates have been very successful finding employment in a variety of positions in academia (both at research-intensive universities and at teaching-oriented liberal arts colleges), government and corporate organizations, where there is a growing demand for the interdisciplinary skill sets developed in CRDM.

See our [website](#) for more details.

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](#). These hours do not count toward the doctoral degree. Disciplinary areas include:

composition studies, including writing across the curriculum, interpersonal/group communication, media studies, organizational communication or public relations, rhetorical studies, and technical communication. 93

Applicants who are otherwise well qualified may make up these courses after admission. GRE scores no older than five years, three reference letters, 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 December 01.

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.

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, as well as departmental need, 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.

[NCSU Graduate Catalog](#)

Communication

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. R. Binder, Box 8104, 919/515-9750, arbinder@ncsu.edu, Communication

M. A. Johnson, Box 8104, 919/515-9757, melissa_johnson@ncsu.edu, Communication

Professors: D. M. Berube, D. P. Dannels, V. J. Gallagher, J. Goodwin, J. K. Jameson, M. A. Johnson, J. Keyton, W. J. Kinsella, R. L. Schrag, K. S. Zagacki; **Emeritus Professors:** W. J. Jordan, C. A. Smith; **Associate Professors:** A. R. Binder, E. A. Craig, A. A. de Souza e Silva, D. A. DeJoy, E. T. Funkhouser, J. Kiwanuka-Tondo, K. A. Kosenko, S. R. Stein, S. B. Wiley; **Emeritus Associate Professors:** E. T. Funkhouser, R. Leonard, B. L. Russell; **Assistant Professors:** G. Bollmer, R. J. Hurley, C. Ingraham, N. M. Lee, L. K. Romo, N. T. Taylor, E. M. Winderman; **Teaching Assistant Professors:** E. A. Nelson; **Lecturers:** K. Albada-Jelgersma

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. The curriculum 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 positions in communication professions and for advanced degree programs (e.g., Ph.D. programs).

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. Students will be required to complete 9 hours of core requirements, and 27 hours of electives, 9 of which can be taken outside of the department with the approval of the graduate advisor. Students can also take up to 6 internship or independent study credit hours. Students on the thesis track can take up to 6 thesis credit hours.

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

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

K. M. Meurs, Box 8401, 919/513-6213, kmmeurs@ncsu.edu, College of Veterinary Medicine

S. L. Jones, Box 8401, 919/513-7722, sam_jones@ncsu.edu, College of Veterinary Medicine

Named Professors: L. Jaykus, H. B. Patisaul; **Named Distinguished Professors:** R. R. Anholt; **Professors:** K. B. Adler, G. W. Almond, K. L. Anderson, P. Arasu, H. J. Barnes, R. E. Baynes, A. J. Birkenheuer, A. T. Blikslager, J. C. Bonner, R. J. Borski, M. Breen, E. B. Breitschwerdt, T. T. Brown, M. T. Correa, P. J. Cray, J. M. Cullen, G. A. Dean, D. C. Dorman, F. J. Fuller, J. E. Gadsby, B. C. Gilger, J. R. Godwin, J. L. Gookin, J. S. Guy, B. Hammerberg, E. C. Hawkins, C. L. Hemenway, J. M. Hinshaw, J. M. Horowitz, S. L. Jones, S. W. Kullman, D. X. Lascelles, S. M. Laster, J. M. Law, J. F. Levine, M. G. Levy, D. P. Lunn, M. C. McGahan, K. M. Meurs, P. E. Mozdziaik, N. J. Olby, T. J. Olivry, M. G. Papich, J. A. Piedrahita, L. P. Posner, E. F. Rissman, P. L. Sannes, B. Sherry, R. C. Smart, G. W. Smith, M. K. Stoskopf; **Research Professors:** A. R. Brody, S. Kennedy-Stoskopf; **Clinical Professors:** K. E. Linder, R. A. Mansmann, S. L. Marks, W. R. Redding, B. L. Sherman; **Adjunct Professors:** T. K. Archer, R. S. Balaban, N. J. Caplen, M. W. Dewhirst, L. J. Helman, C. S. Lau, M. N. Martinez Pelsor, D. B. McGavern, J. H. Shelhamer, R. M. Simpson, J. K. Taubenberger, D. W. Threadgill; **Emeritus Professors:** L. N. Fleisher, M. L. Hauck, D. H. Ley, N. A. Monteiro-Riviere, W. M. Morrow, P. E. Orndorff, M. C. Roberts, D. E. Thrall; **Emeritus Named Distinguished Professors:** J. E. Riviere; **Associate Professors:** C. A. Adin, C. S. Bailey, L. B. Borst, K. Cheng, P. Cowen, W. A. Gebreyes, T. Ghashghaei, I. M. Gimeno, P. R. Hess, M. E. Jacob, M. D. Koci, C. Lanzas, K. F. Lunn, S. K. Lyle, C. L. Mariani, C. J. Mattingly, N. M. Nascone-Yoder, J. A. Neel, X. Peng, M. Rodriguez-Puebla, R. M. Schoenfeld, F. Scholle, M. L. Sikes, B. D. Slenning, L. A. Sombers, S. E. Suter, S. Thakur, S. Tonkonogy, J. A. Yoder; **Research Associate Professors:** R. G. Maggi; **Adjunct Associate Professors:** B. R. BERRIDGE, R. S. DeWoskin, J. A. Dye, S. E. Fenton, A. J. Moeser, E. B. Neufeld, R. C. Sills; **Emeritus Associate Professors:** S. Y. Gardner, C. R. Swanson; **Assistant Professors:** B. S. Akpa, P. Bizikova, B. J. Callahan, G. P. Cruse, C. M. Dekaney, J. R. Elfenbein, S. A. Faith, J. E. Fogle, D. M. Foster, L. M. Gonzalez, H. R. Hunt, T. E. Kaeser, A. A. Kedrowicz, A. J. Keung, C. Laplante, J. A. Luff, J. E. Meitzen, S. K. Mishra, F. M. Mowat, C. C. Nestor, M. W. Nolan, O. A. Petritz, A. J. Planchart, A. San Miguel Delgadillo, L. V. Schnabel, M. K. Sheats, C. M. Theriot, L. C. Van Landeghem, C. S. Walker, H. Yoshikawa; **Research Assistant Professors:** S. K. Nordone, B. A. Quorollo, R. Thomas; **Clinical Associate Professors:** R. B. Baker, C. A. Fogle; **Clinical Assistant Professors:** M. L. Mastromauro, H. Ru, C. A. Stiles, D. A. Stowe, A. P. Stringer, K. M. Tefft, A. Vigan, **Adjunct Assistant Professors:** M. L. Bradley, W. C. Eward, S. E. Fenton, J. M. Giraudel, M. E. Gruen, R. M. Hanel, Y. Kim, D. E. Malarkey, M. W. Wood; **Teaching Assistant Professors:** E. B. Bohorquez, S. E. Robertson

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 except for applicants with a DVM degree. 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, immunology, population medicine, infectious diseases, pathology, pharmacology, and neuroscience. 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.

[NCSU Graduate Catalog](#)

Computational Engineering and Sciences (Minor Program)

GRADUATE FACULTY

Professor P.J. Turinsky, Program Coordinator

The Computational Engineering and Sciences Program includes faculty from twelve departments in the College of Engineering and College of 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 the 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, molecular dynamics, radiation transport, 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 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.

Computer Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

P. D. Franzon, Box 7911, 919/515-7351, paulf@ncsu.edu, Electrical and Computer Engineering

Named Professors: S. A. Bedair, I. Husain, D. D. Stancil, M. B. Steer; **Named Distinguished Professors:** Q. HUANG, J. Narayan, R. J. Trew; **Distinguished Professors:** P. D. Franzon, N. A. Masnari, T. K. Miller, V. Misra, H. T. Nagle, M. A. Vouk; **Distinguished University Professors:** D. E. Aspnes, B. J. Baliga, D. L. Bitzer; **Professors:** M. E. Baran, S. Bhattacharya, G. T. Byrd, M. Chow, H. Dai, W. R. Davis, A. Duel-Hallen, M. J. Escuti, D. Y. Eun, J. J. Grainger, E. Grant, B. L. Hughes, K. W. Kim, R. M. Kolbas, H. Krim, L. Lunardi, R. F. Mueller, J. F. Muth, A. Nilsson, O. Oralkan, M. C. Ozturk, H. G. Perros, D. S. Reeves, E. Rotenberg, G. Rouskas, M. L. Sichitiu, Y. Solihin, M. F. Stallmann, J. K. Townsend, H. J. Trussell, J. V. Veliadis, I. Viniotis, W. Wang, F. Wu, H. Zhou; **Research Professors:** D. C. Hopkins, D. L. Lubkeman, T. M. Paskova; **Professors of the Practice:** L. W. White; **Adjunct Professors:** M. Devetsikiotis, W. C. Holton, G. J. Iafrate, G. Lazzi, T. M. Paskova, I. Rhee, J. M. Zavada; **Emeritus Named Professors:** J. R. Hauser; **Emeritus Professors:** W. E. Alexander, T. H. Glisson, M. A. Littlejohn, D. F. McAllister, C. M. Osburn, S. A. Rajala, W. E. Snyder; **Associate Professors:** S. T. Alexander, D. Z. Baron, M. Becchi, A. Y. Bozkurt, L. Cao, A. Chakraborty, R. Y. Chirkova, D. H. Covington, A. G. Dean, B. A. Floyd, E. F. Gehringer, I. Guvenc, K. H. Harfoush, D. S. Lalush, E. Lobaton, N. Lu, S. M. Lukic, D. Ricketts, X. Shen, J. Tuck, D. Vashae, G. M. Walker, C. M. Williams; **Research Associate Professors:** W. Yu; **Visiting Associate Professors:** C. A. Graves; **Adjunct Associate Professors:** A. J. Rindos, T. Xie, M. Yadav; **Emeritus Associate Professors:** G. F. Bland, D. H. Covington, W. C. Peterson; **Assistant Professors:** J. J. Adams, M. Daniele, M. W. Kudenov, H. Tseng, T. Wu; **Research Assistant Professors:** M. Abbasi, B. Lee; **Adjunct Assistant Professors:** R. D. Callaway, R. Mikail; **Teaching Professors:** S. D. Jackson; **Teaching Associate Professors:** L. J. Bottomley, B. Evans, H. O. Ozturk, D. G. Yu

Graduate programs in Electrical and Computer Engineering provide a variety of excellent education and research opportunities for outstanding students from around the world. Our Master's Degree Program offers a variety of options for specialization including a Master of Science in either Electrical Engineering, Computer Engineering, or Networking (all are available via distance learning or on-campus enrollment). Also, a strong Ph.D. program is available for students who wish to complete their education in the field of Electrical Engineering or Computer Engineering.

The Master of Science in Electric Power Systems Engineering (MS-EPSE) is an innovative new program which will give students a thorough understanding of the tools, methods, and practice of electric power engineering. It is both focused and practical in its orientation, with the goal of providing an education that is directly applicable to a career in industry. The MS-EPSE is an accelerated program that can be completed in ten months. The degree is suitable for a new or recent graduate, as well as experienced professionals who want to receive the necessary retraining to change careers.

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). The GRE is required for all programs of study. Admission is further limited by available room in the elected program of study. Meeting the above minimum requirements alone does not guarantee admission.

Admission to the MS-EPSE program requires students to have a bachelor's degree from an accredited college or university in electrical engineering with an overall GPA of at least 3.0. Students who do not have a bachelor's degree from an accredited college or university in electrical engineering must satisfy:

1. Completion of the following ECE courses (or electrical engineering courses equivalent to ECE 200, 211, 220, 331, and 435.
2. Applicants must have also completed the following courses or equivalent courses: three semesters of calculus, one semester of probability/statistics, two semesters of physics, and one semester of chemistry.

GRE scores within the last four years of the date of anticipated admission. Guideline for minimal GRE percentile scores are 70 percentile verbal, 90 percentile quantitative, and 50 percentile analytical or writing. GRE scores for students who are graduates from NCSU may be waived. They also might be waived for graduates from US ABET accredited programs with good GPAs.

All international applicants must submit TOEFL scores. The TOEFL must have been taken within two years of the date of anticipated admission. On the TOEFL iBT, students must have a minimum of 18 on each section of the test with a minimum total of 90. Scores on previous versions of the TOEFL are considered with the same qualitative standard. On the IELTS, we require a minimum score of 6.5 in each section. This requirement also applies to US citizens whose principal language of instruction has not been English (for example, most applicants from Puerto Rico and the Virgin Islands).

TOEFL - institution code 5496; department code 66

GRE - institution code 5496; department code 1203

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). The GRE is required for all programs of study but might be waived for NCSU graduates or graduates from other US ABET accredited schools with good GPAs. 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 three credit hours of advanced-level (700-level) ECE courses. Students electing the Option B non-thesis option must meet core course requirements; have ECE courses that cover at least three specialty areas' and have at least three credit hours of 700-level ECE courses.

The Master's degrees in CPE 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.

The MS-EPSE program requires 30 credit hours of graduate coursework. Twenty-seven credits of courses include four core electric power engineering courses; two interdisciplinary courses on power electronics, data communications, cyber security and environmental issues associated with electric power systems; professional skill training on project management, communication skills, and the business aspects of electric power utilities, and solid hands-on experience through laboratories and a capstone project. This program provides a one-to-one interaction with industry partners. The MS-EPSE program starts with an introductory course in the summer, five courses in the fall, and concludes with four courses in the spring preparing students in ten months for careers.

Doctoral Degree Requirements: Approximately 54 credit hours are required beyond the M.S. degree or 72 credit hours beyond the B.S. degree. For those with an NCSU MS degree in our department, no additional courses are required. For those with an NCSU MS degree in another department, 6 credit hours are required in our department. For those with a non NCSU MS degree, 12 credit hours of coursework are required. For those with only a Bachelors degree 30 credit hours of coursework 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.

Other Relevant Information: To further promote integration of concepts and provide hands on experience, the MS-EPSE program has a capstone project. The project will be a realistic smart grid application and the students will be asked to prototype a method or device and implement it on the 1 MW Green Hub available at the FREEDM Systems Center for smart grid applications.

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

[NCSU Graduate Catalog](#)

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:

G. Rouskas, Box 8206, 919/515-3860, rouskas@ncsu.edu, Computer Science

P. D. Franzon, Box 7911, 919/515-7351, paulf@ncsu.edu, Electrical and Computer Engineering

Named Professors: D. D. Stancil; **Distinguished Professors:** V. Misra, M. A. Vouk; **Professors:** G. T. Byrd, M. Chow, R. Dutta, D. Y. Eun, L. Lunardi, R. F. Mueller, A. Nilsson, O. Oralkan, H. G. Perros, D. S. Reeves, G. Rouskas, M. L. Sichitiu, M. P. Singh, W. J. Stewart, D. J. Thunte, H. J. Trussell, J. V. Veliadis, I. Viniotis, W. Wang; **Research Professors:** D. L. Lubkeman; **Adjunct Professors:** S. C. Ahalt, M. Devetsikiotis, P. Ning, I. Rhee; **Associate Professors:** M. Becchi, L. Cao, W. H. Enck, I. Guvenc, K. H. Harfoush, N. Lu, X. Shen, D. Vashae; **Research Associate Professors:** W. Yu; **Adjunct Associate Professors:** T. Yu; **Assistant Professors:** J. J. Adams, M. Daniele, C. J. Parnin, M. Shahzad, T. Wu; **Research Assistant Professors:** M. Abbasi; **Adjunct Assistant Professors:** K. E. Boyer, R. D. Callaway, G. W. Howell, R. Mikail; **Teaching Associate Professors:** S. S. Heckman, D. B. Sturgill

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)

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

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

G. Rouskas, Box 8206, 919/515-3860, rouskas@ncsu.edu, Computer Science

Named Distinguished Professors: J. Doyle; **Named Distinguished University Professors:** M. Rappa; **Distinguished Professors:** J. C. Lester II, T. K. Miller, M. A. Vouk; **Distinguished University Professors:** D. L. Bitzer; **Professors:** T. M. Barnes, G. T. Byrd, R. Dutta, C. G. Healey, E. L. Kaltofen, H. Krim, G. Mahinthakumar, T. J. Menzies, C. Meyer, R. F. Mueller, H. G. Perros, D. S. Reeves, E. Rotenberg, G. Rouskas, N. F. Samatova, C. D. Savage, M. L. Sichitiu, M. P. Singh, Y. Solihin, R. A. St. Amant, M. F. Stallmann, W. J. Stewart, D. J. Thuent, I. Viniotis, W. Wang, L. A. Williams; **Research Professors:** P. A. Dreher; **Adjunct Professors:** S. C. Ahalt, A. I. Anton, M. Devetsikiotis, S. P. Iyer, G. Lazzi, P. Ning, I. Rhee, J. T. Whitted, R. M. Young; **Emeritus Professors:** W. Chou, E. W. Davis Jr, R. J. Fornaro, J. C. Glass, D. F. McAllister, W. E. Snyder, A. L. Tharp; **Associate Professors:** D. R. Bahler, R. Y. Chirkova, A. G. Dean, W. H. Enck, V. W. Freeh, E. F. Gehringer, X. Gu, K. H. Harfoush, S. Heber, A. H. Jhala, E. R. Murphy-Hill, K. Ogan, D. L. Roberts, J. S. Scroggs, X. Shen, V. B. Sullivan, R. R. Vatsavai, B. A. Watson; **Adjunct Associate Professors:** X. Jiang, X. Ma, A. J. Rindos, J. N. Staddon, X. Wang, T. Xie, T. Yu; **Emeritus Associate Professors:** T. L. Honeycutt; **Assistant Professors:** M. Chi, G. Jin, A. Kapravelos, C. F. Lynch, C. Martens, C. J. Parnin, A. Scafuro, M. Shahzad, K. T. Stolee, H. Tseng; **Adjunct Assistant Professors:** K. E. Boyer, G. W. Howell, M. D. Kowolenko, B. W. Mott, A. T. Rivers, J. P. Rowe, J. B. Slankas, D. R. Wright, Y. Xin; **Teaching Associate Professors:** S. S. Heckman, D. B. Sturgill; **Teaching Assistant Professors:** S. M. Balik, T. Battestilli, J. T. King, J. Y. Schmidt

The Department of Computer Science is one of the leading computer science departments in the United States. Twenty three of our faculty have received prestigious NSF CAREER development awards. Total research expenditures have quadrupled over the last several years. The graduate program has more than 700 students, of whom more than 200 are PhD students. The faculty has broad-ranging research strengths that include **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 and mathematics course work similar to an undergraduate Computer Science major. Applicants must submit scores for the GRE General Tests.

Master's Degree Requirements: The M.S. requires 31 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 the successful defense of a thesis. 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 31 hours of course work, including three core courses with at least one from each of the two core areas. The M.C.S. degree is offered as an on-campus program or 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 noted above 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 the 2015-2016 academic year, at least 180 students were awarded teaching or research assistantships. The Department also offers numerous supplemental fellowships, and has approximately 10 students on full-time fellowships. In addition, students have many opportunities to work at leading industry and government research labs and high-tech employers, both locally and throughout the United States.

Other Relevant Information: Graduates at all levels are highly respected and aggressively recruited. They enjoy 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, Amazon, Facebook, 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 universities.

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

[NCSU Graduate Catalog](#)

Consumer Textile Product Design and Development (Certificate)

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](#).

[NCSU Graduate Catalog](#)

Counselor Education (Certificate)

Directors of Graduate Certificate Programs:

Siu-Man Ting

ELPHD

Phone: 919/515-6362

Email: ting@ncsu.edu

Lance Fusarelli

ELPHD

Phone: 919/513-0507

Email: lance_fusarelli@ncsu.edu

The online graduate certificate program in Counselor education is designed for teachers, administrators, advisors, and tutors in schools and universities; human service professionals; and individuals who are interested in increasing their counseling and communication skills. Graduates of this program may help professional counselors by supporting the students/clients or will strengthen communication skills for their work.

The certificate itself does not lead to professional certificates or licenses. However, the course credits may be transferred to future graduate degree programs. Students may also apply to master's programs in counseling and transfer the credits from this program.

Admission: Applicants must (1) be a graduate of an undergraduate degree program from an accredited four-year college with a GPA of at least a 3.0 on a 4-point scale in their major or last 60 credit hours of undergraduate study; or (2) have a Master's degree.

Any applicants who do not meet the GPA requirements may be admitted provisionally based on past work experiences as a professional in the field of K-12 education, higher education, human resource development, or training and development and, ultimately, by earning at least a "B" (3.0) average in the first three credit hours of work in the certificate program.

To apply to the program, students submit a Certificate Contract Application, a resume identifying educational preparation and work experiences, and official transcripts of all undergraduate and graduate work (if any). The contract includes a statement of career goals, a rationale for completing the certificate program, and a timeline for certificate completion. When completed, students sign the Contract Application and submit two copies of all materials to the Certificate Coordinator.

Requirements: The Graduate Certificate in Counselor Education requires a minimum of 13 credits of the following courses.

ECD 510 Introduction to Counseling (3 credits)

ECD 525 Cross-cultural Counseling (3 credits)

ECD 524 Career Counseling and Development (3 credits)

ECD 530 Theories and Techniques of Counseling (4 credits)

None of the courses may be taken "for credit only", and no transfer credits from other institutions are allowed for the Certificate.

Students must maintain a minimum overall GPA of B (3.0) in certificate program courses and must complete the requirements within the first four (4) calendar years beginning when the student 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.

For more information about the program and to download an application, please see the [Graduate Certificate in Counselor Education](#) website or call the program office at (919) 513-0378.

[NCSU Graduate Catalog](#)

Creative Writing

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|----------------------------------|-------|-------|------|------|-----------|-------|-----|
| Creative Writing | | | | | | | Y |

GRADUATE FACULTY

Directors of Graduate Programs:

A. M. Penrose, Box 8105, 919/515-4107, penrose@ncsu.edu, English

B. M. Boggs, Box 8105, bmboggs@ncsu.edu, English

W. W. Barnhardt, Box 8105, 919/515-4129, wwbarnha@ncsu.edu, English

Distinguished Professors: A. H. Harrison; ***Distinguished University Professors:*** C. M. Anson; ***Professors:*** J. Balaban, W. W. Barnhardt, M. P. Carter, M. G. Gordon, J. M. Grimwood, H. D. Kellner, J. J. Kessel, D. L. Laux, L. S. May, A. M. Penrose, S. M. Setzer, L. R. Severin, A. F. Stein, J. Swarts, E. R. Thomas, J. F. Thompson, J. N. Wall; ***Emeritus Professors:*** B. J. Baines, J. Balaban, G. W. Barrax, P. E. Blank, J. W. Clark, J. D. Durant, L. T. Holley, J. J. Kessel, A. S. Knowles, T. D. Lisk, L. H. MacKethan, W. E. Meyers, C. A. Prioli, J. J. Small, L. Smith, J. J. Smoot, M. H. Thuente, R. V. Young; ***Associate Professors:*** A. Baker, B. A. Bennett, B. M. Boggs, A. Bolonyai, D. H. Covington, R. S. Dicks, C. J. Fedukovich, S. M. Katz, R. C. Kochersberger, J. D. Morillo, D. A. Orgeron, D. M. Rieder; ***Emeritus Associate Professors:*** D. H. Covington, R. S. Dicks, M. F. King, R. C. Kochersberger, C. E. Moore, H. C. West; ***Assistant Professors:*** E. C. Corral; ***Assistant Professors of the Practice:*** J. H. Millar; ***Teaching Associate Professors:*** B. Blackley, D. A. Hooker

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 (6 credits) and elective areas (12 credits, including 6 credit hours of teaching preparation for those on a composition teaching assistantship).

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. See [program website](#) for specific requirements by concentration.

Student Financial Support: All students admitted to the MFA program are eligible for [teaching assistantships](#). TAs in the MFA train to teach undergraduate composition courses, and a few selected creative writing classes.

Other Relevant Information: Application deadline is February 1. 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. The department is home to editors of several contemporary journals and presses, including *Free Verse: A Journal of Contemporary Poetry & Poetics*, *Hyperrhiz: New Media Cultures*, and *ScribblingWomen.org*. 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 visits by distinguished poets, fiction and non-fiction writers.

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

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

D. C. Bowman, Box 7620, 919/515-2085, dan_bowman@ncsu.edu, Crop and Soil Sciences

Named Professors: J. M. Alonso, R. E. Dewey, L. R. Fisher, T. W. Ruffy; **Distinguished University Professors:** M. M. Goodman, W. F. Thompson; **Professors:** D. C. Bowman, R. J. Cooper, E. J. Dunphy, K. L. Edmisten, G. E. Fernandez, C. H. Haigler, R. W. Heiniger, F. Isik, T. G. Isleib, D. L. Jordan, R. S. Lewis, G. G. McRae, G. L. Miller, J. P. Murphy, R. P. Patterson, C. H. Peacock, R. Qu, R. J. Richardson, R. C. Ruffy, H. T. Stalker, R. Wells, T. R. Wentworth, E. B. Wilson, F. H. Yelverton; **USDA Professors:** G. Brown-Guedira, K. O. Burkey, T. E. Carter, J. B. Holland, D. P. Livingston, D. S. Marshall, R. M. Mian, R. W. Zobel; **Adjunct Professors:** K. D. Getsinger, R. Liebl, T. R. Sinclair; **Emeritus Named Professors:** W. K. Collins, G. F. Peedin, W. D. Smith, J. C. Wynne, A. C. York; **Emeritus Professors:** D. T. Bowman, A. H. Bruneau, B. E. Caldwell, D. S. Chamblee, H. D. Coble, W. A. Cope, F. T. Corbin, D. A. Emery, J. T. Green, J. D. Gregory, H. D. Gross, G. L. Jones, J. A. Lee, W. M. Lewis, H. M. Linker, R. C. Long, J. Luginbuhl, J. P. Mueller, J. F. Spears, G. A. Sullivan, J. B. Weber, A. K. Weissinger, P. R. Weisz, A. D. Worsham; **Emeritus Named Distinguished Professors:** E. A. Wernsman; **Associate Professors:** J. D. Burton, W. J. Everman, V. Kuraparthi, C. Maltecca, S. R. Milla-Lewis, S. C. Reberg-Horton, M. S. Schroeder-Moreno, L. J. Unruh Snyder; **Research Associate Professors:** D. G. Seth Carley; **USDA Associate Professors:** M. D. Krakowsky; **Emeritus USDA Professors:** J. W. Burton, D. L. Thompson; **Adjunct Associate Professors:** M. D. Netherland; **Emeritus Associate Professors:** D. A. Danehower, R. D. Keys; **Assistant Professors:** M. S. Castillo, T. W. Gannon, A. R. Post, M. C. Vann; **USDA Assistant Professors:** A. M. Locke, E. Taliercio; **Adjunct Assistant Professors:** L. M. Miranda; **Extension Associate Professors:** G. D. Collins; **Teaching Associate Professors:** C. V. Jordan

The Department of Crop and Soil Sciences 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; turfgrass 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 minimum GRE percentile scores of 40 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). Additionally, 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 will be awarded to qualified applicants depending on funding availability and program space. Tuition and health insurance are typically covered through the Graduate Student Support Plan for most students granted assistantships.

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.

[NCSU Graduate Catalog](#)

Curriculum and Instruction

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Curriculum and Instruction | | | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences

J. T. DeCuir-Gunby, Box 7801, 919/513-7669, jessica_decur@ncsu.edu, Teacher Education and Learning Sciences

Professors: S. B. Baker, C. L. Crossland, D. A. Cullinan, J. T. DeCuir-Gunby, E. R. Gerler, G. M. Kleiman, J. K. Lee, P. L. Marshall, S. C. Nassar-McMillan, J. Nietfeld, K. M. Oliver, J. A. Picart, E. J. Sabornie, H. A. Spires, S. Ting, E. N. Wiebe; **Emeritus Professors:** B. J. Fox, L. K. Jones, C. A. Pope, R. J. Pritchard, N. A. Sprinthall; **Associate Professors:** C. M. Beal, F. I. Chirino-Klevans, D. S. Davis, H. C. Edwards, D. Eseryel, M. A. Evans, M. A. Grimmett, J. H. Hunt, M. M. Manfra, M. M. Thomson, A. M. Wiseman, C. A. Young; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Emeritus Associate Professors:** J. F. Arnold, S. S. Osborne, L. M. Thies-Sprinthall; **Assistant Professors:** M. M. Falter, D. L. Gray, J. F. Grifenhagen, C. D. Hoggan, T. A. Rutherford, J. Wilson; **Clinical Assistant Professors:** E. T. Horne; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher, M. K. Monaco, R. E. Tyler-Walker; **Teaching Associate Professors:** A. D. Harrington, A. C. Smith; **Teaching Assistant Professors:** D. E. Benge, D. E. Crissman, L. G. Hervey, J. O. McKeown, B. H. Setser

The department of Teacher Education and Learning Sciences offers master's degrees in multiple areas of curriculum and instruction; Curriculum Development and Supervision, Educational Psychology, and New Literacies and Global Learning (with sub-concentrations in English education, general studies, middle grades, reading/ literacy education, and secondary social studies).

For more please see <https://ced.ncsu.edu/graduate/graduate-programs/masters/>

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Teacher Education and Learning Sciences. The College of Education is approved any the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements: *Curriculum and Instruction:* A 500-800 word statement describing professional goals is required, along with transcripts and reference letters. 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. Students from diverse backgrounds are welcome to apply. Admission is competitive. The best qualified applicants will be accepted up to the limited number of spaces available for new students. TOEFL or IELTS scores for international applicants whose first language is not English.

Master's Degree Requirements: *Curriculum and Instruction:* A minimum of 30 course credit hours. 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.

Student Financial Support: Teaching Assistantships are available on a limited basis.

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

[NCSU Graduate Catalog](#)

Data Science Foundations (Certificate)

Directors of Graduate Certificate Programs:

Georgios Rouskas

Computer Science-engr

Phone: 919/515-3860

Email: rousкас@ncsu.edu

Website: <http://www.csc.ncsu.edu/academics/graduate/degrees/dsf.php>

Howard Bondell

Statistics

Phone: 919/515-1914

Email: hdbondel@ncsu.edu

Website: <http://www.csc.ncsu.edu/academics/graduate/degrees/dsf.php>

[NCSU Graduate Catalog](#)

Design

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

S. Cho, Box 7701, scho3@ncsu.edu, Architecture

Professors: R. F. Abrams, T. M. Barrie, E. H. Bressler, C. D. Cox, D. Gonzales Crisp, D. B. Hill, H. Holljes, S. B. Joines, T. Liu, R. C. Moore, W. Place, A. R. Rice, J. M. Searce; **Professors of the Practice:** M. E. Purnell; **Emeritus Professors:** M. J. Davis, H. Khachatoorian, P. Tesar; **Associate Professors:** H. S. Armstrong, K. M. Boone, T. W. Buie, S. Cho, J. Coll-Barreu, P. J. Fitzgerald, R. A. Flinchum, A. A. Fox, C. Gill, D. K. Gulling, J. Hu, B. W. Laffitte, F. H. Magallanes, P. E. Morgado, S. G. Queen, K. J. Schaffer; **Research Associate Professors:** P. K. Baran, N. G. Cosco; **Assistant Professors:** B. Erdim, D. A. Ham, D. K. Littlejohn, C. Mouat Croxatto, C. Pasalar, M. O. Peterson, K. A. Umstead; **Research Assistant Professors:** T. R. Rider

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 may also receive tuition remission. Assistantships are awarded on the recommendation of the program director in consultation with the faculty.

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

[NCSU Graduate Catalog](#)

Digital Humanities (Certificate)

Director of Graduate Certificate Programs:

Paul Fyfe

English

Phone:

Email: pcfefe@ncsu.edu

Website: <http://go.ncsu.edu/dhcertificate>

The Certificate in Digital Humanities is a designed for students from any discipline to construct a curriculum in digital humanities training and project work. The certificate is currently coordinated in the English department with participation across CHASS and other colleges.

The Graduate Certificate consists of a student-proposed curriculum of four 3-credit courses which must collectively satisfy the program's three requirements: contexts, training, and applications. In consultation with the coordinator, students can propose their own tracks through the certificate drawing from a broad array of approved courses at NC State as well as at UNC and Duke, as part of the Triangle Digital Humanities Network. Rather than insisting on a prescriptive definition and preset curriculum for "digital humanities," this certificate program encourages students to adapt course offerings in digital humanities or digital media to their own evolving research and professional interests in any variety of fields.

To qualify for admission to the Graduate Certificate in Digital Humanities, students must be enrolled in, or have completed, a Master's or PhD program at an accredited university. Applicants can be either non-degree or degree students. Degree students must have at the time of application a 3.00 grade point average in their graduate degree program. Non-degree students must have a final grade point average that is at least 3.00. Current degree students in English or CRDM may include no more than six (6) credits from the Certificate program in their degree program. Current degree students in History can apply up to nine (9) towards a doctorate. Students seeking the certificate from other programs must consult with those graduate coordinators to confirm allowed credits toward degree. The certificate will accept up to three hours of transfer credit from courses included in the curriculum. All GCP requirements must be completed within three (3) calendar years beginning on the date the student commences applicable courses.

Curriculum: Courses from which applicants can develop a proposal for admission to the program.

NC State University:

Department of English, CHASS

ENG 506 Verbal Data Analysis

ENG 519 Online Information Design and Evaluation

ENG 582 Introduction to Digital Humanities

ENG 583 Digital Media Theory *

ENG 583 Introduction to Humanities Physical Computing *

ENG 583 Emerging Genres

ENG 584 Studies in Linguistics: Laboratory and Computational Tools

CRD 702 Rhetoric and Digital Media

Department of History, CHASS

HI 534 History and Digital Media

HI 599 The Practice of Digital History

Department of Communication, CHASS

COM 537 Gaming and Social Networks

COM 547 Mobile Technologies and Social Practices

Department of Computer Science, COE**

CSC 116 Introduction to Computing - Java

CSC 281 Foundations of Interactive Game Design

Department of Art + Design, COD

ADN 419 Multimedia and Digital Imaging***

ADN 423 Digital Modeling

ADN 502 Advanced Visual Laboratory***

ADN 503 Graduate Seminar in Art and Design

ADN 561 Digital Animation and Imaging Seminar***

College of Education (CED)

ECI 511 Computer Applications and Curriculum Integration

ECI 512 Emerging Technologies for Teaching and Learning

ECI 513 Teaching and Learning with Digital Video

ECI 514 Multimedia Design and Applications in Instruction

ECI 515 Online Collaborations in Education

ECI 516 Design and Evaluation of Instructional Materials

ECI 546 New Literacies and Media

ECI 717 Advanced Multimedia Design and Applications in Instruction

* These special topics courses will be turned into permanent courses this spring, 2013-14.

** Courses at the 200-level cannot count toward the certificate's credit hours but may be elected.

*** These courses have prerequisites in the College of Design: ADN 419 requires D105 and ADN 219; ADN 561 requires AND 460 and ADN 419.

Additional courses available at UNC Chapel Hill:

School of Information and Library Sciences (SILS)

INLS 490 Usability Engineering

INLS 512 Applications of Natural Language Processing

INLS 613 Text Mining

INLS 720 Metadata

INLS 740 Digital Libraries

INLS 890 Making the Humanities Digital

Journalism & Mass Communication

JOMC 491 Mobile App Design and Development

JOMC 581 Multimedia Design

JOMC 582 Interactive Multimedia Narratives

JOMC 583 Multimedia Programming and Production

JOMC 584 Documentary Multimedia Storytelling

JOMC 585 3D Design Studio

JOMC 586 Intermediate Multimedia

American Studies

AMST 840 Digital Humanities/Digital History

AMST 850 Digital Humanities Practicum

For course descriptions, please refer to the NCSU listing of courses as well as [other DH courses](#) at Triangle institutions.For further information, see the [DH certificate website](#).[NCSU Graduate Catalog](#)

Digital Learning and Teaching

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Digital Learning and Teaching | | | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences

J. T. DeCuir-Gunby, Box 7801, 919/513-7669, jessica_decuir@ncsu.edu, Teacher Education and Learning Sciences

Professors: G. M. Kleiman, K. M. Oliver; **Associate Professors:** D. Eseryel, M. A. Evans, M. M. Manfra, M. M. Thomson; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Assistant Professors:** D. L. Gray; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher; **Teaching Associate Professors:** A. C. Smith; **Teaching Assistant Professors:** L. G. Hervey, J. O. McKeown, B. H. Setser

The department of Teacher Education and Learning Sciences offers master's degrees in Digital Learning and Teaching. These master's programs prepare education professionals to lead digital learning programs, design digital learning environments, and inquire into digital learning solutions to continuously refine instruction and improve student learning.

For more please see <https://ced.ncsu.edu/programs/digital-learning-and-teaching-master/>

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Teacher Education and Learning Sciences. The College of Education is approved any the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements: *Digital Learning and Teaching:* A 500-800 word statement describing professional goals is required, along with transcripts and reference letters. The Graduate School requires a 3.0 in the undergraduate program. TOEFL or IELTS scores for international applicants whose first language is not English

Master's Degree Requirements: *Digital Learning and Teaching:* A minimum of 30 course credit hours. 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.

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

[NCSU Graduate Catalog](#)

Downstream Biomanufacturing (Certificate)

Director of Graduate Certificate Programs:

Michael Flickinger

BTEC-Biomfg Training Ed Ctr

Phone: 919/515-0175

Email: mcfllicki@ncsu.edu

Website: http://www.btec.ncsu.edu/academic/graduate/graduate_certificate.php

Graduate students and working professionals can now earn a new credential to kick-start or advance their career in the biopharmaceutical industry. Applications are currently being accepted for two new BTEC graduate certificate programs. The Downstream Biomanufacturing graduate certificate offers NC State graduate students and working professionals the opportunity for hands-on learning in BTEC's industry-scale simulated cGMP facilities.

Each certificate requires 12 hours of graduate coursework, which can be transferred to the Master of Biomanufacturing program. The majority of BTEC's graduate courses are offered in the evening or online to better accommodate working professionals.

Admission Requirements: Applicants must apply to the Graduate School <http://www.ncsu.edu/grad/applygrad.htm>. Those applicants who are currently enrolled in an NC State graduate program need only provide the Graduate Student Certificate Plan Data Entry forms, <http://ncsu.edu/grad/faculty-and-staff/docs/grad-cert-plan-data-entry.pdf>. An application for acceptance into a certificate programs is required for all new applicants once the student has:

1. either have graduated with a baccalaureate degree in a science or engineering discipline with a minimum GPA of 3.0 or
2. have complete one or more 500+ level BEC courses which satisfy the certificate requirement with a grade of B- or better on the first enrollment in every course completed.

Certificate Degree Requirements: To earn the Graduate Certificate in Downstream Biomanufacturing, students must complete the following list of core courses and complete a minimum total of 12 credit hours. The grade in each course for the Certificate must either be B- or higher, or CR (600-level courses only), and the over-all GPA for the Certificate courses must be 3.00 minimum.

Transfer credit from other institutions will not be allowed for the Certificate. All course work must be registered through NC State University.

Required Unique Courses (9 credits total)

BEC 532 Biological processing science (2 credits)

BEC 536 Introduction to downstream process development (2 credits)

BEC 585 cGMP downstream operations (2 credits)

BEC 575 Global Regulatory Affairs (3 credits)

Additional Courses (Minimum 3 credits total)

MBA 554 Project Management (3 credits) or ISE 589 Project Management for Engineers (3 credits)

BEC 577 Advanced Biomanufacturing and Biocatalysis (3 credits)

BEC 515 Biopharmaceutical Product Characterization Techniques (2 credits)

CHE 752 Separation Processes for Biological Materials (3 credits)

The certificate in Downstream Biomanufacturing requirements must be completed within four (4) calendar years, beginning with the date the student commences courses applicable to the Certificate. Students who complete the certificate in Downstream Recovery and Purification may obtain more than one certificate. However, each certificate must have at least nine (9) hours which are unique to it.

Other Relevant Information: A unique, cross-disciplinary instructional center, the Golden LEAF Biomanufacturing Training and Education Center (BTEC) provides educational and training opportunities to develop skilled professionals for the biomanufacturing industry and create the best-trained, most industry-focused workforce possible.

[NCSU Graduate Catalog](#)

Ecology (Minor Program)

Rebecca Irwin, Coordinator
NCSU Box 7619
Phone: 919.513.2555
Fax: 919.515.2167
E-mail: reirwin@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

Economics

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---------------------------|-------|-------|------|------|-----------|-------|-----|
| Economics | Y | | Y | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

S. G. Allen, Box 8114, 919/515-5584, steve_allen@ncsu.edu, Business Management

X. Zheng, Box 8109, 919/515-4543, xiaoyong_zheng@ncsu.edu, Agriculture and Resource Economics

Named Professors: A. B. Brown, D. A. Dickey; **Named Distinguished Professors:** B. K. Goodwin, J. M. Nason, W. N. Thurman, M. L. Walden, M. K. Wohlgenant; **Professors:** S. G. Allen, J. C. Beghin, R. L. Clark, L. A. Craig, P. L. Fackler, A. R. Hall, D. N. Hyman, C. R. Knoeber, S. E. Margolis, D. K. Pearce, N. E. Piggott, R. M. Rejesus, M. A. Renkow, J. J. Seater, E. O. Sills, L. O. Taylor, T. Vukina, M. D. Walker, K. D. Zering, X. Zheng; **Adjunct Professors:** T. P. Holmes; **Emeritus Professors:** G. A. Benson, R. H. Bernhard, G. A. Carlson, L. E. Danielson, J. E. Easley, E. W. Erickson, E. A. Estes, D. Fisher, D. J. Flath, T. J. Grennes, D. M. Holthausen, T. Johnson, C. E. Joyner, J. S. Lapp, M. C. Marra, C. L. Moore, R. B. Palmquist, C. D. Safley, R. A. Schrimper, W. J. Wessels; **Emeritus Distinguished University Professors:** V. K. Smith; **Associate Professors:** H. G. Fell, R. G. Hammond, I. T. Kandilov, M. B. McElroy, K. Mitchell, M. S. Morrill, T. S. Morrill, A. W. Oltmans, D. Pelletier, N. J. Traum, R. H. von Haefen; **Adjunct Associate Professors:** C. M. Newmark; **Emeritus Associate Professors:** D. S. Ball, A. E. Headen, E. A. McDermed; **Assistant Professors:** K. A. Boys, Z. S. Brown, U. Dur, G. Fiori, R. P. Guiteras; **Adjunct Assistant Professors:** B. J. Hubbell, D. J. MacNair; **Teaching Professors:** P. Cwik, T. C. Morant, B. L. Puryear; **Teaching Assistant Professors:** J. Treme, C. E. Youngblood

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 Poole College of Management. Emphasis is placed on economic theory and quantitative economic analysis and their application to economic problems. Master's students can choose between the terminal master's track and the PhD-prep track. In both tracks, they may further tailor their experience by choosing to concentrate in one or multiple of the four fields: financial/macro econometrics; international trade and development; natural resource and environmental economics and economic policy. Students can also choose between engaging in a research project culminating in a thesis (the Master of Science in economics degree) and simply pursuing a coursework only option (the Master of Economics degree). The major fields of specialization for doctoral students are: agricultural economics, development economics, econometrics, environmental/resource economics, industrial organization, international economics, labor economics, macro-monetary economics and microeconomic theory and experimental/behavioral economics.

Admission Requirements: Minimum background for admission for Master's study includes intermediate microeconomics and intermediate macroeconomics, calculus I and calculus II, and one semester of statistics (econometrics courses included). For doctoral study, prerequisites are intermediate microeconomics, intermediate macroeconomics, calculus I-III, linear algebra, and a course in mathematical statistics. GRE scores are required for doctoral applicants only.

Master's Degree Requirements: Both the Master of Science in economics and the Master of Economics degrees require core courses in microeconomics, macroeconomics and econometrics. Each degree also carries additional elective requirements. The M.S. degree requires a thesis. Both degrees offer two tracks: a terminal master's track and a PhD-prep track. Specific course requirements for both the Master of Science and the Master of Economics can be found on the Graduate Program in Economics [website](#). Both 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 microeconomics and macroeconomics. 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.

[NCSU Graduate Catalog](#)

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

Educational Administration and Supervision

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Educational Administration and Supervision | | Y | | | | | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: D. Akroyd, T. W. Cawthon, J. T. DeCuir-Gunby, B. C. Fusarelli, L. D. Fusarelli, A. J. Jaeger, S. R. Porter, A. N. Rockenbach, P. D. Umbach; **Professors of the Practice:** H. L. Johnson, M. E. Ward; **Adjunct Professors:** B. A. Olson; **Emeritus Professors:** T. Johnson, R. G. Taylor; **Associate Professors:** J. E. Bartlett, F. I. Chirino-Klevans, J. G. Gayles, T. V. Young; **Adjunct Associate Professors:** S. C. Faircloth; **Emeritus Associate Professors:** P. F. Bitting; **Assistant Professors:** L. R. Bass, A. B. Bowden, T. A. Drake, C. D. Hoggan, A. M. Jacob; **Adjunct Assistant Professors:** B. Brander, K. G. Dixon, A. J. McEachin, A. B. Orders, C. Paepflow, D. T. Petherbridge, D. L. Reichard, D. D. Richmond, R. S. Sutton, J. W. Wescott, D. E. Wiese, C. L. Zelna; **Emeritus Assistant Professors:** R. L. Haley; **Teaching Assistant Professors:** M. E. Bartlett, B. D. Champion, P. A. Hessling, F. P. Riddick, T. W. Townsend, C. C. Williams; **Lecturers:** W. C. Harrison, N. T. Smith, M. E. Ward, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/>. Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/>. Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

Educational Leadership, Policy and Human Development

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Educational Leadership, Policy and Human Development | Y | | | | | | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: D. Akroyd, S. B. Baker, T. W. Cawthon, M. Danowitz, M. J. Fleener, B. C. Fusarelli, L. D. Fusarelli, E. R. Gerler, A. J. Jaeger, G. M. Kleiman, S. C. Nassar-McMillan, K. M. Oliver, J. A. Picart, S. R. Porter, A. N. Rockenbach, S. Ting, P. D. Umbach; **Professors of the Practice:** R. G. Templin; **Adjunct Professors:** L. Gonzalez-Sullivan, J. L. Gwyer, B. A. Olson; **Emeritus Named Professors:** C. E. Kasworm; **Emeritus Professors:** L. K. Jones, M. L. Krotee, N. A. Sprinthall, R. G. Taylor; **Associate Professors:** J. E. Bartlett, T. A. Bowles, F. I. Chirino-Klevans, J. G. Gayles, M. A. Grimmett, M. M. Manfra, B. S. Mehlenbacher, J. E. Swiss, M. M. Thomson, T. V. Young; **Adjunct Associate Professors:** H. A. Davis-Bauer, J. Storberg-Walker; **Emeritus Associate Professors:** P. F. Bitting; **Assistant Professors:** L. R. Bass, A. B. Bowden, T. A. Drake, A. S. Dunbar, D. L. Gray, C. D. Hoggan, A. M. Jacob; **Clinical Assistant Professors:** E. T. Horne; **Adjunct Assistant Professors:** M. L. Addor, K. A. Boham, B. Brander, L. M. Chapman, J. O. Corn, D. K. Deardorff, K. G. Dixon, K. L. Ender, S. B. Freeman, B. J. Frye, E. V. Griffin, J. L. Hill, M. B. Jackowski, K. D. Lohr, M. J. Maher, M. G. Maxwell, W. D. McInnis, W. D. Milheim, S. E. Morrissey, C. Paepflow, R. R. Parker, D. T. Petherbridge, T. E. Ray, D. D. Richmond, M. E. Rittling, L. L. Rouse, S. C. Scott, T. H. Stafford, R. S. Sutton, R. E. Tyler-Walker, M. A. Valek, S. J. Wasiolek, J. W. Wescott, D. E. Wiese, S. Williams, C. L. Zelna; **Emeritus Assistant Professors:** R. L. Haley; **Teaching Associate Professors:** A. C. Smith; **Teaching Assistant Professors:** M. E. Bartlett, B. D. Champion, N. M. Childs, D. E. Crissman, P. A. Hessling, G. E. Hicks, H. S. Lupton-Smith, F. P. Riddick, B. H. Setser, C. L. Warren, C. C. Williams; **Lecturers:** N. M. Childs, B. J. Frye, N. T. Smith, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

[NCSU Graduate Catalog](#)

Electric Power Systems Engineering

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Electric Power Systems Engineering | | | Y | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

P. D. Franzon, Box 7911, 919/515-7351, paulf@ncsu.edu, Electrical and Computer Engineering

Professors: M. E. Baran, J. V. Veliadis; **Research Professors:** D. L. Lubkeman; **Professors of the Practice:** L. W. White; **Adjunct Professors:** M. Devetsikiotis; **Associate Professors:** M. Becchi, L. Cao, I. Guvenc, N. Lu, X. Shen, D. Vashae; **Research Associate Professors:** W. Yu; **Assistant Professors:** J. J. Adams, M. Daniele, H. Tseng, T. Wu; **Research Assistant Professors:** M. Abbasi, E. G. Pritchard; **Adjunct Assistant Professors:** R. Mikail; **Teaching Associate Professors:** D. G. Yu

Graduate programs in Electrical and Computer Engineering provide a variety of excellent education and research opportunities for outstanding students from around the world. Our Master's Degree Program offers a variety of options for specialization including a Master of Science in either Electrical Engineering, Computer Engineering, or Networking (all are available via distance learning or on-campus enrollment). Also, a strong Ph.D. program is available for students who wish to complete their education in the field of Electrical Engineering or Computer Engineering.

The Master of Science in Electric Power Systems Engineering (MS-EPSE) is an innovative new program which will give students a thorough understanding of the tools, methods, and practice of electric power engineering. It is both focused and practical in its orientation, with the goal of providing an education that is directly applicable to a career in industry. The MS-EPSE is an accelerated program that can be completed in ten months. The degree is suitable for a new or recent graduate, as well as experienced professionals who want to receive the necessary retraining to change careers.

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). The GRE is required for all programs of study. Admission is further limited by available room in the elected program of study. Meeting the above minimum requirements alone does not guarantee admission.

Admission to the MS-EPSE program requires students to have a bachelor's degree from an accredited college or university in electrical engineering with an overall GPA of at least 3.0. Students who do not have a bachelor's degree from an accredited college or university in electrical engineering must satisfy:

1. Completion of the following ECE courses (or electrical engineering courses equivalent to ECE 200, 211, 220, 331, and 435.
2. Applicants must have also completed the following courses or equivalent courses: three semesters of calculus, one semester of probability/statistics, two semesters of physics, and one semester of chemistry.

GRE scores within the last four years of the date of anticipated admission. Guideline for minimal GRE percentile scores are 70 percentile verbal, 90 percentile quantitative, and 50 percentile analytical or writing. GRE scores for students who are graduates from NCSU may be waived. They also might be waived for graduates from US ABET accredited programs with good GPAs.

All international applicants must submit TOEFL scores. The TOEFL must have been taken within two years of the date of anticipated admission. On the TOEFL iBT, students must have a minimum of 18 on each section of the test with a

minimum total of 90. Scores on previous versions of the TOEFL are considered with the same qualitative standard. On the IELTS, we require a minimum score of 6.5 in each section. This requirement also applies to US citizens whose principal language of instruction has not been English (for example, most applicants from Puerto Rico and the Virgin Islands).

TOEFL - institution code 5496; department code 66

GRE - institution code 5496; department code 1203

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). The GRE is required for all programs of study but might be waived for NCSU graduates or graduates from other US ABET accredited schools with good GPAs. 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 three credit hours of advanced-level (700-level) ECE courses. Students electing the Option B non-thesis option must meet core course requirements; have ECE courses that cover at least three specialty areas' and have at least three credit hours of 700-level ECE courses.

The Master's degrees in CPE 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.

The MS-EPSE program requires 30 credit hours of graduate coursework. Twenty-seven credits of courses include four core electric power engineering courses; two interdisciplinary courses on power electronics, data communications, cyber security and environmental issues associated with electric power systems; professional skill straining on project management, communication skills, and the business aspects of electric power utilities, and solid hands-on experience through laboratories and a capstone project. This program provides a one-to-one interaction with industry partners. The MS-EPSE program starts with an introductory course in the summer, five courses in the fall, and concludes with four courses in the spring preparing students in ten months for careers.

Doctoral Degree Requirements: Approximately 54 credit hours are required beyond the M.S. degree or 72 credit hours beyond the B.S. degree. For those with an NCSU MS degree in our department, no additional courses are required. For those with an NCSU MS degree in another department, 6 credit hours are required in our department. For those with a non NCSU MS degree, 12 credit hours of coursework are required. For those with only a Bachelors degree 30 credit hours of coursework 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.

Other Relevant Information: To further promote integration of concepts and provide hands on experience, the MS-EPSE program has a capstone project. The project will be a realistic smart grid application and the students will be asked to prototype a method or device and implement it on the 1 MW Green Hub available at the FREEDM Systems Center for smart grid applications.

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

Electrical Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

P. D. Franzon, Box 7911, 919/515-7351, paulf@ncsu.edu, Electrical and Computer Engineering

Named Professors: S. A. Bedair, I. Husain, D. D. Stancil, M. B. Steer; **Named Distinguished Professors:** J. Doyle, Q. HUANG, J. Narayan, R. J. Trew; **Distinguished Professors:** P. D. Franzon, N. A. Masnari, T. K. Miller, V. Misra, H. T. Nagle, M. A. Vouk; **Distinguished University Professors:** D. E. Aspnes, B. J. Baliga, D. L. Bitzer; **Professors:** M. E. Baran, S. Bhattacharya, G. T. Byrd, M. Chow, H. Dai, W. R. Davis, W. L. Ditto, A. Duel-Hallen, M. J. Escuti, D. Y. Eun, J. J. Grainger, E. Grant, B. L. Hughes, K. W. Kim, R. M. Kolbas, H. Krim, L. Lunardi, R. F. Mueller, J. F. Muth, A. Nilsson, O. Oralkan, M. C. Ozturk, H. G. Perros, D. S. Reeves, E. Rotenberg, G. Rouskas, M. L. Sichitiu, Y. Solihin, M. F. Stallmann, J. K. Townsend, H. J. Trussell, J. V. Veliadis, I. Viniotis, W. Wang, F. Wu, H. Zhou; **Research Professors:** D. C. Hopkins, D. L. Lubkeman, T. M. Paskova; **Professors of the Practice:** L. W. White; **Adjunct Professors:** M. Devetsikiotis, W. C. Holton, G. J. Iafrate, G. Lazzi, T. M. Paskova, I. Rhee, J. T. Whitted, J. M. Zavada; **Emeritus Named Professors:** J. R. Hauser; **Emeritus Professors:** W. E. Alexander, T. H. Glisson, M. A. Littlejohn, C. M. Osburn, S. A. Rajala, W. E. Snyder; **Associate Professors:** S. T. Alexander, D. Z. Baron, M. Becchi, A. Y. Bozkurt, L. Cao, A. Chakraborty, R. Y. Chirkova, A. G. Dean, B. A. Floyd, E. F. Gehringer, I. Guvenc, K. H. Harfoush, D. S. Lalush, E. Lobaton, N. Lu, S. M. Lukic, D. Ricketts, X. Shen, J. Tuck, D. Vashae, G. M. Walker, C. M. Williams; **Research Associate Professors:** W. Yu; **Visiting Associate Professors:** C. A. Graves; **Adjunct Associate Professors:** A. J. Rindos, T. Xie, M. Yadav; **Emeritus Associate Professors:** G. F. Bland, W. C. Peterson; **Assistant Professors:** J. J. Adams, M. Daniele, C. M. Gallippi, M. W. Kudenov, H. Tseng, T. Wu; **Research Assistant Professors:** M. Abbasi, B. Kia, B. Lee, E. G. Pritchard; **Adjunct Assistant Professors:** R. D. Callaway, B. Kia, R. Mikail; **Teaching Professors:** S. D. Jackson; **Teaching Associate Professors:** L. J. Bottomley, B. Evans, R. A. Gupta, H. O. Ozturk, D. G. Yu; **Teaching Assistant Professors:** S. E. Hollar

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

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences

J. T. DeCuir-Gunby, Box 7801, 919/513-7669, jessica_decuir@ncsu.edu, Teacher Education and Learning Sciences

S. J. Carrier, Box 7801, 919/513-2808, sjcarrie@ncsu.edu, Teacher Education and Learning Sciences

Professors: P. L. Marshall, P. Sztajn; **Associate Professors:** S. J. Carrier, K. A. Keene, J. Minogue, M. M. Thomson, T. A. Walkowiak, A. M. Wiseman; **Assistant Professors:** J. Wilson; **Teaching Associate Professors:** V. N. Faulkner, A. D. Harrington; **Teaching Assistant Professors:** M. J. Jeffries, J. G. Koch

The Elementary Education program in the Department of Teacher Education and Learning Sciences (TELS) offers a Doctor of Philosophy (Ph.D.) degree in Elementary Mathematics or Science Education. This program prepares scholars who are committed to improving learning opportunities for elementary aged children by engaging in coursework, research studies, and practical experiences focusing on children's and teachers' learning in mathematics or science.

The Elementary Education program in the TELS department offers a Master of Education (M.Ed.) degree in Elementary Education with a concentration in either mathematics or science education. The Master's program prepares teacher leaders who possess strong specialized content knowledge in mathematics or science and a deep understanding of how elementary students learn. The program, designed for those who already hold a current teaching license, is especially tailored to provide candidates with leadership and application skills to transfer their knowledge to their work with elementary school teachers and students.

The program is considered Distance Education (DE) and offered off campus at school sites in the region to take advantage of reduced DE tuition rates.

For more information please see <https://ced.ncsu.edu/programs/elementary-education-master/>

The coursework for the mathematics and science concentrations are approved by the North Carolina State Board of Education. Therefore, graduates of the M.Ed. program are eligible to receive the elementary mathematics or elementary science specialist add-on to their North Carolina K-6 teaching license from the Department of Public Instruction. The College of Education is accredited by the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements:

Doctoral Elementary Teacher Education and Learning Sciences program: Application requirements include a 500-800 word personal statement describing professional and research goals, 3 reference letters in support of the applicant's potential for doctoral studies, transcripts with a 3.0 GPA, GRE scores, and resume.

Elementary Education Master's program: Application requirements include a 500-800 word statement describing professional goals, transcripts and reference letters, and a teaching license. The Graduate School requires a 3.0 GPA in an undergraduate program. The best qualified applicants will be accepted up to the limited number of spaces available for new students.

For the M.S. degree, a minimum of 33 hours is required. The M.S. degree requires a thesis and final oral examination approved by the graduate committee. It is the responsibility of MS students to secure an advisor in advance to supervise

their thesis research.

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

[NCSU Graduate Catalog](#)

Energy and Technology in Architecture (Certificate)

Directors of Graduate Certificate Programs:

Arthur Rice

Landscape Architecture

Phone: 919/515-8347

Email: art_rice@ncsu.edu

Website: <https://design.ncsu.edu/academics/architecture/graduate-programs/graduate-certificates>

Jianxin Hu

Architecture

Phone: 919/515-8336

Email: jianxin_hu@ncsu.edu

Website: <https://design.ncsu.edu/academics/architecture/graduate-programs/graduate-certificates>

The Graduate Certificate in Energy and Technology in Architecture provides students the opportunity to focus their elective studies through courses and design studio(s) that concentrate on building energy systems along with other building systems.

The program's objectives are to provide educational opportunities for architecture graduate students who wish to acquire knowledge and skills in the design and operation of building system at site and building levels, with an emphasis on energy and materials; to advocate for the importance of energy efficiency over the entire life cycle of a building; and to make our students more competitive in the fields of architectural practice, building engineering, and construction.

This certificate program also provides unique interdisciplinary academic and research opportunities among the College of Design, programs within the College of Engineering, NC Solar Center, and building design industries/organizations (i.e. architecture, engineering, general contracting, real estate companies, and public policy agencies).

Admissions: Applicants must complete an application form to be considered for the certificate program. To qualify for admission to the graduate certificate in Energy and Technology in Architecture, students must be enrolled in (or have completed) a professional program in architecture. At the time of application, students must have a 3.00 grade point average (GPA) in their professional degree program.

Requirements: Students must complete 15 hours of coursework from the course menu, as specified in the certificate application, and have a minimum of 3.00 GPA on all certificate coursework. All grades on courses taken towards the certificate program in courses numbered 400 and above are included in the GPA. Courses at the 300 level and below are not eligible for certificate credit and subsequently do not affect the graduate GPA.

The minimum grade to receive certificate credit can be no lower than B-. Students who take letter-graded 400-, 500-, and 700-level courses do not have the option of taking the courses for 'credit only' if they intend for the course to be part of the graduate certificate. Transfer credit from other institutions is not allowed for the graduate certificate. All course work must be registered through NC State University.

All certificate requirements must be completed within four (4) calendar years, beginning with the date that the student commences courses applicable to the certificate, unless a more restrictive time limit has been established by the program or academic college/school.

A student may obtain more than one certificate. Each certificate must have a least nine (9) credit hours that are unique to it.

Other Information: Students in this certificate program will become part of an academic and professional community that offers a broad range of extracurricular activities, including the NC Solar Center GreenBuild Lecture Series, visiting lecturers, and colloquia.

Note that academic success might have a strong bearing on admission to a degree program, but completion of the certificate program in no way guarantees entry into a graduate degree program. For more information regarding course requirements and the application process, please contact the certificate program coordinator.

[NCSU Graduate Catalog](#)

Engineering

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:

M. A. Bourham, Box 7909, 919/515-7662, bourham@ncsu.edu, Nuclear Engineering

Named Professors: R. D. Gould, S. A. Khan, G. N. Parsons; ***Named Distinguished Professors:*** C. C. Koch; ***Named Distinguished University Professors:*** T. J. Hodgson; ***Distinguished Professors:*** J. J. Cuomo, P. D. Franzon, J. Genzer, M. A. Vouk; ***Distinguished University Professors:*** M. A. Barlaz; ***Professors:*** M. A. Bourham, M. Chow, A. Duel-Hallen, Y. Fathi, 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; ***Emeritus Named Professors:*** C. F. Zorowski; ***Emeritus Professors:*** T. Johnson, M. L. Leming, C. M. Osburn; ***Emeritus Distinguished Professors:*** D. W. Johnston; ***Associate Professors:*** J. W. Eischen, E. F. Gehringer, J. P. Lavelle; ***Emeritus Associate Professors:*** T. L. Honeycutt, E. Sanii; ***Adjunct Assistant Professors:*** L. D. Krute

The Master of Engineering distance education program serves the needs of students whose schedule or location does not allow for on-campus study, working professionals wishing to obtain an advanced degree, or those who are seeking to change fields within engineering. Students design the plan of study which best meets their career or educational goals.

Admission Requirements: Applicants must have an undergraduate degree in engineering or closely related field with a minimum overall GPA of 3.0. Individuals who do not meet these criteria may need to complete prerequisites before being admitted to the program. GRE scores are not required. International applicants may be required to take the TOEFL or IELTS exam.

Up to 12 hours of credit may be transferred into the program from other universities or non-degree studies, with approval.

Plan of Study: The Master of Engineering is a 30-credit-hour, interdisciplinary program. Students must identify an area of concentration from which they will complete three to six classes. The remaining hours may be taken from any other discipline, or from related departments (Science, Business, etc.) with advisor approval.

Areas of Concentration:

Aerospace Engineering
Chemical Engineering
Computer Engineering
Computer Science
Electrical Engineering
Engineering Management
Industrial Engineering
Mechanical Engineering
Materials Science and Engineering
Nuclear Engineering

[NCSU Graduate Catalog](#)

English

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-------------------------|-------|-------|------|------|-----------|-------|-----|
| English | | | | Y | | | |

GRADUATE FACULTY

Director of Graduate Programs:

A. M. Penrose, Box 8105, 919/515-4107, penrose@ncsu.edu, English

Named Distinguished University Professors: W. A. Wolfram; **Distinguished Professors:** A. H. Harrison, J. M. Nfah-Abbenyi; **Distinguished University Professors:** C. M. Anson; **Professors:** J. Balaban, W. W. Barnhardt, M. P. Carter, M. G. Gordon, J. M. Grimwood, H. D. Kellner, J. J. Kessel, D. L. Laux, L. S. May, W. J. Miller, M. E. Orr, A. M. Penrose, S. M. Setzer, L. R. Severin, A. F. Stein, J. Swarts, E. R. Thomas, J. F. Thompson, J. N. Wall, C. A. Warren; **Emeritus Professors:** B. J. Baines, J. Balaban, G. W. Barrax, P. E. Blank, J. W. Clark, A. M. Davis-Gardner, J. D. Durant, C. Gross, L. T. Holley, W. J. Jordan, J. J. Kessel, A. S. Knowles, T. D. Lisk, L. H. MacKethan, W. E. Meyers, C. R. Miller, C. A. Prioli, J. J. Small, L. Smith, J. J. Smoot, M. H. Thunte, R. V. Young; **Associate Professors:** A. Baker, B. A. Bennett, B. M. Boggs, A. Bolonyai, H. J. Burgess, D. H. Covington, C. J. Crosbie, R. S. Dicks, H. Ding, R. M. Dodsworth, M. K. Dudley, C. J. Fedukovich, P. C. Fyfe, O. Gelley, S. M. Katz, R. C. Kochersberger, J. I. Mielke, J. D. Morillo, J. S. Mulholland, D. A. Orgeron, J. L. Reaser, D. M. Rieder, T. L. Stinson, R. A. Walsh; **Adjunct Associate Professors:** S. L. Joffe; **Emeritus Associate Professors:** D. H. Covington, R. S. Dicks, M. F. King, R. C. Kochersberger, C. E. Moore, D. J. Reavis, H. C. West; **Assistant Professors:** F. D. Cason, E. C. Corral, M. S. Fyfe, A. R. Johnston, J. A. Nolan-Stinson, S. L. Pigg, D. M. Walls; **Teaching Associate Professors:** B. Blackley, D. A. Hooker, M. W. Hunt; **Teaching Assistant Professors:** D. C. Gierdowski, J. R. Knowles

The Master of Arts program offers four concentrations representing distinctive dimensions of the field of English: Literature, Linguistics, Rhetoric and Composition, and Film Studies. United by a common emphasis on research and critical thinking, the four options offer diverse perspectives and methods for exploring culture and language in myriad forms and circumstances. The degree 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: Students select one of four concentrations: Literature, Linguistics, Rhetoric and Composition, or Film Studies. Students choose from a [broad array of courses](#) in these disciplinary areas, including an increasing number of boundary-crossing [special topics](#) courses. Each concentration requires 33 credit hours, including 15-18 hours of coursework in the area of specialization, 12-15 hours distributed among literary study and open electives, and 3 credit hours of independent capstone research. See [program website](#) for specific requirements by concentration.

Student Financial Support: [Teaching assistantships](#) are available for a limited number of promising students. Applications for assistantships are due February 1 and are only available for those entering in the fall semester.

The English department has a long tradition of academic and literary excellence, including its heritage of writers from Guy Owen to Lee Smith. The department is home to editors of several contemporary journals and presses, including *Free Verse: A Journal of Contemporary Poetry & Poetics*, *Hyperrhiz: New Media Cultures*, and *ScribblingWomen.org*. Situated in a university known for its innovative research in engineering and the sciences, the English department's multidisciplinary program offers students the opportunity to do creative and academic work that engages with issues of technology and its interactions with individuals and institutions.

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

[NCSU Graduate Catalog](#)

Entomology

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

C. E. Sorenson, Box 7613, 919/515-8427, clyde_sorenson@ncsu.edu, Entomology and Plant Pathology

Named Professors: R. R. Dunn, N. M. Haddad, B. M. Wiegmann; **Named Distinguished Professors:** R. L. Brandenburg, F. L. Gould, G. G. Kennedy, R. Roe, C. J. Schal, J. Silverman; **Professors:** D. Buchwalter, W. G. Buhler, H. J. Burrack, J. R. Meyer, M. J. Scott, C. E. Sorenson, D. R. Tarpy, J. F. Walgenbach, D. W. Watson; **Research Professors:** A. C. Cohen; **Adjunct Professors:** J. J. Arends, G. Gordh, N. M. Hamon, D. A. Herbert, D. E. Sonenshine; **Emeritus Named Professors:** C. S. Apperson, J. W. VanDuyn; **Emeritus Professors:** R. C. Axtell, J. S. Bacheler, J. R. Baker, J. R. Bradley, W. M. Brooks, W. V. Campbell, L. L. Deitz, M. H. Farrier, F. P. Hain, J. D. Harper, 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:** S. D. Frank, M. D. Lorenzen, D. B. Orr, D. D. Reisig; **Research Associate Professors:** R. M. Jetton; **Adjunct Associate Professors:** S. Bloem, Y. J. Cardoza, K. R. Lakin, W. O. McMillan, C. Nalepa, A. A. Perez de Leon, R. A. Sequeira, J. W. Smith; **Emeritus Associate Professors:** R. C. Hillmann; **Assistant Professors:** Z. S. Brown, M. H. Reiskind; **Adjunct Assistant Professors:** K. T. Kreitlow, M. M. Lopez-Urbe, 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 300 (1000 old score) combined (verbal plus quantitative) is necessary for admission to the M.E. or M.S. program while a score of 306 (1100 old score) 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 15 credits of letter grade entomology courses plus 3 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: Full 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.

[NCSU Graduate Catalog](#)

Environmental Assessment (Certificate)***Director of Graduate Certificate Programs:***

Linda Taylor

For & Envir Res Acad Research

Phone: 919/513-3972

Email: lr_taylor@ncsu.eduWebsite: <http://ea.cals.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](#). Students can start this certificate in Fall or Spring semesters.

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.

[NCSU Graduate Catalog](#)

Environmental Assessment

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

L. R. Taylor, Box 8008, 919/513-3972, lr_taylor@ncsu.edu, Forestry and Environmental Resources

Professors: D. D. Aday, H. V. Daniels, B. Goldfarb, E. G. Nichols, M. N. Peterson, D. Shea; **USDI Professors:** T. J. Kwak; **Associate Professors:** G. B. Blank, L. V. Kochtcheeva, S. T. Warren; **Extension Professors:** M. A. Megalos; **Teaching Assistant Professors:** W. A. Kallestad, C. E. LePrevost; **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. See the program website for admissions deadlines. Students are only admitted for fall and spring semesters.

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.

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.

[NCSU Graduate Catalog](#)

Environmental Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

S. Ranjithan, Box 7908, 919/515-6979, ranji@ncsu.edu, Civil, Construction, and Environmental Engineering

Distinguished University Professors: M. A. Barlaz, H. C. Frey; ***Professors:*** S. Arumugam, E. D. Brill, F. De Los Reyes, J. Ducoste, M. A. Gabr, D. R. Knappe, M. F. Overton, S. Ranjithan; ***Adjunct Professors:*** M. G. Calvi; ***Emeritus Professors:*** R. C. Borden; ***Associate Professors:*** E. Z. Berglund, J. F. DeCarolus; ***Assistant Professors:*** T. Aziz, D. F. Call, J. C. Dietrich, F. Garcia Menendez, A. P. Grieshop, B. M. Montoya, D. R. Obenour, A. C. Ortiz; ***Research Assistant Professors:*** A. R. de Queiroz, J. W. Levis, G. W. Lucier; ***Adjunct Assistant Professors:*** D. J. Findley

Graduate programs are offered in coastal and water resources engineering, computing and systems, construction engineering and management, environmental engineering, geotechnical and geoenvironmental engineering, mechanics and materials, structural engineering and mechanics, transportation engineering and materials.

Admission Requirements: Normal minimum GPA requirements include 3.0 overall and in the major. Students who do not meet these academic requirements may take graduate courses through the [Non Degree Studies](#) program to demonstrate academic ability, but consultation with the Director of Graduate Programs is strongly 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 is required for all international applicants and all applicants to the MSCE or MSEN degree programs.

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 MCE 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 MCE is available both on-campus and through distance education. The MSCE degree requires a thesis and a formal minor is optional. Requirements for the MENE and MSEN 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 -- full or supplemental to an assistantship -- 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.

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

Environmental Remote Sensing and Image Analysis (Minor Program)

Dr. Siamak Khorram
NCSU Box 7106
Phone: 919.515.2868
Email: khorrham@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.

Prerequisite: Graduate status (non-Option B).

Course Requirements: Students must complete a total of 12 credit hours (6 hours from required courses and 6 hours from electives). See the [Remote Sensing Minor](#) website for more details.

Other Requirements: A GIST faculty member must be on the student's graduate committee. A list of currently approved faculty members can be provided to students upon request. If no graduate committee is required by the student's program, the student must obtain approval of his or her minor program. Students enrolled in Option B Masters programs are not eligible to declare a minor. Certificate coursework and Minor coursework must be completely independent

Extension Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-------------------------------------|-------|-------|------|------|-----------|-------|-----|
| Extension Education | | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

M. J. Kistler, Box 7607, 919/513-2349, mark_kistler@ncsu.edu, Agricultural and Human Sciences

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

The Agricultural and Human Sciences Department provides advanced study for professionals in agricultural education, extension education, and 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 with the Cooperative Extension Service. Additional specialization is provided through a minor and/or advised elective courses. The following graduate programs in Agricultural and Extension Education are available in the Department:

- Graduate Certificate in Agricultural and Extension Education (requires 15 hours)
- Master of Science in Agricultural and Extension Education (requires 36 hours including a thesis)
- Master of Agricultural and Extension Education (requires 36 hours)
- Master of Agricultural and Extension 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 Agricultural and Extension Education graduate program requires for full admission a minimum undergraduate GPA of 3.0 ("B" average); a minimum GRE combined General Test score of 300 (Verbal Reasoning plus Quantitative Reasoning) and 3.0 or better on the GRE Analytical Writing Test; three positive references; and a statement of career goals and/or research interests. An interview (personal or by telephone) may also 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 (AEE 695), and a Master of Agricultural and Extension Education as a non-thesis track. All Master's degree programs require a total of 36 credit hours. The Master of Science in Agricultural and Extension Education require a core of five courses in addition to the thesis (AEE 501, 521 or 524 or 529, 523 or 535, 578, and 579 or 777). The Master of Agricultural and Extension Education requires the above except the students will take AEE 620 or 693 as part of completing a culminating project instead of writing a thesis, and is not required to take AEE 579 or 777). 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 and extension education. This certificate program involves completion of 15 credit hours and preparation of a professional portfolio. Based on the student's focus, they will choose from AEE 500, 501, 503, 522, 524, 529, 535, 641, and 735 for the Agricultural Education focus, and AEE 501, 521, 523, 533, 560, 577, 705, and 641 for the Extension Education focus.

Sixth-Year Certificate: The Department offers an array of courses that are recognized by the NC 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 (Ed.D.) 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 (AEE 895).

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.

[NCSU Graduate Catalog](#)

Family Life Education and Coaching (Certificate)

Director of Graduate Certificate Programs:

Kimberly Allen

Agricultural & Human Sciences

Phone:

Email: kiallen@ncsu.edu

The Youth, Family, and Community Sciences (YFCS) academic program at North Carolina State University is proud to offer graduate distance education programs designed to prepare and strengthen current and future professionals. The Youth, Family, and Community Sciences online programs create and advance the careers of those who work with youth and/or families in community-based settings.

The Youth, Family, and Community Sciences Online Graduate Certificate in ***Family Life Education and Coaching*** prepares students to work with parents, professionals, and families as a both family life educator and family life coach. **Family Life Coaches** (FLC) help clients through a thought-provoking and creative process that inspires them to maximize their potential, reach goals, and achieve happiness. **Family Life Educators** (FLE) are strengths-based professionals who provide preventative education to families in organized efforts designed to provide information, skills, experiences, or resources intended to strengthen, improve, or enrich their family experience.

Admissions: Students apply online at <http://www.ncsu.edu/grad/applygrad.htm>

Requirements: A Graduate Certificate in Family Life Education and Coaching requires a total of 12 credit hours. Nine (9) credit hours are required courses, with the remaining three (3) credit hours of electives. All courses are offered online only.

Required Courses (9 credit hours)

YFCS 543 Applied Concepts in Parenting and Family Life Education

YFCS 545 Family Communication and Coaching

YFCS 547 Family Life Coaching

Electives (3 credit hours)

Approved YFCS Elective in family life education (FLE) content area

[NCSU Graduate Catalog](#)

Feed Science (Certificate)

Director of Graduate Certificate Programs:

Jesse Grimes

Prestage Poultry Science

Phone: 919/515-5406

Email: jesse_grimes@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.)

[NCSU Graduate Catalog](#)

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:

S. Michielsen, Box 8301, 919/515-1414, Stephen_Michielsen@ncsu.edu, Textile Engineering, Chemistry and Science

Named Professors: R. L. Barker, H. S. Freeman, D. Hinks, S. A. Khan, W. Oxenham, A. E. Tonelli; **Named Distinguished Professors:** B. Pourdeyhi; **Named Distinguished University Professors:** A. B. Godfrey, J. S. Lindsey, B. M. Novak; **Distinguished Professors:** J. Genzer, R. J. Spontak; **Professors:** H. Ade, C. M. Balik, K. R. Beck, C. L. Bumgardner, T. G. Clapp, A. M. El-Shafei, P. S. Fedkiw, R. E. Fornes, T. K. Ghosh, R. E. Gorga, C. B. Gorman, P. J. Hauser, S. M. Hudson, C. L. Istook, W. J. Jasper, J. A. Joines, M. W. King, T. A. Lamar, T. J. Little, M. G. McCord, S. Michielsen, M. Pasquinelli, J. P. Rust, A. M. Seyam, R. Shamey, R. A. Venditti, A. J. Williams, X. Zhang; **Research Professors:** O. J. Rojas; **Adjunct Professors:** E. G. Lobo-Polefka; **Emeritus Named Professors:** S. K. Batra, S. P. Hersh, H. B. Hopfenberg, C. B. Smith, M. W. Suh, S. C. Winchester, C. F. Zorowski; **Emeritus Professors:** R. A. Donaldson, A. H. El-Shiekh, R. E. Fornes, P. L. Grady, B. S. Gupta, G. N. Mock, H. G. Olf, N. C. Powell, S. T. Purrington, W. C. Stuckey, M. H. Theil, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** K. E. Annett-Hitchcock, P. Banks-Lee, K. A. Barletta, P. D. Bradford, E. A. DenHartog, H. H. Hergeth, G. L. Hodge, J. S. Jur, R. Kotek, W. E. Krause, J. P. Lavelle, L. A. Lucia, L. Pal, Y. Xu; **Research Associate Professors:** D. P. Griffis; **Adjunct Associate Professors:** J. P. Casani, G. M. Garland; **Emeritus Associate Professors:** G. W. Smith; **Assistant Professors:** E. N. Ford, W. Gao, E. Shim, N. R. Vinueza Benitez; **Research Assistant Professors:** N. Anantharamaiah, G. M. Garland, B. Maze, B. Yeom; **Teaching Professors:** H. Hamouda

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 and polymer 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 with at least a 3.15 GPA 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 provided they align well with the FPS program.) 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 demonstrate proficiency in English technical writing.

Student Financial Support: Financial aid in the form of Graduate Research Assistantships, Teaching Assistantships, or other assistantships and fellowships is available to a limited number of 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 Fiber and Polymer Science 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

[NCSU Graduate Catalog](#)

Finance (Certificate)***Directors of Graduate Certificate Programs:***

Karlyn Mitchell

Business Management-Poole COM

Phone: 919/515-5593

Email: karlyn_mitchell@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/finance>

Steven Allen

MBA Program-Poole COM

Phone: 919/515-5584

Email: steve_allen@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/finance>

The Graduate Certificate in Finance is a one to two year program that is designed for graduate students at NC State as well as working professionals in the Research Triangle community. They will obtain advanced skills in capital budgeting, managing risk, and asset valuation.

Admissions requirements: Graduate students at NC State must be in good standing and must submit an application to the certificate program that will be reviewed and approved by the coordinator. Students not attending NC State must have completed a baccalaureate degree. A minimum GPA of 3.0 in undergraduate and graduate work combined 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 520 and earn a grade of B (3.0) or better.

[NCSU Graduate Catalog](#)

Financial Mathematics

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

J. S. Scroggs, Box 8205, 919/515-7817, scroggs@ncsu.edu, Mathematics

S. G. Allen, Box 8114, 919/515-5584, steve.allen@ncsu.edu, Business Management

Named Professors: D. A. Dickey; **Professors:** P. L. Fackler, S. K. Ghosh, K. Ito, N. G. Medhin, J. J. Seater, T. Vukina, J. R. Wilson; **Emeritus Professors:** R. H. Bernhard; **Associate Professors:** M. J. Kang, T. Pang, D. Pelletier, J. S. Scroggs, C. E. Smith; **Adjunct Associate Professors:** R. W. Ellson; **Adjunct Assistant Professors:** J. D. Hauenstein; **Teaching Professors:** B. L. Puryear; **Lecturers:** R. W. Ellson

The Departments of Mathematics, Agricultural and Resource Economics, Economics, Industrial and Systems Engineering, 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.

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: Some funding is available through a limited number of fellowships. Consideration for the support is automatic. There are no teaching assistantships or research assistantships for this Professional Science Masters.

REQUIRED CORE COURSES

ECG 528 Asset Pricing

ISE 711 Capital Investment Economic Analysis

ST 501 Statistical Theory I

MA 547 Financial Mathematics

FIM 548 Monte Carlo Methods for Financial Mathematics

ST 502 Statistical Theory II

ECG 766 Computational Methods in Economics and Finance

GRADUATE COURSES

MBA 521 Advanced Corporate Finance

MBA 522 Portfolio and Capital Market Theory

MBA 524 Equity Valuation

MBA 526 International Finance

MBA 527 Corporate Risk Management

MBA 529 New Firm Financing

ECG 716 Topics in Environmental and Resource Economics

ECG 749 Monetary Aspects Of International Trade

ECG(ST) 751 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

MA 591 Financial Risk Analysis

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

[NCSU Graduate Catalog](#)

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 8008, chris_moorman@ncsu.edu, Forestry and Environmental Resources

M. K. Stoskopf, Box 8401, 919/513-6279, michael_stoskopf@ncsu.edu, College of Veterinary Medicine

R. E. Irwin, Box 7617, reirwin@ncsu.edu, Zoology

Named Professors: W. G. Cope, R. R. Dunn, N. M. Haddad; **Professors:** D. D. Aday, R. J. Borski, J. A. Buckel, M. T. Correa, F. W. Cabbage, H. V. Daniels, C. S. DePerno, D. B. Eggleston, J. R. Godwin, K. Gross, C. A. Harms, G. R. Hess, J. M. Hinshaw, C. A. Layman, J. F. Levine, T. M. Losordo, K. M. Meurs, C. E. Moorman, S. C. Nelson, M. N. Peterson, J. A. Rice, R. J. Richardson, C. E. Sorenson, M. K. Stoskopf; **Research Professors:** S. Kennedy-Stoskopf; **USDI Professors:** J. A. Collazo, T. J. Kwak, T. R. Simons; **Adjunct Professors:** J. G. Boreman, J. E. Hightower, L. S. Mills, F. S. Scharf; **Emeritus Professors:** P. T. Bromley, B. J. Copeland, L. A. Degernes, P. D. Doerr, R. A. Lancia, R. L. Noble, K. H. Pollock, R. A. Powell; **Associate Professors:** M. V. Katti; **Research Associate Professors:** C. B. Cooper, R. W. Kays; **Adjunct Associate Professors:** W. G. Dorgeloh, C. A. Harper; **Assistant Professors:** T. M. Harrison, J. K. Pacifici, B. J. Reading; **Research Assistant Professors:** J. R. Fischer, M. B. Reiskind; **Adjunct Assistant Professors:** D. T. Cobb, M. J. Eaton, R. J. Heise, C. J. Kendall, J. C. Kilgo, R. W. Laney, M. R. Loomis, J. A. Morris, A. J. Terando; **Teaching Associate Professors:** L. B. Pacifici; **Lecturers:** W. G. Dorgeloh

The degrees are offered through the Fisheries, Wildlife, and Conservation Biology program, an intercollegiate program administered by the Colleges of Natural Resources, Agriculture and Life Sciences, and Veterinary Medicine. Students are affiliated with the department of their major professor. The degrees emphasize habitat assessment, population biology, human dimensions, environmental policy, animal health, and sustainable management of fish and wildlife species.

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 completion of the Graduate Record Examination (GRE). Admission is competitive and is contingent on the willingness of a member of the faculty to serve as the 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, Wildlife, and Conservation Biology 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.

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

COURSES FROM ASSOCIATED DEPARTMENTS

- BIO 561 Conservation Biology
- FW 511 Human Dimension of Wildlife
- FW 544 Mammalogy
- 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 542 Herpetology
- ZO 726 Quantitative Fisheries Management

[NCSU Graduate Catalog](#)

Food Safety (Minor Program)

GRADUATE FACULTY

William Neal Reynolds Professor Lee-Ann Jaykus, Director

Email: leeann_jaykus@ncsu.edu

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 minor is directed in the Department of Food, Bioprocessing and Nutrition Sciences with participation by other departments in the Colleges of Agriculture and Life Sciences and Veterinary Medicine. However, it is open to all students having a science background that includes the disciplines of microbiology, biochemistry and molecular biology, and statistics. It is highly desirable that formal course training in food microbiology and/or preservation be part of each student's academic program, either before or concurrent with courses in the minor. Graduate students earning the minor are required to complete all 10 credits from the core courses listed below.

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

Food Science

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

J. C. Allen, Box 7624, 919/513-2257, jon.allen@ncsu.edu, Food, Bioprocessing, and Nutrition Sciences

Named Professors: M. A. Drake, L. Jaykus, S. A. Khan; **Named Distinguished Professors:** E. A. Foegeding; **Distinguished Professors:** M. Lila; **Professors:** J. C. Allen, K. E. Anderson, S. L. Ash, P. A. Curtis, M. G. Ferruzzi, S. A. Hale, H. M. Hassan, S. Kathariou, T. C. Lanier, D. K. Larick, K. P. Sandeep, J. D. Sheppard; **Research Professors:** J. Simunovic; **USDA Professors:** F. Breidt, V. D. Truong; **Adjunct Professors:** P. M. Coronel, J. P. Davis, B. E. Farkas, A. Kilara, R. C. Theuer; **Emeritus Named Professors:** T. R. Klaenhammer; **Emeritus Professors:** L. W. Aurand, H. R. Ball, L. C. Boyd, R. E. Carawan, D. E. Carroll, G. L. Catignani, D. P. Green, M. E. Gregory, A. P. Hansen, V. A. Jones, C. J. Lackey, J. L. Oblinger, D. H. Pilkington, J. E. Rushing, S. J. Schwartz, B. W. Sheldon, L. G. Turner, D. R. Ward; **Emeritus Named Distinguished Professors:** K. R. Swartzel; **Emeritus Distinguished Professors:** H. E. Swaisgood; **Associate Professors:** R. Barrangou, B. J. Chapman, P. Cowen, L. S. Goodell, D. J. Hanson, G. K. Harris, C. D. Kay, S. Komarnytsky; **USDA Associate Professors:** L. L. Dean; **Emeritus USDA Professors:** H. P. Fleming, R. F. McFeeters, T. H. Sanders, W. M. Walter; **Adjunct Associate Professors:** R. R. Sharma-Shivappa; **Assistant Professors:** A. Fogleman, E. Gutierrez Rodriguez, C. D. Stevenson; **USDA Assistant Professors:** S. D. Johanningsmeier, I. M. Perez Diaz, O. T. Toomer; **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. We only recommend admission to the M.S. or Ph.D. degree if a member of our research faculty is willing to advise the student's research. Applications from qualified candidates will be reviewed by faculty seeking research students; conversely applicants may contact faculty whose research specialty is of interest to inquire about available positions. ^[SEP17]
Admission to the Master of Food Science will be based on the qualifications of the applicants.

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 of course work and research. The Master of Food Science requires 36 credit hours of course work, including an independent project and professional skills.

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

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.

[NCSU Graduate Catalog](#)

Foreign Languages and Literature

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

S. Despain, Box 8106, 919/513-1482, despain@ncsu.edu, Foreign Languages and Literatures

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

The Master's degree in Foreign Languages and Literature 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
- GRE (Graduate Record Exam)
- 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/applying/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. or teach in a community college or university receive the requisite training and assistance. K-12 teachers who already have "Initial" or "A" licensure may earn "M" licensure by taking 30 hours in specified disciplines and completing an Action Research Project as their culminating project. 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>).

Student Financial Support: Graduate assistantships are available to students in both the French and Spanish concentrations and are awarded by open competition and based on the strength of the admissions application.

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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

I. M. Peszlen, Box 8005, 919/513-1265, Iлона_Peszlen@ncsu.edu, Forest Biomaterials

Named Professors: A. M. Grunden, M. A. Hubbe, H. Jameel, S. A. Khan; **Named Distinguished Professors:** V. C. Chiang; **Professors:** D. S. Argyropoulos, M. J. Hakovirta, S. S. Kelley, A. G. Kirkman, E. O. Sills, D. C. Tilotta, R. A. Venditti; **Research Professors:** O. J. Rojas; **Adjunct Professors:** R. B. Phillips; **Emeritus Professors:** H. Chang, E. B. Cowling, E. L. Deal, E. L. Ellwood, I. S. Goldstein, J. A. Heitmann, L. G. Jahn, M. J. Kocurek, H. G. Olf, R. G. Pearson, R. J. Thomas, E. A. Wheeler; **Associate Professors:** S. Dasmohapatra, L. A. Lucia, P. H. Mitchell, L. Pal, S. Park, J. J. Pawlak, P. N. Peralta, I. M. Peszlen, D. E. Saloni; **Research Associate Professors:** R. W. Kays; **Adjunct Associate Professors:** E. A. Capanema, P. W. Hart; **Assistant Professors:** R. W. Gonzalez, Y. Yao; **Adjunct Assistant Professors:** A. Ayoub; **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, biomaterials, 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. 166

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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

T. H. Shear, Box 8008, 919/515-7794, ted_shear@ncsu.edu, Forestry and Environmental Resources

Named Professors: R. C. Abt; **Named Distinguished Professors:** V. C. Chiang; **Professors:** V. P. Aneja, R. E. Bardon, R. R. Braham, F. W. Cabbage, C. S. DePerno, J. Frampton, D. J. Frederick, B. Goldfarb, S. T. Gower, G. R. Hess, G. R. Hodge, F. Isik, J. B. Jett, S. Khorram, J. S. King, Y. Leung, B. Li, S. E. McKeand, R. K. Meentemeyer, C. E. Moorman, S. C. Nelson, E. G. Nichols, L. A. Nielsen, D. L. Osmond, M. N. Peterson, J. P. Roise, E. O. Sills, M. Watzin, R. W. Whetten; **Research Professors:** M. D. Lowman; **USDA Professors:** F. E. Bridgwater, J. B. Holland, S. G. McNulty, G. Sun; **USDI Professors:** T. R. Simons; **Adjunct Professors:** K. L. Abt, H. E. Burkhart, M. Fuentes, C. H. Greenberg, T. P. Holmes, J. P. McTague, D. E. Mercer, L. S. Mills, U. J. Nilsson, M. Olsson, J. P. Prestemon, R. C. Purnell, K. H. Riitters, T. A. Steelman, C. Trettin, J. M. Vose, D. N. Wear; **Emeritus Professors:** H. L. Allen, A. W. Cooper, E. B. Cowling, H. A. Devine, P. D. Doerr, W. S. Dvorak, E. C. Franklin, J. D. Gregory, F. P. Hain, A. E. Hassan, L. E. Hinesley, J. B. Jett, R. C. Kellison, R. A. Lancia, E. A. Wheeler; **Emeritus Distinguished Professors:** S. W. Buol, R. R. Sederoff; **Associate Professors:** G. B. Blank, J. A. Delborne, R. E. Emanuel, D. W. Hazel, M. V. Katti, D. B. Morais, E. L. Seekamp, T. H. Shear, S. T. Warren; **Research Associate Professors:** C. B. Cooper, R. M. Jetton, R. W. Kays, K. M. Potter; **Adjunct Associate Professors:** D. M. Amatya, P. J. Donoso, W. G. Dorgeloh, A. L. James, F. H. Koch Jr, M. Lstiburek, S. J. Van Bloem; **Emeritus Associate Professors:** H. V. Amerson; **Assistant Professors:** M. L. Ardon Sayao, R. L. Cook, J. A. Forrester, J. M. Gray, Z. H. Leggett, K. Martin, J. K. Pacifici, L. Rivers; **Research Assistant Professors:** J. J. Acosta, J. K. Costanza, P. Nepal; **Adjunct Assistant Professors:** P. V. Caldwell, J. W. Coulston, W. P. Cumbie, G. E. Frey, E. F. Hain, J. S. Iames, K. A. McGinley, M. C. Moorman, R. A. Rubilar, C. Serenari, J. W. Smith; **Extension Professors:** M. A. Megalos; **Teaching Associate Professors:** J. B. McCarter, L. B. Pacifici; **Teaching Assistant Professors:** E. S. Money; **Lecturers:** W. G. Dorgeloh

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

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assistantships 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), 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.

[NCSU Graduate Catalog](#)

Functional Genomics

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

D. M. Bird, Box 7253, 919/515-1967, david_bird@ncsu.edu, Entomology and Plant Pathology

S. V. Muse, Box 7566, 919/515-1948, muse@ncsu.edu, Statistics

Named Professors: J. M. Alonso, D. M. Bird, R. E. Dewey, A. M. Grunden, R. M. Kelly, J. B. Ristaino, B. M. Wiegmann, G. C. Yencho; **Named Distinguished Professors:** R. R. Anholt, R. S. Boston, V. C. Chiang, M. E. Daub, R. A. Dean, L. K. Hanley-Bowdoin, S. Lommel, J. Odle, G. A. Payne; **Named Distinguished University Professors:** T. F. MacKay; **Distinguished University Professors:** M. M. Goodman, W. F. Thompson; **Professors:** K. B. Adler, P. Arasu, C. M. Ashwell, R. J. Borski, M. Breen, E. B. Breitschwerdt, D. T. Brown, J. W. Brown, I. Carbone, G. A. Dean, C. E. Farin, R. G. Franks, F. J. Fuller, J. E. Gadsby, J. R. Godwin, B. Goldfarb, J. M. Haugh, C. L. Hemenway, J. M. Horowitz, S. Kathariou, J. A. Knopp, B. Li, H. Liu, J. W. Mahaffey, E. S. Maxwell, S. E. McKeand, M. S. Merrill, E. S. Miller, P. E. Mozdziak, D. C. Muddiman, C. H. Opperman, J. N. Petitte, R. M. Petters, J. A. Piedrahita, M. C. Sagui, H. A. Sederoff, B. Sherry, R. C. Smart, R. W. Whetten, P. L. Wollenzien, Q. Xiang, D. Xie; **USDA Professors:** J. B. Holland; **Adjunct Professors:** J. Cavanagh, J. L. Gibson, E. A. Koutsos, M. S. McGinnis, E. A. Stone; **Emeritus Named Professors:** W. F. Boss, E. Eisen, T. R. Klaenhammer; **Emeritus Professors:** S. D. Clouse, S. E. Curtis, D. H. Ley, J. W. Moyer, P. E. Orndorff, W. Tompkins; **Emeritus Named Distinguished Professors:** W. R. Atchley; **Emeritus Distinguished Professors:** R. R. Sederoff; **Associate Professors:** R. Barrangou, J. M. Bruno-Barcena, M. B. Goshe, S. Heber, C. Hoyo, M. D. Koci, S. Komarnytsky, D. S. Lalush, X. Li, T. A. Long, F. Meilleur, N. M. Nascone-Yoder, J. W. Olson, X. Peng, M. Pierce, B. J. Reich, D. M. Reif, M. Rodriguez-Puebla, M. L. Sikes, N. D. Singh, L. J. Unruh Snyder, Y. Wu, J. A. Yoder; **Research Associate Professors:** P. A. Estes; **Adjunct Associate Professors:** W. O. McMillan; **Emeritus Associate Professors:** H. V. Amerson; **Assistant Professors:** H. Ashrafi, D. L. Aylor, S. A. Faith, T. Hsieh, M. Iorizzo, C. C. Nestor, B. J. Reading, R. Sozzani, A. N. Stepanova; **USDA Assistant Professors:** I. M. Perez Diaz; **Adjunct Assistant Professors:** J. L. Stephenson; **Teaching Assistant Professors:** 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.

[NCSU Graduate Catalog](#)

Genetic Engineering and Society (Minor Program)

Professor F. Gould, co-Director
1552 Thomas Hall
Phone: 919.515.1647
Email: fgould@ncsu.edu

Professor J. Delborne, co-Director
5221 Jordan Hall Addition
Phone: 919.515.0106
Email: jadelbor@ncsu.edu

IGERT home page: <http://research.ncsu.edu/igert/>

GES Minor home page: <http://research.ncsu.edu/igert/graduate-program/ges-minor-program/>

Overview

The interdisciplinary minor in Genetic Engineering and Society (GES) examines the technological, societal and ecological issues surrounding the development and potential use of genetically engineered organisms. Participants in the minor will learn the basic concepts and principles underlying genetic engineering and the methods used for evaluating the technology's social, cultural and environmental dimensions. Initially, the minor is focused on genetic pest management, but will broaden to consider other applications of genetic engineering, including genetically modified crops and synthetic biology. The graduate minor is available to students pursuing either an MS or a PhD degree.

Requirements

In order to complete the minor, coursework must be taken in relevant areas of natural sciences and the humanities and social sciences. 9 credit hours from a list of approved courses (see below) are required, 6 of which must be the two core GES courses. The remaining 3 credit hours must be fulfilled by a course from the list of approved courses that is outside the students' home discipline. A grade of B or higher must be achieved in each course counted towards the minor. In addition, a student must have a GES faculty member on his or her committee (see <link> GES program homepage for a list of the GES faculty), and this faculty member should be from a discipline other than the student's major, ensuring that there is representation from both humanities/social science and natural science.

The choice of courses must be consistent with the interdisciplinary outlook of this minor, namely that students will learn the basic concepts and principles underlying genetic engineering and the methods used for evaluating the technology's social, cultural and environmental dimensions. The minor representative will be responsible for ensuring that the courses taken are appropriate and balance the student's major. Students in the biological sciences will be encouraged to take hands on courses, such as those offered by the BIT program.

Approved courses

Core courses:

GES/ENT 506 (3 CR) Principles of Genetic Pest Management
GES/COM/BI 508 (3 CR) Emerging Technologies and Society
GES 591 (3 CR) Governance, Systems and Modeling

Other approved courses:

ANT 550 Culture, Ecology, and Sustainable Living
BIT 410/510 Manipulation of Recombinant DNA
COM 536 Seminar in Environmental Communication
ECG 540 Economic Development
ENG 515 Rhetoric of Science and Technology
FW 411/511 Human Dimensions of Wildlife Management
GN 735 Genomic Science
HI 540 Topics in Environmental History

HI 581 History of the Life Sciences
HI 585 History of American Technology
NR 571 Current Issues in Natural Resource Policy
REL 571 Darwinism and Christianity
PA 598/798 Science and Technology Policy
PHI 475/575 Ethical Theory
PSY 757 Innovation and Technology
ST 590 A,C Bioinformatics I/II

Additional courses may be added to the approved list, as determined by the Executive Committee. Courses may be substituted at the Co-Directors' discretion.

Genetics

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

T. F. MacKay, Box 7614, 919/515-5810, trudy_mackay@ncsu.edu, Biological Sciences

Named Professors: J. M. Alonso, D. M. Bird, R. E. Dewey, J. B. Ristaino, B. M. Wiegmann; **Named Distinguished Professors:** R. R. Anholt, R. S. Boston, V. C. Chiang, R. A. Dean, F. L. Gould, L. K. Hanley-Bowdoin, S. Lommel, C. J. Schal, Z. Zeng; **Named Distinguished University Professors:** T. F. MacKay; **Distinguished University Professors:** M. M. Goodman, W. F. Thompson; **Professors:** M. Breen, D. J. Burke, I. Carbone, R. G. Franks, J. R. Godwin, C. H. Haigler, F. Isik, R. S. Lewis, H. Liu, J. W. Mahaffey, K. M. Meurs, S. V. Muse, N. J. Olby, C. H. Opperman, E. F. Rissman, M. J. Scott, H. A. Sederoff, S. M. Sullivant, J. L. Thorne, J. Tzeng, K. R. Weninger, R. W. Whetten, Q. Xiang; **USDA Professors:** J. B. Holland; **Adjunct Professors:** R. E. Cannon, E. A. Stone, D. W. Threadgill; **Emeritus Named Professors:** W. F. Boss, E. Eisen, T. R. Klaenhammer; **Emeritus Professors:** S. E. Curtis, W. E. Kloos, D. F. Matzinger, W. H. McKenzie, J. G. Scandalios, H. E. Schaffer; **Emeritus Named Distinguished Professors:** W. R. Atchley, C. S. Levings, E. A. Wernsman; **Emeritus Distinguished Professors:** R. R. Sederoff; **Associate Professors:** R. Barrangou, C. Beisel, G. C. Conant, T. Ghashghaei, S. Heber, V. Kuraparthi, R. B. Langerhans, T. A. Long, M. D. Lorenzen, C. Maltecca, S. R. Milla-Lewis, A. A. Motsinger-Reif, D. M. Nielsen, X. Peng, M. Pierce, D. M. Reif, M. L. Sikes, N. D. Singh, J. A. Yoder; **Research Associate Professors:** P. A. Estes; **USDA Associate Professors:** P. J. Balint-Kurti; **Emeritus USDA Professors:** C. W. Stuber; **Adjunct Associate Professors:** W. O. McMillan; **Assistant Professors:** H. Ashrafi, D. L. Aylor, M. A. Cowley, J. R. Elfenbein, S. A. Faith, R. Ke, A. J. Keung, C. Laplante, L. A. McGraw, S. K. Mishra, F. M. Mowat, C. C. Nestor, A. J. Planchart, G. T. Reeves, M. H. Reiskind, R. B. Roberts, A. San Miguel Delgadillo, R. Sozzani, A. N. Stepanova, C. M. Theriot; **Research Assistant Professors:** M. A. Carbone, M. B. Reiskind, Y. Zhou; **USDA Assistant Professors:** A. M. Hulse-Kemp; **Adjunct Assistant Professors:** R. E. Cannon; **Teaching Professors:** M. B. Gardner; **Teaching Assistant Professors:** C. L. Gordy, C. J. Halweg, W. M. Jones, J. Little

The Genetics Graduate Program is a University wide program. Current faculty are in 14 Departments and four Colleges. The Genetics Program provides a well-balanced program of graduate course work and research training. The faculty conducts basic research in all areas of genetics, including molecular, cellular and developmental genetics; behavioral genetics, biomedical genetics, evolutionary, population and quantitative genetics, statistical genetics, and bioinformatics. Faculty research utilizes both traditional model organisms (fruit flies, mice and Arabidopsis) and non-traditional systems (cats, cockroaches, dairy cattle, dogs, maize, pigs, pine trees and more). Interdisciplinary research is encouraged.

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 an admissions 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, of which 14 hours are core course requirements, three hours are additional elective graduate courses with substantial genetics content, and three hours are other elective graduate courses. M.S. students majoring in Genetics are required to complete dissertation research with three credit hours of Master's Supervised Research, six credits of Master's Thesis Research, one credit of Master's Thesis Prep, and one credit of Master's Examination. M.S. students are also required to teach one semester of undergraduate courses and may enroll in Master's Supervised Teaching. 12 hours of required courses are required for Genetics minors. The Master's of Genetics requires a minimum of 31 credit hours, of which 17 hours are core course requirements, six hours are additional elective genetics courses and eight hours are elective graduate courses.

Doctoral Degree Requirements: A total of 18 hours of seven core courses and 12 hours of elective graduate courses, nine of which have substantial genetics content, is required of all majors. Ph.D. students majoring in Genetics are required to complete dissertation research with three credit hours of Doctoral Supervised Research and a combination of Doctoral Dissertation Research, Doctoral Preliminary Examination, and Doctoral Dissertation Prep to total 39 hours. Students are also required to and teach two semesters of undergraduate courses and may enroll in six credits of Doctoral Supervised Teaching to be used toward the remaining 39 credit hours. 12 hours of required courses are required for Genetics minors.

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: All M. S. and Ph. D. students rotate through three laboratories during their first semester. At the end of the semester, they choose a laboratory for their research activities consistent with their interests and available research projects. Provisions are available for a co-major and collaborative research in more than one laboratory.

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

[NCSU Graduate Catalog](#)

Geographic Information Systems (Minor Program)

Dr. Eric Money

Center for Geospatial Analytics

NCSU Box 7106

Phone: 919.513.0408

Email: esmoney@ncsu.edu

Website: <https://cnr.ncsu.edu/geospatial/academics/programs>

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 (non-Option B).

Course Requirements: Students must complete a total of 9 credit hours (6 hours from required courses and 3 hours from electives). See [GIS minor website](#) for course details.

Other Requirements: A GIST faculty member must be on the student's graduate committee. A list of currently approved faculty members can be provided to students upon request. If no graduate committee is required by the student's program, the student must obtain approval of his or her minor program. Students enrolled in Option B Masters programs are not eligible to declare a minor. Certificate coursework and Minor coursework must be completely independent.

Geographic Information Systems (Certificate)

Director of Graduate Certificate Programs:

Eric Money

Ctr. for Geospatial Analytics

Phone:

Email: esmoney@ncsu.edu

The Graduate Certificate in Geospatial Information Science (GIS) and Geographic Information Systems provides students with a graduate level academic credential in advanced GIS applications. This program is designed for students who wish to establish themselves in GIS practice but are not yet ready to commit to a full graduate program. The Certificate can be completed entirely online. The Certificate is also available to current NC State students enrolled in a non-GIS graduate degree. The entire program requires 12 credit hours. The program is designed to add GIS competencies to an existing professional portfolio and to allow the initial exploration of graduate level geospatial studies. Students may transfer up to 12 credit hours from the Certificate into the Masters of Geospatial Information Science and Technology degree (MGIST) upon application and acceptance into that program.

Admission Requirements: The Certificate program requires a Bachelor's degree, a personal statement describing your interest in the program and highlighting professional ambitions and experience, a resume/CV, and a minimum 3.0 undergraduate GPA. Application information and curriculum requirements are listed on the [GIS Certificate website](#).

Certificate Requirements: Award of a certificate requires a cumulative GPA of 3.0 or better for the certificate courses (12 credit hours total; 6 required, 6 elective). See the GIS Certificate website for a detailed list of courses.

Other Relevant Information: The Certificate may be taken entirely online. Undergraduates interested in taking courses towards the Certificate should contact the program or refer to the [GIS Certificate website](#) for more information.

[NCSU Graduate Catalog](#)

Geospatial Analytics

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

R. K. Meentemeyer, Box 8008, 919/513-2372, rkmeente@ncsu.edu, Ctr. for Geospatial Analytics

Professors: S. T. Gower, S. Khorram, Y. Leung, R. K. Meentemeyer, H. Mitsova, S. C. Nelson, A. G. Wilson;

Associate Professors: D. R. Bohnenstiehl, R. E. Emanuel, J. A. Hipp, R. R. Vatsavai, B. A. Watson, K. W. Wegmann, J. G. White; **Research Associate Professors:** P. K. Baran, R. W. Kays; **Assistant Professors:** E. L. Hestir, D. R.

Obenour; **Research Assistant Professors:** L. G. Tateosian; **Teaching Assistant Professors:** E. S. Money

The PhD in Geospatial Analytics is an integrative program bringing together the Center for Geospatial Analytics (CGA) with departments from across NC State to produce a new generation of interdisciplinary data scientists skilled in developing novel understanding of spatial phenomena. The program connects students with mentors and peers across multiple disciplines and provides scientific and professional knowledge through practicing geospatial analytics in academia, industry, and government agencies. The program consists of (1) multidisciplinary advising, (2) an intense core curriculum that covers advanced theory in the geospatial sciences along with specialized training in the quantitative, algorithmic, and systems aspect of geospatial computing, information technology, applications, and analytics, in combination with domain research and coursework, (3) an internship experience, and (4) a complete dissertation that advances the field of geospatial science, GIS, and geospatial analytics.

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

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

E. S. Money, Box 7106, esmoney@ncsu.edu, Ctr. for Geospatial Analytics

Professors: E. H. Bressler, D. A. Crouse, G. D. Garson, C. G. Healey, R. W. Heiniger, G. R. Hess, S. Khorram, H. Krim, D. K. Larick, Y. Leung, J. F. Levine, R. K. Meentemeyer, H. Mitsova, S. C. Nelson, M. F. Overton, W. J. Rasdorf, A. R. Rice, R. A. St. Amant, H. J. Trussell, S. E. Yuter; **USDI Professors:** T. J. Kwak; **Emeritus Professors:** H. A. Devine; **Associate Professors:** D. R. Bohnenstiehl, G. T. Roberson, W. R. Smith, R. R. Vatsavai, K. W. Wegmann, J. G. White, S. B. Wiley; **Research Associate Professors:** P. K. Baran, R. W. Kays; **Adjunct Associate Professors:** F. H. Koch Jr; **Emeritus Associate Professors:** M. L. Vasu; **Assistant Professors:** J. M. Gray, E. L. Hestir, J. Vukomanovic; **Research Assistant Professors:** L. G. Tateosian; **Adjunct Assistant Professors:** J. W. Coulston, E. F. Hain, M. R. Loomis, J. W. Smith; **Teaching Associate Professors:** J. B. McCarter; **Teaching Assistant Professors:** E. S. Money, S. K. Supak

The Master of Geospatial Information Science and Technology (MGIST) equips students with the necessary knowledge and tools to become high-end geospatial professionals using a unique curriculum that leverages NC State's strengths in computational and data sciences, information technology, and interdisciplinary training in combination with professional skills development in areas of project management, technical writing, and communications. The **MGIST can be completed entirely online**, allowing flexibility for both students just entering the work force and working professionals.

Through a combination of geospatial theory, hands-on applications, and client-based service-learning experiences, students graduate from the program with a solid foundation to provide a wide range of geospatial expertise for local, state, national, and international organizations.

Admissions Requirements: Admission to the program requires an undergraduate GPA of 3.0 or better, a professional resume, a personal statement describing the applicant's professional ambitions and experience, and 3 letters of reference. Students with less than a 3.0 undergraduate GPA may be considered for provisional admission into the MGIST or referred to the [GIS Certificate](#) program to enhance skills and prepare for reapplication to the MGIST.

Master's Degree Requirements: The MGIST degree requires 33 course credit hours including a 3-credit-hour Capstone course and development of a professional portfolio highlighting geospatial analytic skills and competencies. A cumulative GPA of 3.0 or better is required in order to graduate. 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](#) (12 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](#) or [Environmental Remote Sensing](#)).

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

Directors of Graduate Programs:

L. Shamblin, Box 7229, lsbrown2@ncsu.edu, Business Management

S. G. Allen, Box 8114, 919/515-5584, steve.allen@ncsu.edu, Business Management

Professors: D. H. Henard, S. K. Markham, D. P. Pagach; **Professors of the Practice:** L. Shamblin; **Associate Professors:** P. W. Mulvey; **Emeritus Associate Professors:** J. K. McCreery

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 590 MGIM Practicum
MBA 554 Project Management
MBA 564 Business Relationship Management
BUS 610 Managerial Communications
BUS 610 Innovation Tools and Culture

Elective Courses:

MBA 551 Services Management and Marketing
MBA 570 Entrepreneurship
MBA 563 Product and Brand Management
MBA 541 Supply Management
MBA 590 Consumer Behavior
MBA 585 Current Topics in BioScience Management

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.

[NCSU Graduate Catalog](#)

Graphic Design

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

D. Gonzales Crisp, Box 7701, 919/515-8361, denise_crisp@ncsu.edu, Graphic and Industrial Design

Professors: D. Gonzales Crisp, H. Holljes, T. Liu; **Emeritus Professors:** M. J. Davis, A. S. Lowrey; **Associate Professors:** H. S. Armstrong, K. L. Bailey, R. A. Flinchum, C. Gill, S. Townsend; **Assistant Professors:** D. A. Ham, D. K. Littlejohn, M. O. Peterson, K. A. Umstead

Today's design problems are complex, require systems-oriented thinking, and call for new problem-solving paradigms. The contemporary culture is participatory, arguing for greater user influence and the design of tools and systems through which people create their own experiences. Rapid technological evolution challenges the traditional "almost perfect" goal of design, accepting that design will arise from an organic approach to problem solving, not a mechanistic one. And designers are increasingly accountable for anticipating the outcomes of design decisions with real people and need research skills to forecast changes in the surrounding context.

Studios and seminars in the Master of Graphic Design program explore the implications of thinking about user experience and research from these perspectives. Student work invites dialogue through the propositional artifacts and systems that students design.

At the same time, the Master of Graphic Design is not a fine arts program. Student work must convince thought leaders that new ideas about communication can live in the world of professional design practice and add value to people's lives. To make that argument, it must be informed by deep understanding of people, activities, and settings and its effects must be nested within larger physical, cultural, social, and technological systems. The program acquaints students with methods for studying these things and for describing them to audiences outside of design. The program has the broad objective to educate socially responsible, intellectually curious, historically aware, and technologically adept communication design professionals.

Admissions Requirements: Applications are due to the Department of Graphic Design and Industrial Design by January 5. Contact the Director of Graduate Programs to discuss the feasibility of late application.

In addition to Graduate School requirements, the Department asks for department personal data forms, a written statement of intent, and a website or accessible online PDF portfolio—designed specifically for application to the program—that demonstrates experience and skills in visual communication.

MGD II Track: Applicants whose first degree is a BFA (or BGD) in graphic design should apply to the MGD II program. The applicant ideally will have worked in professional practice for at least one year, however recent BFA graduates will be considered.

MGD III Track: Applicants whose first degree is not in graphic design but who have some graphic design experience should apply to the MGD III program. Applicants who have earned a BA or BS (rather than a BFA) in visual art or design will be considered for the MGD III program. This initial year in advanced graphic design practices prepares candidates for the MGD II curriculum, and therefore the portfolio submitted should demonstrate sufficient experience to undertake our upper-level undergraduate coursework. In the statement of intent, applicants should describe a research connection between the first discipline and the intended graduate graphic design study. MGD III applicants are required

Master's Degree (MGD II) 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.

Student Financial Support: The department has limited provisions for tuition remission and assistantships. Assistantships are awarded on the basis of student and departmental needs, student GPA, and pertinent work experience. Assistantship requests should be made to the Department Head 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.

[NCSU Graduate Catalog](#)

Higher Education Administration

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Higher Education Administration | | Y | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: D. Akroyd, T. W. Cawthon, A. J. Jaeger, S. R. Porter, A. N. Rockenbach, P. D. Umbach; **Professors of the Practice:** R. G. Templin; **Adjunct Professors:** L. Gonzalez-Sullivan, B. A. Olson, R. S. Ralls; **Emeritus Named Professors:** C. E. Kasworm; **Emeritus Professors:** J. C. Glass, C. R. Tittle, G. B. Vaughan; **Emeritus Named Distinguished Professors:** G. A. Baker; **Associate Professors:** S. J. Barcinas, J. E. Bartlett, T. A. Bowles, F. I. Chirino-Klevans, J. G. Gayles, B. S. Mehlenbacher, T. V. Young; **Adjunct Associate Professors:** S. C. Faircloth, B. I. Mallette; **Assistant Professors:** L. R. Bass, A. B. Bowden, T. A. Drake, A. M. Jacob; **Adjunct Assistant Professors:** K. A. Boham, L. M. Chapman, D. K. Deardorff, K. G. Dixon, K. L. Ender, C. C. Figuers, J. E. Fleming, B. J. Frye, E. V. Griffin, C. O. Grochowski, J. L. Hill, M. B. Jackowski, W. D. McInnis, S. E. Morrissey, A. B. Orders, C. Paepflow, R. R. Parker, D. L. Reichard, D. D. Richmond, M. E. Rittling, L. L. Rouse, S. C. Scott, M. A. Valek, S. J. Wasiolek, J. W. Wescott, S. Williams, C. L. Zelna; **Teaching Professors:** D. D. Chapman; **Teaching Assistant Professors:** M. E. Bartlett, F. P. Riddick, C. C. Williams; **Lecturers:** B. J. Frye, N. T. Smith, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

History

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

J. E. Rudolph, Box 8108, 919/515-2483, jerudolp@ncsu.edu, History

Named Professors: D. P. Gilmartin; **Distinguished University Professors:** W. Adler; **Professors:** R. K. Bassett, C. T. Friend, O. J. Kalinga, A. F. Khater, M. G. Kim, K. P. Luria, A. W. Mitchell, S. T. Parker, J. E. Rudolph, R. W. Slatta, S. L. Spencer, K. S. Vincent, D. A. Zonderman; **Emeritus Professors:** J. E. Crisp, M. S. Downs, J. M. Riddle, K. P. Vickery; **Associate Professors:** D. R. Ambaras, M. M. Booker, T. S. Gordon, B. M. Kelley, W. C. Kimler, S. M. Lee, J. L. Mell, K. Mellen Charron, B. S. Sirota, N. B. Strote; **Emeritus Associate Professors:** G. Surh; **Assistant Professors:** M. L. Cherry, F. Freitas, V. I. Kasper-Marienberg, J. Kertesz, A. E. McGill; **Adjunct Assistant Professors:** J. W. Caddell; **Teaching Associate Professors:** N. A. Robins; **Teaching Assistant Professors:** J. C. Bonham, J. C. Boyles, H. C. Perros

Admission Requirements: Admission to the M.A. in History and Public History and Ph.D. in Public History programs require: a bachelor's degree from an accredited college or university; transcripts; scores from the Graduate Record Exam (GRE); personal statement, listing career goals, historical interests, and potential advisor; letters of recommendation; and a writing sample of approximately ten pages. See the program's website (<http://history.chass.ncsu.edu/grad/apply.php>) for additional details.

Master's Degree Requirements: *Master of Arts Degree in History:* This program requires a total of 30 credit hours, including 6 hours in core courses, 12 credit hours in a major field, 6 credit hours in a minor field, and 6 credit hours in thesis work. 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 museum studies and heritage studies. Students perform internships in their own special areas of interest.

Doctoral Degree Requirements: The Ph.D. program in Public History requires 72 credit hours. Students complete 21 credit hours in a public history field, including an internship; 21 credit hours in a history field; 6 credit hours in an outside field; and 24 credit hours of dissertation work.

Student Financial Support: Graduate teaching assistantships are available to students in all programs and are awarded by open competition.

Other Relevant Information: The application deadline for fall semester is January 15; students are admitted for the fall semester only.

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

Horticultural Science (Certificate)

Director of Graduate Certificate Programs:

Helen Kraus

Horticultural Science

Phone: 919/515-1208

Email: helen_kraus@ncsu.edu

Website: https://cals.ncsu.edu/hort_sci/teaching/degrees/grad-programs/

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 523 General Viticulture

HS 532 Permaculture

HS 541 Plant Breeding Methods

HS 562 Post Harvest Physiology

HS 550 Special Problems in Horticultural Science (Environmental Nursery Production)

HS 590 Plant Breeding Overview

HS 707 Environmental Stress Physiology

HS 717 Weed Management Systems

HS 790 Diagnostic Criteria for Plant Nutrition

Horticultural Science (On-campus sections only)

HS 502 Plant Disease: Methods and Diagnosis

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 Behavior and Fate in the Environment
HS 727 Pesticide Behavior and Fate in the Environment
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.

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

H. T. Kraus, Box 7609, 919/515-1208, helen_kraus@ncsu.edu, Horticultural Science

J. L. Kornegay, Box 7609, 919/515-1193, julia_kornegay@ncsu.edu, Horticultural Science

Named Professors: M. D. Boyette, G. C. Yencho; **Named Distinguished Professors:** N. G. Creamer, D. J. Werner; **Professors:** S. M. Blankenship, W. G. Buhler, J. M. Dole, G. E. Fernandez, W. C. Fonteno, J. L. Kornegay, D. W. Monks, J. C. Neal, P. M. Perkins-Veazie, T. G. Ranney, J. R. Schultheis, T. C. Wehner, B. E. Whipker, F. H. Yelverton, E. Young; **Adjunct Professors:** J. L. Gibson, M. S. McGinnis, P. S. Zorner; **Emeritus Professors:** W. E. Ballinger, J. R. Ballington, T. E. Bilderback, S. D. Clouse, A. A. DeHertogh, P. R. Fantz, R. G. Gardner, W. R. Henderson, L. E. Hinesley, W. E. Hooker, T. R. Konsler, C. M. Mainland, T. J. Monaco, P. V. Nelson, E. B. Poling, M. A. Powell, W. A. Skroch, S. E. Spayd, C. R. Unrath, L. G. Wilson; **Associate Professors:** L. K. Bradley, J. D. Burton, J. M. Davis, B. Fair, C. Gunter, B. E. Jackson, K. M. Jennings, H. T. Kraus, A. V. Lebude, D. R. Panthee, M. L. Parker, J. T. Sherk, A. M. Spafford, J. D. Williamson; **Research Associate Professors:** D. G. Seth Carley; **Emeritus Research Associate Professors:** G. C. Allen; **Assistant Professors:** H. Ashrafi, J. D. Bloom, R. Hernandez, M. Iorizzo; **Research Assistant Professors:** R. D. Dunning, B. A. Olukolu; **Adjunct Assistant Professors:** G. Gusmini

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 commodity areas such as floriculture, ornamental and landscape horticulture, pomology (fruit crops) and olericulture (vegetables) or on cross-commodity topics such as plant physiology, breeding and genetics, genomics, herbicide physiology and weed control, nutrition, propagation, tissue culture, growth regulators, sustainable agriculture, postharvest physiology, and controlled environments.

Admission Requirements: To be admitted, a student should have completed course work in mathematics, chemistry (inorganic and organic), genetics, plant physiology, and several courses in horticulture, agronomy and/or botany. Priority is given to students who have also completed courses in biochemistry, plant pathology, entomology, soil science, statistics and physics. 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, test of English as a foreign language (TOEFL) scores (applicant are from non-English speaking countries), three letters of reference, copy of transcript for each prior degree, statement of career goals, and current resume or CV.

Master's Degree Requirements: The Master's degree is a research-oriented degree requiring 30 credit hours and a written thesis. Four one-credit core courses and two credits of HS 601 must be completed. Up to 6 of the 30 credits may be research credits (HS 695). At least 24 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. Twenty-four (24) credits must be at the 500-700 level. Two credits of HS 601 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. The M.H.S degree is also available through Distance Education. NCSU University Graduate Catalog (2017-2019)

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 core courses and two credits of HS 601 are required, if not taken as part of a prior M.S. degree in the Horticultural Science department.

Student Financial Support: The department has a limited number of assistantships available on a competitive basis for promising students. The assistantship includes salary, tuition and health insurance as covered under the Graduate School's Graduate Student Support Plan. Applicants are considered for assistantship support at the 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 for those programs of interest.

Other Relevant Information: Facilities for graduate studies include 40,500 square feet of greenhouse space on main campus 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.

[NCSU Graduate Catalog](#)

Immunology

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

S. M. Laster, Box 7615, 919/515-7958, Scott_Laster@ncsu.edu, Biological Sciences

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

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

S. B. Joines, Box 7701, 919/513-0825, sharon_joines@ncsu.edu, Graphic and Industrial Design

Professors: C. D. Cox, H. Holljes, S. B. Joines, T. Liu; **Emeritus Professors:** V. Foote, C. E. Joyner, H. Khachatoorian;

Associate Professors: H. S. Armstrong, T. W. Buie, L. M. Diaz, P. J. Fitzgerald, C. Gill, P. R. Hooper, B. Jin, B. W.

Laffitte; **Emeritus Associate Professors:** V. K. Plume, D. G. Raymond, S. M. Toplikar; **Assistant Professors:** D. A.

Ham, M. O. Peterson, K. A. Umstead

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. Augmenting transdisciplinary practices, emerging areas of industrial design include design research and experience design.

Graduates with a Master of Industrial Design have career opportunities in four general areas; corporate design offices in manufacturing companies, 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 of design work, resume, 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 [NCSU Graduate Catalog \(2017-2018\)](#) for current course information.

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[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

M. G. Kay, Box 7906, 919/515-2008, kay@ncsu.edu, Industrial Engineering

Y. Fathi, Box 7906, 919/515-6417, fathi@ncsu.edu, Industrial Engineering

Named Professors: S. Fang, R. E. King, R. A. Wysk; **Named Distinguished Professors:** P. Cohen, R. Uzsoy; **Named Distinguished University Professors:** T. J. Hodgson; **Distinguished Professors:** O. A. Harrysson; **Professors:** G. D. Buckner, Y. Fathi, J. S. Ivy, D. B. Kaber, Y. Lee, D. J. Marcellin, L. A. Martin, M. E. Mayorga, R. J. Narayan, J. R. Wilson; **Adjunct Professors:** S. M. Hsiang, A. K. Mallik; **Emeritus Named Professors:** A. L. Prak; **Emeritus Professors:** M. A. Ayoub, R. H. Bernhard, T. Johnson, R. G. Pearson, W. A. Smith; **Emeritus Distinguished Professors:** C. T. Culbreth Jr; **Associate Professors:** J. Dong, M. G. Kay, J. P. Lavelle, Y. Liu, C. S. Nam, R. A. Shirwaiker, B. Starly, D. P. Warsing; **Research Associate Professors:** J. Taheri, H. A. West II; **Adjunct Associate Professors:** N. J. Currie, B. Denton, R. Stoll, A. R. Vila-Parrish; **Emeritus Associate Professors:** T. L. Honeycutt, E. Sanii; **Assistant Professors:** K. B. Chen, O. Y. Ozaltin, X. Xu; **Research Assistant Professors:** T. J. Horn; **Adjunct Assistant Professors:** J. E. Mason, M. Swangnetr, L. A. Tupler; **Teaching Professors:** S. D. Jackson, H. L. Nuttle

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 [NCSU Graduate Catalog \(2017-2018\)](#) for current course information.

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[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

S. D. Jackson, Box 7915, 919/515-3808, sdjacks@ncsu.edu, Integrated Manufacturing Systems Engineering
S. G. Allen, Box 8114, 919/515-5584, steve.allen@ncsu.edu, Business Management

Named Professors: R. L. Barker, M. D. Boyette, R. E. King, R. A. Wysk; **Named Distinguished University Professors:** R. B. Handfield, T. J. Hodgson, M. Rappa; **Distinguished Professors:** O. A. Harrysson; **Professors:** G. D. Buckner, Y. A. Chen, M. Chow, T. G. Clapp, E. C. Dickey, Y. Fathi, T. K. Ghosh, J. S. Ivy, W. J. Jasper, J. A. Joines, J. W. Leach, Y. Lee, T. J. Little, L. A. Martin, W. J. Rasdorf, P. I. Ro, J. P. Rust, A. M. Seyam, J. R. Wilson; **Research Professors:** B. L. Edge, D. L. Lubkeman, T. M. Paskova; **Adjunct Professors:** M. Devetsikiotis, T. M. Paskova; **Emeritus Named Professors:** C. F. Zorowski; **Emeritus Professors:** R. E. Carawan, P. L. Grady, T. Johnson, W. A. Smith; **Emeritus Distinguished Professors:** C. T. Culbreth Jr; **Associate Professors:** D. R. Bahler, P. Banks-Lee, K. A. Barletta, R. R. Collazo, J. Dong, G. L. Hodge, H. Huang, M. G. Kay, N. Lu, K. Mitchell, D. E. Saloni, D. P. Warsing; **Research Associate Professors:** J. Taheri; **Adjunct Associate Professors:** B. Denton; **Emeritus Associate Professors:** S. N. Chapman, E. Sanii; **Assistant Professors:** J. J. Adams; **Research Assistant Professors:** T. J. Horn; **Adjunct Assistant Professors:** S. S. Ahiska; **Teaching Professors:** S. D. Jackson, H. L. Nuttle, C. L. Reynolds Jr

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](#) (nkevans@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

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.

[NCSU Graduate Catalog](#)

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.

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

Named Distinguished Professors: M. D. Schulman; **Professors:** F. W. Cabbage, D. M. Daley, M. A. Johnson, A. F. Khater, J. Kuzma, A. W. Mitchell, R. P. Patterson, M. A. Renkow, A. J. Taylor; **Emeritus Professors:** L. S. Bull, 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, C. E. Griffin, H. H. Hobbs, J. Kiwanuka-Tondo, R. C. Kochersberger, L. V. Kochtcheeva, R. S. Moog, M. T. Nance, T. V. Reid, M. J. Struett, J. M. Wallace, S. T. Warren, S. B. Wiley; **Emeritus Associate Professors:** L. D. Gustke, R. C. Kochersberger, R. J. Thomson; **Assistant Professors:** J. Liao, R. J. Reardon; **Teaching Assistant Professors:** T. A. Appling, J. P. Crane-Seeber, D. Mitin, A. G. Solari

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 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. The program has an excellent internship program that contributes to job placement upon graduation.

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 - Research Methods
3. Individualized specialization (12-15 hours). The specialization may be in a geographical region (e.g., Latin America, Middle East), an international topic (e.g., security, global governance, sustainable development), a professional field (e.g., public administration, non-profit management), or a technical specialty (e.g., Geographic Information System-GIS);
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

[NCSU Graduate Catalog](#)

Landscape Architecture

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture

C. F. Delcambre, Box 7701, 919/513-4320, cfdelcam@ncsu.edu, Landscape Architecture

E. H. Bressler, Box 7701, 919/515-8342, gene_bressler@ncsu.edu, Landscape Architecture

Professors: R. F. Abrams, E. H. Bressler, D. B. Hill, R. C. Moore, A. R. Rice; **Professors of the Practice:** P. K. Kjaer;

Emeritus Professors: A. R. Abbate, H. A. Devine, M. J. Malecha, R. R. Wilkinson; **Associate Professors:** K. M.

Boone, A. A. Fox, F. H. Magallanes, T. H. Shear, J. T. Sherk; **Research Associate Professors:** N. G. Cosco; **Assistant**

Professors: C. Pasalar; **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.

[NCSU Graduate Catalog](#)

Leadership and Volunteer Management (Certificate)

Director of Graduate Certificate Programs:

Kimberly Allen
Agricultural & Human Sciences
Phone:
Email: kiallen@ncsu.edu

The Youth, Family, and Community Sciences (YFCS) academic program at North Carolina State University offers three graduate distance education programs designed to prepare and strengthen the careers of those who work with youth and/or families in community-based settings.

The Youth, Family, and Community Sciences online Graduate Certificate in ***Leadership and Volunteer Management*** specifically prepares students to work as leaders in community-based organizations. Students gain a more comprehensive understanding of organizational leadership, as well as an applied understanding of effective management skills. The certificate is intended to enhance a student's work in organizational administration and/or volunteer management including volunteer recruitment, retention, risk management, and recognition.

Admissions: Students apply online at <http://www.ncsu.edu/grad/applygrad.htm>

Requirements: A Graduate Certificate in Leadership and Volunteer Management requires a total of 12 credit hours. Six (6) credit hours are required courses, with the remaining six (6) credit hours of electives. All courses are offered online only.

Required Courses (6 credit hours)

YFCS 550 Youth and Family Professionals as Leaders
YFCS 557 Volunteerism in Youth and Family Settings

Electives (6 credit hours)

Approved YFCS course related to organizational administration
Approved YFCS course related to student's career interests

[NCSU Graduate Catalog](#)

Learning and Teaching in STEM

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Learning and Teaching in STEM | Y | | | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

A. Clark, Box 7801, 919/515-1771, aclark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education

Named Distinguished University Professors: J. Confrey; **Professors:** A. Clark, M. J. Fleener, K. F. Hollebrands, M. G. Jones, H. S. Lee, L. V. Stiff, K. C. Trundle, E. N. Wiebe; **Associate Professors:** M. R. Blanchard, S. J. Carrier, K. A. Keene, A. W. McCulloch, S. Park; **Assistant Professors:** C. Delgado, C. D. Denson; **Adjunct Assistant Professors:** P. P. Carpenter; **Teaching Assistant Professors:** T. B. Baldwin, C. P. Edgington, P. M. Shumaker Jeffrey

The Department of Science, Technology, Engineering and Mathematics (STEM) Education offers graduate programs that lead to the degrees of Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Science (MS), Master of Education (MEd), and Master of Arts in Teaching (MAT). We prepare educators and researchers for positions as teachers, leaders, and 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 academic discipline areas including: biological sciences, chemistry, computer science, earth science, engineering, graphic arts, interdisciplinary science, mathematics, physics, or statistics.

A master's program is offered that leads to initial teaching licensure. Master's programs are also offered leading to North Carolina M-licensure as a teacher of mathematics, science, or technology at grades 6-9 and/or 9-12. Programs are also available for those seeking advanced graduate-level certification as a teacher. Finally, students may choose a program to prepare for teaching careers in post-secondary education.

Doctoral students are knowledge-seekers and who are eager to pursue educational problems and develop critical thinking skills in a collaborative environment. The programs prepare individuals for positions in their fields of study 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.A.T., M.Ed., M.S., 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 of Arts in Teaching requires 33 hours. Other 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 Learning and Teaching in STEM requires a minimum of 50 semester hours of course work and 9 semester hours of dissertation research beyond the Master's Degree requirements. There are three program

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areas of study (PAS). The PAS in Mathematics and Statistics Education requires 56-62 hours beyond the masters degree, including 9 hours of dissertation research. There is a PAS in Science Education..... The PAS in Technology Education.....

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.

[NCSU Graduate Catalog](#)

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:

M. D. Garval, Box 8106, 919/260-1768, garval@ncsu.edu, Foreign Languages and Literatures

Distinguished Professors: A. H. Harrison; ***Professors:*** J. P. Braden, G. L. Comstock, M. D. Garval, J. K. Jameson, D. M. Marchi, S. C. Nassar-McMillan, J. A. Pasten, R. P. Patterson, R. W. Slatta, K. S. Vincent, C. A. Warren, R. A. Waschka; ***Clinical Professors:*** B. L. Sherman; ***Emeritus Professors:*** C. K. Coe, D. H. Crumbley, M. L. Krotee, J. S. Lapp, L. H. MacKethan, C. R. Miller, M. H. Thuente; ***Associate Professors:*** K. I. Allen, A. O. Behnke, A. B. Bigelow, C. C. Brookins, J. R. Brunet, J. M. Casper, A. A. de Souza e Silva, S. L. Desmarais, M. B. Edwards, S. E. Garrigan, N. M. Haenn, J. Kiwanuka-Tondo, R. S. Moog, D. M. Rieder, S. R. Stein, J. M. Wallace, S. T. Warren; ***Emeritus Associate Professors:*** P. F. Bitting, R. E. Peterson, M. L. Vasu; ***Assistant Professors:*** C. D. Denson, J. Kertesz; ***Teaching Professors:*** G. D. Beckman, J. C. Kramer; ***Teaching Associate Professors:*** K. A. Bush, D. S. Murray; ***Teaching Assistant Professors:*** A. E. Arnold; ***Lecturers:*** A. E. Arnold

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 Liberal Studies course information.

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

E. L. Leithold, Box 8208, 919/515-7282, leithold@ncsu.edu, Marine, Earth and Atmospheric Sciences

V. P. Aneja, Box 8208, 919/515-7808, viney_aneja@ncsu.edu, Marine, Earth and Atmospheric Sciences

Named Distinguished Professors: J. M. Burkholder; **Professors:** V. P. Aneja, D. J. DeMaster, D. B. Eggleston, R. V. Fodor, D. P. Genereux, P. J. Harries, R. He, G. M. Lackmann, E. L. Leithold, J. F. Levine, D. A. McConnell, N. Meskhidze, H. Mitsova, M. D. Parker, W. A. Robinson, M. H. Schweitzer, F. H. Semazzi, W. J. Showers, M. K. Stoskopf, L. Xie, S. E. Yuter, Y. Zhang; **Research Professors:** O. B. Brown, T. S. Hopkins, K. E. Kunkel, S. Rebach, T. G. Wolcott; **Adjunct Professors:** J. J. Bates, N. E. Blair, S. W. Chang, T. F. Clark, B. A. Colle, W. J. Cooper, R. P. Dziak, D. R. Easterling, P. Hamilton, A. F. Hanna, R. S. Harmon, D. E. Kingsmill, S. E. Koch, E. H. Koster, S. K. Leduc, J. M. Morrison, S. T. Rao, R. Rotunno, C. R. Smith, S. Yu, C. L. Ziegler; **Emeritus Professors:** S. S. Arya, H. S. Brown, V. V. Cavaroc, B. J. Copeland, J. M. Davis, J. C. Fountain, J. P. Hibbard, G. S. Janowitz, D. Kamykowski, L. J. Langfelder, L. J. Pietrafesa, S. Raman, P. Shaw, C. W. Welby, E. A. Wheeler, T. G. Wolcott; **Associate Professors:** A. Aiyer, D. R. Bohnenstiehl, J. Liu, C. L. Osburn, M. D. Petters, A. Schnetzer, K. W. Wegmann; **Research Associate Professors:** C. J. Thomas, D. L. Wolcott; **Adjunct Associate Professors:** G. B. Avery, S. Basu, M. A. Baxter, R. X. Black, R. P. Boyles, S. A. Braun, S. Bulusu, D. H. Doctor, B. S. Ferrier, J. C. Gosse, C. D. Harrington, Y. Hu, C. Jang, C. E. Konrad, B. Kosovic, J. J. Luczkovich, K. S. McNeal, R. D. Nair, C. Nelson, J. C. Reid, J. Rudek, J. C. Warner, S. N. White, R. W. Wiener; **Emeritus Associate Professors:** A. J. Riordan, E. F. Stoddard, D. L. Wolcott; **Assistant Professors:** S. P. Bishop, P. K. Byrne, E. L. Hestir, E. G. Hyland, R. W. Paerl; **Research Assistant Professors:** K. Wang; **Emeritus Research Professors:** D. A. Russell; **Adjunct Assistant Professors:** G. W. Bell, P. W. Belmont, J. H. Bowden, M. Brennan, A. G. Carlton, J. J. Charney, D. R. Corbett, P. W. Curley, J. M. Dahl, S. H. Ensign, B. J. Etherton, S. Gasso, N. S. Hall, A. L. Holder, G. J. Kirkpatrick, A. J. Lewitus, J. Lin, B. Liu, H. Liu, K. M. Mahoney, J. E. McNinch, D. B. Mechem, D. S. Niyogi, S. B. Phillips, B. J. Puckett, R. E. Reed, P. A. Roelle, B. Schaeffer, C. J. Schreck, G. A. Sinclair, R. C. Tacker, Q. Tong; **Teaching Assistant Professors:** L. Falk; **Lecturers:** B. K. Eder, J. T. Walker

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. 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.

[NCSU Graduate Catalog](#)

Marketing (Certificate)

Directors of Graduate Certificate Programs:

Steven Allen

MBA Program-Poole COM

Phone: 919/515-5584

Email: steve_allen@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/marketing>

Jonathan Bohlmann

Business Management-Poole COM

Phone:

Email: jon_bohlmann@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/marketing>

The Graduate Certificate in Marketing is a one to two year program that is designed for graduate students at NC State as well as working professionals in the Research Triangle community. They will obtain advanced skills in consumer behavior, marketing research, product management and innovation, and relationship management.

Admission requirements: Graduate students at NC State must be in good standing and must submit an application to the certificate program that will be reviewed and approved by the coordinator. Students not attending NC State must have completed a baccalaureate degree. A minimum GPA of 3.0 in undergraduate and graduate work combined 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 560 and earn a grade of B (3.0) or better.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

E. C. Dickey, Box 7907, ecdickey@ncsu.edu, Materials Science and Engineering

Named Professors: S. A. Bedair, G. N. Parsons, J. Schwartz, Y. T. Zhu; **Named Distinguished Professors:** D. W. Brenner, C. C. Koch, J. Narayan, Z. Sitar; **Distinguished Professors:** J. J. Cuomo, J. Genzer, O. A. Harrysson, F. So, R. J. Spontak; **Distinguished University Professors:** D. E. Aspnes; **Professors:** H. Ade, C. M. Balik, E. C. Dickey, N. A. El-Masry, R. E. Gorga, A. Ivanisevic, J. L. Jones, J. Krim, T. H. LaBean, H. H. Lamb, J. Maria, K. L. Murty, R. J. Narayan, R. O. Scattergood, J. S. Strenkowski, Y. G. Yingling, X. Zhang, Y. Zhu; **Research Professors:** M. A. Johnson, T. M. Paskova, P. E. Russell; **Adjunct Professors:** E. G. Lobo-Polefka, T. M. Paskova, J. T. Prater, T. Shen, F. Shimura; **Emeritus Named Professors:** R. F. Davis; **Emeritus Professors:** K. J. Bachmann, J. A. Bailey, H. Conrad, K. S. Havner, K. L. Moazed, H. Palmour; **Associate Professors:** L. Cao, R. R. Collazo, D. L. Irving, J. S. Jur, J. Kasichainula, J. M. LeBeau, J. B. Tracy, D. Vashae; **Research Associate Professors:** D. P. Griffis; **Adjunct Associate Professors:** A. Karoui, V. Zhirnov; **Emeritus Associate Professors:** J. V. Hamme; **Assistant Professors:** V. Augustyn, F. L. Hunte, S. Patala; **Adjunct Assistant Professors:** S. N. Mathaudhu; **Teaching Professors:** C. L. Reynolds Jr; **Teaching Associate Professors:** C. P. Cass

Materials enable 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.

The M.S. and Ph.D. programs are research-based degree programs focusing on faculty-mentored, state-of-the-art materials research that leads to a thesis or dissertation.

The Master of Materials Science and Engineering is a non-thesis degree program designed for students from a variety of technical backgrounds interested in furthering their understanding of materials processing, characterization and properties. This program is appropriate for distance-education Masters students.

The Master of Nanoengineering is a multidisciplinary non-thesis degree program designed so students can declare a concentration in one of the following three areas: (1) Materials Science in Nanoengineering; (2) Nanoelectronics and Nanophotonics; or (3) Biomedical Sciences in Nanoengineering. This program is appropriate for distance-education Masters students.

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 Science degree (M.S.) requires 30 credit hours of coursework/research and a research thesis. The Master of Materials Science and Engineering degree (M.M.S.E.) requires 30 credit hours of coursework only. The Master of Nanoengineering (M.NAE.) requires 30 credit hours of coursework only.

Doctoral Degree Requirements: The doctoral degree (Ph.D.) requires 72 credit hours of coursework/research, a

Student Financial Support: Students in the M.S. and Ph.D. graduate programs 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.

[NCSU Graduate Catalog](#)

Mathematics Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---------------------------------------|-------|-------|------|------|-----------|-------|-----|
| Mathematics Education | | | Y | | | Y | |

GRADUATE FACULTY

Director of Graduate Programs:

A. Clark, Box 7801, 919/515-1771, aclark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education

Named Distinguished University Professors: J. Confrey; **Professors:** S. B. Berenson, A. Clark, M. J. Fleener, K. F. Hollebrands, M. G. Jones, H. S. Lee, L. V. Stiff, P. Sztajn, E. N. Wiebe; **Emeritus Professors:** N. D. Anderson, J. R. Kolb; **Associate Professors:** M. R. Blanchard, K. A. Keene, A. W. McCulloch, T. A. Walkowiak; **Emeritus Associate Professors:** G. S. Carter, V. W. DeLuca, R. E. Peterson, W. M. Waters, L. W. Watson, R. E. Wenig, J. H. Wheatley; **Assistant Professors:** C. D. Denson; **Adjunct Assistant Professors:** P. P. Carpenter; **Emeritus Assistant Professors:** J. L. Crow, W. J. VanDerWall; **Teaching Assistant Professors:** C. P. Edgington, B. Matthews, A. Y. Scales

The Department of Science, Technology, Engineering and Mathematics (STEM) Education offers graduate programs that lead to the degrees of Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Science (MS), Master of Education (MEd), and Master of Arts in Teaching (MAT). We prepare educators and researchers for positions as teachers, leaders, and 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 academic discipline areas including: biological sciences, chemistry, computer science, earth science, engineering, graphic arts, interdisciplinary science, mathematics, physics, or statistics.

A master's program is offered that leads to initial teaching licensure. Master's programs are also offered leading to North Carolina M-licensure as a teacher of mathematics, science, or technology at grades 6-9 and/or 9-12. Programs are also available for those seeking advanced graduate-level certification as a teacher. Finally, students may choose a program to prepare for teaching careers in post-secondary education.

Doctoral students are knowledge-seekers and who are eager to pursue educational problems and develop critical thinking skills in a collaborative environment. The programs prepare individuals for positions in their fields of study 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.A.T., M.Ed., M.S., 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 of Arts in Teaching requires 33 hours. Other 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 Learning and Teaching in STEM requires a minimum of 50 semester hours of course work and 9 semester hours of dissertation research beyond the Master's Degree requirements. There are three program areas of study (PAS). The PAS in Mathematics and Statistics Education requires 56-62 hours beyond the masters degree, including 9 hours of dissertation research. There is a PAS in Science Education..... The PAS in Technology Education.....

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.

[NCSU Graduate Catalog](#)

Mathematics (Certificate)***Director of Graduate Certificate Programs:***

Pierre Gremaud

Mathematics

Phone: 919/515-3085

Email: gremaud@ncsu.eduWebsite: <http://www.math.ncsu.edu/index.php>

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.

[NCSU Graduate Catalog](#)

Mathematics

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

P. A. Gremaud, Box 8205, 919/515-3085, gremaud@ncsu.edu, Mathematics

Named Professors: C. T. Kelley; **Named Distinguished University Professors:** H. T. Banks; **Professors:** J. D. Brown, S. L. Campbell, A. E. Chertock, M. T. Chu, L. Chung, J. D. Cohen, P. L. Combettes, R. O. Fulp, P. A. Gremaud, M. Haider, R. E. Hartwig, A. G. Helminck, P. L. Hersh, K. F. Hollebrands, H. Hong, I. Ipsen, K. Ito, N. Jing, E. L. Kaltofen, A. Kheyfets, Z. Li, X. Lin, A. L. Lloyd, S. R. Lubkin, R. H. Martin, N. G. Medhin, C. Meyer, K. C. Misra, M. Olufsen, M. Paesler, M. S. Putcha, J. Rodriguez, M. Shearer, J. W. Silverstein, M. F. Singer, R. C. Smith, E. L. Stitzinger, S. M. Sullivant, H. T. Tran, S. V. Tsynkov, D. V. Zenkov; **Adjunct Professors:** J. T. Betts, O. J. Eslinger, M. V. Evans, S. P. Hamilton, C. L. Hughes, R. L. Ives, V. E. Manukian, J. T. Ottesen, R. P. Pawlowski, P. M. Schlosser, C. S. Woodward; **Emeritus Professors:** J. W. Bishir, R. E. Chandler, E. N. Chukwu, J. C. Dunn, J. E. Franke, R. O. Fulp, J. A. Marlin, C. V. Pao, J. F. Selgrade; **Emeritus Distinguished University Professors:** R. A. Struble; **Associate Professors:** B. N. Bakalov, L. V. Bociu, S. Ghoshal, M. J. Kang, I. A. Kogan, L. K. Norris, T. Pang, S. Paur, N. P. Reading, J. S. Scroggs, A. Szanto; **Adjunct Associate Professors:** R. W. Ellson; **Emeritus Associate Professors:** G. D. Faulkner, D. E. Garoutte, L. B. Page, R. Silber, D. F. Ullrich; **Assistant Professors:** A. Alexanderian, K. B. Flores, R. Ke, T. Lidman, R. I. Liu, T. Nguyen, D. Papp, A. Saibaba, R. Sazdanovic, C. L. Vinzant; **Adjunct Assistant Professors:** K. S. Berenhaut, S. Bhattacharya, W. Chen, P. Drineas, J. D. Hauenstein, S. E. Howington, D. A. Knoll, A. Mahdi, J. L. Matthews, A. Mokhtari, V. Novak; **Emeritus Assistant Professors:** D. J. Hansen; **Teaching Associate Professors:** A. N. Duca, M. A. Fenn, J. R. Griggs; **Teaching Assistant Professors:** A. A. Cooper, B. L. Maultsby; **Lecturers:** R. E. Chandler, R. W. Ellson, J. E. Franke, R. O. Fulp

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. Joint research endeavors with industrial and governmental partners are facilitated and encouraged. The Department of Mathematics also offers a Certificate.

Admissions Requirements: Applicants for admission should have an undergraduate or Master's degree in mathematics or 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. GRE general scores are required. 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 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.

[NCSU Graduate Catalog](#)

Mechanical Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

P. I. Ro, Box 7910, 919/515-5235, paul_ro@ncsu.edu, Mechanical and Aerospace Engineering

Named Professors: R. D. Gould, F. Yuan, Y. T. Zhu, M. A. Zikry; **Named Distinguished University Professors:** T. A. Dow; **Distinguished Professors:** O. A. Harrysson; **Professors:** G. D. Buckner, T. Echekki, J. R. Edwards, T. Fang, A. Gopalarathnam, E. Grant, H. A. Hassan, X. Jiang, R. F. Keltie, C. Kleinstreuer, A. V. Kuznetsov, J. W. Leach, H. Luo, K. M. Lyons, G. Ngaile, K. J. Peters, A. Rabiei, P. I. Ro, R. O. Scattergood, L. M. Silverberg, J. S. Strenkowski, J. F. Tu, F. Wu, Y. Zhu; **Adjunct Professors:** C. S. Kim, W. Linak, W. L. Roberts; **Emeritus Named Professors:** C. F. Zorowski; **Emeritus Professors:** J. A. Bailey, F. J. Hale, F. D. Hart, T. H. Hodgson, R. R. Johnson, D. S. McRae, J. C. Mulligan, R. T. Nagel, L. H. Royster, F. Y. Sorrell; **Associate Professors:** M. A. Boles, C. Chang, J. W. Eischen, S. M. Ferguson, C. E. Hall, H. Huang, Y. Jing, A. P. Mazzoleni, B. T. O'Connor, K. Saul, A. V. Saveliev; **Assistant Professors:** M. Bryant, K. Granlund, J. Liu, M. Muller, V. Narayanaswamy, M. R. Pankow, P. K. Subbareddy; **Research Assistant Professors:** S. D. Terry; **Adjunct Assistant Professors:** J. A. Cooke; **Teaching Associate Professors:** C. M. Tran; **Teaching Assistant Professors:** S. E. Hollar

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 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 21 hours of course credit and nine 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 72 hours of credit are required to obtain the Ph.D. degree. 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.

[NCSU Graduate Catalog](#)

Medical Devices (Certificate)

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 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, two related business courses, and participation in ten clinical seminars.

For more information, see the [Certificate's website](#) or contact the Director.

[NCSU Graduate Catalog](#)

Microbial Biotechnology

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Microbial Biotechnology | | | | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

E. S. Miller, Box 7615, 919/513-1368, eric_miller@ncsu.edu, Plant and Microbial Biology

Professors: M. Hyman, E. S. Miller; **Adjunct Professors:** D. van der Lelie; **Associate Professors:** S. B. Carson, P. T. Hamilton; **Teaching Associate Professors:** S. B. Carson

The Master of Microbial Biotechnology Program (MMB) is recognized by the [Council of Graduate Schools](#) as a [Professional Science Master's degree](#) (PSM). The MMB degree combines training in Microbiology, Business and Biotechnology. This degree is specifically designed to prepare students for positions in the biotechnology, biopharmaceutical and agrobusiness industries. The program includes courses that involve semester-long interactions with local biotechnology companies as well as foundational courses in microbiology, business management and molecular biology.

Admission Requirements: Applications are invited from individuals holding B.S. or M.S. degrees in the physical and life sciences. Applications should be received before May 1 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 career goals as well as why they are pursuing the MMB degree.

Master's Degree Requirements: The Master of Microbial Biotechnology (MMB) degree requires 40 credit hours, including four semesters involvement in an Industry Case Studies course, as well as a summer industry internship. This program also can be combined with a Master of Business Administration (MBA) offered through the College of Management.

Student Financial Support: A limited number of full-time participants in the Master of Microbial Biotechnology program may be eligible for Teaching Assistantships. The number of TA positions available varies every semester and there are no guaranteed positions. Students in the MMB program should assume that they will self-fund their education.

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

[NCSU Graduate Catalog](#)

Microbiology

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|------------------------------|-------|-------|------|------|-----------|-------|-----|
| Microbiology | Y | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

E. S. Miller, Box 7615, 919/513-1368, eric_miller@ncsu.edu, Plant and Microbial Biology

Named Professors: R. R. Dunn, A. M. Grunden, L. Jaykus, R. M. Kelly; **Professors:** P. Arasu, D. T. Brown, J. W. Brown, M. S. Chinn, M. A. Cubeta, F. De Los Reyes, M. C. Flickinger, F. J. Fuller, H. M. Hassan, S. Hu, M. Hyman, S. Kathariou, S. M. Laster, H. Liu, J. M. Mackenzie, C. C. Melander, E. S. Miller, I. T. Petty, B. Sherry; **USDA Professors:** F. Breidt; **Adjunct Professors:** D. van der Lelie; **Emeritus Named Professors:** T. R. Klaenhammer; **Emeritus Professors:** W. J. Dobrogosz, G. H. Elkan, W. E. Kloos, G. Luginbuhl, P. E. Orndorff, L. W. Parks, J. C. Shih; **Associate Professors:** R. Barrangou, C. Beisel, J. M. Bruno-Barcelona, S. B. Carson, R. A. Ghiladi, P. T. Hamilton, M. E. Jacob, M. D. Koci, C. Lanzas, J. W. Olson, F. Scholle, M. L. Sikes, S. Thakur, G. J. Williams, J. A. Yoder; **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. R. Elfenbein, J. E. Fogle, E. Gutierrez Rodriguez, J. G. Pierce, C. M. Theriot; **USDA Assistant Professors:** I. M. Perez Diaz; **Adjunct Assistant Professors:** J. L. Stephenson; **Teaching Associate Professors:** S. B. Carson; **Teaching Assistant Professors:** C. C. Goller

Microbiology is an integral part of the life science and biotechnology disciplines across the North Carolina State University campus. The Microbiology Graduate Program involves research and education in laboratories and departments that form inter-disciplinary teams to address critical, global challenges for science and society. The MGP (<http://harvest.cals.ncsu.edu/microbiology/>) 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 (M.S and Ph.D.) offered by the program 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, bioprocessing and fermentation, biotechnology, virology, immunology and host-pathogen interactions. Research throughout the program is diverse, emphasizing most areas where microbes, viruses and systems biology have relevance to basic science and biotechnology. Research opportunities for students involve many areas of specialization including biofuels, bioremediation, environmental microbiology, antibiotic resistance, extremophiles, bacterial pathogens, probiotics, developmental epigenetics, bacteriophages, inflammation modulation and viral pathogenesis; the list is long and broad. Financial support for study towards Ph.D. and M.S. degrees is limited, but can be available in the form of teaching/research assistantships and competitive fellowships.

The non-research-based Masters of Microbial Biotechnology (MMB) is a Professional Science Masters degree that combines concentrations in Microbiology, Business and Biotechnology. This degree is specifically designed to prepare students for positions in the biotechnology, biopharmaceutical and agrobusiness industries. The 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 degree that is designed for students who want a higher degree in microbiology but 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 extremely limited 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, of which 18 must be graded, a written thesis and at least one semester of laboratory teaching experience. The Master of Microbial Biotechnology (M.M.B.; <http://harvest.cals.ncsu.edu/master-of-microbial-biotechnology/mmb/>) degree requires 40 credit hours and four semesters involvement in an Industry Case Studies course, as well as a summer industry internship. 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 30 credit hours, of which 18 must be graded, but has no requirement for a written thesis or laboratory instruction).

Doctoral Degree Requirements: The Ph.D. program (<http://harvest.cals.ncsu.edu/microbiology/>) is designed for individuals desiring to pursue careers in research and/or teaching. Prospective Ph.D. and M.S. students should become aware of departmental research programs and faculty so that an area of specialization is indicated in the application materials (personal statement). A faculty dissertation advisor and laboratory research program are confirmed at admission or 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 teaching assistance / experience is required. A preliminary examination is held soon after completing the second year of study, and the final examination 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 Microbiology Graduate Program are considered for available assistantships. For highly qualified students, supplemental funds are frequently available. There is limited funding available for international students given the structure of the NC State University Graduate Student Support Plan.

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

[NCSU Graduate Catalog](#)

Molecular Biotechnology (Certificate)***Director of Graduate Certificate Programs:***

Sabrina Robertson

Dept Molecular Biomedical Scie

Phone:

Email: sedought@ncsu.eduWebsite: <http://www.ncsu.edu/biotechnology/>

Training in molecular biotechnology is essential for a wide range of disciplines from microbiology, 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 molecular biology training. NC State 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

BIT Capstone Cloning Project (due two weeks after completing BIT510)

BIOTECHNOLOGY LABORATORY ELECTIVES (4 credits)For the most up to date list of courses please visit the BIT website: <http://biotech.ncsu.edu/courses>

Two of the following courses and their laboratories (2 credits each):

Any BIT 595 laboratory course (2 credits)

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

BIT 577 Metagenomics

BIT 578 Mapping the Brain

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

[NCSU Graduate Catalog](#)

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

Nanobiotechnology (Certificate)

[NCSU Graduate Catalog](#)

Nanoengineering

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---------------------------------|-------|-------|------|------|-----------|-------|-----|
| Nanoengineering | | | | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

C. L. Reynolds Jr, Box 7907, 919/515-7622, lew_reynolds@ncsu.edu, Materials Science and Engineering

Named Professors: J. Schwartz, Y. T. Zhu; ***Named Distinguished Professors:*** D. W. Brenner, C. C. Koch, J. Narayan, Z. Sitar; ***Distinguished Professors:*** J. J. Cuomo, O. A. Harrysson, F. So; ***Professors:*** C. M. Balik, E. C. Dickey, N. A. El-Masry, A. Ivanisevic, J. L. Jones, T. H. LaBean, J. Maria, R. O. Scattergood, Y. G. Yingling, X. Zhang, Y. Zhu; ***Adjunct Professors:*** E. G. Lobo-Polefka; ***Associate Professors:*** L. Cao, R. R. Collazo, D. L. Irving, J. S. Jur, J. Kasichainula, J. M. LeBeau, J. B. Tracy, D. Vashae; ***Assistant Professors:*** V. Augustyn, F. L. Hunte, S. Patala; ***Teaching Professors:*** C. L. Reynolds Jr; ***Teaching Associate Professors:*** C. P. Cass

Information coming soon.

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

[NCSU Graduate Catalog](#)

Nano-Systems Engineering (Certificate)

Director of Graduate Certificate Programs:

Mehmet Ozturk

Electrical & Computer Engr.

Phone: 919/515-5245

Email: mco@ncsu.edu

Website: <http://assist.ncsu.edu/education/graduate/>

[NCSU Graduate Catalog](#)

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:

A. R. Rice, Box 7701, 919/515-8347, art_rice@ncsu.edu, Landscape Architecture
 E. H. Bressler, Box 7701, 919/515-8342, gene_bressler@ncsu.edu, Landscape Architecture
 T. J. Smyth, Box 7620, 919/515-2838, jot_smyth@ncsu.edu, Crop and Soil Sciences
 Y. Leung, Box 7106, 919/513-3489, leung@ncsu.edu, Parks, Recreation and Tourism Management

Named Professors: R. C. Abt; **Named Distinguished Professors:** M. J. Vepraskas; **Professors:** A. Amoozegar, F. W. Cubbage, M. F. Floyd, D. J. Frederick, B. Goldfarb, J. L. Havlin, G. R. Hess, F. Isik, S. Khorram, Y. Leung, R. K. Meentemeyer, S. C. Nelson, E. G. Nichols, M. N. Peterson, J. P. Roise, C. D. Siderelis, E. O. Sills, T. J. Smyth, W. E. Winner; **Adjunct Professors:** T. A. Steelman, J. M. Vose; **Emeritus Professors:** K. A. Henderson, H. J. Kleiss; **Associate Professors:** C. E. Barbieri, G. B. Blank, K. M. Boone, G. L. Brothers, J. A. Delborne, M. B. Edwards, R. E. Emanuel, A. A. Fox, C. Galik, D. W. Hazel, M. V. Katti, F. H. Magallanes, D. B. Morais, E. L. Seekamp, T. H. Shear, C. G. Vick, S. T. Warren; **Emeritus Associate Professors:** R. L. Moore; **Assistant Professors:** M. L. Ardon Sayao, R. L. Cook, B. B. Cutts, J. A. Forrester, L. R. Larson, Z. H. Leggett, K. Martin, L. Rivers, K. T. Stevenson; **Research Assistant Professors:** L. G. Tateosian; **Adjunct Assistant Professors:** M. L. Addor, J. W. Smith; **Extension Professors:** M. A. Megalos

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 geographic 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

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

[NCSU Graduate Catalog](#)

Nonprofit Management (Certificate)

Director of Graduate Certificate Programs:

Richard Clerkin

Institute for Nonprofits

Phone: 919/513-7031

Email: rmclerki@ncsu.edu

Website: http://spia.ncsu.edu/pa/prospective-students/graduate_certificates/nonprofit.html

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 and substantive nonprofit experience. 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 https://spia.ncsu.edu/graduate/nonprofit_cert.php.

[NCSU Graduate Catalog](#)

Nonwovens Science and Technology (Certificate)

Director of Graduate Certificate Programs:

Behnam Pourdeyhimi
College Of Textiles-dean's Off
Phone:
Email: bpourdey@ncsu.edu
Website:

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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

K. L. Murty, Box 7909, 919/515-3657, murty@ncsu.edu, Nuclear Engineering

Distinguished Professors: Y. Y. Azmy, D. Kropaczek; **Distinguished University Professors:** J. G. Gilligan; **Professors:** B. Bhattacharyya, M. A. Bourham, N. T. Dinh, J. M. Doster, R. P. Gardner, A. Gupta, T. Hassan, A. I. Hawari, K. N. Ivanov, K. L. Murty, P. J. Turinsky; **Research Professors:** B. W. Wehring; **Adjunct Professors:** S. M. Bragg-Sitton, D. N. McNelis, R. R. Pemper, G. Tryggvason, R. W. Youngblood; **Emeritus Professors:** D. J. Dudziak, V. C. Matzen, K. Verghese; **Associate Professors:** D. Y. Anistratov, M. N. Avramova, I. A. Bolotnov, J. Eapen, R. B. Hayes, D. Kaoumi, J. K. Mattingly, S. C. Shannon; **Adjunct Associate Professors:** H. S. Abdel Khalik, P. A. Hausladen, U. Mertyurek, M. F. Simpson, M. H. Stokely; **Research Assistant Professors:** J. J. Hou; **Adjunct Assistant Professors:** B. R. Grogan, J. Li, I. Meric, S. Schunert, L. G. Worrall

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 analytical, computational and experimental research in the neutronics, materials, thermal-hydraulics and control aspects of fission reactors; radiation detection and measurement of basic physics parameters; nuclear safety and security; applications of radioisotopes and radiation in industry, medicine and science; and plasma science, 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 year of graduate study. GRE scores (general test) are needed for on-campus graduate study.

Master's Degree Requirements: A total of 30 credit hours (at least nine semester hours of interdisciplinary breadth and 21 Nuclear Engineering) is required for both the M.S. and MNE degrees. An engineering project is required for the MNE degree and a formal thesis is required for the M.S. degree.

Doctoral Degree Requirements: A total of 72 credit hours which includes a minor (at least 12 hours) is required. Students must pass a departmental qualifying exam in three core areas of nuclear engineering, and they can (if they so choose and if their advisor approves) prepare for the exam by enrolling during their first year in three corresponding graduate courses comprising radiation fundamentals, reactor engineering, and radiation detection. Students who already earned a masters degree may count some of their credits towards the required PhD hours; consult <grad manual posted online> for details.

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 and fuel vendors, 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 (soon to be uprated to 2MW), ultra cold neutron source, intense low-energy positron 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, Generic PWR simulator and access to extensive computer facilities ranging from workstations to a supercomputer.

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

[NCSU Graduate Catalog](#)

Nuclear Nonproliferation Science and Policy (Certificate)

Director of Graduate Certificate Programs:

John Mattingly

Nuclear Engineering

Phone: 919/515-0224

Email: jkmattin@ncsu.edu

Website: <http://www.cnec.ncsu.edu/opportunities/nuclear-nonproliferation-science-and-policy-graduate-certificate/>

The objective of the program is to educate students about nuclear nonproliferation, safeguards, and security from both the global and the technical perspectives. Students will be exposed to state-of-the-art techniques and will develop an understanding of the technical and policy challenges to maintain and support a robust nuclear nonproliferation regime. This process will be supported by assignments designed to reinforce understanding of the individual subject areas covered, class projects which cover key areas such as proliferation case studies and physical security simulations, as well as interactions with subject matter experts in nuclear nonproliferation technology and policy.

[NCSU Graduate Catalog](#)

Nutrition

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---------------------------|-------|-------|------|------|-----------|-------|-----|
| Nutrition | Y | | Y | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

J. C. Allen, Box 7624, 919/513-2257, jon.allen@ncsu.edu, Food, Bioprocessing, and Nutrition Sciences

L. S. Goodell, Box 7624, lsgoodel@ncsu.edu, Food, Bioprocessing, and Nutrition Sciences

Named Distinguished Professors: J. T. Brake, P. R. Ferket, J. Odle; **Distinguished Professors:** M. Lila; **Professors:** J. C. Allen, K. E. Anderson, S. L. Ash, P. C. Dunn, J. Eisemann, V. Fellner, M. G. Ferruzzi, J. L. Grimes, S. Kathariou, S. W. Kim, J. A. Knopp, J. A. Moore, P. E. Mozdziak, E. O. Oviedo-Rondon, M. H. Poore, P. D. Siciliano, R. C. Smart, E. VanHeugten; **USDA Professors:** V. D. Truong; **Adjunct Professors:** E. A. Koutsos; **Emeritus Professors:** B. P. Alston-Mills, L. W. Aurand, L. C. Boyd, L. S. Bull, E. V. Caruolo, G. L. Catignani, W. J. Croom, J. D. Garlich, W. M. Hagler, R. W. Harvey, W. L. Johnson, J. R. Jones, C. J. Lackey, J. Luginbuhl, J. W. McClelland, R. D. Mochrie, S. J. Schwartz, J. C. Shih, L. W. Whitlow; **Emeritus Distinguished Professors:** H. E. Swaisgood; **Associate Professors:** L. S. Goodell, G. K. Harris, C. D. Kay, M. D. Koci, S. Komarnytsky, C. Maltecca, S. E. Phillips; **Adjunct Associate Professors:** R. J. Harrell, C. R. Stark; **Assistant Professors:** A. Fogleman, M. Iorizzo, K. A. Livingston, C. L. Pickworth, C. D. Stevenson; **USDA Assistant Professors:** O. T. Toomer; **Adjunct Assistant Professors:** S. Sang; **Teaching Associate Professors:** C. V. Jordan; **Teaching Assistant Professors:** K. D. Ange-Van Heugten

The Interdepartmental Nutrition Program consists of faculty from four departments: Animal Science; Youth, Family, and Community Sciences; Food, Bioprocessing, and Nutrition Sciences; and the Prestage Department of 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), or community nutrition and public health. Graduates find employment in academia, government, industry, and non-profit organizations, or continue their education in medical and allied health fields.

Admission Requirement: To be considered for admission, a student should have a B.S. or M.S degree in a science-related area, including course work in biology and organic chemistry. 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. Applicants to the Master of Nutrition should indicate their preferences for: on-campus or Distance Education delivery; core science or Professional Science Masters (PSM); and within the PSM, Feed Science or Human Nutrition, Food and Bioprocessing.

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 may be available for M.S. and Ph.D. students 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 and Supply Chain Management (Certificate)

Directors of Graduate Certificate Programs:

Cecil Bozarth

Business Management-Poole COM

Phone: 919/515-4511

Email: cecil_bozarth@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/supply-chain>

Steven Allen

MBA Program-Poole COM

Phone: 919/515-5584

Email: steve_allen@ncsu.edu

Website: <http://poole.ncsu.edu/index-exp.php/business-management/supply-chain>

The Graduate Certificate in Supply Chain Management is a one to two year program that is designed for graduate students at NC State as well as working professionals in the Research Triangle community. They will obtain advanced skills in strategies, processes, planning and control, quality, scheduling, work design, and advanced operations techniques using a variety of managerial and quantitative models.

Admission requirements: Graduate students at NC State must be in good standing and must submit an application to the certificate program what will be reviewed and approved by the coordinator. Students not attending NC State must have completed a baccalaureate degree. A minimum GPA of 3.0 in undergraduate and graduate work combined 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 540 and earn a grade of B (3.0) or better.

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

M. G. Kay, Box 7906, 919/515-2008, kay@ncsu.edu, Industrial Engineering

N. G. Medhin, Box 8205, ngmedhin@ncsu.edu, Mathematics

Named Professors: S. Fang, C. T. Kelley, R. E. King; **Named Distinguished Professors:** R. Uzsoy, Z. Zeng; **Named Distinguished University Professors:** R. B. Handfield, T. J. Hodgson, M. Rappa; **Distinguished Professors:** M. A. Vouk; **Named Distinguished Professor:** M. Liu; **Professors:** J. W. Baugh, B. Bhattacharyya, E. D. Brill, S. L. Campbell, Y. Fathi, R. E. Hartwig, P. L. Hersh, I. Ipsen, K. Ito, J. S. Ivy, J. A. Joines, Z. Li, G. F. List, L. A. Martin, M. E. Mayorga, N. G. Medhin, C. Meyer, A. Nilsson, H. G. Perros, S. Ranjithan, J. P. Roise, G. Rouskas, N. F. Samatova, C. D. Savage, M. P. Singh, R. C. Smith, M. F. Stallmann, W. J. Stewart, H. T. Tran, I. Viniotis, W. Wang, J. R. Wilson, F. Wu, D. V. Zenkov; **Research Professors:** B. L. Edge, D. L. Lubkeman; **Adjunct Professors:** J. T. Betts, M. Devetsikiotis, S. M. Hsiang; **Emeritus Named Professors:** M. W. Suh; **Emeritus Professors:** R. H. Bernhard, J. W. Bishir, J. C. Dunn, H. J. Gold, D. M. Holthausen, D. F. McAllister, K. H. Pollock, J. R. Stone; **Associate Professors:** K. A. Barletta, R. Y. Chirkova, J. F. DeCarolus, S. Ghoshal, M. J. Kang, M. G. Kay, E. Kemahlioglu-Ziya, Y. Liu, N. Lu, T. Pang, T. W. Reiland, J. S. Scroggs, C. E. Smith, D. P. Warsing; **Research Associate Professors:** J. Taheri; **Adjunct Associate Professors:** B. Denton, T. Yu; **Emeritus Associate Professors:** T. L. Honeycutt; **Assistant Professors:** J. J. Adams, O. Y. Ozaltin, D. Papp; **Research Assistant Professors:** A. R. de Queiroz; **Teaching Professors:** H. L. Nuttle

Operations Research (OR) is a graduate program of an interdisciplinary nature, governed by an administrative board and the program committee, and administered through the office of the program director.

Admission Requirements: Applications are accepted from undergraduate majors in all technical disciplines. Applicants should have had at least four math courses beyond calculus (e.g., courses in differential equations, linear algebra, probability and statistics, and mathematical analysis). Knowledge of a computer programming language is recommended, but not required. 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 a minimum of 72 hours of graduate credit beyond the bachelor's degree, including coursework in major and minor areas of concentration together with credit for doctoral research and dissertation preparation. A departmental written qualifying examination is required. For students who have completed a Master's degree from another institution prior to joining the Ph.D. program, a minimum of 54 hours of additional graduate credit are 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 without the consent of their faculty advisor. Students can take other non-cognate courses in their programs of study with the consent of their faculty advisor.

Biomathematics

BMA/MA/ST 771, 772 Biomathematics I & II

Chemical Engineering

CHE 525 Process System Analysis and Control

Civil Engineering

CE 775 Modeling and Analysis of Environmental Systems

Computer Science

CSC 505 Design and Analysis of Algorithms

CSC/MA 580, 780 Numerical Analysis I & II

CSC/ECE 779 Advanced Computer Performance Modeling

Electrical and Computer Engineering

ECE 716 Feedback Control Systems

ECE 521 Computer Design and Technology

Economics

ECG/BUS 750 Economic Decision Theory

ECG/ST 651 Econometrics

ECG/ST 751 Econometric Methods

Industrial and Systems Engineering

ISE 553 Modeling and Analysis of Supply Chains

ISE 711 Capital Investment Economic Analysis

ISE 723 Production Planning, Scheduling, and Inventory Control

ISE 747 Reliability Engineering

ISE 748 Quality Engineering

ISE 754 Logistics Engineering

ISE 861 The Design of Production Systems

Mathematics

MA 523 Linear Transformations and Matrix Theory

MA 540 Uncertainty Quantification for Physical and Biological Models

MA 547 Financial Mathematics

MA 583 Introduction to Parallel Computing

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

MA 587 Numerical Solution of Partial Differential Equations - Finite Element Methods

MA 715 Analysis II

MA 723 Theory of Matrices and Applications

MA 748 Stochastic Differential Equations

MA/ST 778, 779 Measure Theory and Advanced Probability

MA 790 Advanced Special Topics System Optimization - Introduction to Interacting Random Systems

MA 790 Advanced Special Topics System Optimization - Convex Optimization

MA 790 Advanced Special Topics System Optimization - Semidefinite Programming

MA 790 Advanced Special Topics System Optimization - Deterministic and Stochastic Control

ST 515 Experimental Statistics for Engineers I
ST 516 Experimental Statistics for Engineers II
ST 730 Applied Time Series Analysis
ST 785 Introduction to Statistical Decision Theory
ST 782, ST 783 Time Series Analysis I & II

[NCSU Graduate Catalog](#)

Parks, Recreation, and Tourism Management

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Parks, Recreation, Tourism, and Sport Management | Y | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

Y. Leung, Box 7106, 919/513-3489, leung@ncsu.edu, Parks, Recreation and Tourism Management

Professors: J. N. Bocarro, M. F. Floyd, M. A. Kanters, Y. Leung, R. K. Meentemeyer, M. N. Peterson, C. D. Siderelis; **Adjunct Professors:** T. A. Steelman; **Emeritus Professors:** H. A. Devine, K. A. Henderson; **Associate Professors:** A. Attarian, C. E. Barbieri, G. L. Brothers, J. M. Casper, M. B. Edwards, J. A. Hipp, D. B. Morais, E. L. Seekamp, C. G. Vick; **Emeritus Associate Professors:** L. D. Gustke, R. L. Moore; **Assistant Professors:** K. S. Bunds, B. B. Cutts, W. G. Knollenberg, L. R. Larson, K. T. Stevenson, J. Vukomanovic; **Research Assistant Professors:** L. G. Tateosian; **Adjunct Assistant Professors:** S. A. Rich, J. W. Smith; **Teaching Associate Professors:** K. A. Bush, E. K. Lindsay; **Teaching Assistant Professors:** R. W. Wade

The 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 health and well-being, human dimensions of the natural and built environment, sustainable and equitable tourism, and geospatial methods and modelling with a substantive area of study in another discipline.

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. [Several Master's Degree options](#) are available: MS in Parks, Recreation and Tourism Management, MS in Natural Resources-Outdoor Recreation Technical Option, Master of Natural Resources (MNR)-Outdoor Recreation Technical Option (non-thesis), and Online Professional Master of Parks, Recreation, Tourism and Sport Management (MPRTSM) (non-thesis). The Department also co-administers the [Masters of Geospatial Information Science and Technology \(MGIST\) degree](#), and a [Graduate Certificate in Geographic Information Science](#).

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. The MS-NR and MNR (Outdoor Recreation Technical Option) develops the knowledge and skills needed for planning and managing natural resource-based outdoor recreation opportunities and resources. The online MPRTSM degree provides students with a solid professional and business education designed to advance their career development in parks, recreation, tourism, and sport industries. The online degree program operates on a cohort model and admits students in fall and 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.

Master's Degree Requirements: Each Master's Degree has [specific requirements](#). The minimum credit hours range

from 30 for MS in PR/TM Degree, to 34 for MNR-Outdoor Recreation Technical Option Degree. Doctoral and M.S. application deadline is February 15 for both U.S. and international students. MPRTSM application deadline is May 15

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.

[NCSU Graduate Catalog](#)

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.

The Department also administers the [Graduate Minor in Cognitive Science](#).

GRADUATE COURSES

LOGIC

LOG 535 Advanced Logic and Metamathematics

LOG 537 Model Theoretic Semantics

PHILOSOPHY

PHI 501 Kant's Critique of Pure Reason

PHI 520 Global Justice

PHI(PSY) 525 Introduction to Cognitive Science

PHI 540 The Scientific Method

PHI 547 Philosophy, Evolution and Human Nature

PHI 575 Ethical Theory

PHI 598 Special Topics 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

REL 582 Religion and Conflict

Physics

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-------------------------|-------|-------|------|------|-----------|-------|-----|
| Physics | Y | | Y | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

D. E. Aspnes, Box 8202, 919/515-4261, aspnes@ncsu.edu, Physics

Named Professors: J. Bernholc, J. Schwartz; **Named Distinguished Professors:** D. W. Brenner, Z. Sitar; **Distinguished Professors:** F. So; **Distinguished University Professors:** D. E. Aspnes; **Professors:** H. Ade, R. J. Beichner, J. M. Blondin, J. D. Brown, M. T. Chu, L. I. Clarke, K. E. Daniels, W. L. Ditto, M. J. Escuti, R. E. Fornes, R. Golub, D. G. Haase, H. D. Hallen, P. R. Huffman, C. R. Ji, K. W. Kim, R. M. Kolbas, H. Krim, J. Krim, D. J. Lee, G. C. McLaughlin, L. Mitas, J. F. Muth, R. J. Nemanich, M. Paesler, M. Pasquinelli, S. P. Reynolds, R. Riehn, C. M. Roland, M. C. Sagui, T. M. Schaefer, J. E. Thomas, K. R. Weninger, Y. G. Yingling, A. R. Young; **Research Professors:** K. Borkowski, C. R. Philbrick, J. E. Rowe, B. A. Sherwood, J. W. York; **Adjunct Professors:** U. Agvaanluvsan, M. Buongiorno-Nardelli, J. L. Hubisz, P. J. Reynolds; **Emeritus Professors:** R. W. Chabay, K. T. Chung, J. W. Cook, S. Cotanch, W. R. Davis, D. C. Ellison, R. E. Fornes, G. L. Hall, K. L. Johnston, G. H. Katzin, F. Lado, G. E. Mitchell, R. R. Patty, P. J. Stiles, D. R. Tilley; **Associate Professors:** L. Cao, D. B. Dougherty, C. Frohlich, K. Gundogdu, D. L. Irving, J. P. Kneller, M. Unsal, H. Wang; **Research Associate Professors:** J. H. Kelley, W. Lu; **Adjunct Associate Professors:** P. E. Garrett, D. Lazzati; **Emeritus Associate Professors:** G. C. Cobb, G. W. Parker; **Assistant Professors:** M. P. Green, F. L. Hunte, A. Kemper, D. P. Kumah, S. Lim, R. L. Longland, D. Sun; **Research Assistant Professors:** J. R. Bochinski, A. G. Dinku; **Adjunct Assistant Professors:** B. R. Conrad; **Teaching Professors:** B. I. Fortner

Research opportunities in theoretical/computational physics are available in astrophysics, biomolecular simulations, chaos, condensed matter, nanoscience/nanomaterials, nuclear/particle physics, and relativity. Research opportunities in experimental physics are available in astronomy, atomic and molecular physics, biophysics, emergent phenomena, materials physics, nanoscale science, nonlinear systems, nuclear and particle physics, optics, physics education research, soft-condensed-matter physics 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, and 785; pass a written qualifier exam, an oral preliminary exam, and an oral final 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 | | |

GRADUATE FACULTY

Director of Graduate Programs:

P. E. Mozdziak, Box 7608, 919/515-5544, paul_mozdziak@ncsu.edu, Poultry Science

Named Professors: W. L. Flowers, H. B. Patisaul; **Named Distinguished Professors:** J. T. Brake, J. Odle, R. Roe; **Professors:** G. W. Almond, K. E. Anderson, C. M. Ashwell, B. L. Black, A. T. Blikslager, R. J. Borski, T. T. Brown, D. C. Dorman, F. W. Edens, K. L. Esbenshade, C. E. Farin, J. E. Gadsby, J. L. Gookin, S. L. Jones, S. W. Kim, H. Liu, K. M. Meurs, P. E. Mozdziak, J. N. Petite, R. M. Petters, P. D. Siciliano, G. W. Smith, S. P. Washburn; **Research Professors:** T. G. Wolcott; **Adjunct Professors:** J. B. Golden, E. A. Koutsos, D. W. Threadgill; **Emeritus Professors:** W. J. Croom, R. M. Grossfeld, H. F. Heatwole, T. E. Levere, J. F. Roberts, M. C. Roberts, T. D. Siopes, H. A. Underwood, T. G. Wolcott; **Associate Professors:** L. B. Borst, B. A. Breuhaus, J. M. Bruno-Barcena, T. Ghashghaei, M. D. Koci, C. Maltecca, M. Niedzlek-Feaver, S. E. Phillips, M. Rodriguez-Puebla, J. A. Yoder; **Research Associate Professors:** H. Gracz; **Adjunct Associate Professors:** A. J. Moeser; **Emeritus Associate Professors:** M. D. Whitacre; **Assistant Professors:** K. A. Livingston, J. E. Meitzen; **Teaching Associate Professors:** J. L. Lubischer, S. Trivedi; **Teaching Assistant Professors:** E. B. Bohorquez

The Physiology Graduate Program is an interdisciplinary and interdepartmental program comprising faculty drawn from across the University. 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, undergraduate courses, letters of recommendation, and the willingness of a member of the Graduate Physiology faculty to serve as the applicant's advisor.

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 to complete. *Master of Physiology Degree:* The non-thesis Master's degree (Master of Physiology) requires a total of 36 credits. The median time to degree completion is 1.75 years or less.

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 for thesis-based students only.

Other Relevant Information: 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.

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

R. L. Blanton, Box 7612, 919/513-2181, larry_blanton@ncsu.edu, Plant and Microbial Biology

Named Professors: J. M. Alonso, R. E. Dewey, A. M. Grunden, J. B. Ristaino, T. W. Rufty; **Named Distinguished Professors:** R. S. Boston, J. M. Burkholder, M. E. Daub, L. K. Hanley-Bowdoin; **Distinguished University Professors:** W. F. Thompson; **Professors:** R. L. Blanton, R. G. Franks, C. H. Haigler, W. A. Hoffmann, S. Hu, J. E. Mickle, R. Qu, H. A. Sederoff, T. R. Wentworth, R. W. Whetten, Q. Xiang, D. Xie; **Research Professors:** I. Y. Perera; **USDA Professors:** K. O. Burkey; **Adjunct Professors:** C. S. Brown; **Emeritus Named Professors:** W. F. Boss; **Emeritus Professors:** N. S. Allen, U. Blum, E. Davies, R. C. Fites, J. W. Hardin, J. M. Stucky, J. F. Thomas, C. G. VanDyke; **Associate Professors:** S. B. Carson, S. Komarnytsky, A. Krings, X. Li, T. A. Long, M. Pierce; **Emeritus USDA Professors:** W. W. Heck; **Assistant Professors:** C. J. Doherty, T. Hsieh, R. Sozzani, A. N. Stepanova; **Research Assistant Professors:** C. H. Saravitz; **Teaching Associate Professors:** S. B. Carson, C. V. Jordan; **Teaching Assistant Professors:** J. M. De Gezelle

Course offerings or research facilities are available in the following areas: plant cell biology, cellular imaging, cellulose biology, cellular signaling, plant development, plant hormones, epigenetics, plant systems biology, plant genetic engineering, transgene regulation and silencing, stress biology, chemical genomics, plant gravitational genomics, phytochemistry, metabolic engineering, plant-microbe interactions, aquatic ecology, toxic dinoflagellates, endangered species, plant community ecology, physiological ecology, tropical ecology, evolutionary ecology, paleobotany, plant systematics, evolution of flowering plants, and ethnobotany.

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.

Click on [NCSU Graduate Catalog \(2017-2018\)](#) for current course information.

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[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

C. H. Opperman, Box 7616, 919/515-6699, warthog@ncsu.edu, Entomology and Plant Pathology

Named Professors: D. M. Bird, T. A. Melton, J. B. Ristaino, H. D. Shew; **Named Distinguished Professors:** R. S. Boston, M. E. Daub, E. L. Davis, R. A. Dean, L. K. Hanley-Bowdoin, G. G. Kennedy, S. Lommel, G. A. Payne; **Professors:** D. M. Benson, I. Carbone, M. A. Cubeta, S. Franzen, H. M. Hassan, C. L. Hemenway, S. Hu, F. J. Louws, C. H. Opperman, C. H. Peacock, D. F. Ritchie, R. C. Rufty, J. Tzeng; **USDA Professors:** J. B. Holland, D. S. Marshall; **Visiting Professors:** C. S. Hodges; **Adjunct Professors:** B. K. Clarke, M. R. Schwarz, S. R. Shafer, L. P. Tredway; **Emeritus Named Professors:** N. T. Powell; **Emeritus Professors:** C. W. Averre, D. F. Bateman, M. K. Beute, E. B. Cowling, G. V. Gooding, W. M. Hagler, J. S. Huang, R. K. Jones, L. T. Lucas, C. E. Main, R. D. Milholland, J. W. Moyer, P. B. Shoemaker, T. B. Sutton, H. H. Triantaphyllou, C. G. VanDyke, J. C. Wells; **Associate Professors:** J. P. Kerns, A. L. Mila, P. Ojiambo; **USDA Associate Professors:** P. J. Balint-Kurti, C. Cowger, R. G. Upchurch; **Emeritus USDA Professors:** H. W. Spurr; **Emeritus Research Associate Professors:** S. R. Koenning; **Assistant Professors:** L. M. Quesada; **Research Assistant Professors:** B. B. Shew; **Adjunct Assistant Professors:** T. L. Harp, T. L. Sit, W. Ye; **Extension Assistant Professors:** S. M. Villani

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.

[NCSU Graduate Catalog](#)

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.

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

Director of Graduate Programs:

J. L. Grimes, Box 7608, 919/515-5406, jesse_grimes@ncsu.edu, Poultry Science

Named Distinguished Professors: J. T. Brake, P. R. Ferket; **Professors:** K. E. Anderson, C. M. Ashwell, D. K. Carver, P. A. Curtis, F. W. Edens, J. L. Grimes, H. M. Hassan, P. E. Mozdziak, E. O. Oviedo-Rondon, J. N. Petitte, D. P. Wages; **Adjunct Professors:** M. Choct, J. B. Golden, J. K. Northcutt, W. B. Roush, S. M. Shane, Z. Uni; **Emeritus Professors:** T. A. Carter, V. L. Christensen, W. J. Croom, J. D. Garlich, E. W. Glazener, W. M. Hagler, G. B. Havenstein, C. R. Parkhurst, B. W. Sheldon, J. C. Shih, T. D. Siopes, C. M. Williams; **Associate Professors:** R. B. Beckstead, M. T. Knauer, M. D. Koci; **Adjunct Associate Professors:** C. R. Stark; **Assistant Professors:** A. C. Fahrenholz, K. A. Livingston; **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.

Professional Communication and Managerial Skills (Certificate)

Director of Graduate Certificate Programs:

Melissa Johnson

Communication

Phone: 919/515-9757

Email: melissa_johnson@ncsu.edu

Website: <http://pcms.ncsu.edu/>

This online certificate program is designed to provide graduate students and professionals with a common platform of courses that will enhance their communication skills and professional development. In particular, professional science master's program students in the program will gain the management and communication training that will allow them to transfer success in the laboratory to success in the marketplace.

Admission Requirements: Students not attending NC State must apply through the regular application process (see <http://www.ncsu.edu/grad/applygrad.htm>). Proof of completion of a bachelor's degree is necessary. A minimum undergraduate GPA of 3.0 is generally required for admission to the certificate program. However, 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, see the program web site at <http://pcms.ncsu.edu/>.

Student Financial Support: See NC State's Office of Scholarships and Financial Aid at http://www7.acs.ncsu.edu/financial_aid/.

Other Relevant Information: The interdisciplinary certificate requires a total of 12 credit hours, with 6 hours taken in the Poole College of Management and 6 hours taken in the College of Humanities and Social Sciences. Two required classes are BUS 590 (Management Foundations) and MBA 554 (Project Management). Two of the three following classes should also be taken: COM 521 (Communication and Globalization), COM 527 (Seminar in Organizational Conflict Management), or COM 530 (Interpersonal Communication in Science/Technology Organizations). To earn the certificate students must achieve a minimum 3.0 GPA in the program.

[NCSU Graduate Catalog](#)

Psychology

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|----------------------------|-------|-------|------|------|-----------|-------|-----|
| Psychology | Y | | Y | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

M. B. Wyer, Box 7650, mary_wyer@ncsu.edu, Psychology

Professors: R. Azevedo, L. E. Baker-Ward, J. P. Braden, L. L. Foster, D. J. Gillan, D. O. Gray, A. g. Halberstadt, M. E. Haskett, T. M. Hess, D. B. Kaber, C. B. Mayhorn, A. W. Meade, R. W. Nacoste, K. E. Stewart, E. N. Wiebe; **Adjunct Professors:** A. D. Hall, M. G. Sanders, W. Schlenger, W. M. Wechsberg; **Emeritus Professors:** J. W. Cunningham, K. B. DeBord, D. W. Drewes, W. P. Erchul, J. W. Kalat, T. E. Levere, J. E. Luginbuhl, D. W. Martin, D. H. Mershon, J. J. Michael, A. C. Schulte, P. W. Thayer, M. S. Wogalter; **Associate Professors:** J. C. Allaire, J. C. Begeny, C. C. Brookins, J. L. Burnette, S. B. Craig, S. L. Desmarais, D. Gruehn, A. C. McLaughlin, B. S. Mehlenbacher, C. S. Nam, S. D. Neupert, S. B. Pond, S. A. Stage, M. A. Wilson, M. B. Wyer; **Adjunct Associate Professors:** J. W. Fleenor; **Emeritus Associate Professors:** R. E. Mitchell; **Assistant Professors:** J. Feng, E. Hope, E. Kim, K. Norwalk, L. M. Widman; **Teaching Assistant Professors:** H. M. Njie, J. M. Simons-Rudolph

The Department of Psychology offers five courses of study (concentrations) leading to the Ph.D.: applied social and community psychology, human factors and applied cognition, industrial-organizational psychology, lifespan developmental psychology, and school psychology. An additional master's degree program is available for school psychology.

Admission Requirements: With the exception of the school psychology master's degree program, admitted students enter doctoral training programs. Applicants must be graduates of accredited institutions. Although a degree in psychology is not required, applicants must demonstrate that their academic backgrounds have prepared them for doctoral training in their specialty area. A strong academic record, competitive scores on the GRE (General Test) and three satisfactory letters of recommendation are required for admission. Research experience is important. Match of applicants' research interests with current faculty research is an important consideration. See <https://psychology.chass.ncsu.edu/graduate/apply.php> for additional information.

Master's Degree Requirements: The department offers the master's degree in school psychology; students in the other concentrations are admitted only to the doctoral program. Students completing the school psychology master's program are eligible for licensure as public school psychologists in North Carolina. The program requires a total of 60 credit hours, including two years of course work, a summer practicum program, and a full-time internship in the third year.

For students entering doctoral programs, the master's degree is awarded only in special circumstances, typically when a student in good standing chooses not to continue in the doctoral program.

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. Requirements vary across concentrations, but all doctoral plans of work include at least 72 credit hours. See <https://psychology.chass.ncsu.edu/graduate/> for information about requirements for different concentrations.

Student Financial Support: Many graduate students receive financial support in the form of teaching or research assistantships. All admitted applicants are considered for assistantships.

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

[NCSU Graduate Catalog](#)

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

Directors of Graduate Programs:

B. L. Nowell, Box 8102, 517/377-0932, blnowell@ncsu.edu, Political Science

B. McDonald, Box 8102, bmcadona@ncsu.edu, Political Science

J. D. Coggburn, Box 8102, 919/515-1888, jcoggburn@ncsu.edu, Political Science

Named Distinguished Professors: T. A. Birkland; **Professors:** R. M. Clerkin, J. D. Coggburn, D. M. Daley, G. D. Garson, J. Kuzma, B. L. Nowell; **Emeritus Professors:** C. K. Coe; **Associate Professors:** R. M. Berry-James, J. R. Brunet, C. Galik, B. McDonald, J. E. Swiss; **Emeritus Associate Professors:** M. L. Vasu; **Assistant Professors:** J. A. Coupet, J. C. Diebold, R. J. Reardon, A. J. Stewart; **Teaching Assistant Professors:** T. A. Appling, D. L. Weisel

Public Administration students at NC State are prepared for a career in public service. They will develop the leadership tools and knowledge they need to serve, manage, and lead public or nonprofit organizations or to conduct cutting-edge academic research.

Admission Requirements: A list of required application documents can be found on the [Public Administration webpage](#). The deadline to apply to the MPA program is May 15 (March 1 for International applicants) for Fall admission and November 1 (March 1 for International applicants) for Spring admission. The deadline to apply to the Ph.D. program is March 15 (March 1 for International applicants) for Fall admission. Completed applications received by February 1 will receive consideration for all available university and department scholarships and assistantships.

Master's Degree Requirements: The MPA degree requires the completion of 40 graduate credit hours:

- 21 credit hours of core coursework
- 19 credit hours of elective coursework
 - Students lacking the equivalent of one year of full-time public service experience must complete a 3 credit hour internship as part of their elective coursework.

Prerequisites for the program are an undergraduate course in microeconomics and in intermediate statistics (equivalent to ST 311). Students who do not have one or both of these prerequisite courses must successfully complete equivalent coursework prior to graduation. The MPA is an option B Master's degree with a one-person committee and no final oral examination. Details on the degree requirements can be found on the Master of Public Administration page.

The MPA program offers elective coursework in public management, nonprofit management, urban management, financial management, organizational leadership, public policy, and justice administration.

Doctoral Degree Requirements: The Ph.D. degree requires the completion of 72 graduate credit hours:

- 60 credit hours of coursework (between 18 and up to 24 hours of relevant graduate credit from a prior Master's degree may be used; total degree hours must include at least 36 hours at the doctoral level)
- 12 credit hours of dissertation research

Prerequisites for the program are a graduate course in intermediate statistics, a course in methodology (covering research design, internal and external validity, sampling, and measurement), and at least one course in American government. Students who have not met one or more of these prerequisites before admission must successfully complete

equivalent coursework prior to graduation. Details on the degree requirements can be found on the [Ph.D. in Public Administration webpage](#). NCSU University Graduate Catalog (2017-2018) 269

Each student will select or develop one or two fields of specialization.

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.

Other Relevant Information: The Department of Public Administration also offers a Graduate Certificate in Public Policy and a Graduate Certificate in Nonprofit Management, either of which can be taken alone or in conjunction with a degree.

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

[NCSU Graduate Catalog](#)

Public History

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

J. E. Rudolph, Box 8108, 919/515-2483, jerudolp@ncsu.edu, History

Named Professors: D. P. Gilmartin; **Professors:** R. K. Bassett, C. T. Friend, O. J. Kalinga, A. F. Khater, M. G. Kim, K. P. Luria, A. W. Mitchell, S. T. Parker, J. E. Rudolph, R. W. Slatta, S. L. Spencer, K. S. Vincent, D. A. Zonderman; **Associate Professors:** D. R. Ambaras, M. M. Booker, T. S. Gordon, B. M. Kelley, W. C. Kimler, S. M. Lee, J. L. Mell, K. Mellen Charron, B. S. Sirota, N. B. Strote; **Assistant Professors:** M. L. Cherry, F. Freitas, V. I. Kasper-Marienberg, J. Kertesz, A. E. McGill; **Teaching Associate Professors:** S. B. Freitag; **Teaching Assistant Professors:** J. C. Boyles

Admission Requirements: Admission to the M.A. in History and Public History and Ph.D. in Public History programs require: a bachelor's degree from an accredited college or university; transcripts; scores from the Graduate Record Exam (GRE); personal statement, listing career goals, historical interests, and potential advisor; letters of recommendation; and a writing sample of approximately ten pages. See the program's website (<http://history.chass.ncsu.edu/grad/apply.php>) for additional details.

Master's Degree Requirements: *Master of Arts Degree in History:* This program requires a total of 30 credit hours, including 6 hours in core courses, 12 credit hours in a major field, 6 credit hours in a minor field, and 6 credit hours in thesis work. 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 museum studies and heritage studies. Students perform internships in their own special areas of interest.

Doctoral Degree Requirements: The Ph.D. program in Public History requires 72 credit hours. Students complete 21 credit hours in a public history field, including an internship; 21 credit hours in a history field; 6 credit hours in an outside field; and 24 credit hours of dissertation work.

Student Financial Support: Graduate teaching assistantships are available to students in all programs and are awarded by open competition.

Other Relevant Information: The application deadline for fall semester is January 15; students are admitted for the fall semester only.

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

[NCSU Graduate Catalog](#)

Public Policy (Certificate)

Director of Graduate Certificate Programs:

Jeffrey Diebold

Public & International Affairs

Phone:

Email: jcdiebol@ncsu.edu

Website: http://spia.ncsu.edu/pa/prospective-students/graduate_certificates/public-policy.html

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 the [Public Policy Certificate Program](#) web site.

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 agricultural sciences, business management, communication, education, engineering, humanities, natural resources, or social sciences.

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.

[NCSU Graduate Catalog](#)

Renewable Electric Energy Systems (Certificate)

Director of Graduate Certificate Programs:

Mesut Baran

Electrical & Computer Engr.

Phone: 919/515-5081

Email: baran@ncsu.edu

Website: http://www.ece.ncsu.edu/graduate/rees_certificate

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 [Department of Electrical and Computer Engineering website](#).

[NCSU Graduate Catalog](#)

School Administration

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---------------------------------------|-------|-------|------|------|-----------|-------|-----|
| School Administration | | | | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: T. W. Cawthon, B. C. Fusarelli, L. D. Fusarelli, S. R. Porter; **Adjunct Professors:** B. A. Olson; **Emeritus Professors:** R. G. Taylor; **Associate Professors:** J. E. Bartlett, J. G. Gayles; **Adjunct Associate Professors:** S. C. Faircloth; **Emeritus Associate Professors:** P. F. Bitting; **Assistant Professors:** L. R. Bass, A. B. Bowden, T. A. Drake, A. M. Jacob; **Adjunct Assistant Professors:** B. Brander, K. G. Dixon, A. B. Orders, D. T. Petherbridge, D. L. Reichard, J. W. Wescott, D. E. Wiese, C. L. Zelna; **Emeritus Assistant Professors:** R. L. Haley; **Teaching Assistant Professors:** M. E. Bartlett, B. D. Champion, G. E. Hicks, F. P. Riddick, C. C. Williams; **Lecturers:** N. T. Smith, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

[NCSU Graduate Catalog](#)

School Counseling

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-----------------------------------|-------|-------|------|------|-----------|-------|-----|
| School Counseling | | | Y | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: S. B. Baker, E. R. Gerler, G. M. Kleiman, S. C. Nassar-McMillan, K. M. Oliver, J. A. Picart, S. Ting;

Emeritus Professors: L. K. Jones, N. A. Sprinthall; **Associate Professors:** M. A. Grimmett, M. M. Manfra, J. E. Swiss,

M. M. Thomson; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Assistant Professors:** A. S. Dunbar, D. L. Gray;

Clinical Assistant Professors: E. T. Horne; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher, M.

G. Maxwell, T. H. Stafford, M. B. Sumerel, R. S. Sutton, R. E. Tyler-Walker; **Teaching Associate Professors:** A. C.

Smith; **Teaching Assistant Professors:** C. Braga, N. M. Childs, D. E. Crissman, H. S. Lupton-Smith, B. H. Setser;

Lecturers: N. M. Childs

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL:

<https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching,

Training and Educational Technology: See the following URL for information on the graduate certificate.

<https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

Science Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-----------------------------------|-------|-------|------|------|-----------|-------|-----|
| Science Education | | | Y | | | Y | |

GRADUATE FACULTY

Director of Graduate Programs:

A. Clark, Box 7801, 919/515-1771, aclark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education

Professors: M. G. Jones, K. C. Trundle, E. N. Wiebe; **Associate Professors:** M. R. Blanchard, S. J. Carrier, J. Minogue, S. Park; **Emeritus Associate Professors:** G. S. Carter, J. H. Wheatley; **Assistant Professors:** C. Delgado, C. D. Denson; **Teaching Assistant Professors:** P. M. Shumaker Jeffrey

The Department of Science, Technology, Engineering and Mathematics (STEM) Education offers graduate programs that lead to the degrees of Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Science (MS), Master of Education (MEd), and Master of Arts in Teaching (MAT). We prepare educators and researchers for positions as teachers, leaders, and 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 academic discipline areas including: biological sciences, chemistry, computer science, earth science, engineering, graphic arts, interdisciplinary science, mathematics, physics, or statistics.

A master's program is offered that leads to initial teaching licensure. Master's programs are also offered leading to North Carolina M-licensure as a teacher of mathematics, science, or technology at grades 6-9 and/or 9-12. Programs are also available for those seeking advanced graduate-level certification as a teacher. Finally, students may choose a program to prepare for teaching careers in post-secondary education.

Doctoral students are knowledge-seekers and who are eager to pursue educational problems and develop critical thinking skills in a collaborative environment. The programs prepare individuals for positions in their fields of study 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.A.T., M.Ed., M.S., 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 of Arts in Teaching requires 33 hours. Other 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 Learning and Teaching in STEM requires a minimum of 50 semester hours of course work and 9 semester hours of dissertation research beyond the Master's Degree requirements. There are three program areas of study (PAS). The PAS in Mathematics and Statistics Education requires 56-62 hours beyond the masters

degree, including 9 hours of dissertation research. There is a PAS in Science Education..... The PAS in Technology Education.....

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.

[NCSU Graduate Catalog](#)

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:

K. L. Stansbury, Box 7639, klstansb@ncsu.edu, Social Work

Professors: K. Bullock, J. T. Pennell; **Associate Professors:** N. R. Ames, W. J. Casstevens, K. L. Stansbury, J. Taliaferro, I. Yoon; **Emeritus Clinical Associate Professors:** L. R. Williams; **Assistant Professors:** Q. Cryer-Coupet, A. R. Ellis, J. K. Hall; **Clinical Assistant Professors:** B. A. Zelter; **Teaching Assistant Professors:** D. C. Fitzpatrick

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 (*scroll down to see additional requirements for Advanced Standing applicants*)

- Bachelor's degree (any major) from an accredited liberal arts college or university.
- GPA of 3.0 or higher for the last 60 hours of academic work. Students with a GPA less than 3.0 but greater than 2.5 for the last 60 hours of academic course work must have official Graduate Record Exam (GRE) or Miller Analogies Test (MAT) scores forwarded to the Graduate School.
- Liberal arts coursework in the social sciences, humanities, biology, and statistics.
 - Four courses in the social sciences (e.g. anthropology, economics, ethnic studies, political science, psychology, social work, sociology), with a grade of C or better.
 - Three courses in the humanities (e.g. comparative religions, history, linguistics, literature, modern or classic languages, philosophy and ethics, visual and performing arts), with a grade of C or better.
 - A biology and a statistics course, with a grade of C or better.
- A variety of life and work experience in human services, paid or volunteer. *Note: In accordance with the CSWE standards, students cannot receive academic credit based on life and work experience.*

Additional Requirements for Advanced Standing

In addition to the above admissions requirements, the following applies to Advanced Standing applicants:

- Applicants with a BSW degree from an accredited program and a GPA of at least 3.5 (on a 4.0 scale) for the last 60 credit hours of academic work are eligible to apply for Advanced Standing status. Students with a GPA less than 3.5 but greater than 2.5 for the last 60 hours of academic course work must have official Graduate Record Exam (GRE) or Miller Analogies Test (MAT) scores forwarded to the Graduate School.
- BSW students who graduate prior to the first semester of Advanced Standing coursework will be considered for admission.
- Applicants must have grades of "B" or better in all social work courses.
- One of three references must be from Field/Task Supervisor or Field Director/Liaison.

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 MSW program is accredited by The Council on Social Work Education (CSWE).

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

[NCSU Graduate Catalog](#)

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:

S. J. McDonald, Box 8107, 919/515-9028, steve_mcdonald@ncsu.edu, Sociology and Anthropology

Named Distinguished Professors: M. D. Schulman; **Named Distinguished University Professors:** W. A. Wolfram; **Professors:** M. P. Atkinson, T. N. Greenstein, E. L. Kick, P. L. McCall, S. J. McDonald, T. L. Parcel, A. H. Ross, M. L. Schwalbe, T. E. Shriver; **Emeritus Named Professors:** V. M. Aldige; **Emeritus Professors:** W. B. Clifford, E. M. Crawford, L. R. Dellafave, T. N. Hobgood, R. L. Moxley, R. D. Mustian, M. M. Sawhney, C. R. Tittle, E. M. Woodrum, J. J. Zuiches; **Emeritus Distinguished Professors:** L. B. Otto; **Associate Professors:** S. K. Bowen, D. T. Case, M. L. Crowley, S. M. De Coster, K. L. Ebert, N. M. Haenn, S. B. Longo, A. Manzoni, W. R. Smith, M. E. Thomas, M. S. Thompson, J. M. Wallace; **Adjunct Associate Professors:** J. F. Thigpen, W. E. Wormsley; **Emeritus Associate Professors:** R. C. Brisson, R. F. Czaja, A. C. Davis, S. C. Lilley, R. J. Thomson, M. L. Walek; **Assistant Professors:** M. A. DeSoucey, A. D. Fernandes, C. A. Juarez, W. Liao, S. C. McManus, J. K. Millhauser; **Adjunct Assistant Professors:** B. L. Clark

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

Director of Graduate Programs:

T. J. Smyth, Box 7620, 919/515-2838, tjot_smyth@ncsu.edu, Crop and Soil Sciences

Named Professors: D. L. Hesterberg; **Named Distinguished Professors:** J. T. Brake, M. J. Vepraskas; **Professors:** A. Amoozegar, S. W. Broome, D. A. Crouse, C. R. Crozier, J. L. Havlin, J. L. Heitman, M. Hyman, R. A. McLaughlin, M. Mullen, D. L. Osmond, W. Shi, T. J. Smyth; **USDA Professors:** A. J. Franzluebbers; **Emeritus Professors:** D. K. Cassel, D. W. Israel, H. J. Kleiss, W. P. Robarge; **Emeritus Named Distinguished Professors:** J. W. Gilliam, R. W. Skaggs; **Emeritus Distinguished Professors:** S. W. Buol; **Associate Professors:** O. W. Duckworth, A. K. Graves, M. L. Polizzotto, J. G. White; **Emeritus Associate Professors:** J. P. Lilly, G. C. Naderman; **Assistant Professors:** T. G. Gardner; **Adjunct Assistant Professors:** D. H. Hardy, R. O. Maguire; **Lecturers:** 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 final 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 four, but not more than six, credit hours of a Master's project (SSC 620). One credit hour of seminar (SSC 601) and a final oral examination is also required.

Master of Soil Science Degree Requirements (non-thesis campus based 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) and a final oral examination. One credit hour of seminar (SSC 601) is required and a maximum of two credit hours is acceptable.

Master of Natural Resources Requirements (Soil Science option, non-thesis program): Requirements for this interdisciplinary degree 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 (SSC 620). One credit hour of seminar (SSC 601) and a final oral examination 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.

[NCSU Graduate Catalog](#)

Special Education: Multi-Tiered Systems of Support (Certificate)

The intent of the program is to provide post-baccalaureate students with knowledge related to 21st century special education service delivery in the schools. The certificate program courses include foci on the contemporary, evidenced based intervention concepts of Multi-Tiered Systems of Support (MTSS), as well as Positive Behavior Intervention and Support (PBIS) and, to a lesser degree, Response to Intervention (RtI).

[NCSU Graduate Catalog](#)

Special Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-----------------------------------|-------|-------|------|------|-----------|-------|-----|
| Special Education | | | Y | | | Y | |

GRADUATE FACULTY

Director of Graduate Programs:

J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences

Professors: C. L. Crossland, D. A. Cullinan, G. M. Kleiman, K. M. Oliver, E. J. Sabornie; **Associate Professors:** J. H. Hunt, M. M. Manfra, M. M. Thomson; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Emeritus Associate Professors:** S. S. Osborne; **Assistant Professors:** D. L. Gray; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher; **Teaching Associate Professors:** A. C. Smith

The department of Teacher Education and Learning Sciences offers master's degrees in Special Education. The Special Education program at NC State prepares students for excellence in teaching, assessment, curriculum development, classroom and behavior management, teaching students with high incidence disabilities, evaluation and professional leadership, as well as other areas of service to students with disabilities and to schools and agencies. Our nationally recognized faculty provides excellent teaching, leadership opportunities, and high standards of performance.

For more please see <https://ced.ncsu.edu/programs/special-education-master/>

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Teacher Education and Learning Sciences. The College of Education is approved by the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements: *Special Education:* A 500-800 word statement describing professional goals is required, along with transcripts and reference letters. Some areas of study require that applicants be qualified to hold a baccalaureate-level teaching license or have teaching experience. A match to resources and faculty areas of interest and expertise is necessary, since the program is competitive. The Graduate School requires a 3.0 in the undergraduate program.

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

[NCSU Graduate Catalog](#)

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

Director of Graduate Programs:

K. M. Meurs, Box 8401, 919/513-6213, kmmeurs@ncsu.edu, College of Veterinary Medicine

Named Professors: A. A. Tsatis; **Professors:** G. W. Almond, K. L. Anderson, P. Arasu, H. J. Barnes, R. E. Baynes, A. T. Blikslager, J. C. Bonner, M. Breen, E. B. Breitschwerdt, T. T. Brown, D. K. Carver, M. T. Correa, J. M. Cullen, M. G. Davidson, G. A. Dean, T. C. DeFrancesco, D. C. Dorman, O. J. Fletcher, F. J. Fuller, J. E. Gadsby, B. C. Gilger, J. L. Gookin, C. B. Grindem, J. S. Guy, B. Hammerberg, E. M. Hardie, C. A. Harms, E. C. Hawkins, J. M. Hinshaw, J. M. Horowitz, S. L. Jones, B. W. Keene, D. X. Lascelles, S. M. Laster, J. M. Law, J. F. Levine, M. G. Levy, G. A. Lewbart, D. J. Marcellin, K. G. Mathews, M. C. McGahan, K. M. Meurs, K. R. Munana, S. C. Nelson, N. J. Olby, T. J. Olivry, M. G. Papich, J. A. Piedrahita, L. P. Posner, S. C. Roe, P. L. Sannes, D. Shea, B. Sherry, W. J. Showers, J. E. Smallwood, G. W. Smith, S. L. Vaden, D. P. Wages, D. W. Watson; **Research Professors:** S. Kennedy-Stoskopf; **Clinical Professors:** K. E. Linder, S. L. Marks, W. R. Redding; **Adjunct Professors:** A. E. Bogan, G. R. Burleson, M. W. Dewhirst, K. L. Dreher, R. B. Meeker, L. E. Williams; **Emeritus Professors:** L. A. Degernes, H. A. Devine, L. N. Fleisher, R. B. Ford, M. L. Hauck, L. C. Hudson, D. H. Ley, D. J. Meuten, N. A. Monteiro-Riviere, W. M. Morrow, P. E. Orndorff, J. F. Roberts, M. C. Roberts, L. P. Tate, D. E. Thrall, M. B. Tompkins, W. Tompkins; **Emeritus Named Distinguished Professors:** J. E. Riviere; **Emeritus Distinguished Professors:** C. E. Atkins; **Associate Professors:** C. A. Adin, B. A. Breuhaus, K. Cheng, P. Cowen, R. E. Fish, B. Hansen, P. R. Hess, B. D. Slenning, S. Tonkonogy; **Adjunct Associate Professors:** M. L. Alley, D. Dixon, R. C. Sills; **Emeritus Associate Professors:** S. Y. Gardner, C. R. Swanson, M. D. Whitacre; **Assistant Professors:** F. M. Mowat, L. V. Schnabel, H. D. Westermeyer; **Emeritus Research Professors:** M. J. Dykstra; **Clinical Assistant Professors:** S. E. Musulin, A. M. Snyder; **Visiting Assistant Professors:** R. Linnehan; **Adjunct Assistant Professors:** D. B. Adin, A. E. Bogan, M. R. Loomis, D. E. Malarkey; **Teaching Associate Professors:** M. P. Gerard

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 Health Complex 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.

The MSPVM Program offers graduate training with participating graduate faculty from all three 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 degree.

Each MSPVM student will have a unique graduate training program focused in his/her clinical specialty area and directed by a graduate committee comprised of faculty experts from this clinical specialty and other specialty areas. The MSPVM Program allows the College to document more clearly the effort that faculty commit to advanced training in 17 different veterinary specialties. The program 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 House Officer

Program at the NC State University College of Veterinary Medicine 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 36 credit hours of coursework including 18 credit hours of letter-graded coursework to earn a Master of Specialized Veterinary Medicine degree. The program generally takes two years to complete and should be factored into the internship/residency timeframe when considering the graduate program.

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.

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

[NCSU Graduate Catalog](#)

Statistics Education (Certificate)

[NCSU Graduate Catalog](#)

Statistics

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|----------------------------|-------|-------|------|------|-----------|-------|-----|
| Statistics | Y | | Y | | Y | | |

GRADUATE FACULTY

Directors of Graduate Programs:

D. E. Martin, Box 8203, 919 5151936, demarti4@ncsu.edu, Statistics

H. D. Bondell, Box 8203, 919/515-1914, hdbondel@ncsu.edu, Statistics

Named Professors: M. Davidian, D. A. Dickey, A. A. Tsiatis; **Named Distinguished Professors:** Z. Zeng; **Named Distinguished University Professors:** A. B. Godfrey; **Distinguished University Professors:** M. M. Goodman; **Professors:** B. Bhattacharyya, H. D. Bondell, D. D. Boos, S. K. Ghosh, K. Gross, M. L. Gumpertz, A. R. Hall, J. M. Hughes-Oliver, S. N. Lahiri, W. Lu, S. V. Muse, L. A. Stefanski, J. L. Thorne, J. Tzeng, A. G. Wilson, F. A. Wright, D. Zhang; **Adjunct Professors:** S. Chow, J. R. Chromy, R. B. Conolly, M. Fuentes, J. H. Goodnight, P. H. Morgan, D. W. Nychka, R. W. Setzer, E. A. Stone, R. D. Wolfinger, S. S. Young; **Emeritus Named Professors:** M. W. Suh; **Emeritus Professors:** C. Brownie, T. M. Gerig, H. J. Gold, T. Johnson, J. F. Monahan, L. A. Nelson, K. H. Pollock, C. H. Proctor, C. P. Quesenberry, J. O. Rawlings, D. L. Ridgeway, W. H. Swallow, J. L. Wasik; **Emeritus Named Distinguished Professors:** W. R. Atchley, J. E. Riviere; **Associate Professors:** S. Ghoshal, E. B. Laber, A. Maity, D. E. Martin, R. G. Martin, A. A. Motsinger-Reif, J. A. Osborne, B. J. Reich, D. M. Reif, T. W. Reiland, C. E. Smith, R. Song, A. Staicu, Y. Wu; **Research Associate Professors:** C. Arellano; **Adjunct Associate Professors:** L. Li; **Emeritus Associate Professors:** A. E. Headen; **Assistant Professors:** E. C. Chi, J. S. Guinness, X. J. Jeng, J. K. Pacifici, J. W. Richards-Stallings, L. Xiao, S. Yang; **Research Assistant Professors:** E. H. Griffith; **Adjunct Assistant Professors:** G. Bobashev, M. G. Ehm, C. M. Gotwalt, J. S. Kimbell, E. C. Mannshardt, H. Zhou; **Teaching Associate Professors:** H. M. McGowan; **Teaching Assistant Professors:** J. W. Duggins, J. B. Post; **Lecturers:** B. K. Eder

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. Starting Summer of 2013, we will begin to offer courses to allow a student to complete the Master of Statistics degree in one calendar year. The one year masters program has the same requirements as the current Master of Statistics program. Since courses start in the summer, the deadline to submit completed applications is January 15 of the same year, and student should apply for 'Summer I' admission. Students are not normally admitted for spring.

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 remainders 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 to students in the Ph.D. program 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. The Department provides a dynamic environment for teaching, core research and collaborative research across disciplines, with formal program concentrations in biostatistics, bioinformatics, environmental, financial and mathematical statistics.

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

[NCSU Graduate Catalog](#)

Teacher Education and Learning Sciences

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Teacher Education and Learning Sciences | Y | | | | | | |

GRADUATE FACULTY

Directors of Graduate Programs:

J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences

J. T. DeCuir-Gunby, Box 7801, 919/513-7669, jessica_decur@ncsu.edu, Teacher Education and Learning Sciences

Professors: C. L. Crossland, D. A. Cullinan, J. T. DeCuir-Gunby, G. M. Kleiman, J. K. Lee, P. L. Marshall, J. Nietfeld, K. M. Oliver, E. J. Sabornie, H. A. Spires, P. Sztajn; **Emeritus Professors:** B. J. Fox, C. A. Pope, R. J. Pritchard, N. A. Sprinthall; **Associate Professors:** C. M. Beal, S. J. Carrier, F. I. Chirino-Klevans, D. S. Davis, D. Eseryel, M. A. Evans, J. H. Hunt, M. M. Manfra, J. Minogue, M. M. Thomson, T. A. Walkowiak, A. M. Wiseman, C. A. Young; **Adjunct Associate Professors:** H. A. Davis-Bauer; **Emeritus Associate Professors:** J. F. Arnold, S. S. Osborne, L. M. Thies-Sprinthall; **Assistant Professors:** M. M. Falter, D. L. Gray, J. F. Grifenhagen, T. A. Rutherford, J. Wilson; **Clinical Assistant Professors:** K. F. Hoffmann, E. T. Horne; **Adjunct Assistant Professors:** J. O. Corn, S. B. Freeman, M. J. Maher, M. K. Monaco, J. L. Painter, T. E. Ray; **Teaching Associate Professors:** V. N. Faulkner, A. D. Harrington; **Teaching Assistant Professors:** D. E. Bengé, D. E. Crissman, L. G. Hervey, M. J. Jeffries, S. B. Kellogg, J. G. Koch, J. O. McKeown; **Lecturers:** K. F. Hoffmann

The Ph.D. program in the Department of Teacher Education and Learning Sciences 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. Five program areas of study (focus) are offered by the department: Educational Psychology; Elementary Learning Sciences; Learning, Design, & Technology; Literacy & English Language Arts; and Social Studies Education.

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Teacher Education and Learning Sciences. The College of Education is approved by the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements: *Teacher Education and Learning Sciences:* A 500-800 word statement describing professional goals is required, along with transcripts and reference letters. Some areas of study require that applicants be qualified to hold a baccalaureate-level teaching license or have teaching experience. A match to resources and faculty areas of interest and expertise is necessary since the program is competitive. The Graduate School requires a 3.0 in the undergraduate program. GRE scores not more than five years old are required for the doctoral program.

Doctoral Degree Requirements: *Teacher Education and Learning Sciences:* A minimum of 72 course credit hours beyond a bachelor's degree is required. For students with a master's degree, at least 60 new hours must be taken after the student matriculates into the doctoral program. The 60-hour program includes 12 hours of scholar leader courses (college and departmental levels), 15 hours of research, 24 hours of program area specialty courses, and 9 hours of dissertation credit.

Student Financial Support: Teaching and Research Assistantships are available on a limited basis.

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

[NCSU Graduate Catalog](#)

Teaching Training and Educational Technology (Certificate)

Directors of Graduate Certificate Programs:

Siu-Man Ting

ELPHD

Phone: 919/515-6362

Email: ting@ncsu.edu

Lance Fusarelli

ELPHD

Phone: 919/513-0507

Email: lance_fusarelli@ncsu.edu

Michelle Bartlett

ELPHD

Phone:

Email: mebartle@ncsu.edu

Delivered 100% online, the Certificate consists of five 3-credit courses focused on teaching, training, and the use of technology in a variety of educational environments. Students can tailor the program to meet their needs and gain the knowledge and skills necessary to design and deliver course-related content through face-to-face, technology-enhanced, and e-learning environments. The program is designed for mid-career individuals who may be without academic preparation for their current positions, or for those choosing to increase their knowledge and skills in the field for future job opportunities.

Students may choose one of the following specialty areas: Training and Development, Instructional Design, E-Learning, Community College Teaching, and Community College Leadership.

In order to be awarded the Certificate, all required courses must be taken and one elective is allowed. Transfer credit from other institutions is not allowed.

Please see the department website for the specific required and elective courses for each specialization. For course descriptions, please refer to the NC State [listing of courses](#). For further information, see the Certificate in Teaching, Training and Educational Technology (<https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>) website.

[NCSU Graduate Catalog](#)

Teaching

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--------------------------|-------|-------|------|------|-----------|-------|-----|
| Teaching | | | | Y | | | |

GRADUATE FACULTY

Directors of Graduate Programs:

A. Clark, Box 7801, 919/515-1771, aclark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education
 J. K. Lee, Box 7801, jkleee@ncsu.edu, Teacher Education and Learning Sciences
 J. T. DeCuir-Gunby, Box 7801, 919/513-7669, jessica_decuir@ncsu.edu, Teacher Education and Learning Sciences
 S. J. Carrier, Box 7801, 919/513-2808, sjcarrie@ncsu.edu, Teacher Education and Learning Sciences

Professors: C. L. Crossland, D. A. Cullinan, G. M. Kleiman, H. S. Lee, J. K. Lee, E. J. Sabornie; ***Emeritus Professors:*** C. A. Pope, R. J. Pritchard; **Associate Professors:** M. R. Blanchard, J. H. Hunt, M. M. Thomson, T. A. Walkowiak; **Emeritus Associate Professors:** V. W. DeLuca, S. S. Osborne; **Assistant Professors:** C. D. Denson, D. L. Gray; **Adjunct Assistant Professors:** S. B. Freeman; **Teaching Assistant Professors:** D. E. Benge, M. J. Jeffries, J. G. Koch

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); English as a Second Language; K-12 Reading; Special Education; and Elementary Education.

For more please see <https://ced.ncsu.edu/academics/professional-education/master-of-arts-in-teaching/>

The NC Department of Public Instruction has conferred accreditation to the graduate programs in Teacher Education and Learning Sciences. The College of Education is approved by the Council for the Accreditation of Educator Preparation (CAEP).

Admission Requirements: Applicants must have (1) a four-year degree from a college or university that holds regional accreditation, such as SACS; (2) 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.

[NCSU Graduate Catalog](#)

Technical Communication

Degrees Offered:

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

GRADUATE FACULTY

Directors of Graduate Programs:

A. M. Penrose, Box 8105, 919/515-4107, penrose@ncsu.edu, English

H. Ding, Box 8105, hding@ncsu.edu, English

Emeritus Professors: C. R. Miller; *Associate Professors:* D. H. Covington, R. S. Dicks, H. Ding; *Emeritus Associate Professors:* D. H. Covington, R. S. Dicks; *Assistant Professors:* S. L. Pigg, D. M. Walls

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. The application deadline is June 15. Those who wish to be considered for teaching assistantships should complete the application by February. Students are admitted in the fall semester only.

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. See [program website](#) for specific requirements by concentration.

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 professional writing courses. They devote half time in subsequent semesters to teaching technical communication.

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

[NCSU Graduate Catalog](#)

Technology Education

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--------------------------------------|-------|-------|------|------|-----------|-------|-----|
| Technology Education | | | Y | | | Y | |

GRADUATE FACULTY

Director of Graduate Programs:

A. Clark, Box 7801, 919/515-1771, aclark@ncsu.edu, Science, Technology, Engineering, and Mathematics Education

Professors: A. Clark, E. N. Wiebe; **Emeritus Associate Professors:** V. W. DeLuca, R. E. Peterson, R. E. Wenig;

Assistant Professors: C. D. Denson; **Adjunct Assistant Professors:** P. P. Carpenter; **Emeritus Assistant Professors:** J. L. Crow; **Teaching Assistant Professors:** T. B. Baldwin, B. Matthews, A. Y. Scales

The Department of Science, Technology, Engineering and Mathematics (STEM) Education offers graduate programs that lead to the degrees of Doctor of Philosophy (PhD), Doctor of Education (EdD), Master of Science (MS), Master of Education (MEd), and Master of Arts in Teaching (MAT). We prepare educators and researchers for positions as teachers, leaders, and 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 academic discipline areas including: biological sciences, chemistry, computer science, earth science, engineering, graphic arts, interdisciplinary science, mathematics, physics, or statistics.

A master's program is offered that leads to initial teaching licensure. Master's programs are also offered leading to North Carolina M-licensure as a teacher of mathematics, science, or technology at grades 6-9 and/or 9-12. Programs are also available for those seeking advanced graduate-level certification as a teacher. Finally, students may choose a program to prepare for teaching careers in post-secondary education.

Doctoral students are knowledge-seekers and who are eager to pursue educational problems and develop critical thinking skills in a collaborative environment. The programs prepare individuals for positions in their fields of study 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.A.T., M.Ed., M.S., 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 of Arts in Teaching requires 33 hours. Other 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 Learning and Teaching in STEM requires a minimum of 50 semester hours of course work and 9 semester hours of dissertation research beyond the Master's Degree requirements. There are three program areas of study (PAS). The PAS in Mathematics and Statistics Education requires 56-62 hours beyond the masters

degree, including 9 hours of dissertation research. There is a PAS in Science Education..... The PAS in Technology Education.....

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.

[NCSU Graduate Catalog](#)

Technology Entrepreneurship and Commercialization (Certificate)

Directors of Graduate Certificate Programs:

Steven Allen

MBA Program-Poole COM

Phone: 919/515-5584

Email: steve_allen@ncsu.edu

Website: <http://www.mgt.ncsu.edu/mba/concentrations/entrepreneurship-technology-commercialization/>

Steve Barr

Mgmt, Innovation&Entrepreneur

Phone: 919/515-4566

Email: steve_barr@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.

[NCSU Graduate Catalog](#)

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.

[NCSU Graduate Catalog](#)

Textile Chemistry

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

M. Pasquinelli, Box 8301, 919/515-9426, melissa_pasquinelli@ncsu.edu, Textile Engineering, Chemistry and Science

Named Professors: R. L. Barker, H. S. Freeman, D. Hinks, A. E. Tonelli; **Named Distinguished Professors:** B. Pourdeyimi; **Distinguished Professors:** R. J. Spontak; **Professors:** K. R. Beck, T. G. Clapp, L. I. Clarke, A. M. El-Shafei, R. E. Gorga, P. J. Hauser, S. M. Hudson, W. J. Jasper, J. A. Joines, M. W. King, M. G. McCord, S. Michielsen, M. Pasquinelli, J. P. Rust, R. Shamey, A. J. Williams, X. Zhang; **Adjunct Professors:** A. Bogdanovich, W. G. O'Neal; **Emeritus Named Professors:** S. P. Hersh, C. B. Smith; **Emeritus Professors:** A. H. El-Shiekh, P. L. Grady, B. S. Gupta, G. N. Mock, M. H. Theil, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** P. D. Bradford, E. A. DenHartog, J. S. Jur, R. Kotek, W. E. Krause, J. P. Lavelle; **Research Associate Professors:** D. P. Griffis, D. B. Thompson; **Adjunct Associate Professors:** J. P. Casani, G. M. Garland, T. G. Montgomery; **Assistant Professors:** E. N. Ford, W. Gao, E. Shim, N. R. Vinueza Benitez; **Research Assistant Professors:** N. Anantharamaiah, G. M. Garland, B. Maze, R. B. Ormond, B. Yeom; **Adjunct Assistant Professors:** H. A. Boyter; **Teaching Professors:** H. Hamouda

Master of Science in Textile Chemistry (MS/TC): The Master of Science in Textile Chemistry degree program, offered by the Department of Textile Engineering, Chemistry and Science (TECS) in the College of Textiles (COT), 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, textile engineering, 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, including traditional textile areas or even areas outside of textiles, such as research laboratories or the State and Federal Bureaus of Investigation. Some graduates have also gone onto doctoral programs, particularly in fiber and polymer science (FPS) and textile technology management (TTM).

Admission Requirements (MS/TC): Applicants must have must have an undergraduate degree in chemistry or an equivalent degree with demonstrated proficiency in the appropriate calculus-based sciences (such as physics) and core chemistry competencies, including physical chemistry and organic chemistry. If these requirements are not met, additional coursework may be required prior to admission into the program. 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): For students on the thesis track, a minimum of 32 credit hours is required to fulfill the degree requirements; a minimum of 15 credit hours (5 courses) must come from the approved textile chemistry offerings, and 9 credit hours (3 courses) from a supporting area (minor), in addition to 2 credit hours of COT Seminar (TC 601) and 6 credit hours of thesis research. For students who choose the Option B (non-thesis) or Distance Education (DE) track, a minimum of 35 credit hours is required; a minimum of 18 credit hours (6 courses) must come from the approved textile chemistry offerings, and 9 credit hours (3 courses) from a supporting

area, in addition to 2 credit hours of COT Seminar (TC 601) and 6 credit hours of independent study (TC 630).

Student Financial Support: Although financial aid is limited, some support is available for full-time students in the form of research assistantships, teaching assistantships, or fellowships. Research assistantships are only available for M.S. students in the thesis option, and students should contact individual faculty members in their research interest areas for such opportunities. 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 TECS Department either houses or has access to state-of-the-art facilities for conducting quality research and independent study projects related to this degree program area. Close cooperation between COT 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.

[NCSU Graduate Catalog](#)

Textile Engineering

Degrees Offered:

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

GRADUATE FACULTY

Director of Graduate Programs:

M. Pasquinelli, Box 8301, 919/515-9426, melissa_pasquinelli@ncsu.edu, Textile Engineering, Chemistry and Science

Named Professors: R. L. Barker, H. S. Freeman, D. Hinks, W. Oxenham, A. E. Tonelli; **Named Distinguished Professors:** B. Pourdeyhi; **Distinguished Professors:** R. J. Spontak; **Professors:** K. R. Beck, T. G. Clapp, L. I. Clarke, A. M. El-Shafei, T. K. Ghosh, R. E. Gorga, P. J. Hauser, S. M. Hudson, W. J. Jasper, J. A. Joines, M. W. King, M. G. McCord, S. Michielsen, M. Pasquinelli, J. P. Rust, A. M. Seyam, R. Shamey, A. J. Williams, X. Zhang; **Adjunct Professors:** W. G. O'Neal; **Emeritus Named Professors:** C. B. Smith; **Emeritus Professors:** R. A. Barnhardt, A. H. El-Shiekh, P. L. Grady, B. S. Gupta, G. N. Mock, M. H. Theil, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** P. Banks-Lee, P. D. Bradford, E. A. DenHartog, G. L. Hodge, J. S. Jur, R. Kotek, W. E. Krause, J. P. Lavelle; **Research Associate Professors:** D. P. Griffis, D. B. Thompson; **Adjunct Associate Professors:** J. P. Casani, G. M. Garland; **Assistant Professors:** E. N. Ford, W. Gao, E. Shim, N. R. Vinueza Benitez; **Research Assistant Professors:** N. Anantharamaiah, G. M. Garland, B. Maze, R. B. Ormond, B. Yeom; **Adjunct Assistant Professors:** H. A. Boyter; **Teaching Professors:** H. Hamouda

Master of Science in Textile Engineering (MS/TE): The Master of Science in Textile Engineering degree program, offered by the Department of Textile Engineering, Chemistry and Science (TECS) in the College of Textiles (COT), offers unique educational and research opportunities within the domain of textile materials, structures, and technologies, as well as process design. The program is interdisciplinary in nature, drawing upon polymer and fiber science, mathematical sciences, other engineering disciplines, and the physical sciences. Current research activities in textile engineering include inventory and supply chain control, molecular modeling, nonwovens, thermal and protection sciences, polymer and fiber science, biomedical applications of textiles, wearable and smart textiles, textile composites, filtration, nanotextiles, and sustainability. Since this program encompasses such diverse fields of study, many of our students opt to minor or co-major in other programs at NC State, such as statistics, biomedical engineering, chemical engineering, and industrial engineering. Graduates of Textile Engineering are recruited by a broad range of employers, including traditional textile areas such as performance athletic wear or outdoor apparel and equipment, or even areas outside of textiles, such as hospitals, research laboratories, or banks. Some graduates have also gone onto doctoral programs, particularly in fiber and polymer science (FPS) and textile technology management (TTM).

Admission Requirements (MS/TE): Applicants must have an undergraduate engineering degree or demonstrated proficiency in the appropriate calculus-based sciences (such as physics) and technical competencies in areas such as fiber science. If these requirements are not met, additional coursework may be required prior to admission into the program. A background in materials science, engineering mechanics, statistics, or chemical engineering 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 Engineering (MS/TE): A minimum of 32 credit hours is required to fulfill the degree requirements. Of the 32 credits, a minimum of 24 credit hours (8 courses) must meet the following two requirements: (1) students must take a minimum of five 3-credit courses at the ≥ 500 level offered by TECS faculty that have the following prefixes: TE, TMS, TC (PCC), TT, FPS, and TTM; and (2) students must take a minimum of four 3-credit engineering courses at the ≥ 500 level (i.e., courses offered by an engineering department, which includes

courses with the TECS prefix). In addition, two semester credits of COT Seminar (TE 601) are required. Students who choose the thesis option must also take 6 credit hours of thesis research, whereas Option B (non-thesis) students must take 6 credit hours (2 courses) of independent study (TE 630).

Student Financial Support: Although financial aid is limited, some support is available for full-time students in the form of research assistantships, teaching assistantships, or fellowships. Research assistantships are only available for M.S. students in the thesis option, and students should contact individual faculty members in their research interest areas for such opportunities. 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 TECS Department either houses or has access to state-of-the-art facilities for conducting quality research and independent study projects related to this degree program area, including fiber science and textile engineering. Close cooperation between COT 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.

[NCSU Graduate Catalog](#)

Textile Supply Chain Management (Certificate)

The Graduate Certificate Program 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.

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[NCSU Graduate Catalog](#)

Textile Technology Management

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Textile Technology Management | Y | | | | | | |

GRADUATE FACULTY

Director of Graduate Programs:

S. Michielsen, Box 8301, 919/515-1414, Stephen_Michielsen@ncsu.edu, Textile Engineering, Chemistry and Science

Named Professors: R. L. Barker, S. Fang, H. S. Freeman, D. Hinks, R. E. King, W. Oxenham; **Named Distinguished Professors:** B. Pourdeyhimi; **Named Distinguished University Professors:** A. B. Godfrey, R. B. Handfield, T. J. Hodgson, M. Rappa; **Professors:** K. R. Beck, C. C. Bozarth, T. G. Clapp, A. M. El-Shafei, T. K. Ghosh, R. E. Gorga, P. J. Hauser, C. L. Istook, W. J. Jasper, J. A. Joines, M. W. King, T. A. Lamar, K. K. Leonas, T. J. Little, S. E. Margolis, S. Michielsen, M. M. Moore, M. Pasquinelli, J. P. Rust, A. M. Seyam, R. Shamey, A. J. Williams, J. R. Wilson; **Adjunct Professors:** K. Mathur; **Emeritus Named Professors:** S. K. Batra, S. P. Hersh, C. B. Smith, M. W. Suh, S. C. Winchester; **Emeritus Professors:** R. A. Barnhardt, R. A. Donaldson, A. H. El-Shiekh, P. L. Grady, B. S. Gupta, D. M. Holthausen, G. N. Mock, N. C. Powell, C. Tomasino, P. A. Tucker; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** K. E. Annett-Hitchcock, P. Banks-Lee, K. A. Barletta, P. D. Bradford, E. A. DenHartog, H. H. Hergeth, G. L. Hodge, R. Kotek, W. E. Krause, J. P. Lavelle, L. L. Parrillo-Chapman, L. F. Rothenberg, Y. Xu; **Adjunct Associate Professors:** J. P. Casani, G. M. Garland, S. B. Moore; **Emeritus Associate Professors:** S. N. Chapman, J. K. McCreery, G. W. Smith; **Assistant Professors:** E. N. Ford, W. Gao, D. R. Matthews, J. A. Porterfield, E. Shim, M. Suh, A. J. West; **Research Assistant Professors:** N. Anantharamaiah, G. M. Garland, B. Maze, B. Yeom; **Teaching Professors:** H. Hamouda, 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 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 demonstrated proficiency in English technical writing course 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 Graduate Research Assistantships, Teaching Assistantships, or other assistantships and fellowships is available to a limited number of 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 [NCSU Graduate Catalog \(2017-2018\)](#) for current course information.

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[NCSU Graduate Catalog](#)

Textiles

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--------------------------|-------|-------|------|------|-----------|-------|-----|
| Textiles | | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

Y. Xu, Box 8301, yxu11@ncsu.edu, Textile and Apparel Management

Named Professors: R. L. Barker, D. Hinks, W. Oxenham; **Named Distinguished Professors:** B. Pourdeyehimi; **Named Distinguished University Professors:** A. B. Godfrey; **Professors:** T. G. Clapp, T. K. Ghosh, C. L. Istook, J. A. Joines, M. W. King, T. A. Lamar, K. K. Leonas, T. J. Little, S. Michielsen, M. M. Moore, A. M. Seyam, R. Shamey, X. Zhang; **Adjunct Professors:** D. A. Bruner, K. Mathur, W. G. O'Neal, T. W. Theyson; **Emeritus Named Professors:** S. K. Batra, M. W. Suh, S. C. Winchester; **Emeritus Professors:** R. A. Barnhardt, R. A. Donaldson, A. H. El-Shiekh, N. C. Powell, W. C. Stuckey; **Emeritus Distinguished Professors:** M. H. Mohamed; **Associate Professors:** K. E. Annett-Hitchcock, P. Banks-Lee, K. A. Barletta, H. H. Hergeth, G. L. Hodge, R. Kotek, L. L. Parrillo-Chapman, L. F. Rothenberg, Y. Xu; **Adjunct Associate Professors:** M. T. Fralix, G. M. Garland, J. Meng, M. A. Messura, S. B. Moore, E. D. Parrish; **Emeritus Associate Professors:** H. A. Davis, P. B. Hudson, M. L. Robinson, G. W. Smith; **Assistant Professors:** E. N. Ford, D. R. Matthews, J. A. Porterfield, E. Shim, M. Suh, A. J. West; **Research Assistant Professors:** G. M. Garland, B. Maze; **Teaching Associate Professors:** W. D. Harazin

NC State's College of Textiles, and the Department of Textile and Apparel, Technology and Management (TATM), prepares future leaders for the textile, apparel, home/furniture, fashion and retail industries. Based in Raleigh, North Carolina, undergraduate and graduate programs (Fashion and Textile Management; Fashion and Textile Design) incorporate global marketplace dynamics with a strategic management focus. Our graduates incorporate "art/design" + "science/technology" + "management" concepts in creative problem-solving. Our program is equipped with access to and experiences utilizing the latest industry technologies. The majority of the students have an enriching and intensive study abroad experience. Our program faculty works closely with industry partners, including the Department's 24-member Industry Advisory Board, to develop academic and experiential "real world" learning experiences. Student internships combined with a global alumni network provide an additional "value-added" experience, with our students prepared to make an immediate impact in diverse companies throughout the global supply chain. Career paths of our graduates are in the areas of: brand marketing, merchandising, retail, sourcing, private brand development, market analyst, design, product development, supply chain, and public relations and communications.

Master of Science in Textiles Degree: The objective of the Master of Science (MS) in Textiles is to prepare students for careers that require independent research skills, including designing, planning, and carrying out research projects. Students can choose to focus their studies in one of the following areas of specializations: Textile and Fashion Design, Retail and Brand Management, Textile Technology, and Textile Management. The MS degree requires a minimum of 36 hours of study including a thesis and typically takes 2 years to complete. Students interested in continuing with a Ph.D. in Textile Technology and Management (TTM) or Fiber and Polymer Science (FPS) are encouraged to pursue the MS degree.

Master of Textiles Degree: The Non-Thesis Master of Textiles (MT) program offers preparation and career advancement for students with interests in the design, management, and technological perspectives of the textile industry. The program is available on campus and online via Distance Education (DE) with flexibility to accommodate a breadth of student needs. The MT degree requires a minimum of 30 credit hours and can be completed in only two semesters (1 year) of full-time on campus study or up to a maximum of six (6) years for part time on-campus or DE students.

Accelerated Bachelor's and Master's Degrees: The Accelerated Bachelor's and Master's (ABM) degrees²⁹⁷ in the Department of Textile and Apparel, Technology and Management (TATM) are designed to provide exceptional undergraduate students in the Fashion and Textile Management (FTM) and Fashion and Textile Design (FTD) programs with the opportunity to complete a BS degree (in FTM or FTD) and a TATM Master's degree in 5 to 5 1/2 years. Students in the ABM program can choose to pursue a non-thesis track in which they can potentially complete a Master of Textiles (MT) degree within 12 months after obtaining a Bachelor's (BS) degree in FTM or FTD. Alternatively, students can choose the thesis track in which they can potentially complete a Master of Science in Textiles (MS) degree within the 18 months following obtaining a BS degree in FTM or FTD.

Admission Requirements: Students with a Bachelor of Science or a Bachelor of Arts degree may apply to either of the degree programs. Students apply with degrees in textiles, engineering, management, or design. The minimum acceptable overall Grade Point Average (GPA) is a 3.0 out of 4.0, based on most current U.S. universities. Students should have 20 credit hours in mathematics and natural sciences in their undergraduate degree. Degrees must be obtained from a four-year, accredited university. Graduate transfer credits can only be from other U.S. universities, and must be approved by the student's graduate committee. Certificates and diplomas are not recognized as undergraduate degrees.

Click [Application](#) for more information on application procedures and requirements.

Student Financial Support: Competitive 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 [Graduate Programs in TATM](#) for more details on degree requirements.

Click on [Graduate Courses - Textile Technology Management](#) for current course information.

[NCSU Graduate Catalog](#)

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:

J. C. Bonner, Box 7558, 919/515-8615, jcbonner@ncsu.edu, Biological Sciences

Named Professors: W. G. Cope, H. B. Patisaul; **Named Distinguished Professors:** R. R. Anholt, R. Roe; **Professors:** K. B. Adler, R. E. Baynes, J. C. Bonner, M. Breen, D. Buchwalter, D. J. Burke, J. M. Cullen, H. M. Hassan, J. M. Horowitz, M. Hyman, S. W. Kullman, S. M. Laster, J. M. Law, G. A. LeBlanc, E. G. Nichols, E. F. Rissman, P. L. Sannes, D. Shea, R. C. Smart, M. K. Stoskopf, J. Tsuji, Y. Tsuji; **Research Professors:** S. M. Belcher, A. R. Brody; **Adjunct Professors:** D. W. Threadgill, D. C. Zeldin; **Emeritus Professors:** E. Hodgson, R. B. Leidy, N. A. Monteiro-Riviere, J. F. Roberts; **Associate Professors:** J. A. Hoppin, C. Hoyo, C. J. Mattingly, N. M. Nascone-Yoder, D. M. Reif, M. Rodriguez-Puebla; **Assistant Professors:** D. L. Aylor, M. S. Bereman, M. A. Cowley, D. Fourches, A. J. Planchart; **Research Assistant Professors:** J. R. Hall, D. A. Skaar; **Adjunct Assistant Professors:** R. L. Langley

The Toxicology Program provides course work and research training to prepare prospective toxicologists and environmental health scientists for careers in academia, government, and industry. Research in the program spans an array of topics ranging from the molecular to population level consequences of toxicant exposure. Areas of research excellence within the program include elucidating relationships among cell signaling processes and stressor-induced disease and toxicity, establishing mechanisms of system-specific toxicity, using physiological and genomic approaches to understand differences in species and individual susceptibility to environmental contaminants, and unraveling gene-environment interactions. Some specific research areas include: apoptosis, endocrine disruption, trace metal bioaccumulation and detoxification, oxidative stress/gene regulation/cell toxicity, asthma and lung fibrosis, cancer and mutagenesis, ecotoxicology, developmental abnormalities, chemical exposure assessment and environmental epidemiology. Some examples of the types of environmental agents that are being investigated include chemical carcinogens, trace metals, pesticides, particulates metals, endocrine disruptors, nanoparticles and UVB 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 Quantitative GRE score in the 70th percentile. 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 an admissions committee. Students are encouraged to submit applications no later than January 15 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 interested in pursuing non-research careers in toxicology and environmental health science, and/or working professionals seeking to further their education and advance their careers. To accommodate working professionals the MTOX degree can be pursued on a part-time basis. A minimum of 30 credit hours is required, with at least 14 credit hours in toxicology courses.

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 students 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 [Environmental and Molecular Toxicology](#) web site.

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

Courses from Associated Departments

BIT 510 Core Technologies in Molecular and Cellular Biology
BIT 567 Polymerase Chain Reaction Technologies
BIT 568 Genome Mapping
BIT 569 RNA Purification and Analysis
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
CBS 754 Principles of Analytical Epidemiology CBS 762 Principles of Pharmacology
CBS 770 Cell Biology
CBS (TOX) 771 Cancer Biology
CBS 795A Special Topics: Veterinary Pathology I. General Pathology GN 820 Professional Development
HS 707 Environmental Stress Physiology MB 751 Immunology
MEA 540 Principles of Physical Oceanography MEA 750 Marine Benthic Ecology
PHY 503 General Physiology I PHY 504 General Physiology II
PHY 780 Mammalian Endocrinology
ZO 509 Ecology of Stream Invertebrates
ZO 513 Comparative Physiology
ZO 524 Comparative Endocrinology

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](#).

[NCSU Graduate Catalog](#)

Training and Development

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|--|-------|-------|------|------|-----------|-------|-----|
| Training and Development | | | | | | Y | |

GRADUATE FACULTY

Directors of Graduate Programs:

L. D. Fusarelli, Box 7801, 919/513-0507, lance_fusarelli@ncsu.edu, Educational Leadership, Policy and Human Development

M. E. Bartlett, Box 7801, mebartle@ncsu.edu, Educational Leadership, Policy and Human Development

S. Ting, Box 7801, 919/515-6362, ting@ncsu.edu, Educational Leadership, Policy and Human Development

Professors: D. Akroyd, T. W. Cawthon, A. J. Jaeger, S. R. Porter, A. N. Rockenbach; **Professors of the Practice:** R. G. Templin; **Adjunct Professors:** L. Gonzalez-Sullivan, B. A. Olson, R. S. Ralls; **Emeritus Named Professors:** C. E. Kasworm; **Emeritus Professors:** G. B. Vaughan; **Associate Professors:** S. J. Barcinas, J. E. Bartlett, T. A. Bowles, F. I. Chirino-Klevans, J. G. Gayles, B. S. Mehlenbacher, T. V. Young; **Adjunct Associate Professors:** S. C. Faircloth; **Assistant Professors:** L. R. Bass, C. D. Hoggan; **Adjunct Assistant Professors:** K. A. Boham, L. M. Chapman, D. K. Deardorff, K. G. Dixon, K. L. Ender, J. E. Fleming, B. J. Frye, E. V. Griffin, C. O. Grochowski, M. B. Jackowski, W. D. McInnis, W. D. Milheim, A. B. Orders, R. R. Parker, D. L. Reichard, D. D. Richmond, M. E. Rittling, S. C. Scott, J. W. Wescott, S. Williams, C. L. Zelna; **Teaching Professors:** D. D. Chapman; **Teaching Assistant Professors:** M. E. Bartlett, F. P. Riddick, C. L. Warren, C. C. Williams; **Lecturers:** B. J. Frye, N. T. Smith, C. C. Williams

The program area of Adult, Workforce and Continuing Professional Education within the Department of Educational Leadership, Policy and Human Development, offers an Ed.D. and an MED in Adult and Community College Education and an MED in Training and Development and a Graduate Certificate in Teaching, Training and Educational Technology. These programs are designed to meet the professional needs of leaders, administrators, program specialists, instructors, and consultants who serve in a variety of capacities in both formal and informal adult educational organizations and its inclusion of administrative, instructional and technology based leadership with a practitioner orientation.

Admissions Requirements: Specific information regarding Ed.D. admissions and degree information may be found at web site; <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Apply online and check the status of your application at: <http://www.ncsu.edu/grad/applygrad.htm>.

Master's Program Requirements: Master's programs in Adult and Community College Education, and Training and Development require 36 semester hours. Admissions for the masters programs may be found at the following web site; <https://ced.ncsu.edu/programs/adult-workforce-and-continuing-professional-education-program-master/>

Ed.D. Program Requirements: Information on the Ed.D program may be found at the following program URL: <https://ced.ncsu.edu/programs/doctoral-adult-and-community-college-education/> Graduate Certificate in Teaching, Training and Educational Technology: See the following URL for information on the graduate certificate. <https://ced.ncsu.edu/programs/teaching-training-educational-technology-certificate/>

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

Upstream Biomanufacturing (Certificate)

Director of Graduate Certificate Programs:

Michael Flickinger

BTEC-Biomfg Training Ed Ctr

Phone: 919/515-0175

Email: mcfllicki@ncsu.edu

Website: http://www.btec.ncsu.edu/academic/graduate/graduate_certificate.php

Graduate students and working professionals can now earn a new credential to kick-start or advance their career in the biopharmaceutical industry. Applications are currently being accepted for two new BTEC graduate certificate programs. The Upstream Biomanufacturing graduate certificate offers NC State graduate students and working professionals the opportunity for hands-on learning in BTEC's industry-scale simulated cGMP facilities.

Each certificate requires 12 hours of graduate coursework, which can be transferred to the Master of Biomanufacturing program. The majority of BTEC's graduate courses are offered in the evening or online to better accommodate working professionals.

Admission Requirements: Applicants must apply to the Graduate School <http://www.ncsu.edu/grad/applygrad.htm>. Those applicants who are currently enrolled in an NC State graduate program need only provide the Graduate Student Certificate Plan Data Entry forms, <http://ncsu.edu/grad/faculty-and-staff/docs/grad-cert-plan-data-entry.pdf>. An application for acceptance into a certificate programs is required for all new applicants once the student has:

1. either have graduated with a baccalaureate degree in a science or engineering discipline with a minimum GPA of 3.0 or
2. have complete one or more 500+ level BEC courses which satisfy the certificate requirement with a grade of B- or better on the first enrollment in every course completed.

Certificate Degree Requirements: To earn the Graduate Certificate in Upstream Biomanufacturing, students must complete the following list of unique core courses and complete one or more elective course for a minimum total of 12 credit hours. The grade in each course for the Certificate must either be B- or higher and the over-all GPA for the Certificate courses must be 3.00 minimum. Graduate certificates are limited to 1 400 level course.

Transfer credit from other institutions will not be allowed for the Certificate. All course work must be registered through NC State University.

Required Unique Courses (9 credits total)

CHE 563 Fermentation of recombinant microorganisms (2 credits)

BBS 526 Upstream biomanufacturing laboratory (2 credits)

BEC 580 cGMP Fermentation operations (2 credits)

BEC 577 Advanced Biomanufacturing and Biocatalysis (3 credits)

Additional Courses (Minimum of 3 credits total)

BEC 575 Global regulatory affairs (3 credits)

MBA 554 Project Management (3 credits) or ISE 589 Project Management for Engineers (3 credits)

BIT 566 Animal Cell Culture Techniques (2 credits)

BEC 488 Cell Culture Engineering (2 credits)

BEC 440 Expression Systems in Biomanufacturing (3 credits) or BIT 510 Core Technologies in Molecular and Cellular Biology (4 credits)

The certificate in Upstream Biomanufacturing requirements must be completed within four (4) calendar years, beginning with the date the student commences courses applicable to the Certificate. Students who complete the

certificate in Upstream Biomanufacturing may obtain more than one certificate. However, each certificate must have at least nine (9) hours of BEC course work which are unique to it.

Other Relevant Information: A unique, cross-disciplinary instructional center, the Golden LEAF Biomanufacturing Training and Education Center (BTEC) provides educational and training opportunities to develop skilled professionals for the biomanufacturing industry and create the best-trained, most industry-focused workforce possible.

[NCSU Graduate Catalog](#)

Water Resources (Minor Program)

Josh Heitman, Chair
 Soil Science
 3410A Williams Hall
 NCSU Box 7619
 Phone: 919.513.1593
 Email: jheitman@ncsu.edu

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 584 Introduction to Fluvial Geomorphology
 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

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

Watershed Assessment and Restoration (Certificate)

Director of Graduate Certificate Programs:

John Classen

Biological And Agricultural En

Phone: 919/515-6755

Email: john_classen@ncsu.edu

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 574 Drainmod
 BAE 575 Design of Structural Stormwater Best Management Practices
 BAE 576 Watershed Monitoring and Assessment
 BAE 578 Agricultural Waste Management
 BAE 579 Stream Channel Assessment and Restoration
 BAE 580 Introduction to Land and Water Engineering
 BAE 581 Open Channel Hydraulics for Natural Systems
 BAE 582 Risk and Failure Assessment of Stream Restoration Structures
 BAE 583 Ecohydraulics and River Corridor Function
 BAE 585 Integrating AutoCAD, Civil3D, and GIS
 BAE 590 Introduction to Fluvial Geomorphology
 BAE 590 GIS Applications in Precision Agriculture
 BAE 590 Wetland Design
 BAE 590 Water / Nutrient Management for Sustainability
 BAE 590 Biogeochemical Processes
 BAE 771 Theory of Drainage – Saturated Flow
 BAE 774 Theory of Drainage – Unsaturated Flow

Up to 3 Credit Hours may 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

[NCSU Graduate Catalog](#)

Women's and Gender Studies (Minor Program)

Karey Harwood, PhD
Coordinator, Women's and Gender Studies
Associate Professor
Department of Philosophy and Religious Studies
Phone: 919-515-6383
Email: karey_harwood@ncsu.edu

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 with a B or better in each course.
- 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.
- Because the Minor is an interdisciplinary one, at least one of the courses needs to be in a field different from that of the graduate program in which the student is enrolled.
- All courses must be taught by the Women's and Gender Studies Affiliated Faculty.
- An Affiliated Faculty member (not in the field of the degree graduate program) must sit on the master's or dissertation committee.

Youth Development and Leadership (Certificate)

Director of Graduate Certificate Programs:

Kimberly Allen

Agricultural & Human Sciences

Phone:

Email: kiallen@ncsu.edu

The Youth, Family, and Community Sciences (YFCS) academic program at North Carolina State University offers three graduate distance education programs designed to prepare and strengthen the careers of those who work with youth and/or families in community-based settings.

The Youth, Family, and Community Sciences Online Graduate Certificate in ***Youth Development and Leadership*** specifically prepares students to work as leaders in youth-serving organizations. Students will gain a more comprehensive understanding of youth development, as well as an applied understanding of strengths-based leadership skills, designed to provide oversight, preventative education, enrichment opportunities, and/or resources intended to strengthen, improve, or enhance youth development and organizational administration.

Admissions: Students apply online at <http://www.ncsu.edu/grad/applygrad.htm>

Requirements: A Graduate Certificate in Youth Development Leadership requires a total of 12 credit hours. Six (6) credit hours are required courses, with the remaining six (6) credit hours of electives. All courses are offered online only.

Required Courses (6 credit hours)

YFCS 550 Youth and Family Professionals as Leaders

YFCS 553 Applied Concepts in Child and Youth Development

Electives (6 credit hours)

Approved YFCS course related to organizational administration

Approved YFCS course related to youth or family development

[NCSU Graduate Catalog](#)

Youth, Family, and Community Sciences

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|---|-------|-------|------|------|-----------|-------|-----|
| Youth, Family, and Community Sciences | | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

K. I. Allen, Box 7606, kiallen@ncsu.edu, Agricultural and Human Sciences

Named Distinguished Professors: M. D. Schulman; **Professors:** P. C. Dunn, S. D. Kirby, B. Silliman; **Emeritus Professors:** K. B. DeBord, J. W. McClelland, T. T. McKinney; **Associate Professors:** K. I. Allen, L. B. Bearon, A. O. Behnke, C. L. Bird, B. J. Chapman, H. C. Edwards; **Emeritus Associate Professors:** D. W. Matthews, R. M. Stewart; **Assistant Professors:** J. D. Bloom, A. M. Hardison-Moody, L. H. Haynes-Maslow; **Extension Assistant Professors:** S. S. Jakes, M. N. Stumpf

The Youth, Family & Community Sciences Program 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:

Master of Science in Youth, Family, and Community Sciences (M.S. requires 36 total hours including a thesis)

Master of Youth, Family, and Community Sciences (M.R. requires 30 hours and a culminating supervised professional experience)

Admission Requirements: Students apply through NC State via the normal Graduate School admissions procedures; applications are reviewed twice each year on March 1 and October 1. All application materials must be submitted electronically (online); mailed or faxed materials are not accepted. Only complete applications 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. 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 Youth, Family, and Community Sciences (M.S.) requires 36 hours culminating in a final oral examination and thesis approved by the student's graduate committee. The Master of Youth, Family, and Community Sciences (M.R.) is a non-thesis degree that requires a total of 30 credit hours culminating in a capstone supervised professional experience. 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. 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, and

synchronous Internet based classes. The M.R. and M.S. programs may be successfully completed totally via distance.

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

[NCSU Graduate Catalog](#)

Zoology

Degrees Offered:

| Program Title | Ph.D. | Ed.D. | M.S. | M.A. | Master of | M.Ed. | MFA |
|-------------------------|-------|-------|------|------|-----------|-------|-----|
| Zoology | Y | | Y | | Y | | |

GRADUATE FACULTY

Director of Graduate Programs:

R. E. Irwin, Box 7617, reirwin@ncsu.edu, Zoology

Named Professors: W. G. Cope, R. R. Dunn, N. M. Haddad, H. B. Patisaul; **Named Distinguished Professors:** R. R. Anholt; **Named Distinguished University Professors:** T. F. MacKay; **Professors:** D. D. Aday, B. L. Black, R. J. Borski, D. Buchwalter, J. A. Buckel, H. V. Daniels, D. B. Eggleston, J. R. Godwin, K. Gross, J. M. Hinshaw, R. E. Irwin, C. A. Layman, T. M. Losordo, J. A. Rice, A. H. Ross, M. H. Schweitzer, D. Shea; **Research Professors:** S. M. Belcher, T. G. Wolcott; **USDI Professors:** J. A. Collazo, T. J. Kwak, T. R. Simons; **Adjunct Professors:** A. E. Bogan, J. G. Boreman, J. J. Govoni, J. E. Hightower, G. McMahon, J. Rogers, F. S. Scharf; **Emeritus Professors:** P. T. Bromley, B. J. Copeland, F. T. Corbin, P. D. Doerr, W. C. Grant, R. M. Grossfeld, T. L. Grove, H. F. Heatwole, R. A. Lancia, R. L. Noble, K. H. Pollock, J. F. Roberts, D. E. Smith, H. A. Underwood, J. G. Vandenberg, T. G. Wolcott; **Associate Professors:** R. B. Langerhans, C. J. Mattingly, N. M. Nascone-Yoder, M. Niedzlek-Feaver; **Adjunct Associate Professors:** A. B. Heckert, R. M. Shelley, B. L. Stuart; **Assistant Professors:** L. A. McGraw, J. E. Meitzen, J. K. Pacifici, A. J. Planchart, B. J. Reading, R. B. Roberts, B. W. Taylor; **Research Assistant Professors:** J. R. Fischer, M. B. Reiskind, A. A. Smith, L. E. Zanno; **Adjunct Assistant Professors:** A. E. Bogan, D. T. Cobb, L. B. Daniel, M. J. Eaton, R. J. Heise, C. J. Kendall, R. W. Laney, A. J. McKerrow, J. A. Morris, K. W. Shertzer, A. J. Terando; **Teaching Associate Professors:** J. L. Campbell, M. D. Engell, M. G. Ferzli, J. L. Lubischer, L. D. Parks; **Teaching Assistant Professors:** M. Hawkins

Areas of study include: cell biology, physiology, ecology, evolution, behavior, and fisheries, wildlife and conservation 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: It is important that you identify a potential faculty adviser, as this will greatly increase your chance of admission to NCSUs Biology Department. Although all applications are made available to faculty advisers for review, a graduate student will not be admitted to the Biology Department for graduate studies unless the prospective student has identified a faculty adviser. Once a faculty adviser has requested review of prospective student, the application is then evaluated with regard to the applicants' potential for success in graduate school only at the request of a faculty adviser. The admissions process involves consideration of the ability of our program to accommodate students.

Successful applicants usually have a Bachelor's degree in a biological science with at least an overall B average and a minimum number of courses in biology and supporting fields (6 in biology, 4 in chemistry, 2 in physics, and 2 in mathematics). In addition to the applicant's grades and coursework, we consider relevant experience (e.g., through

internships, NC State University Graduate Catalog (2017-2018) of interest, letters of recommendation, and GRE scores. We expect applicants for the MS degree to have at least a 3.0 GPA and a combined score of at least 295 (new GRE scale) or 1000 (old scale) on the quantitative and verbal GREs. For PhD applicants we look for a GPA of at least 3.2 and combined GRE of at least 308 (new GRE scale) or 1200 (old scale). 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.

[NCSU Graduate Catalog](#)

Graduate Faculty

Abbasi, Morteza, Research Assistant Professor, Electrical & Computer Engr.

Abbate, Angelo R, Emeritus Professor, Landscape Architecture

Abdel Khalik, Hany Samy, Adjunct Associate Professor, Nuclear Engineering

Abolhasani, Milad, Assistant Professor, Chemical & Biomolecular Engr

Abrams, Charlie F., Emeritus Professor, Biological And Agricultural En

Abrams, Robin Fran, Professor, Architecture

Abt, Karen L, Adjunct Professor, For & Envir Res Acad Research

Abt, Robert Carroll, Named Professor, For & Envir Res Acad Research

Acosta, Juan Jose, Research Assistant Professor, CAMCORE-Cooperative

Adams, Jacob James, Assistant Professor, Electrical & Computer Engr.

Aday, David Derek, Professor, Applied Ecology

Addor, Mary Lou, Adjunct Assistant Professor, Personal Org. Development

Ade, Harald, Professor, Physics

Adin, Christopher Andrew, Associate Professor, Dept of Clinical Sciences

Adin, Darcy Brittain, Adjunct Assistant Professor, Dept of Clinical Sciences

Adler, Kenneth B., Professor, Dept Molecular Biomedical Scie

Adler, William, Distinguished University Professor, Philosophy & Religious Studies

Agvaanluvsan, Undraa, Adjunct Professor, Physics

Ahalt, Stanley Carlton, Adjunct Professor, Computer Science-engr

Ahiska, Semra Sebnem, Adjunct Assistant Professor, Fitts Dept Indust & Syst Engr

Aiyyer, Anantha, Associate Professor, Marine, Earth And Atmospheric

Akpa, Belinda Sena, Assistant Professor, Dept Molecular Biomedical Scie

Akroyd, Duane, Professor, ELPHD

Albada-Jelgersma, Kelly, Lecturer, Communication

Albert, Alex, Assistant Professor, Civil Const & Environ Engineer

Alder, Ruth A., Emeritus Associate Professor, Foreign Languages And Literatu

Aldige, Virginia M, Emeritus Named Professor, Sociology & Anthropology

Alexander, Samuel T., Associate Professor, Electrical & Computer Engr.

Alexander, Winsor E., Emeritus Professor, Electrical & Computer Engr.

Alexanderian, Alen, Assistant Professor, Mathematics

Allaire, Jason Christopher, Associate Professor, Psychology

Allbritton, Nancy Lynn, Professor, Biomedical Program - ENG

Allen, George C, Emeritus 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., Associate Professor, Agricultural & Human Sciences

Allen, Nina S, Emeritus Professor, Plant and Microbial Biology

Allen, Steven G., Professor, MBA Program-Poole COM

Allen, Tania Leigh, Assistant Professor, Art and Design

Alley, Mark L, Adjunct Associate Professor, Dept-Population,Health,Pathobi

Almond, Glen William, Professor, Dept-Population,Health,Pathobi

Alonso, Jose Miguel, Named Professor, Plant and Microbial Biology

Alonso, Silvia T., Emeritus Associate Professor, Foreign Languages And Literatu

Alston-Mills, Brenda P, Emeritus Professor, Animal Science

Amatya, Devendra M, Adjunct Associate Professor, Biological And Agricultural En

Ambaras, David R, Associate Professor, History

Amein, Michael, Emeritus Professor, Civil Const & Environ Engineer

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, Crop & Soil Sciences

Anantharamaiah, Nagendra, Research Assistant Professor, Textile Engineering, Chemistry

Anderson, Kenneth E, Professor, Prestage Poultry Science

Anderson, Kevin L., Professor, Dept-Population,Health,Pathobi

Anderson, Norman Dean, Emeritus Professor, Sci, Tech, Engr & Math (STEM)

Andrews, Janice M, Adjunct Associate Professor, Dept-Population,Health,Pathobi

Aneja, Viney Pal, Professor, Marine, Earth And Atmospheric

Ange-Van Heugten, Kimberly Dawn, Teaching Assistant Professor, Animal Science

Anholt, Robert R, Named Distinguished Professor, Biological Sciences

Anistratov, Dmitriy Y, Associate Professor, Nuclear Engineering

Annett-Hitchcock, Katherine Emma, Associate Professor, Textile & Apparel, Technology

Anson, Christopher M, Distinguished University Professor, English

Anton, Ana I, Adjunct Professor, Computer Science-engr

Apperson, Charles S., Emeritus Named Professor, Entomology & Plant Pathology

Appling, Tracy Ann, Teaching Assistant Professor, Public & International Affairs

Arasu, Prema, Professor, Dept Molecular Biomedical Scie

Archer, Trevor Keith, Adjunct Professor, Dept-Population,Health,Pathobi

Ardon Sayao, Marcelo Luise, Assistant Professor, For & Envir Res Acad Research

Arellano, Consuelo, Research Associate Professor, Statistics

Arends, James J., Adjunct Professor, Entomology & Plant Pathology

Argyropoulos, Dimitris S, Professor, Forest Biomaterials

Armstrong, Helen Saunders, Associate Professor, Graphic & Industrial Design

Arnold, Alison E., Teaching Assistant Professor, Interdisciplinary Studies, Music

Arnold, John F., Emeritus Associate Professor, TELS

Arumugam, Sankarasubramanian, Professor, Civil Const & Environ Engineer

Arya, Satya Pal Singh, Emeritus Professor, Marine, Earth And Atmospheric

Ascencio-Ibanez, Jose Trinidad, Teaching Assistant Professor, Biochemistry

Ash, Sarah L, Professor, Food,Bioprocess & Nutrition Sc

Ashrafi, Hamid, Assistant Professor, Horticultural Science

Ashwell, Christopher M., Professor, Prestage Poultry Science

Aspnes, David E, Distinguished University Professor, Physics

Atchley, William Reid, Emeritus Named Distinguished Professor, Biological Sciences

Atkins, Clarke E., Emeritus Distinguished Professor, Dept of Clinical Sciences

Atkinson, Maxine P., Professor, Sociology & Anthropology

Attarian, Aram, Associate Professor, Parks, Recreation & Tourism Mg

Auerbach, David D., Emeritus Assistant Professor, Philosophy & Religious Studies

Augustyn, Veronica, Assistant Professor, Materials Science &Engineering

Aurand, Leonard W., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Austin, David Franklin, Associate Professor, Philosophy & Religious Studies

Averre, Charles W, Emeritus Professor, Entomology & Plant Pathology

Avery, Gene Brooks, Adjunct Associate Professor, Marine, Earth And Atmospheric

Avramova, Maria Nikolova, Associate Professor, Nuclear Engineering

Axtell, Richard C., Emeritus Professor, Entomology & Plant Pathology

Aylor, David Lawrence, Assistant Professor, Biological Sciences

Ayoub, Ali, Adjunct Assistant Professor, Forest Biomaterials

Ayoub, Mahmoud A., Emeritus Professor, Fitts Dept Indust & Syst Engr

Azevedo, Roger, Professor, Psychology

Aziz, Tarek, Assistant Professor, Civil Const & Environ Engineer

Azmy, Yousry Y, Distinguished Professor, Nuclear Engineering

Bachelor, Jack S., Emeritus Professor, Entomology & Plant Pathology

Bachmann, Klaus J., Emeritus Professor, Materials Science & Engineering

Bahler, Dennis R, Associate Professor, Computer Science-engr

Bailey, Christopher Scott, Associate Professor, Dept of Clinical Sciences

Bailey, John A., Emeritus Professor, Mechanical & Aerospace Engr

Bailey, Kermit L, Associate Professor, Graphic & Industrial Design

Baines, Barbara Joan, Emeritus Professor, English

Bakalov, Bojko Nentchev, Associate Professor, Mathematics

Baker, Anne, Associate Professor, English

Baker, George A, Emeritus Named Distinguished Professor, ELPHD

Baker, James R., Emeritus Professor, Entomology & Plant Pathology

Baker, Meecee M., Adjunct Professor, Agricultural & Human Sciences

Baker, Rodney B, Clinical Associate Professor, Dept-Population, Health, Pathobi

Baker, Stanley B, Professor, ELPHD

Baker-Ward, Lynne Elizabeth, Professor, Psychology

Balaban, John, Professor, English

Balaban, Robert S, Adjunct Professor, Dept-Population, Health, Pathobi

Baldwin, Tameshia Ballard, Teaching Assistant Professor, Engineering-Academic Affairs

Baliga, B. Jayant, Distinguished University Professor, Electrical & Computer Engr.

Balik, Charles M., Professor, Materials Science & Engineering

Balik, Suzanne M, Teaching Assistant Professor, Computer Science-engr

Balint-Kurti, Peter J., USDA Associate Professor, Entomology & Plant Pathology

Ball, David S., Emeritus Associate Professor, Economics-Poole COM

Ball, Hershell R., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Ballinger, Walter Elmer, Emeritus Professor, Horticultural Science

Ballington, James R., Emeritus Professor, Horticultural Science

Banker, James R., Emeritus Professor, History

Banks, Harvey Thomas, Named Distinguished University Professor, Mathematics

Banks-Lee, Pamela, Associate Professor, Textile Engineering, Chemistry

Baran, Mesut E, Professor, Electrical & Computer Engr.

Baran, Perver Korca, Research Associate Professor, Ctr. for Geospatial Analytics

Barbieri, Carla E, Associate Professor, Parks, Recreation & Tourism Mg

Barcinas, Susan J, Associate Professor, ELPHD

Bardaka, Eleni, Assistant Professor, Civil Const & Environ Engineer

Bardon, Robert E, Professor, Forestry Extension

Barker, Roger L., Named Professor, Textile Engineering, Chemistry

Barlaz, Morton A, Distinguished University Professor, Civil Const & Environ Engineer

Barletta, Kristin Anne, Associate Professor, Textile & Apparel, Technology

Barnes, Harold J., Professor, Dept-Population,Health,Pathobi

Barnes, Tiffany M, Professor, Computer Science-engr

Barnhardt, Robert A, Emeritus Professor, Textile & Apparel, Technology

Barnhardt, William Wilton, Professor, English

Baron, Dror Zeev, Associate Professor, Electrical & Computer Engr.

Barr, Steve H, Professor, Mgmt, Innovation&Entrepreneur

Barrangou, Rodolphe, Associate Professor, Food,Bioprocess & Nutrition Sc

Barrax, Gerald W., Emeritus Professor, English

Barrie, Thomas M, Professor, Architecture

Bartlett, James E, Associate Professor, ELPHD

Bartlett, Michelle E, Teaching Assistant Professor, ELPHD

Bartley, Jon W., Professor, Accounting-Poole COM

Bass, Lisa R, Assistant Professor, ELPHD

Bassett, Ross Knox, Professor, History

Basu, Sukanta, Adjunct Associate Professor, Marine, Earth And Atmospheric

Batchelor, Peter, Emeritus Professor, Architecture

Bateman, Durward F., Emeritus Professor, Dean's Office - CALS

Bates, John Joseph, Adjunct Professor, Marine, Earth And Atmospheric

Batra, Subhash K., Emeritus Named Professor, Textile & Apparel, Technology

Battestilli, Tzvetelina, Teaching Assistant Professor, Computer Science-engr

Baugh, John W, Professor, Civil Const & Environ Engineer

Baughman, Gerald R., Emeritus Associate Professor, Biological And Agricultural En

Baumer, David L., Emeritus Professor, Business Management-Poole COM

Baxter, Martin A, Adjunct Associate Professor, Marine, Earth And Atmospheric

Baynes, Ronald E, Professor, Dept-Population,Health,Pathobi

Beal, Candy M, Associate Professor, TELS

Bean, Eban Zachary, Adjunct Assistant Professor, Biological And Agricultural En

Bearon, Lucille B, Associate Professor, Agricultural & Human Sciences

Beasley, Mark S, Named Professor, Accounting-Poole COM

Becchi, Michela, Associate Professor, Electrical & Computer Engr.

Beck, Keith R., Professor, Textile Engineering, Chemistry

Beckman, Gary Dean, Teaching Professor, Music

Beckstead, Robert Byron, Associate Professor, Prestage Poultry Science

Bedair, Salah M. A., Named Professor, Electrical & Computer Engr.

Begeny, John Charles, Associate Professor, Psychology

Beghin, John Christopher, Professor, Ag & Resource Economics

Behnke, Andrew O, Associate Professor, Agricultural & Human Sciences

Beichner, Robert J, Professor, STEM:Science,Tech,Engin,&Math

Beisel, Chase, Associate Professor, Chemical & Biomolecular Engr

Belcher, Scott M, Research Professor, Biological Sciences

Bell, Bryan, Associate Professor, Architecture

Bell, Geoffrey Weszely, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Belmont, Patrick William, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Benge, Drinda Elaine, Teaching Assistant Professor, TELS

Bennett, Barbara A, Associate Professor, English

Benson, David M., Professor, Entomology & Plant Pathology

Benson, Geoffrey A., Emeritus Professor, Ag & Resource Economics

Bereman, Michael S., Assistant Professor, Biological Sciences

Bereman, Robert D., Emeritus Professor, Chemistry

Berenhaut, Kenneth Stephen, Adjunct Assistant Professor, Mathematics

Berenson, Sarah B., Professor, Sci, Tech, Engr & Math (STEM)

Berglund, Emily Zechman, Associate Professor, Civil Const & Environ Engineer

Bernhard, Richard Harold, Emeritus Professor, Fitts Dept Indust & Syst Engr

Bernholc, Jerzy, Named Professor, Physics

Berreth, Todd Michael, Assistant Professor, Art and Design

BERRIDGE, Brian R, Adjunct Associate Professor, Dept-Population,Health,Pathobi

Berry-James, Rajade M, Associate Professor, Public & International Affairs

Berube, David Michael, Professor, Communication

Betts, John T., Adjunct Professor, Mathematics

Beute, Marvin K., Emeritus Professor, Entomology & Plant Pathology

Bhattacharya, Subhashish, Professor, Electrical & Computer Engr.

Bhattacharya, Sudin, Adjunct Assistant Professor, Mathematics

Bhattacharyya, Bibhut, Professor, Statistics

Bhawe, Nachiket Meghashyam, Assistant Professor, Mgmt, Innovation&Entrepreneur

Bigelow, Anna Barry, Associate Professor, Philosophy & Religious Studies

Bilderback, Theodore E., Emeritus Professor, Horticultural Science

Bilenkin, Vladimir, Associate Professor, Foreign Languages And Literatu

Binder, Andrew Ray, Associate Professor, Communication

Bingham, William L., Emeritus Associate Professor, Civil Const & Environ Engineer

Bird, Carolyn L., Associate Professor, Agricultural & Human Sciences

Bird, David M, Named Professor, Entomology & Plant Pathology

Birgand, Francois Philippe, Associate Professor, Biological And Agricultural En

Birkenheuer, Adam Joseph, Professor, Dept of Clinical Sciences

Birkland, Thomas A, Named Distinguished Professor, Dean's Office Research

Bishir, John William, Emeritus Professor, Mathematics

Bishop, Paul Edward, Emeritus USDA Professor, Plant and Microbial Biology

Bishop, Stuart Paul, Assistant Professor, Marine, Earth And Atmospheric

Bitting, Paul F., Emeritus Associate Professor, ELPHD

Bitzer, Donald L., Distinguished University Professor, Computer Science-engr

Bivins, Jason Caulfield, Professor, Philosophy & Religious Studies

Bizikova, Petra, Assistant Professor, Dept of Clinical Sciences

Bizios, Georgia, Emeritus Professor, Architecture

Black, Betty L., Professor, Biological Sciences

Black, Robert X, Adjunct Associate Professor, Marine, Earth And Atmospheric

Blackley, Brian, Teaching Associate Professor, English

Blair, Neal Edward, Adjunct Professor, Marine, Earth And Atmospheric

Blanchard, Margaret R., Associate Professor, Sci, Tech, Engr & Math (STEM)

Bland, George F., Emeritus Associate Professor, Electrical & Computer Engr.

Blank, Gary B., Associate Professor, For & Envir Res Acad Research

Blank, Philip E., Emeritus Professor, English

Blankenship, Sylvia M., Professor, CALS - Academic Programs

Blanton, Richard L., Professor, Plant and Microbial Biology

Blikslager, Anthony T, Professor, Dept of Clinical Sciences

Bloem, Stephanie, Adjunct Associate Professor, Entomology & Plant Pathology

Blondin, John Michael, Professor, College of Sciences Research

Bloom, Jessica Dara, Assistant Professor, Agricultural & Human Sciences

Blum, Udo, Emeritus Professor, Plant and Microbial Biology

Bobashev, Georgiy, Adjunct Assistant Professor, Statistics

Bobko, Christopher P, Adjunct Associate Professor, Civil Const & Environ Engineer

Bocarro, Jason N., Professor, Parks, Recreation & Tourism Mg

Bochinski, Jason Russell, Research Assistant Professor, Physics

Bociu, Lorena Viorica, Associate Professor, Mathematics

Boettcher, William A, Associate Professor, Public & International Affairs

Bogan, Arthur E, Adjunct Professor, Applied Ecology, Dept-Population,Health,Pathobi

Bogdanovich, Alexander, Adjunct Professor, Textile Engineering, Chemistry

Boggs, Belle McQuaide, Associate Professor, English

Boham, Kenneth Arnold, Adjunct Assistant Professor, ELPHD

Bohlmann, Jonathan D, Professor, Business Management-Poole COM

Bohnenstiehl, DelWayne R, Associate Professor, Marine, Earth And Atmospheric
Bohorquez, Elaine B, Teaching Assistant Professor, Physiology Program
Boles, Michael A., Associate Professor, Mechanical & Aerospace Engr
Bollmer, Grant, Assistant Professor, Communication
Bolonyai, Agnes, Associate Professor, English
Bolotnov, Igor A, Associate Professor, Nuclear Engineering
Bondell, Howard D, Professor, Statistics
Bonham, Julia C., Teaching Assistant Professor, History
Bonner, James C, Professor, Biological Sciences
Booker, Matthew Morse, Associate Professor, History
Boone, Deborah A, Adjunct Associate Professor, Agricultural & Human Sciences
Boone, Kofi Malik, Associate Professor, Landscape Architecture
Boos, Dennis D., Professor, Statistics
Borden, Robert C., Emeritus Professor, Civil Const & Environ Engineer
Borden, Roy H., Emeritus Professor, Civil Const & Environ Engineer
Boreman, John G., Adjunct Professor, Applied Ecology
Borkowski, Kazimierz, Research Professor, Physics
Borski, Russell J, Professor, Biological Sciences
Borst, Luke B, Associate Professor, Dept-Population,Health,Pathobi
Boss, Charles B., Associate Professor, Chemistry
Boss, Wendy F., Emeritus Named Professor, Plant and Microbial Biology
Bostick, George W., Emeritus Professor, Agricultural & Human Sciences
Boston, Rebecca S., Named Distinguished Professor, Administration - Research Serv
Bottomley, Laura J, Teaching Associate Professor, Engineering-Academic Affairs, TELS
Bourham, Mohamed Abdelhay, Professor, Nuclear Engineering
Bowden, A. Brooks, Assistant Professor, ELPHD
Bowden, Edmond F., Professor, Chemistry
Bowden, Jared H, Adjunct Assistant Professor, Marine, Earth And Atmospheric
Bowen, Sarah K, Associate Professor, Sociology & Anthropology
Bowers, Crowell G., Emeritus Professor, Biological And Agricultural En
Bowles, Tuere A., Associate Professor, ELPHD

Bowman, Daniel C, Professor, Crop & Soil Sciences

Bowman, Daryl T., Emeritus Professor, Crop & Soil Sciences

Boyd, Leon Carl, Emeritus Professor, Food,Bioprocess & Nutrition Sc

Boyd, Raymond Dean, Adjunct Professor, Animal Science

Boyer, Kristy Elizabeth, Adjunct Assistant Professor, Computer Science-engr

Boyette, Michael D, Named Professor, Biological And Agricultural En

Boyles, James C, Teaching Assistant Professor, History

Boyles, Ryan P, Adjunct Associate Professor, Marine, Earth And Atmospheric

Boys, Kathryn Ann, Assistant Professor, Ag & Resource Economics

Boyter, Henry Alfred, Adjunct Assistant Professor, Textile Engineering, Chemistry

Bozarth, Cecil C, Professor, Business Management-Poole COM

Bozkurt, Alper Yusuf, Associate Professor, Electrical & Computer Engr.

Braden, Jeffery P, Professor, College Of Humanities & Soc SC

Bradford, Marianne, Professor, Accounting-Poole COM

Bradford, Philip David, Associate Professor, Textile Engineering, Chemistry

Bradley, Julius R., Emeritus Professor, Entomology & Plant Pathology

Bradley, Lucy K, Associate Professor, Horticultural Science

Bradley, Michael Lee, Adjunct Assistant Professor, Dept-Population,Health,Pathobi

Braga, Cristina, Teaching Assistant Professor, ELPHD

Bragg-Sitton, Shannon Michelle, Adjunct Professor, Nuclear Engineering

Braham, Richard Riley, Professor, For & Envir Res Acad Research

Brake, John Thomas, Named Distinguished Professor, Prestage Poultry Science

Brandeis, Susan D., Professor, Art and Design

Brandenburg, Rick Lynn, Named Distinguished Professor, Entomology & Plant Pathology

Brander, Bryan, Adjunct Assistant Professor, ELPHD

Branson, Bruce C, Professor, Accounting-Poole COM

Braun, Scott Anthony, Adjunct Associate Professor, Marine, Earth And Atmospheric

Braunbeck, Helga G, Associate Professor, Foreign Languages And Literatu

Brazel, Joseph F., Professor, Accounting-Poole COM

Breen, Matthew, Professor, Dept Molecular Biomedical Scie

Breidt, Frederick, USDA Professor, Food,Bioprocess & Nutrition Sc

Breitschwerdt, Edward Bealmear, Professor, Dept of Clinical Sciences

Brennan, Michael, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Brenner, Donald W, Named Distinguished Professor, Materials Science & Engineering

Bressler, Eugene H, Professor, Landscape Architecture

Breuhaus, Babetta Ann, Associate Professor, Dept of Clinical Sciences

Bridgwater, Floyd Emmitt, USDA Professor, For & Envir Res Acad Research

Brill, Earl Downey, Professor, Civil Const & Environ Engineer

Brisson, Robert C., Emeritus Associate Professor, Sociology & Anthropology

Brody, Arnold R., Research Professor, Dept Molecular Biomedical Scie

Bromley, Peter T, Emeritus Professor, Applied Ecology

Brookins, Craig C, Associate Professor, Psychology

Brooks, Wayne M., Emeritus Professor, Entomology & Plant Pathology

Broome, Stephen W., Professor, Crop & Soil Sciences

Brothers, Gene Leroy, Associate Professor, Parks, Recreation & Tourism Mg

Brown, Alvin B., Named Professor, Ag & Resource Economics

Brown, Ashley Carson, Assistant Professor, Biomedical Program - ENG

Brown, Christopher S, Adjunct Professor, Plant and Microbial Biology

Brown, Dennis T, Professor, Biochemistry

Brown, Henry S., Emeritus Professor, Marine, Earth And Atmospheric

Brown, James W, Professor, Biological Sciences

Brown, John D, Professor, Physics

Brown, Otis B, Research Professor, NC Inst of Climate Studies

Brown, Talmage T., Professor, Dept-Population, Health, Pathobi

Brown, Zachary Steven, Assistant Professor, Ag & Resource Economics

Brown-Guedira, Gina, USDA Professor, Crop & Soil Sciences

Brownie, Cavell, Emeritus Professor, Statistics

Bruce, Jacklyn A, Associate Professor, Agricultural & Human Sciences

Brudno, Yevgeny, Assistant Professor, Biomedical Program - ENG

Bruneau, Arthur Henry, Emeritus Professor, Crop & Soil Sciences

Bruner, David Allen, Adjunct Professor, Textile & Apparel, Technology

Brunet, James R, Associate Professor, Public & International Affairs

Bruno-Barcena, Jose Manuel, Associate Professor, Plant and Microbial Biology

Bryan, Robert S., Emeritus Professor, Philosophy & Religious Studies

Bryant, Matthew, Assistant Professor, Mechanical & Aerospace Engr

Buchwalter, David, Professor, Biological Sciences

Buckel, Jeffrey A., Professor, Applied Ecology

Buckless, Frank A., Named Professor, Accounting-Poole COM

Buckner, Gregory D, Professor, Mechanical & Aerospace Engr

Buhler, Wayne G, Professor, Horticultural Science

Buie, Timothy W, Associate Professor, Graphic & Industrial Design

Bull, Leonard S, Emeritus Professor, Animal Science

Bullock, Karen, Professor, Social Work

Bulusu, Subrahmanyam, Adjunct Associate Professor, Marine, Earth And Atmospheric

Bumgardner, Carl L., Professor, Chemistry

Bunds, Kyle S, Assistant Professor, Parks, Recreation & Tourism Mg

Buol, Stanley W., Emeritus Distinguished Professor, Crop & Soil Sciences

Buongiorno-Nardelli, Marco, Adjunct Professor, Physics

Burchell, Michael R, Associate Professor, Biological And Agricultural En

Burgess, Helen Jane, Associate Professor, English

Burke, Daniel Joseph, Professor, Biological Sciences

Burkey, Kent Oliver, USDA Professor, Crop & Soil Sciences

Burkhart, Harold` Eugene, Adjunct Professor, For & Envir Res Acad Research

Burkholder, Joann M., Named Distinguished Professor, Applied Aquatic Ecology Center

Burleson, Gary Ray, Adjunct Professor, Dept of Clinical Sciences

Burnette, Jennifer Leslie, Associate Professor, Psychology

Burniston, Ernest E., Emeritus Professor, Mathematics

Burrack, Hannah J, Professor, Entomology & Plant Pathology

Burton, James D., Associate Professor, Horticultural Science

Burton, Joseph William, Emeritus USDA Professor, Crop & Soil Sciences

Bush, Kimberly Ann, Teaching Associate Professor, Parks, Recreation & Tourism Mg

Bykova, Marina F., Professor, Philosophy & Religious Studies

Byrd, Gregory T, Professor, Electrical & Computer Engr.

Byrd, Medwick V, Teaching Associate Professor, Forest Biomaterials

Byrne, Paul Kevin, Assistant Professor, Marine, Earth And Atmospheric

Cabas Mijares, Ashly Margot, Assistant Professor, Civil Const & Environ Engineer

Caddell, Joseph William, Adjunct Assistant Professor, History

Caldwell, Billy E., Emeritus Professor, Crop & Soil Sciences

Caldwell, Peter Vernon, Adjunct Assistant Professor, For & Envir Res Acad Research

Call, Douglas Franklin, Assistant Professor, Civil Const & Environ Engineer

Callahan, Ben John, Assistant Professor, Dept-Population,Health,Pathobi

Callaway, Robert David, Adjunct Assistant Professor, Electrical & Computer Engr.

Calvi, Michele Gian, Adjunct Professor, Civil Const & Environ Engineer

Campbell, Jennifer L, Teaching Associate Professor, Biological Sciences

Campbell, Stephen LaVern, Professor, Mathematics

Campbell, William V., Emeritus Professor, Entomology & Plant Pathology

Cannon, Ronald Eugene, Adjunct Professor, Biological Sciences, Genetics

Cantrell, Keri B., Adjunct Assistant Professor, Biological And Agricultural En

Cao, Linyou, Associate Professor, Materials Science &Engineering

Capanema, Ewellyn A, Adjunct Associate Professor, Forest Biomaterials

Caple, Patricia C., Emeritus Associate Professor, Communication

Caplen, Natasha Jane, Adjunct Professor, Dept-Population,Health,Pathobi

Carawan, Roy E., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Carbone, Ignazio, Professor, Entomology & Plant Pathology

Carbone, Mary Anna, Research Assistant Professor, Biological Sciences

Carbonell, Ruben G., Named Distinguished Professor, BTEC-Biomfg Training Ed Ctr

Cardoza, Yasmin Judith, Adjunct Associate Professor, Entomology & Plant Pathology

Carlson, Gerald A., Emeritus Professor, Ag & Resource Economics

Carlton, Ann Marie Grover, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Carmichael, Halbert H., Emeritus Professor, Chemistry

Carpenter, Pamela Page, Adjunct Assistant Professor, FREEDM Center

Carr, Jon, Named Distinguished Professor, Mgmt, Innovation&Entrepreneur

Carrier, Sarah J, Associate Professor, TELS

Carroll, Daniel E, Emeritus Professor, Food,Bioprocess & Nutrition Sc

Carroll, John W, Professor, Philosophy & Religious Studies

Carson, Susan B., Teaching Associate Professor, Plant and Microbial Biology, Quality Enhancement Plan

Cartee, Lianne A., Teaching Associate Professor, Biomedical Program - ENG

Carter, George L, Emeritus Professor, Adult & Higher Education

Carter, Glenda S., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Carter, Michael P., Professor, Graduate School-Dean's Office

Carter, Thomas A., Emeritus Professor, Prestage Poultry Science

Carter, Thomas E., USDA Professor, Crop & Soil Sciences

Caruolo, Edward V., Emeritus Professor, Animal Science

Carver, Donna K., Professor, Prestage Poultry Science

Casani, Julie Ann Paula, Adjunct Associate Professor, Biological Sciences

Case, Daniel Troy, Associate Professor, Sociology & Anthropology

Casey, David S., Adjunct Assistant Professor, Animal Science

Casey, Warren Michael, Adjunct Associate Professor, Microbiology

Cason, Franklin D, Assistant Professor, English

Casper, Jonathan M, Associate Professor, Parks, Recreation & Tourism Mg

Cass, Cheryl Parzel, Teaching Associate Professor, Materials Science &Engineering

Cassel, Donald K., Emeritus Professor, Crop & Soil Sciences

Casstevens, Willa Jeanne, Associate Professor, Social Work

Castellano, Felix Nicholas, Professor, Chemistry

Castillo, Miguel Sebastian, Assistant Professor, Crop & Soil Sciences

Castorena, Cassandra Alison, Assistant Professor, Civil Const & Environ Engineer

Castro Bolinaga, Celso Francisco, Assistant Professor, Biological And Agricultural En

Catignani, George L., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Cavanagh, John, Adjunct Professor, Biochemistry

Cavaroc, Victor V., Emeritus Professor, Marine, Earth And Atmospheric

Cawthon, Tony W, Professor, ELPHD

Chabay, Ruth W., Emeritus Professor, Physics

Chakraborty, Aranya, Associate Professor, Electrical & Computer Engr.

Chamblee, Douglas Scales, Emeritus Professor, Crop & Soil Sciences

Champion, Brenda D, Teaching Assistant Professor, ELPHD

Chandler, Richard E., Lecturer, Mathematics

Chang, Chih-Hao, Associate Professor, Mechanical & Aerospace Engr

Chang, Hou-Min, Emeritus Professor, Forest Biomaterials

Chang, Simon W., Adjunct Professor, Marine, Earth And Atmospheric

Chang, Wei-Chen, Assistant Professor, Chemistry

Chao, Allen C., Emeritus Associate Professor, Civil Const & Environ Engineer

Chapman, Benjamin James, Associate Professor, Agricultural & Human Sciences

Chapman, Diane D, Teaching Professor, ELPHD

Chapman, Lisa McNew, Adjunct Assistant Professor, ELPHD

Chapman, Stephen N, Emeritus Associate Professor, Business Management-Poole COM

Charlton, Harvey Johnson, Emeritus Assistant Professor, Mathematics

Charney, Joseph J, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Chen, Karen Boru, Assistant Professor, Fitts Dept Indust & Syst Engr

Chen, Wei, Adjunct Assistant Professor, Mathematics

Chen, Yuang-Sung AI, Professor, Accounting-Poole COM

Cheng, Jay Jiayang, Professor, Biological And Agricultural En

Cheng, Ke, Associate Professor, Dept Molecular Biomedical Scie

Cherry, Megan L, Assistant Professor, History

Chertock, Alina Emil, Professor, Mathematics

Chi, Eric Culbert, Assistant Professor, Statistics

Chi, Min, Assistant Professor, Computer Science-engr

Chiang, Vincent L C, Named Distinguished Professor, Forest Biotech Program

Childs, Nicole Marie, Teaching Assistant Professor, ELPHD

Chinn, Mari S, Professor, Biological And Agricultural En

Chirino-Klevans, Flor Ivonne, Associate Professor, Internat'l & Dist Ed Alliance

Chirkova, Rada Yuryevna, Associate Professor, Computer Science-engr

Cho, Soolyeon, Associate Professor, Architecture

Choct, Mingan, Adjunct Professor, Prestage Poultry Science

Chou, Wu-show, Emeritus Professor, Computer Science-engr

Chow, Mo-Yuen, Professor, Electrical & Computer Engr.

Chow, Shein-Chung, Adjunct Professor, Statistics

Christensen, Vern L., Emeritus Professor, Prestage Poultry Science

Chromy, James Raymond, Adjunct Professor, Statistics

Chu, Moody Ten-Chao, Professor, Mathematics

Chukwu, Ethelbert N., Emeritus Professor, Mathematics

Chung, Kwong T., Emeritus Professor, Physics

Chung, Lung-ock, Professor, Mathematics

Clapp, Timothy Gladstone, Professor, Textile & Apparel, Technology, Textile Engineering, Chemistry

Clark, Aaron, Professor, Sci, Tech, Engr & Math (STEM)

Clark, Brett L., Adjunct Assistant Professor, Sociology & Anthropology

Clark, James W, Emeritus Professor, English

Clark, Robert L., Professor, Economics-Poole COM

Clark, Tony F, Adjunct Professor, Marine, Earth And Atmospheric

Clarke, Bruce Kurk, Adjunct Professor, Entomology & Plant Pathology

Clarke, Laura I, Professor, Physics

Classen, John J, Associate Professor, Biological And Agricultural En

Clerkin, Richard M, Professor, Institute for Nonprofits

Clifford, William B., Emeritus Professor, Sociology And Anthropology

Clouse, Steven D, Emeritus Professor, Horticultural Science

Cobb, David T., Adjunct Assistant Professor, Applied Ecology

Cobb, Grover Cleveland, Emeritus Associate Professor, Physics

Cobb, Michael D, Associate Professor, Public & International Affairs

Coble, Harold D., Emeritus Professor, Crop & Soil Sciences

Coe, Charles K., Emeritus Professor, Public & International Affairs

Coffin, Marie A., Adjunct Professor, Mathematics

Coggburn, Jerrell D, Professor, Public & International Affairs

Cohen, Allen C, Research Professor, Entomology & Plant Pathology

Cohen, Jo-Ann D., Professor, Mathematics

Cohen, Paul, Named Distinguished Professor, Fitts Dept Indust & Syst Engr

Cole-Husseini, Jacqueline, Assistant Professor, Biomedical Program - ENG

Coll-Barreu, Juan, Associate Professor, Architecture

Collazo, Jaime A., USDI Professor, Applied Ecology

Collazo, Ramon R, Associate Professor, Materials Science & Engineering

Colle, Brian A, Adjunct Professor, Marine, Earth And Atmospheric

Collins, Guy David, Extension Associate Professor, Crop & Soil Sciences

Collins, William K., Emeritus Named Professor, Crop & Soil Sciences

Combettes, Patrick Louis, Professor, Mathematics

Comins, Daniel L., Emeritus Professor, Chemistry

Comstock, Gary L, Professor, Philosophy & Religious Studies

Conant, Gavin Clay, Associate Professor, Biological Sciences

Confrey, Jere, Named Distinguished University Professor, Sci, Tech, Engr & Math (STEM)

Conolly, Rory B, Adjunct Professor, Statistics

Conrad, Brad Richard, Adjunct Assistant Professor, Physics

Conrad, Hans, Emeritus Professor, Materials Science & Engineering

Cook, James W, Emeritus Professor, Physics

Cook, Rachel Louise, Assistant Professor, The Forest Nutrition Cooperati

Cooke, James A, Adjunct Assistant Professor, Mechanical & Aerospace Engr

Cooper, Andrew A., Teaching Assistant Professor, Mathematics

Cooper, Arthur W., Emeritus Professor, For & Envir Res Acad Research

Cooper, Caren Beth, Research Associate Professor, For & Envir Res Acad Research

Cooper, Richard J, Professor, Crop & Soil Sciences

Cooper, William J, Adjunct Professor, Marine, Earth And Atmospheric

Cope, Will Allen, Emeritus Professor, Crop & Soil Sciences

Cope, William Gregory, Named Professor, Applied Ecology

Copeland, Billy J., Emeritus Professor, Applied Ecology

Corbett, David Reide, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Corbin, Frederick Thomas, Emeritus Professor, Crop & Soil Sciences

Corn, Jenifer Osullivan, Adjunct Assistant Professor, Friday Institute

Cornwell, John C., Emeritus Professor, Animal Science

Coronel, Pablo Marcelo, Adjunct Professor, Food, Bioprocess & Nutrition Sc

Corral, Eduardo C, Assistant Professor, English

Correa, Maria T, Professor, Dept-Population, Health, Pathobi

Cosco, Nilda Graciela, Research Associate Professor, Design Research

Costanza, Jennifer Kwasny, Research Assistant Professor, For & Envir Res Acad Research

Cotanch, Steve, Emeritus Professor, Physics

Coulston, John Wesley, Adjunct Assistant Professor, For & Envir Res Acad Research

Coupet, Jason Alix, Assistant Professor, Public & International Affairs

Covington, David H., Emeritus Associate Professor, English

Cowen, Peter, Associate Professor, Dept-Population,Health,Pathobi

Cowger, Christina, USDA Associate Professor, Entomology & Plant Pathology

Cowley, Michael Anthony, Assistant Professor, Biological Sciences

Cowling, Ellis B., Emeritus Professor, College of Natural Resources

Cox, Chandra D, Professor, Art and Design

Craig, Elizabeth Ann, Associate Professor, Communication

Craig, Lee A, Professor, Economics-Poole COM

Craig, Stephen Bartholomew, Associate Professor, Psychology

Crane-Seeber, Jesse P, Teaching Assistant Professor, Public & International Affairs

Crawford, Elizabeth M., Emeritus Professor, Sociology & Anthropology

Cray, Paula J, Professor, Dept-Population,Health,Pathobi

Creamer, Nancy G, Named Distinguished Professor, Horticultural Science

Crickenberger, Roger G., Emeritus Professor, Administration - Research Serv, Animal Science

Crisp, James E., Emeritus Professor, History

Crissman, Dorothy E, Teaching Assistant Professor, TELS

Croom, Barry, Emeritus Professor, Agricultural & Human Sciences

Croom, Warren J, Emeritus Professor, Prestage Poultry Science

Crosbie, Christopher James, Associate Professor, English

Crossland, Cathy L., Professor, TELS

Crouse, David A, Professor, Crop & Soil Sciences

Crow, Johnny L., Emeritus Assistant Professor, Sci, Tech, Engr & Math (STEM)

Crowley, Martha L., Associate Professor, Sociology & Anthropology

Crozier, Carl R, Professor, Crop & Soil Sciences

Crumbley, Deidre H, Emeritus Professor, Interdisciplinary Studies

Cruse, Glenn Paul, Assistant Professor, Dept Molecular Biomedical Scie

Cryer-Coupet, Qiana, Assistant Professor, Social Work

Cubbage, Frederick Willis, Professor, For & Envir Res Acad Research

Cubeta, Marc A, Professor, Entomology & Plant Pathology

Culbreth Jr, Charles Thomas, Emeritus Distinguished Professor, Fitts Dept Indust & Syst Engr

Cullen, John Michael, Professor, Dept-Population,Health,Pathobi

Cullinan, Douglas A., Professor, College Of Education

Cumbie, William P, Adjunct Assistant Professor, For & Envir Res Acad Research

Cunningham, Joseph W., Emeritus Professor, Psychology

Cunningham, Mary K., Associate Professor, Philosophy & Religious Studies

Cuomo, Jerome J, Distinguished Professor, Materials Science &Engineering

Curley, Patrick Wilkie, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Currie, Nancy Jane, Adjunct Associate Professor, Fitts Dept Indust & Syst Engr

Curtis, Patricia Ann, Professor, Prestage Poultry Science

Curtis, Stephanie E., Emeritus Professor, Biological Sciences

Cutts, Bethany Brooke, Assistant Professor, Parks, Recreation & Tourism Mg

Cwik, Paul, Teaching Professor, Economics-Poole COM

Czaja, Ronald F, Emeritus Associate Professor, Sociology & Anthropology

Dahl, Johannes Michael Leopold, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Dai, Huaiyu, Professor, Electrical & Computer Engr.

Daley, Dennis M., Professor, Public & International Affairs

Danehower, David A., Emeritus Associate Professor, Crop & Soil Sciences

Daniel, Louis B, Adjunct Assistant Professor, Applied Ecology

Daniele, Michael, Assistant Professor, Electrical & Computer Engr.

Daniels, Harry V, Professor, Applied Ecology

Daniels, Karen E, Professor, Physics

Danielsen, Bartley R, Associate Professor, Business Management-Poole COM

Danielson, Leon E., Emeritus Professor, Ag & Resource Economics

Dannels, Deanna P, Professor, College Of Humanities & Soc SC

Danowitz, Mary Ann, Professor, College Of Education

Darhower, Mark Anthony, Associate Professor, Foreign Languages And Literatu

Dasmohapatra, Sudipta, Associate Professor, Forest Biomaterials

Daub, Margaret E., Named Distinguished Professor, Plant and Microbial Biology

Davidian, Marie, Named Professor, Statistics

Davidson, Michael G., Professor, Dept of Clinical Sciences

Davies, Eric, Emeritus Professor, Plant and Microbial Biology

Davis Jr, Edward Willmore, Emeritus Professor, Computer Science-engr

Davis, Adam C, Emeritus Associate Professor, Sociology And Anthropology

Davis, Dennis Scott, Associate Professor, TELS

Davis, Eric Lee, Named Distinguished Professor, Entomology & Plant Pathology

Davis, Hawthorne A, Emeritus Associate Professor, Textile & Apparel, Technology

Davis, Jack Parker, Adjunct Professor, Food,Bioprocess & Nutrition Sc

Davis, Jeanine M., Associate Professor, Horticultural Science

Davis, Jerry M., Emeritus Professor, Marine, Earth And Atmospheric

Davis, K. Shannon, Emeritus Associate Professor, Mgmt, Innovation&Entrepreneur

Davis, Meredith Joy, Emeritus Professor, Graphic & Industrial Design

Davis, Robert F., Emeritus Named Professor, Materials Science &Engineering

Davis, William Rhett, Professor, Electrical & Computer Engr.

Davis, William Robert, Emeritus Professor, Physics

Davis-Bauer, Heather A, Adjunct Associate Professor, TELS

Davis-Gardner, Angela Mackie, Emeritus Professor, English

Dawes, Gregory A., Named Professor, Foreign Languages And Literatu

Dayton, Paul A, Associate Professor, Biomedical Program - ENG

De Coster, Stacy M., Associate Professor, Sociology & Anthropology

De Gezelle, Jillian Marie, Teaching Assistant Professor, Plant and Microbial Biology

De Los Reyes, Francis Lajara, Professor, Civil Const & Environ Engineer

de Queiroz, Anderson Rodrigo, Research Assistant Professor, Civil Const & Environ Engineer

de Souza e Silva, Adriana Araujo, Associate Professor, Communication

Deal, Earl L, Emeritus Professor, Forest Biomaterials

Dean, Alexander G., Associate Professor, Electrical & Computer Engr.

Dean, Gregg A, Professor, Dept Molecular Biomedical Scie

Dean, Lisa Louise, USDA Associate Professor, Food,Bioprocess & Nutrition Sc

Dean, Ralph A, Named Distinguished Professor, Entomology & Plant Pathology

Deardorff, Darla K, Adjunct Assistant Professor, ELPHD

DeBord, Karen B, Emeritus Professor, Agricultural & Human Sciences

DeCarolis, Joseph F, Associate Professor, Civil Const & Environ Engineer

DeCuir-Gunby, Jessica Theresa, Professor, TELS

DeFrancesco, Teresa C, Professor, Dept of Clinical Sciences

Degernes, Laurel A, Emeritus Professor, Dept of Clinical Sciences

DeGrand, Alexander J, Emeritus Professor, History

DeHertogh, August A., Emeritus Professor, Horticultural Science

Deiters, Alexander, Adjunct Professor, Chemistry

Deitz, Lewis L., Emeritus Professor, Entomology & Plant Pathology

DeJoy, Daniel A., Associate Professor, Communication

Dekaney, Christopher Matthew, Assistant Professor, Dept Molecular Biomedical Scie

Delborne, Jason Aaron, Associate Professor, For & Envir Res Acad Research

Delcambre, Carla F, Teaching Assistant Professor, Landscape Architecture

Delgado, Cesar, Assistant Professor, Sci, Tech, Engr & Math (STEM)

Dellafave, L. Richard, Emeritus Professor, Sociology & Anthropology

DeLuca, V. William, Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

DeMaster, David John, Professor, Marine, Earth And Atmospheric

DenHartog, Emiel A, Associate Professor, Textile Engineering, Chemistry

Dennis, Robert G, Associate Professor, Biomedical Program - ENG

Denson, Cameron DeLeon, Assistant Professor, Sci, Tech, Engr & Math (STEM)

Denton, Brian, Adjunct Associate Professor, Fitts Dept Indust & Syst Engr

DePerno, Christopher S, Professor, Fisheries and Wildlife Program

DeSimone, Joseph M, Named Distinguished Professor, Chemical & Biomolecular Engr

Desmarais, Sarah Louise, Associate Professor, Psychology

DeSoucey, Michaela Anne, Assistant Professor, Sociology & Anthropology

Despain, Scott, Associate Professor, Foreign Languages And Literatu

Devetsikiotis, Mihail, Adjunct Professor, Electrical & Computer Engr.

Devine, Hugh A., Emeritus Professor, Parks, Recreation & Tourism Mg

Devorshak, Christina, Adjunct Assistant Professor, Entomology & Plant Pathology

Dewey, Ralph E, Named Professor, Crop & Soil Sciences

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

Dickey, David Alan, Named Professor, Statistics

Dickey, Elizabeth Carol, Professor, Materials Science &Engineering

Dickey, Michael David, Professor, Chemical & Biomolecular Engr

Dicks, Robert S, Emeritus Associate Professor, English

Dickson, Gary W, Emeritus Professor, Business Management-Poole COM

Diebold, Jeffrey Childress, Assistant Professor, Public & International Affairs

Dietrich, Joel Casey, Assistant Professor, Civil Const & Environ Engineer

Dillard, Emmett Urcey, Emeritus Associate Professor, Animal Science

DiMeo, Andrew J, Associate Professor of the Practice, Biomedical Program - ENG

Ding, Huiling, Associate Professor, English

Dinh, Nam Truc, Professor, Nuclear Engineering

Dinku, Abay Gadisa, Research Assistant Professor, Physics

Ditto, William Lawrence, Professor, College of Sciences - Dean

Diuguid, Katherine Ann, Assistant Professor, Art and Design

Dixon, Darlene, Adjunct Associate Professor, Dept Molecular Biomedical Scie

Dixon, Karrie Gibson, Adjunct Assistant Professor, ELPHD

Dobrogosz, Walter J., Emeritus Professor, Prestage Poultry Science

Doctor, Daniel H., Adjunct Associate Professor, Marine, Earth And Atmospheric

Dodsworth, Robin M, Associate Professor, English

Doerr, Phillip David, Emeritus Professor, For & Envir Res Acad Research

Doherty, Colleen Jennifer, Assistant Professor, Biochemistry

Dole, John M., Professor, CALS - Academic Programs

Doll, Barbara A, Extension Associate Professor, Sea Grant Program

Donaldson, Robert Alan, Emeritus Professor, Textile & Apparel, Technology

Dong, Jingyan, Associate Professor, Fitts Dept Indust & Syst Engr

Donoso, Pablo Jorge, Adjunct Associate Professor, For & Envir Res Acad Research

Dorgeloh, Werner Gunter, Lecturer, For & Envir Res Acad Research, Study Abroad

Dorman, David C, Professor, Dept Molecular Biomedical Scie

Doster, Joseph M., Professor, Nuclear Engineering

Dougherty, Daniel B., Associate Professor, Physics

Dow, Thomas A., Named Distinguished University Professor, Mechanical & Aerospace Engr

Downs, Murray S., Emeritus Professor, Exec Vice Chancellor & Provost

Doyle, Jon, Named Distinguished Professor, Computer Science-engr

Drake, Mary Anne, Named Professor, Food,Bioprocess & Nutrition Sc

Drake, Timothy Arthur, Assistant Professor, ELPHD

Dreher, Kevin L, Adjunct Professor, Dept Molecular Biomedical Scie

Dreher, Patrick A, Research Professor, Computer Science-engr

Dretsch, Heather Johnson, Assistant Professor, Business Management-Poole COM

Drewes, Donald William, Emeritus Professor, Psychology

Drineas, Petros, Adjunct Assistant Professor, Mathematics

Driscoll, Catherine M, Associate Professor, Philosophy & Religious Studies

Duca, Alina Nicoleta, Teaching Associate Professor, Mathematics

Duckworth, Owen W, Associate Professor, Crop & Soil Sciences

Ducoste, Joel, Professor, Civil Const & Environ Engineer

Dudley, Marc K., Associate Professor, English

Dudziak, Donald J., Emeritus Professor, Nuclear Engineering

Duel-Hallen, Alexandra, Professor, Electrical & Computer Engr.

Dugba, Prince Noah, Adjunct Associate Professor, Biological And Agricultural En

Duggins, Jonathan William, Teaching Assistant Professor, Statistics

Dunbar, Adria Shipp, Assistant Professor, ELPHD

Dunn, Joseph C., Emeritus Professor, Mathematics

Dunn, Patricia C, Professor, Agricultural & Human Sciences

Dunn, Robert R., Named Professor, Applied Ecology

Dunning, Dianne, Clinical Associate Professor, College Of Veterinary Medicine

Dunning, Rebecca Diane, Research Assistant Professor, Horticultural Science

Dunphy, Edward James, Professor, Crop & Soil Sciences

Dur, Umut, Assistant Professor, Economics-Poole COM

Durant, Jack D., Emeritus Professor, English

Dutta, Rudra, Professor, Computer Science-engr

Dvorak, William Stephen, Emeritus Professor, CAMCORE-Cooperative

Dye, Janice A, Adjunct Associate Professor, Dept of Clinical Sciences

Dykstra, Michael Jack, Emeritus Research Professor, Dept-Population,Health,Pathobi

Dziak, Robert Paul, Adjunct Professor, Marine, Earth And Atmospheric

Eapen, Jacob, Associate Professor, Nuclear Engineering

Early, Peter Joseph, Clinical Associate Professor, Dept of Clinical Sciences

Earp, Julia B, Associate Professor, Business Management-Poole COM

Easley, James E, Emeritus Professor, Ag & Resource Economics

Easterling, David R, Adjunct Professor, Marine, Earth And Atmospheric

Eaton, Mitchell J, Adjunct Assistant Professor, Applied Ecology

Ebert, Kimberly Lynn, Associate Professor, Sociology & Anthropology

Echekki, Tarek, Professor, Mechanical & Aerospace Engr

Edens, Frank W., Professor, Prestage Poultry Science

Eder, Brian K, Lecturer, Marine, Earth And Atmospheric

Edge, Billy L, Research Professor, Civil Const & Environ Engineer

Edgington, Cynthia Page, Teaching Assistant Professor, Sci, Tech, Engr & Math (STEM)

Edmisten, Keith L, Professor, Crop & Soil Sciences

Edwards, Harriett C, Associate Professor, Agricultural & Human Sciences

Edwards, Jack Ray, Professor, Mechanical & Aerospace Engr

Edwards, Linda McMurry, Emeritus Professor, History

Edwards, Michael B, Associate Professor, Parks, Recreation & Tourism Mg

Efimenko, Kirill, Research Associate 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, Emeritus Named Professor, Animal Science

El-Masry, Nadia A, Professor, Materials Science &Engineering

El-Shafei, Ahmed Mohamed, Professor, Textile Engineering, Chemistry

El-Shiekh, Aly H, Emeritus Professor, Textile & Apparel, Technology

Eley, Michelle Rene, Assistant Professor, Foreign Languages And Literatu

Elfenbein, Johanna Rebecca, Assistant Professor, Dept of Clinical Sciences

Elkan, Gerald Hugh, Emeritus Professor, Microbiology, Park Scholars

Ellington, Grant H, Extension Assistant Professor, Biological And Agricultural En

Ellis, Alan Reid, Assistant Professor, Social Work

Ellis, Jesse Aaron, Associate Professor, Business Management-Poole COM

Ellison, Donald C, Emeritus Professor, Physics

Ellson, Richard Wayne, Lecturer, Mathematics

Ellwood, Eric L., Emeritus Professor, College of Natural Resources

Ely, John F., Emeritus Professor, Civil Const & Environ Engineer

Emanuel, Ryan E, Associate Professor, For & Envir Res Acad Research

Emery, Donald Allen, Emeritus Professor, Graduate School-Dean's Office

Enck, William H, Associate Professor, Computer Science-engr

Ender, Ken Lyle, Adjunct Assistant Professor, ELPHD

Endicott, Ronald P, Associate Professor, Philosophy & Religious Studies

Engell, Miles Dean, Teaching Associate Professor, Biological Sciences

Ensign, Scott Howard, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Erchul, William P., Emeritus Professor, Psychology

Erdim, Burak, Assistant Professor, Architecture

Erickson, Edward W., Emeritus Professor, Economics-Poole COM

Esbenshade, Kenneth L., Professor, Animal Science

Escuti, Michael James, Professor, Electrical & Computer Engr.

Eseryel, Deniz, Associate Professor, TELS

Eslinger, Owen J, Adjunct Professor, Mathematics

Esposito, Debora A., Assistant Professor, Kannapolis Research

Estes, Edmund A., Emeritus Professor, Ag & Resource Economics

Estes, Patricia A, Research Associate Professor, Biological Sciences

Etherton, Brian John, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Eun, Do Young, Professor, Electrical & Computer Engr.

Evans, Bob, Teaching Associate Professor, Electrical & Computer Engr.

Evans, Marina V, Adjunct Professor, Mathematics

Evans, Michael Alan, Associate Professor, TELS

Evans, Robert O, Professor, Biological And Agricultural En

Evans, Timothy Matthew, Adjunct Assistant Professor, Civil Const & Environ Engineer

Everman, Wesley J, Associate Professor, Crop & Soil Sciences

Eward, William Curtis, Adjunct Assistant Professor, Dept of Clinical Sciences

Fackler, Paul L., Professor, Ag & Resource Economics

Fahrenholz, Adam Charles, Assistant Professor, Prestage Poultry Science

Fair, Barbara, Associate Professor, Horticultural Science

Faircloth, Susan C, Adjunct Associate Professor, ELPHD

Faith, Seth Adam, Assistant Professor, Dept Molecular Biomedical Scie

Falk, Lisa, Teaching Assistant Professor, Marine, Earth And Atmospheric

Falter, Michelle Marie, Assistant Professor, TELS

Fang, Shu-Cherng, Named Professor, Fitts Dept Indust & Syst Engr

Fang, Tiegang, Professor, Mechanical & Aerospace Engr

Fantz, Paul R., Emeritus Professor, Horticultural Science

Farin, Charlotte E, Professor, Animal Science

Farkas, Brian E, Adjunct Professor, Food,Bioprocess & Nutrition Sc

Farrier, Maurice H., Emeritus Professor, Entomology & Plant Pathology

Fathi, Yahya, Professor, Fitts Dept Indust & Syst Engr

Faulkner, Gary Doyle, Emeritus Associate Professor, Mathematics

Faulkner, Valerie Ness, Teaching Associate Professor, TELS

Fauntleroy, Amassa, Emeritus Professor, Mathematics

Favorov, Oleg V, Research Associate Professor, Biomedical Program - ENG

Fedkiw, Peter S., Professor, Chemical & Biomolecular Engr

Fedukovich, Casie J, Associate Professor, English

Feeny, Thomas P., Professor, Foreign Languages And Literatu

Felder, Richard M., Emeritus Named Professor, Chemical & Biomolecular Engr

Fell, Harrison George, Associate Professor, Ag & Resource Economics

Fellner, Vivek, Professor, Animal Science

Felts, James Vernon, Adjunct Assistant Professor, Prestage Poultry Science

Feng, Jing, Assistant Professor, Psychology

Fenn, Molly A., Teaching Associate Professor, Mathematics

Fenton, Sue Elizabeth, Adjunct Associate Professor, Biological Sciences, Dept-Population,Health,Pathobi

Ferguson, Scott M, Associate Professor, Mechanical & Aerospace Engr

Ferket, Peter R., Named Distinguished Professor, Prestage Poultry Science

Fernandes, April Dawn, Assistant Professor, Sociology & Anthropology

Fernandez, Gina E, Professor, Horticultural Science

Ferreira, Davis Fernandes, Adjunct Associate Professor, Biochemistry

Ferrier, Brad S, Adjunct Associate Professor, Marine, Earth And Atmospheric

Ferruzzi, Mario Giovanni, Professor, Kannapolis Research

Ferzli, Miriam G, Teaching Associate Professor, Biological Sciences

Figuers, Carol C, Adjunct Assistant Professor, ELPHD

Findley, Daniel J., Adjunct Assistant Professor, Civil Const & Environ Engineer, Institute For Trans Research &

Fiori, Giuseppe, Assistant Professor, Economics-Poole COM

Fischer, Jesse Robert, Research Assistant Professor, Applied Ecology

Fish, Richard E, Associate Professor, Dept of Clinical Sciences

Fisher, Douglas, Emeritus Professor, Economics-Poole COM

Fisher, John S., Emeritus Professor, Civil Const & Environ Engineer

Fisher, Loren R, Named Professor, Crop & Soil Sciences

Fisher, Matthew Bruce, Assistant Professor, Biomedical Program - ENG

Fites, Roger C., Emeritus Professor, Plant and Microbial Biology

Fitzgerald, Patrick J, Associate Professor, Art and Design

Fitzpatrick, David Charles, Teaching Assistant Professor, Social Work

Flammer, Keven, Professor, Dept of Clinical Sciences

Flath, David Joseph, Emeritus Professor, Economics-Poole COM

Fleener, Mattie Jayne, Professor, ELPHD

Fleenor, John W, Adjunct Associate Professor, Psychology

Fleisher, Lloyd Norman, Emeritus Professor, Dept Molecular Biomedical Scie

Fleming, Henry Pridgen, Emeritus USDA Professor, Food,Bioprocess & Nutrition Sc

Fleming, Jean E., Adjunct Assistant Professor, ELPHD

Fletcher, Oscar J, Professor, Dept-Population,Health,Pathobi

Flickinger, Michael Carl, Professor, BTEC-Biomfg Training Ed Ctr

Flinchum, Russell Alan, Associate Professor, Graphic & Industrial Design

Flores, Kevin Bryant, Assistant Professor, Mathematics

Flowers, James L., Professor, Agricultural & Human Sciences

Flowers, James R, Clinical Associate Professor, Dept-Population,Health,Pathobi

Flowers, William Lucas, Named Professor, Animal Science

Floyd, Brian Allan, Associate Professor, Electrical & Computer Engr.

Floyd, Myron F, Professor, Parks, Recreation & Tourism Mg

Fodor, Ronald Victor, Professor, Marine, Earth And Atmospheric

Foegeding, Edward Allen, Named Distinguished Professor, Food,Bioprocess & Nutrition Sc

Fogle, Callie Anne, Clinical Associate Professor, Dept of Clinical Sciences

Fogle, Jonathan E., Assistant Professor, Dept-Population,Health,Pathobi

Fogleman, April, Assistant Professor, Food,Bioprocess & Nutrition Sc

Fonteno, William Carl, Professor, Horticultural Science

Foote, Vincent, Emeritus Professor, Industrial Design

Ford, Ericka N, Assistant Professor, Textile Engineering, Chemistry

Ford, Richard Banbury, Emeritus Professor, Dept of Clinical Sciences

Forest, M. Gregory, Professor, Biomedical Program - ENG

Fornaro, Robert Joseph, Emeritus Professor, Computer Science-engr

Fornes, Raymond Earl, Professor, College of Sciences - Dean

Forrester, Jodi Anne, Assistant Professor, For & Envir Res Acad Research

Fortner, Brand Irving, Teaching Professor, Physics

Foster, Derek M., Assistant Professor, Dept-Population,Health,Pathobi

Foster, Lori Lea, Professor, Psychology

Fountain, John Crothers, Emeritus Professor, Marine, Earth And Atmospheric

Fourches, Denis, Assistant Professor, Chemistry

Fox, Andrew Alan, Associate Professor, Landscape Architecture

Fox, Barbara J., Emeritus Professor, TELS

Fox, Garey A., Professor, Biological And Agricultural En

Fralix, Michael Thomas, Adjunct Associate Professor, Textile & Apparel, Technology

Frampton, John, Professor, For & Envir Res Acad Research

Frank, Steven D, Associate Professor, Entomology & Plant Pathology

Franke, John E., Lecturer, Mathematics

Franklin, E. Carlyle, Emeritus Professor, For & Envir Res Acad Research

Franks, Robert Graham, Professor, Plant and Microbial Biology

Franz, Jason Roy, Assistant Professor, Biomedical Program - ENG

Franzen, Stefan, Professor, Chemistry

Franzluebbbers, Alan J, USDA Professor, Crop & Soil Sciences

Franzon, Paul D., Distinguished 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., Named Professor, Textile Engineering, Chemistry

Freeman, Sharon Booth, Adjunct Assistant Professor, Friday Institute

Freitag, Sandria B, Teaching Associate Professor, History

Freitas, Frederico, Assistant Professor, History

Frey, Gregory E, Adjunct Assistant Professor, For & Envir Res Acad Research

Frey, Henry C, Distinguished University Professor, Civil Const & Environ Engineer

Freytes, Donald Osvaldo, Assistant Professor, Biomedical Program - ENG

Friend, Craig T, Professor, History

Frohlich, Carla, Associate Professor, Physics

Frye, Bobbie Jean, Lecturer, ELPHD

Fuentes, Montserrat, Adjunct Professor, Statistics

Fuller, Frederick J., Professor, Dept-Population,Health,Pathobi

Fulp, Ronald O., Professor, Mathematics

Funkhouser, Edward T., Emeritus Associate Professor, Communication

Fusarelli, Bonnie C, Professor, ELPHD

Fusarelli, Lance D., Professor, ELPHD

Fyfe, Margaret Simon, Assistant Professor, English

Fyfe, Paul CAm, Associate Professor, English

Gabr, Mohammed Awad, Professor, Civil Const & Environ Engineer

Gadsby, John E., Professor, Dept Molecular Biomedical Scie

Galik, Christopher, Associate Professor, Public & International Affairs

Gallagher, Victoria J, Professor, Communication

Gallippi, Caterina M, Assistant Professor, Biomedical Program - ENG

Gamcsik, Michael, Associate Professor, Biomedical Program - ENG

Gannon, Travis W, Assistant Professor, Crop & Soil Sciences

Gao, Wei, Assistant Professor, Textile Engineering, Chemistry

Garcia Menendez, Fernando, Assistant Professor, Civil Const & Environ Engineer

Garcia, Rosanna, Associate Professor, Business Management-Poole COM

Gardner, Marian-Elizabeth B., Teaching Professor, Biological Sciences

Gardner, Randolph G., Emeritus Professor, Horticultural Science

Gardner, Robin Pierce, Professor, Nuclear Engineering

Gardner, Sarah Y., Emeritus Associate Professor, Dept of Clinical Sciences

Gardner, Terrence G, Assistant Professor, Crop & Soil Sciences

Garland, Genevieve Marie, Research Assistant Professor, Ofc Research, Innov & Econ Dev, Textile & Apparel, Technology

Garlich, Jimmy Dale, Emeritus Professor, Prestage Poultry Science

Garoutte, Dennis E., Emeritus Associate Professor, Mathematics

Garrett, Paul E, Adjunct Associate Professor, Physics

Garrigan, Shelley E., Associate Professor, Foreign Languages And Literatu

Garson, George D, Professor, Public & International Affairs

Garval, Michael D, Professor, Foreign Languages And Literatu

Gasso, Santiago, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Gayles, Joy Gaston, Associate Professor, ELPHD

Gebreyes, Wondwossen A, Associate Professor, Dept-Population,Health,Pathobi

Gehringer, Edward F., Associate Professor, Computer Science-engr

Gelley, Ora, Associate Professor, English

Genereux, David Paul, Professor, Marine, Earth And Atmospheric

Genzer, Jan, Distinguished Professor, Chemical & Biomolecular Engr

Gerard, Mathew P., Teaching Associate Professor, Dept Molecular Biomedical Scie

Gerig, Thomas Michael, Emeritus Professor, Statistics

Gerler, Edwin R, Professor, ELPHD

Gernat, Abel G., Adjunct Assistant Professor, Prestage Poultry Science

Getsinger, Kurt D, Adjunct Professor, Crop & Soil Sciences

Getzen, Forrest W, Emeritus Professor, Chemistry

Ghashghaei, Troy, Associate Professor, Dept Molecular Biomedical Scie

Ghiladi, Reza A, Associate Professor, Chemistry

Ghosh, Sujit K, Professor, Statistics

Ghosh, Tushar K., Professor, Textile Engineering, Chemistry

Ghoshal, Subhashis, Associate Professor, Statistics

Gibson, James L, Adjunct Professor, Horticultural Science

Gierdowski, Dana Cockrum, Teaching Assistant Professor, English

Gilbert, John H., Emeritus Associate Professor, Public & International Affairs

Gilger, Brian C, Professor, Dept of Clinical Sciences

Gill, Carolina, Associate Professor, Graphic & Industrial Design

Gillan, Douglas J, Professor, Psychology

Gilleskie, Gary Louis, Teaching Associate Professor, BTEC-Biomfg Training Ed Ctr

Gilliam, James W., Emeritus Named Distinguished Professor, Crop & Soil Sciences

Gilligan, John G., Distinguished University Professor, College Of Engineering-dean's

Gilmartin, David P., Named Professor, History

Gilmour, Matthew Ian, Adjunct Assistant Professor, Dept-Population,Health,Pathobi

Gimeno, Isabel M, Associate 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, Named Distinguished University Professor, Textile & Apparel, Technology

Godwin, John R, Professor, Biological Sciences

Gold, Harvey J., Emeritus Professor, Statistics

Goldberg, Richard L., Research Associate Professor, Biomedical Program - ENG

Golden, Jacquelyn Beth, Adjunct Professor, Prestage Poultry Science

Goldfarb, Barry, Professor, For & Envir Res Acad Research

Goldstein, Irving S., Emeritus Professor, Forest Biomaterials

Goller, Carlos Christopher, Teaching Assistant Professor, Biological Sciences

Golub, Robert, Professor, Physics

Gomez, Joseph A., Emeritus Professor, English

Gomez, Shawn M., Assistant Professor, Biomedical Program - ENG

Gonzales Crisp, Denise, Professor, Graphic & Industrial Design

Gonzalez, Liara M, Assistant Professor, Dept of Clinical Sciences

Gonzalez, Ronalds Wilfredo, Assistant Professor, Forest Biomaterials

Gonzalez-Sullivan, Leila, Adjunct Professor, Adult & Higher Education

Goode, Larry Richard, Adjunct Associate Professor, Civil Const & Environ Engineer

Goodell, Lora Suzanne, Associate Professor, Food, Bioprocess & Nutrition Sc

Gooding, Guy V, Emeritus Professor, Entomology & Plant Pathology

Goodman, Major M., Distinguished University Professor, Crop & Soil Sciences

Goodnight, James Howard, Adjunct Professor, Statistics

Goodwin, Barry K, Named Distinguished Professor, Ag & Resource Economics

Goodwin, Jean, Professor, Communication

Gookin, Jody L, Professor, Dept of Clinical Sciences

Gopalarathnam, Ashok, Professor, Mechanical & Aerospace Engr

Gordh, Gordon, Adjunct Professor, Entomology & Plant Pathology

Gordon, Marsha Gabrielle, Professor, English

Gordon, Tammrah S, Associate Professor, History

Gordy, Claire Lee, Teaching Assistant Professor, Biological Sciences

Gorga, Russell E., Professor, Textile Engineering, Chemistry

Gorman, Christopher B, Professor, Chemistry

Goshe, Michael B., Associate Professor, Biochemistry

Gosse, John Charles, Adjunct Associate Professor, Marine, Earth And Atmospheric

Gotwalt, Christopher M, Adjunct Assistant Professor, Statistics

Gould, Fred L., Named Distinguished Professor, Entomology & Plant Pathology

Gould, Richard David, Named Professor, Mechanical & Aerospace Engr

Govoni, John Jeffrey, Adjunct Professor, Applied Ecology

Gower, Stith Thompson, Professor, For & Envir Res Acad Research

Grabow, Garry L, 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.

Granlund, Kenneth, Assistant Professor, Mechanical & Aerospace Engr

Grant, Christine S., Professor, College Of Engineering-dean's

Grant, Edward, Professor, Electrical & Computer Engr.

Grant, William Cullen, Emeritus Professor, Biological Sciences

Graves, Alexandria K, Associate Professor, Crop & Soil Sciences

Graves, Corey Albert, Visiting Associate Professor, Electrical & Computer Engr.

Gray, DeLeon L, Assistant Professor, TELS

Gray, Denis O., Professor, Psychology

Gray, Josh M, Assistant Professor, For & Envir Res Acad Research

Gray, Kent A, Adjunct Assistant Professor, Animal Science

Green, David Patrick, Emeritus Professor, Food,Bioprocess & Nutrition Sc

Green, James T, Emeritus Professor, Crop & Soil Sciences

Green, Matthew Piron, Assistant Professor, Physics

Greenberg, Cathryn Hoben, Adjunct Professor, For & Envir Res Acad Research

Greene, Steven H, Professor, Public & International Affairs

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., Emeritus Professor, Economics-Poole COM

Grieshop, Andrew P, Assistant Professor, Civil Const & Environ Engineer

Grifenhagen, Jill Freiberg, Assistant Professor, TELS

Griffin, Clifford E, Associate Professor, Public & International Affairs

Griffin, Ervin Verome, Adjunct Assistant Professor, ELPHD

Griffis, Dieter P., Research Associate Professor, Textile Engineering, Chemistry

Griffith, Emily Hohmeister, Research Assistant Professor, Statistics

Griggs, John Richard, Teaching Associate Professor, Mathematics

Grimes, Jesse Lee, Professor, Prestage Poultry Science

Grimmett, Marc Anderson, Associate Professor, ELPHD

Grimwood, James M., Professor, English

Grindem, Carol B., Professor, Dept-Population,Health,Pathobi

Grochowski, Colleen O'Connor, Adjunct Assistant Professor, ELPHD

Grogan, Brandon Robert, Adjunct Assistant Professor, Nuclear Engineering

Gross, Charlotte, Emeritus Professor, English

Gross, Harry D., Emeritus Professor, Crop & Soil Sciences

Gross, Kevin, Professor, Statistics

Gross, Ruth Vera, Professor, Foreign Languages And Literatu

Grossfeld, Robert M., Emeritus Professor, Applied Ecology

Grove, Thurman L, Emeritus Professor, Applied Ecology

Gruehn, Daniel, Associate Professor, Psychology

Gruen, Margaret Elizabeth, Adjunct Assistant Professor, Dept of Clinical Sciences

Grunden, Amy Michele, Named Professor, Plant and Microbial Biology

Gu, Xiaohui, Associate Professor, Computer Science-engr

Gu, Zhen, Associate Professor, Biomedical Program - ENG

Gubbins, Keith E, Named Distinguished University Professor, Chemical & Biomolecular Engr

Guddati, Murthy N., Professor, Civil Const & Environ Engineer

Guinness, Joseph S, Assistant Professor, Statistics

Guiteras, Raymond Patrick, Assistant Professor, Ag & Resource Economics

Gulling, Dana Kathleen, Associate Professor, Architecture

Gumpertz, Marcia Lynn, Professor, OIED Administration

Gundogdu, Kenan, Associate Professor, Physics

Gunnoe, Thomas Brent, Associate Professor, Chemistry

Gunter, Christopher, Associate Professor, Horticultural Science

Gupta, Abhinav, Professor, Civil Const & Environ Engineer

Gupta, Ajaya K., Emeritus Professor, Civil Const & Environ Engineer

Gupta, Bhupender S., Emeritus Professor, Textile Engineering, Chemistry

Gupta, Rachana Ashok, Teaching Associate Professor, Electrical & Computer Engr.

Gurgel, Patrick V, Adjunct Assistant Professor, Chemical & Biomolecular C&G

Gusmini, Gabriele, Adjunct Assistant Professor, Horticultural Science

Gustke, Larry Douglas, Emeritus Associate Professor, Parks, Recreation & Tourism Mg

Gutierrez Rodriguez, Eduardo, Assistant Professor, Food,Bioprocess & Nutrition Sc

Guvenc, Ismail, Associate Professor, Electrical & Computer Engr.

Guy, James S., Professor, Dept-Population,Health,Pathobi

Gwyer, Janet Lynn, Adjunct Professor, ELPHD

Haase, David G., Professor, Physics

Haddad, Nicholas M, Named Professor, Applied Ecology

Haenn, Nora M, Associate Professor, Sociology & Anthropology

Hagler, Winston Murry, Emeritus Professor, Prestage Poultry Science

Haider, Mansoor, Professor, Mathematics

Haigler, Candace Hope, Professor, Crop & Soil Sciences

Hain, Ernie Frederick, Adjunct Assistant Professor, Integrated Pest Mgmt-Research

Hain, Fred P., Emeritus Professor, Entomology & Plant Pathology

Hakovirta, Marko Juhani, Professor, Forest Biomaterials

Halberstadt, Amy gene, Professor, Psychology

Hale, Francis J., Emeritus Professor, Mechanical & Aerospace Engr

Hale, Scott A, Professor, Biological And Agricultural En

Haley, Richard L, Emeritus Assistant Professor, ELPHD

Hall, Alastair R., Professor, Economics-Poole COM

Hall, Anthony Douglas, Adjunct Professor, Psychology

Hall, Carol K., Named Distinguished University Professor, Chemical & Biomolecular Engr

Hall, Charles Edward, Associate Professor, Mechanical & Aerospace Engr

Hall, George L., Emeritus Professor, Physics

Hall, Jodi K, Assistant Professor, Social Work

Hall, Jonathan Russell, Research Assistant Professor, Biological Sciences

Hall, Nathan Samuel, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Hall, Steven G, Associate Professor, Biological And Agricultural En

Hallen, Hans D, Professor, Physics

Hallowell, George Dewey, Assistant Professor of the Practice, Architecture

Halweg, Christopher J, Teaching Assistant Professor, Biological Sciences

Ham, Derek Allen, Assistant Professor, Graphic & Industrial Design

Hamilton, Paul T, Associate Professor, Plant and Microbial Biology

Hamilton, Peter, Adjunct Professor, Marine, Earth And Atmospheric

Hamilton, Steven Paul, Adjunct Professor, Mathematics

Hamme, John Valentine, Emeritus Associate Professor, Materials Science & Engineering

Hammerberg, Bruce, Professor, Dept-Population, Health, Pathobi

Hammond, Robert Guthrie, Associate Professor, Economics-Poole COM

Hamon, Nicholas M., Adjunct Professor, Entomology & Plant Pathology

Hamouda, Hechmi, Teaching Professor, Textile Engineering, Chemistry

Han, Kevin, Assistant Professor, Civil Const & Environ Engineer

Hanck, Kenneth W., Emeritus Professor, Chemistry

Handfield, Robert B, Named Distinguished University Professor, Business Management-Poole COM

Hanel, Rita M, Adjunct Assistant Professor, Dept of Clinical Sciences

Hanley-Bowdoin, Linda Kay, Named Distinguished Professor, Plant and Microbial Biology

Hanna, Adel F, Adjunct 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, Jeffrey Alan, Adjunct Professor, Animal Science

Hanson, Dana J., Associate Professor, Food, Bioprocess & Nutrition Sc

Hanson, John M, Emeritus Distinguished University Professor, Civil Const & Environ Engineer

Harazin, William Dennis, Teaching 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 and Microbial Biology

Hardison-Moody, Annie Margaret, Assistant Professor, Agricultural & Human Sciences

Hardy, David H, Adjunct Assistant Professor, Crop & Soil Sciences

Harfoush, Khaled Abdel Hamid, Associate Professor, Computer Science-engr

Harlim, John, Adjunct Assistant Professor, Mathematics

Harmon, Russell S, Adjunct Professor, Marine, Earth And Atmospheric

Harms, Craig A, Professor, Dept of Clinical Sciences

Harp, Tyler L, Adjunct Assistant Professor, Entomology & Plant Pathology

Harper, Craig Andrew, Adjunct Associate Professor, For & Envir Res Acad Research

Harper, James D, Emeritus Professor, Entomology & Plant Pathology

Harrell, Cleon W, Emeritus Associate Professor, Economics-Poole COM

Harrell, Robert J, Adjunct Associate Professor, Animal Science

Harries, Peter J, Professor, Graduate School-Dean's Office

Harrington, Ann D, Teaching Associate Professor, TELS

Harrington, Charles D, Adjunct Associate Professor, Marine, Earth And Atmospheric

Harris, Gabriel Keith, Associate Professor, Food,Bioprocess & Nutrition Sc

Harris, William C., Emeritus Professor, History

Harrison, Antony Howard, Distinguished Professor, English

Harrison, Tara Myers, Assistant Professor, Dept of Clinical Sciences

Harrison, William C, Lecturer, ELPHD

Harrysson, Ola Lars Anders, Distinguished Professor, Fitts Dept Indust & Syst Engr

Hart, Franklin D., Emeritus Professor, Ofc Research, Innov & Econ Dev

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, Prestage Poultry Science

Hassan, Tasnim, Professor, Civil Const & Environ Engineer

Hathaway, Jon Michael, Adjunct Assistant Professor, Biological And Agricultural En

Hauck, Marlene L, Emeritus Professor, Dept of Clinical Sciences

Hauenstein, Jonathan David, Adjunct Assistant Professor, Mathematics

Haugh, Jason M, Professor, Chemical & Biomolecular Engr

Hauser, John R., Emeritus Named Professor, Electrical & Computer Engr.

Hauser, Peter J, Professor, Textile Engineering, Chemistry

Hausladen, Paul Andrew, Adjunct Associate Professor, Nuclear Engineering

Havenstein, Gerald B., Emeritus Professor, Prestage Poultry Science

Havlin, John L, Professor, Crop & Soil Sciences

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, Biological Sciences

Hayes, Robert Bruce, Associate Professor, Nuclear Engineering

Haynes-Maslow, Lindsey Haynes, Assistant Professor, Agricultural & Human Sciences

Haynie, William J, Emeritus Professor, Sci, Tech, Engr & Math (STEM)

Hazel, Dennis W., Associate Professor, Forestry Extension

He, Lin, Adjunct Associate Professor, Chemistry

He, Ruoying, Professor, Marine, Earth And Atmospheric

Headen, Alvin E., Emeritus Associate Professor, Economics-Poole COM

Healey, Christopher Graham, Professor, Advanced Analytics

Heatwole, Harold F, Emeritus Professor, Biological Sciences

Heber, Steffen, Associate Professor, Computer Science-engr

Heck, Walter Webb, Emeritus USDA Professor, Administration - Research Serv

Heckert, Andrew Bittinger, Adjunct Associate Professor, Biological Sciences

Heckman, Sarah Smith, Teaching Associate Professor, Computer Science-engr

Heese, Hans Sebastian, Named Distinguished Professor, Business Management-Poole COM

Heggen-Peay, Cheryl L, Adjunct Assistant Professor, Prestage Poultry Science

Heimbach, Clinton L., Emeritus Professor, Civil Const & Environ Engineer

Heiniger, Ronnie William, Professor, Crop & Soil Sciences

Heise, Ryan J, Adjunct Assistant Professor, Applied Ecology

Heitman, Joshua L, Professor, Crop & Soil Sciences

Heitmann, John A, Emeritus Professor, Forest Biomaterials

Helman, Lee Jay, Adjunct Professor, Dept-Population,Health,Pathobi

Helminck, Aloysius G, Professor, Mathematics

Hemenway, Cynthia L, Professor, Biochemistry

Henard, David H, Professor, Business Management-Poole COM

Henderson, Karla Ann, Emeritus Professor, Parks, Recreation & Tourism Mg

Henderson, Warren R., Emeritus Professor, Horticultural Science

Hentz, Forrest Clyde, Emeritus Professor, Chemistry

Herbert, David A, Adjunct Professor, Entomology & Plant Pathology

Hergeth, Helmut H, Associate Professor, Textile & Apparel, Technology

Hernandez, Raquel, Research Associate Professor, Biochemistry

Hernandez, Ricardo, Assistant Professor, Horticultural Science

Herring, William O, Adjunct Professor, Animal Science

Hersh, Patricia L, Professor, Mathematics

Hersh, Solomon P., Emeritus Named Professor, Textile Engineering, Chemistry

Hervey, Lisa Geralyn, Teaching Assistant Professor, Friday Institute

Hess, George R., Professor, For & Envir Res Acad Research

Hess, Paul R, Associate Professor, Dept of Clinical Sciences

Hess, Thomas M., Professor, Psychology

Hessling, Peter A, Teaching Assistant Professor, ELPHD

Hesterberg, Dean L, Named Professor, Crop & Soil Sciences

Hestir, Erin Lee, Assistant Professor, Marine, Earth And Atmospheric

Hibbard, James Patrick, Emeritus Professor, Marine, Earth And Atmospheric

Hicks, Gregory E., Teaching Assistant Professor, ELPHD

Hightower, Joseph E, Adjunct Professor, Applied Ecology

Hill, David Brian, Professor, Architecture

Hill, Jennifer Lee, Adjunct Assistant Professor, ELPHD

Hillmann, Ruediger C., Emeritus Associate Professor, Entomology & Plant Pathology

Hinesley, Lewis E., Emeritus Professor, Horticultural Science

Hinks, David, Named Professor, College Of Textiles-dean's Off

Hinshaw, Jeffrey M., Professor, Applied Ecology

Hinton, Timothy J, Professor, Philosophy & Religious Studies

Hipp, James Aaron, Associate Professor, Parks, Recreation & Tourism Mg

Hobbs, Heidi H, Associate Professor, Public & International Affairs

Hobgood, Thomas N, Emeritus Professor, Administration - Extension Ser

Hodge, Gary Ray, Professor, CAMCORE-Cooperative

Hodge, George Lawrence, Associate Professor, Textile Engineering, Chemistry

Hodges, Charles S, Visiting Professor, Entomology & Plant Pathology

Hodgson, Ernest, Emeritus Professor, Applied Ecology

Hodgson, Thom Joel, Named Distinguished University Professor, Fitts Dept Indust & Syst Engr

Hodgson, Thomas H., Emeritus Professor, Mechanical & Aerospace Engr

Hoefer, Mark Alan, Adjunct Assistant Professor, Mathematics

Hoffmann, Kristin Fisher, Lecturer, TELS

Hoffmann, William A, Professor, Plant and Microbial Biology

Hoggan, Chad David, Assistant Professor, ELPHD

Hoit, Marc I, Professor, VC for Off of Info Technology

Holder, Amara Lee, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Holl, Justin W, Adjunct Assistant Professor, Animal Science

Holland, James B, USDA Professor, Crop & Soil Sciences

Hollar, Seth E, Teaching Assistant Professor, Electrical & Computer Engr.

Hollebrands, Karen Flanagan, Professor, Sci, Tech, Engr & Math (STEM)

Holley, Linda T., Emeritus Professor, English

Holljes, H. Christian, Professor, Graphic & Industrial Design

Holmes, Thomas P, Adjunct Professor, For & Envir Res Acad Research

Holthausen, Duncan M., Emeritus Professor, Economics-Poole COM

Holton, William C., Adjunct Professor, Electrical & Computer Engr.

Honeycutt, Thomas Lynn, Emeritus Associate Professor, Computer Science-engr

Hong, Hoon, Professor, Mathematics

Hooker, Deborah Anne, Teaching Associate Professor, English

Hooker, Willard E., Emeritus Professor, Horticultural Science

Hooper, Percy Rivera, Associate Professor, Graphic & Industrial Design

Hope, Elan, Assistant Professor, Psychology

Hopfenberg, Harold B., Emeritus Named Professor, Chemical & Biomolecular Engr

Hopkins, Douglas C, Research Professor, Electrical & Computer Engr.

Hopkins, Thomas Sawyer, Research Professor, Marine, Earth And Atmospheric

Hoppin, Jane A, Associate Professor, Biological Sciences

Horie, Yasuyuki, Emeritus Professor, Civil Const & Environ Engineer

Horn, Timothy J, Research Assistant Professor, Fitts Dept Indust & Syst Engr

Horne, Erin Thomas, Clinical Assistant Professor, College Of Education

Horowitz, Jonathan M, Professor, Ofc Research, Innov & Econ Dev

Horton, Horace R, Emeritus Named Distinguished Professor, Biochemistry

Hou, Jia Jia, Research Assistant Professor, Nuclear Engineering

Howard, Kristina Elaine, Research Assistant Professor, Dept Molecular Biomedical Scie

Howell, Gary W, Adjunct Assistant Professor, Computer Science-engr

Howington, Stacy E., Adjunct Assistant Professor, Mathematics

Hoyo, Cathrine, Associate Professor, Biological Sciences

Hren, John Joseph, Emeritus Professor, Materials Science & Engineering

Hsiang, Simon M, Adjunct Professor, Fitts Dept Indust & Syst Engr

Hsiao, Lilian C, Assistant Professor, Chemical & Biomolecular Engr

Hsieh, Tzung Fu, Assistant Professor, Plant and Microbial Biology

Hu, Jianxin, Associate Professor, Architecture

Hu, Shuijin, Professor, Entomology & Plant Pathology

Hu, Yongxiang, Adjunct Associate Professor, Marine, Earth And Atmospheric

Huang, He, Professor, Biomedical Program - ENG

Huang, Hsiao-Ying Shadow, Associate Professor, Mechanical & Aerospace Engr

Huang, Jeng Sheng, Emeritus Professor, Entomology & Plant Pathology

HUANG, QIN, Named Distinguished Professor, Electrical & Computer Engr.

Hubbe, Martin A, Named Professor, Forest Biomaterials

Hubbell, Bryan J, Adjunct Assistant Professor, Ag & Resource Economics

Hubisz, John L, Adjunct Professor, Physics

Hudson, Lola C., Emeritus Professor, Dept Molecular Biomedical Scie

Hudson, Peyton B, Emeritus Associate Professor, Textile & Apparel, Technology

Hudson, Samuel Mack, Professor, Textile Engineering, Chemistry

Huffman, Paul R, Professor, Physics

Huffman, Rodney L., Associate Professor, Biological And Agricultural En

Hughes, Brian L, Professor, Electrical & Computer Engr.

Hughes, Claude L., Adjunct Professor, Mathematics

Hughes-Oliver, Jacqueline M., Professor, Statistics

Hulse-Kemp, Amanda Marie, USDA Assistant Professor, Crop & Soil Sciences

Hunt, Heather Rose Shive, Assistant Professor, Dept-Population,Health,Pathobi

Hunt, Jessica Heather, Associate Professor, TELS

Hunt, Louis David, Adjunct Assistant Professor, EMAS-Enrollment Mgt & Services

Hunt, Marvin W, Teaching Associate Professor, English

Hunt, William F, Named Professor, Biological And Agricultural En

Hunte, Frank L., Assistant Professor, Materials Science &Engineering

Hurley, Ryan J, Assistant Professor, Communication

Husain, Iqbal, Named Professor, Electrical & Computer Engr.

Hyland, Ethan Gordon, Assistant Professor, Marine, Earth And Atmospheric

Hyman, David N., Professor, Economics-Poole COM

Hyman, Michael, Professor, Plant and Microbial Biology

Iafrate, Gerald J., Adjunct Professor, Electrical & Computer Engr.

Iames, John S, Adjunct Assistant Professor, For & Envir Res Acad Research

Ingraham, Christopher, Assistant Professor, Communication

Iorizzo, Massimo, Assistant Professor, Horticultural Science

Ipsen, Ilse, Professor, Mathematics

Irving, Douglas Lee, Associate Professor, Materials Science &Engineering

Irwin, Rebecca Elizabeth, Professor, Applied Ecology

Isaacson, Nathaniel Kenneth, Associate Professor, Foreign Languages And Literatu

Isik, Fikret, Professor, Tree Improvement Cooperative

Isleib, Thomas G., Professor, Crop & Soil Sciences

Ison, Elon Ayinde, Associate Professor, Chemistry

Israel, Daniel Wesley, Emeritus Professor, Crop & Soil Sciences

Istook, Cynthia L, Professor, Textile & Apparel, Technology

Ito, Kazufumi, Professor, Mathematics

Ivanisevic, Albena, Professor, Materials Science &Engineering

Ivanov, Kostadin Nikolov, Professor, Nuclear Engineering

Ives, Robert Lawrence, Adjunct Professor, Mathematics

Ivy, Julie Simmons, Professor, Fitts Dept Indust & Syst Engr

Iyer, S. Purushothaman, Adjunct Professor, Computer Science-engr

Jackowski, Melissa Bristle, Adjunct Assistant Professor, ELPHD

Jackson, Brian Eugene, Associate Professor, Horticultural Science

Jackson, Steven D, Teaching Professor, Integrated Manufacturing Sys E

Jacob, Anna Margaret, Assistant Professor, ELPHD

Jacob, Megan E, Associate Professor, Dept-Population,Health,Pathobi

Jaeger, Audrey J., Professor, ELPHD

Jahn, Larry G., Emeritus Professor, Forest Biomaterials

Jaimes, Hector A, Professor, Foreign Languages And Literatu

Jakes, Susan S, Extension Assistant Professor, Ag And Natural Resources/comm, Psychology

Jakubikova, Elena, Associate Professor, Chemistry

Jameel, Hasan, Named Professor, Forest Biomaterials

James, April Lynda, Adjunct Associate Professor, For & Envir Res Acad Research

Jameson, Jessica K, Professor, Communication

Jang, Carey, Adjunct Associate Professor, Marine, Earth And Atmospheric

Janowitz, Gerald S., Emeritus Professor, Marine, Earth And Atmospheric

Jaselskis, Edward J, Distinguished Professor, Civil Const & Environ Engineer

Jasper, Warren J, Professor, Textile Engineering, Chemistry

Jayaratne, Koralalage Sunil Upali, Associate Professor, Agricultural & Human Sciences

Jaykus, Lee-Ann, Named Professor, Food,Bioprocess & Nutrition Sc

Jeffries, Micha Jennine, Teaching Assistant Professor, TELS

Jeng, Xinge Jessie, Assistant Professor, Statistics

Jenkins, David M., Emeritus Professor, Personal Org. Development

Jennings, Greg Donald, Emeritus Professor, Biological And Agricultural En

Jennings, Katherine Mary, Associate Professor, Horticultural Science

Jett, Jackson Bates, Professor, College of Natural Resources, Tree Improvement Cooperative

Jetton, Robert Miller, Research Associate Professor, CAMCORE-Cooperative

Jhala, Arnav H, Associate Professor, Computer Science-engr

Ji, Chueng Ryong, Professor, Physics

Jiang, Xiaoning, Professor, Mechanical & Aerospace Engr

Jiang, Xuxian, Adjunct Associate Professor, Computer Science-engr

Jin, Bongil, Associate Professor, Graphic & Industrial Design

Jin, Guoliang, Assistant Professor, Computer Science-engr

Jing, Naihuan, Professor, Mathematics

Jing, Yun, Associate Professor, Mechanical & Aerospace Engr

Joffe, Sharon Lynne, Adjunct Associate Professor, English

Johanningsmeier, Suzanne D, USDA Assistant Professor, Food,Bioprocess & Nutrition Sc

Johnson, Henry Louis, Professor of the Practice, ELPHD

Johnson, Mark A, Research Professor, Materials Science &Engineering

Johnson, Melissa A, Professor, Communication

Johnson, Richard R., Emeritus Professor, Mechanical & Aerospace Engr

Johnson, Thomas, Emeritus Professor, Ag & Resource Economics

Johnson, William L, Emeritus Professor, Animal Science

Johnston, Andrew Robert, Assistant Professor, English

Johnston, David West, Emeritus Distinguished Professor, Civil Const & Environ Engineer

Johnston, Karen L., Emeritus Professor, Physics

Joines, Jeffrey Allen, Professor, Textile Engineering, Chemistry

Joines, Sharon Melissa Bennett, Professor, Graphic & Industrial Design

Jones, Charles P., Emeritus Named Professor, Business Management-Poole COM

Jones, David W.W., Associate Professor, Agricultural & Human Sciences

Jones, Guy Langston, Emeritus Professor, Crop & Soil Sciences

Jones, Jacob L, Professor, Materials Science &Engineering

Jones, James R., Emeritus Professor, Animal Science

Jones, Lawrence Keith, Emeritus Professor, Curr, Instr & Counselor Ed-CED

Jones, Melissa Gail, Professor, Sci, Tech, Engr & Math (STEM)

Jones, Ronald K, Emeritus Professor, Entomology & Plant Pathology

Jones, Samuel L, Professor, Dept of Clinical Sciences

Jones, Victor A., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Jones, Whitney Mcrae, Teaching Assistant Professor, Biological Sciences

Jordan, Chad Victor, Teaching Associate Professor, Plant and Microbial Biology

Jordan, David L, Professor, Crop & Soil Sciences

Jordan, William J., Emeritus Professor, Communication

Joyner, Charles Edward, Emeritus Professor, Art and Design

Juarez, Chelsey Ann, Assistant Professor, Sociology & Anthropology

Jur, Jesse Stephen, Associate Professor, Textile Engineering, Chemistry

Kaber, David B, Professor, Fitts Dept Indust & Syst Engr

Kaeser, Tobias Ernst, Assistant Professor, Dept-Population,Health,Pathobi

Kahn, Joseph Stephan, Emeritus Professor, Biochemistry

Kalat, James W., Emeritus Professor, Psychology

Kalinga, Owen J, Professor, History

Kallestad, Waverly Anne, Teaching Assistant Professor, Applied Ecology

Kaltofen, Erich L, Professor, Mathematics

Kamper, Derek Gary, Associate Professor, Biomedical Program - ENG

Kamykowski, Daniel, Emeritus Professor, Marine, Earth And Atmospheric

Kandilov, Ivan Todorov, Associate Professor, Ag & Resource Economics

Kang, Min Jeong, Associate Professor, Mathematics

Kanters, Michael A, Professor, Parks, Recreation & Tourism Mg

Kaoumi, Djamel, Associate Professor, Nuclear Engineering

Kapravelos, Alexandros, Assistant Professor, Computer Science-engr

Karoui, Abdennaceur, Adjunct Associate Professor, Materials Science &Engineering

Kasal, Bohumil, Adjunct Professor, Forest Biomaterials

Kasichainula, Jagannadham, Associate Professor, Materials Science &Engineering

Kasper-Marienberg, Verena Ines, Assistant Professor, History

Kasworm, Carol Edith, Emeritus Named Professor, ELPHD

Kathariou, Sophia, Professor, Food,Bioprocess & Nutrition Sc

Katti, Madhusudan Vithal, Associate Professor, For & Envir Res Acad Research

Katz, Susan M, Associate Professor, English

Katzin, Gerald H., Emeritus Professor, Physics

Kay, Colin David, Associate Professor, Kannapolis Research

Kay, Michael G., Associate Professor, Fitts Dept Indust & Syst Engr

Kays, Roland Wesley, Research Associate Professor, For & Envir Res Acad Research

Ke, Ruian, Assistant Professor, Mathematics

Kebschull, Harvey G., Emeritus Associate Professor, Public & International Affairs

Kedrowicz, April Ann, Assistant Professor, Dept of Clinical Sciences

Keene, Bruce W, Professor, Dept of Clinical Sciences

Keene, Karen Allen, Associate Professor, Sci, Tech, Engr & Math (STEM)

Kelley, Blair Lynne Murphy, Associate Professor, Interdisciplinary Studies

Kelley, Carl Timothy, Named Professor, Mathematics

Kelley, John H, Research Associate Professor, Physics

Kelley, Stephen S, Professor, Forest Biomaterials

Kellison, Robert C., Emeritus Professor, For & Envir Res Acad Research

Kellner, Hans Dodds, Professor, English

Kellogg, Shaun B., Teaching Assistant Professor, Friday Institute

Kelly, John Rivard, Emeritus Professor, Foreign Languages And Literatu

Kelly, Robert M, Named Professor, Chemical & Biomolecular Engr

Keltie, Richard F., Professor, Mechanical & Aerospace Engr

Kemahlioglu-Ziya, Eda, Associate Professor, Business Management-Poole COM

Kemper, Alexander, Assistant Professor, Physics

Kendall, Corinne J, Adjunct Assistant Professor, Applied Ecology

Kennedy, George G., Named Distinguished Professor, Entomology & Plant Pathology

Kennedy-Stoskopf, Suzanne, Research Professor, Dept of Clinical Sciences

Kentgens-Craig, Margret, Adjunct Associate Professor, Architecture

Kerns, James P, Associate Professor, Entomology & Plant Pathology

Kertesz, Judy, Assistant Professor, History

Kessel, John J., Professor, English

Keung, Albert Jun Qi, Assistant Professor, Chemical & Biomolecular Engr

Keys, Robert Dean, Emeritus Associate Professor, Crop & Soil Sciences

Keyton, Joann, Professor, Communication

Khachatoorian, Haig, Emeritus Professor, Graphic & Industrial Design

Khaledi, Morteza, Adjunct Professor, Chemistry

Khan, Saad A, Named Professor, Chemical & Biomolecular Engr

Khater, Akram F, Professor, KCLDS

Kheyfets, Arkady, Professor, Mathematics

Khorram, Siamak, Professor, FER-Ctr for Earth Observation

Khosla, Narendra P., Emeritus Professor, Civil Const & Environ Engineer

Kia, Behnam, Research Assistant Professor, Electrical & Computer Engr., Physics

Kick, Edward Lee, Professor, Ag & Resource Economics

Kilara, Arun, Adjunct Professor, Food,Bioprocess & Nutrition Sc

Kilgo, John C, Adjunct Assistant Professor, For & Envir Res Acad Research

Kim, Chong S, Adjunct Professor, Mechanical & Aerospace Engr

Kim, Eui Kyung, Assistant Professor, Psychology

Kim, Ki Wook, Professor, Electrical & Computer Engr.

Kim, Mi Gyung, Professor, History

Kim, Sung Woo, Professor, Animal Science

Kim, Yongbaek, Adjunct Assistant Professor, Dept-Population,Health,Pathobi

Kim, Youngsoo R, Distinguished University Professor, Civil Const & Environ Engineer

Kimbell, Julia S, Adjunct Assistant Professor, Statistics

Kimler, William C., Associate Professor, History

King, Jason Tyler, Teaching Assistant Professor, Computer Science-engr

King, John S, Professor, FER Tree Physiology

King, Margaret Fontaine, Emeritus Associate Professor, English

King, Martin William, Professor, Textile Engineering, Chemistry

King, Russell E., Named Professor, Fitts Dept Indust & Syst Engr

King, Stacy W, Distinguished Professor, Business Management-Poole COM

Kingsmill, David E, Adjunct Professor, Marine, Earth And Atmospheric

Kinsella, William J, Professor, Communication

Kirby, Barbara Malpiedi, Professor, University College

Kirby, Sarah D, Professor, Agricultural & Human Sciences

Kirkman, Adrianna G., Professor, College of Natural Resources

Kirkman, Bradley Lane, Professor, Mgmt, Innovation&Entrepreneur

Kirkpatrick, Gary Jay, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Kistler, Mark J., Associate Professor, Agricultural & Human Sciences

Kiwanuka-Tondo, James, Associate Professor, Communication

Kjaer, Peter Krarup, Professor of the Practice, NC State Prague

Klaenhammer, Todd Robert, Emeritus Named Professor, Food, Bioprocess & Nutrition Sc

Kleiman, Glenn Marshall, Professor, Friday Institute

Klein, Katherine W., Emeritus Associate Professor, Psychology

Kleinstreuer, Clement, Professor, Mechanical & Aerospace Engr

Kleiss, Harold J., Emeritus Professor, Crop & Soil Sciences

Kloos, Wesley Edwin, Emeritus Professor, Biological Sciences

Knappe, Detlef R, Professor, Civil Const & Environ Engineer

Knauer, Mark T, Associate Professor, Animal Science

Kneller, James P, Associate Professor, Physics

Knoeber, Charles Robert, Professor, Economics-Poole COM

Knoll, Dana A., Adjunct Assistant Professor, Mathematics

Knollenberg, Whitney Grace, Assistant Professor, Parks, Recreation & Tourism Mg

Knopp, James Arthur, Professor, Biochemistry

Knowles, A Sidney, Emeritus Professor, English

Knowles, Charles Ernest, Lecturer, Mar, Earth & Atmos Sci Grad-Tm, Marine, Earth And Atmospheric

Knowles, James Robert, Teaching Assistant Professor, English

Koch Jr, Frank H, Adjunct Associate Professor, For & Envir Res Acad Research

Koch, Carl C., Named Distinguished Professor, Materials Science & Engineering

Koch, Joanna Greer, Teaching Assistant Professor, TELS

Koch, Steven E, Adjunct Professor, Marine, Earth And Atmospheric

Kochersberger, Robert C., Emeritus Associate Professor, English

Kochtcheeva, Lada Vyacheslavovna, Associate Professor, Public & International Affairs

Koci, Matthew D., Associate Professor, Prestage Poultry Science

Kocurek, Michael J, Emeritus Professor, Forest Biomaterials

Koenning, Stephen Robert, Emeritus Research Associate Professor, Entomology & Plant Pathology

Kogan, Irina Aleksandrovna, Associate Professor, Mathematics

Kolar, Praveen, Associate Professor, Biological And Agricultural En

Kolb, John Ronald, Emeritus Professor, Sci, Tech, Engr & Math (STEM)

Kolbas, Robert Michael, Professor, Electrical & Computer Engr.

Komarnytsky, Slavko, Associate Professor, Food,Bioprocess & Nutrition Sc

Konrad, Charles Edward, Adjunct Associate Professor, Marine, Earth And Atmospheric

Konsler, Thomas R., Emeritus Professor, Horticultural Science

Kordick, Stephanie, Adjunct Assistant Professor, Dept-Population,Health,Pathobi

Kornegay, Julia L, Professor, Horticultural Science

Kosenko, Kama A, Associate Professor, Communication

Kosovic, Branko, Adjunct Associate Professor, Mar, Earth & Atmos Sci Grad-Tm

Koster, Emlyn H, Adjunct Professor, Marine, Earth And Atmospheric

Kotek, Richard, Associate Professor, Textile Engineering, Chemistry

Kouri, Richard E, Adjunct Professor, Biomedical Program - ENG

Koutsos, Elizabeth A, Adjunct Professor, Animal Science

Kowalsky, Mervyn J, Professor, Civil Const & Environ Engineer

Kowolenko, Michael D., Adjunct Assistant Professor, Computer Science-engr

Krakovsky, Matthew David, USDA Associate Professor, Crop & Soil Sciences

Kramer, Jonathan Charles, Teaching Professor, Music

Kraus, Helen Tyler, Associate Professor, Horticultural Science

Krause, Wendy E., Associate Professor, Textile Engineering, Chemistry

Krawczyk, Kathy, Professor, Accounting-Poole COM

Kreitlow, Kimberly Lane Tabor, Adjunct Assistant Professor, Entomology & Plant Pathology

Krim, Hamid, Professor, Electrical & Computer Engr.

Krim, Jacqueline, Professor, Physics

Krings, Alexander, Associate Professor, Plant and Microbial Biology

Krishnamurthy, Srinivasan, Associate Professor, Business Management-Poole COM

Kropaczek, David, Distinguished Professor, Nuclear Engineering

Krotee, March Lee, Emeritus Professor, Health and Exercise Studies

Krute, Linda D, Adjunct Assistant Professor, College Of Engineering-dean's

Kudenov, Michael W, Assistant Professor, Electrical & Computer Engr.

Kullman, Seth William, Professor, Biological Sciences

Kumah, Divine Philip, Assistant Professor, Physics

Kunkel, Kenneth E, Research Professor, Marine, Earth And Atmospheric

Kuraparthi, Vasu, Associate Professor, Crop & Soil Sciences

Kuzma, Jennifer, Professor, Public & International Affairs

Kuznetsov, Andrey Valerevich, Professor, Mechanical & Aerospace Engr

Kwak, Thomas J, USDI Professor, Applied Ecology

Labate, Demetrio, Associate Professor, Mathematics

LaBean, Thomas H, Professor, Materials Science & Engineering

Laber, Eric Benjamin, Associate Professor, Statistics

Lackey, Carolyn Jean, Emeritus Professor, Agricultural & Human Sciences

Lackmann, Gary M., Professor, Marine, Earth And Atmospheric

Lado, Fred, Emeritus Professor, Physics

Laffitte, Bryan W, Associate Professor, Graphic & Industrial Design

Lahiri, Soumendra Nath, Professor, Statistics

Lakin, Kenneth R., Adjunct Associate Professor, Entomology & Plant Pathology

Lalush, David S, Associate Professor, Biomedical Program - ENG

Lamar, Traci Ann May, Professor, Textile & Apparel, Technology

Lamb, Harold Henry, Professor, Chemical & Biomolecular Engr

Lancia, Richard Angelo, Emeritus Professor, For & Envir Res Acad Research

Laney, Reid W, Adjunct Assistant Professor, Applied Ecology

Langerhans, Randall Brian, Associate Professor, Biological Sciences

Langfelder, Leonard J., Emeritus Professor, Marine, Earth And Atmospheric

Langley, Ricky Lee, Adjunct Assistant Professor, Biological Sciences

Lanier, Tyre C., Professor, Food, Bioprocess & Nutrition Sc

Lanzas, Cristina, Associate Professor, Dept-Population, Health, Pathobi

Laplante, Caroline, Assistant Professor, Dept Molecular Biomedical Scie

Lapp, John S., Emeritus Professor, Economics-Poole COM

Lari, Pooneh, Adjunct Assistant Professor, ELPHD

Larick, Duane K., Professor, Exec Vice Chancellor & Provost

Larson, Lincoln Ray, Assistant Professor, Parks, Recreation & Tourism Mg

Lascelles, Duncan X., Professor, Dept of Clinical Sciences

Lassiter, Charles A., Emeritus Professor, Animal Science

Laster, Scott M., Professor, Biological Sciences

Lau, Christopher S, Adjunct Professor, Dept Molecular Biomedical Scie

Laux, Dorianne Louise, Professor, English

Lavelle, Jerome Philip, Associate Professor, College Of Engineering-dean's

Lavopa, Anthony J., Emeritus Professor, History

Law, Jerry M, Professor, Dept-Population,Health,Pathobi

Layman, Craig Anthony, Professor, Applied Ecology

Lazzati, Davide, Adjunct Associate Professor, Physics

Lazzi, Gianluca, Adjunct Professor, Electrical & Computer Engr.

Leach, James Woodrow, Professor, Mechanical & Aerospace Engr

LeBeau, James Michael, Associate Professor, Materials Science &Engineering

LeBlanc, Gerald Andre, Professor, Biological Sciences

LeBlanc, Justin Douglas Edwards, Assistant Professor, Art and Design

Lebude, Anthony V, Associate Professor, Horticultural Science

Leduc, Sharon K, Adjunct Professor, Marine, Earth And Atmospheric

Lee, Bongmook, Research Assistant Professor, Adv Self-pwr Sys Integr SensrT

Lee, Dean J., Professor, Physics

Lee, Hollylynne Stohl, Professor, Sci, Tech, Engr & Math (STEM)

Lee, John Kelly, Professor, TELS

Lee, Joshua Alexander, Emeritus Professor, Crop & Soil Sciences

Lee, Nicole Marie, Assistant Professor, Communication

Lee, Susanna M, Associate Professor, History

Lee, Yuan-Shin, Professor, Fitts Dept Indust & Syst Engr

Leggett, Zakiya Holmes, Assistant Professor, For & Envir Res Acad Research

Leidy, Ross Bennett, Emeritus Professor, Biological Sciences

Leithold, Elana L., Professor, Marine, Earth And Atmospheric

Leming, Michael Lloyd, Emeritus Professor, Civil Const & Environ Engineer

Leonard, Rebecca, Emeritus Associate Professor, Communication

Leonas, Karen K., Professor, Textile & Apparel, Technology

LePrevost, Catherine Elizabeth, Teaching Assistant Professor, Applied Ecology

Lester II, James C, Distinguished Professor, Computer Science-engr

Leung, Yu-Fai, Professor, Parks, Recreation & Tourism Mg

Levenbook, Barbara B., Professor, Philosophy & Religious Studies

Levere, Thomas E., Emeritus Professor, Psychology

Levin, Harold D., Emeritus Associate Professor, Philosophy & Religious Studies

Levine, Jay F, Professor, Marine, Earth And Atmospheric

Levings, Charles S, Emeritus Named Distinguished Professor, Biological Sciences

Levis, James William, Research Assistant Professor, Civil Const & Environ Engineer

Levy, Michael G., Professor, Dept-Population,Health,Pathobi

Lewald, Carol Ann, Teaching Assistant Professor, Interdisciplinary Studies

Lewbart, Gregory A, Professor, Dept of Clinical Sciences

Lewis, Ramsey S, Professor, Crop & Soil Sciences

Lewis, William M., Emeritus Professor, Crop & Soil Sciences

Lewitus, Alan J, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Ley, David H., Emeritus Professor, Dept-Population,Health,Pathobi

Li, Bailian, Professor, Office of Int'l Affairs-OIA

Li, Fanxing, Associate Professor, Chemical & Biomolecular Engr

Li, Jun, Adjunct Assistant Professor, Nuclear Engineering

Li, Lexin, Adjunct Associate Professor, Statistics

Li, Lingjuan Wang, Professor, Biological And Agricultural En

Li, Xu, Associate Professor, Plant and Microbial Biology

Li, Zhilin, Professor, Mathematics

Liao, Jessica, Assistant Professor, Public & International Affairs

Liao, Wenjie, Assistant Professor, Sociology & Anthropology

Lidman, Tye, Assistant Professor, Mathematics

Liebl, Rex, Adjunct Professor, Crop & Soil Sciences

Ligler, Frances Smith, Named Distinguished Professor, Biomedical Program - ENG

Ligon, James M, Adjunct Associate Professor, Plant and Microbial Biology

Lila, Mary Ann, Distinguished Professor, Kannapolis Research

Lilley, Stephen C., Emeritus Associate Professor, Sociology & Anthropology, Sociology And Anthropology

Lilly, John P., Emeritus Associate Professor, Crop & Soil Sciences

Lim, Phooi K., Professor, Chemical & Biomolecular Engr

Lim, Shuang Fang, Assistant Professor, Physics

Lin, Jing, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Lin, Weili, Professor, Biomedical Program - ENG

Lin, Xiao-Biao, Professor, Mathematics

Linak, William, Adjunct Professor, Mechanical & Aerospace Engr

Linder, Keith E, Clinical Professor, Dept-Population,Health,Pathobi

Lindsay, Edwin Keith, Teaching Associate Professor, Parks, Recreation & Tourism Mg

Lindsay, Vincent, Assistant Professor, Chemistry

Lindsey, Jonathan S, Named Distinguished University Professor, Chemistry

Linker, Harry M., Emeritus Professor, Crop & Soil Sciences

Linnehan, Richard, Visiting Assistant Professor, Dept of Clinical Sciences

Lisk, Thomas D, Emeritus Professor, English

List, George F, Professor, Civil Const & Environ Engineer

Little, Joy, Teaching Assistant Professor, Biological Sciences

Little, Trevor J., Professor, Textile & Apparel, Technology

Littlejohn, Deborah K, Assistant Professor, Graphic & Industrial Design

Littlejohn, Michael A., Emeritus Professor, Electrical & Computer Engr.

Liu, Bin, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Liu, Hsiao-Ching, Professor, Animal Science

Liu, Huiqing, Adjunct Assistant Professor, Mar, Earth & Atmos Sci Grad-Tm

Liu, Jing-pu, Associate Professor, Marine, Earth And Atmospheric

Liu, Jun, Assistant Professor, Mechanical & Aerospace Engr

Liu, Min, Named Distinguished Professor, Civil Const & Environ Engineer

Liu, Ricky Ini, Assistant Professor, Mathematics

Liu, Tsailu, Professor, Graphic & Industrial Design

Liu, Yunan, Associate Professor, Operations Research-engr

Livingston, David P, USDA Professor, Crop & Soil Sciences

Livingston, Kimberly Ann, Assistant Professor, Prestage Poultry Science

Lloyd, Alun L., Professor, Mathematics

Lloyd, Cheryl L., Adjunct Assistant Professor, Administration - Extension Ser

Lobaton, Edgar, Associate Professor, Electrical & Computer Engr.

Loboa-Polefka, Elizabeth Grace, Adjunct Professor, Materials Science &Engineering

Locke, Anna Michelle, USDA Assistant Professor, Crop & Soil Sciences

Locklear, Eddie Lee, Emeritus Associate Professor, Agricultural & Human Sciences

Loeppert, Richard Henry, Emeritus Professor, Chemistry

Lohr, Kathy Diane, Adjunct Assistant Professor, ELPHD

Lommel, Steven, Named Distinguished Professor, Administration - Research Serv

Long, Raymond Carl, Emeritus Professor, Crop & Soil Sciences

Long, Terri A., Associate Professor, Plant and Microbial Biology

Longland, Richard Leigh, Assistant Professor, Physics

Longo, Stefano B, Associate Professor, Sociology & Anthropology

Loomis, Michael R, Adjunct Assistant Professor, Dept of Clinical Sciences

Lopez-Uribe, Margarita Maria, Adjunct Assistant Professor, Entomology & Plant Pathology

Lorenzen, Marce D., Associate Professor, Entomology & Plant Pathology

Losordo, Thomas M., Professor, Biological And Agricultural En

Loughlin, Daniel H, Adjunct Assistant Professor, Civil Const & Environ Engineer

Louws, Frank J, Professor, Integrated Pest Mgmt-Research

Lowman, Margaret D, Research Professor, College of Sciences - Dean

Lowrey, Austin S, Emeritus Professor, Graphic & Industrial Design

Lstiburek, Milan, Adjunct Associate Professor, For & Envir Res Acad Research

Lu, Ning, Associate Professor, Electrical & Computer Engr.

Lu, Wenbin, Professor, Statistics

Lu, Wenchang, Research Associate Professor, Physics

Lubischer, Jane L., Teaching Associate Professor, Biological Sciences

Lubkeman, David Lee, Research Professor, FREEDM Center

Lubkin, Sharon R, Professor, Mathematics

Lucas, Leon T, Emeritus Professor, Entomology & Plant Pathology

Lucia, Lucian A, Associate Professor, Forest Biomaterials

Lucier, Gregory W, Research Assistant Professor, Civil Const & Environ Engineer

Luczkovich, Joseph John, Adjunct Associate Professor, Marine, Earth And Atmospheric

Luff, Jennifer Ann, Assistant Professor, Dept-Population,Health,Pathobi

Luginbuhl, Geraldine, Emeritus Professor, Plant and Microbial Biology

Luginbuhl, James E., Emeritus Professor, Psychology

Luginbuhl, Jean-Marie, Emeritus Professor, Crop & Soil Sciences

Lukic, Srdjan Miodrag, Associate Professor, Electrical & Computer Engr.

Lunardi, Leda, Professor, Electrical & Computer Engr.

Lunn, David Paul, Professor, College Of Veterinary Medicine

Lunn, Katharine Fiona, Associate Professor, Dept of Clinical Sciences

Luo, Hong, Professor, Mechanical & Aerospace Engr

Lupton-Smith, Helen S, Teaching Assistant Professor, ELPHD

Luria, Keith Phillip, Professor, History

Lyle, Sara K, Associate Professor, Dept of Clinical Sciences

Lynch, Collin F., Assistant Professor, Computer Science-engr

Lyons, Kevin M, Professor, Mechanical & Aerospace Engr

Ma, Xiaosong, Adjunct Associate Professor, Computer Science-engr

Mabrito, Robert Alan, Associate Professor, Philosophy & Religious Studies

Macdonald, Jeffrey M, Associate Professor, Biomedical Program - ENG

MacKay, Trudy F., Named Distinguished University Professor, Biological Sciences

Mackenzie, John M, Professor, Biochemistry

MacKethan, Lucinda H., Emeritus Professor, English

MacNair, Douglas J, Adjunct Assistant Professor, Ag & Resource Economics

Magallanes, Fernando H., Associate Professor, Landscape Architecture

Maggard, Paul Anthony, Associate Professor, Chemistry

Maggi, Ricardo G., Research Associate Professor, Dept of Clinical Sciences

Magill, Michele M., Emeritus Associate Professor, Foreign Languages And Literatu

Maguire, Rory O, Adjunct Assistant Professor, Prestage Poultry Science

Mahaffey, James W., Professor, Biological Sciences

Mahdi, Adam, Adjunct Assistant Professor, Mathematics

Maher, Michael J, Adjunct Assistant Professor, Strengthen Teacher Education &

Mahinthakumar, Gnanamanikam, Professor, Civil Const & Environ Engineer

Mahoney, Kelly M, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Main, Charles E., Emeritus Professor, Entomology & Plant Pathology

Mainland, Charles Michael, Emeritus Professor, Horticultural Science

Maity, Arnab, Associate Professor, Statistics

Malarkey, David E, Adjunct Assistant Professor, Dept-Population,Health,Pathobi

Malecha, Marvin J, Emeritus Professor, College of Design

Mallette, Bruce Ingram, Adjunct Associate Professor, ELPHD

Mallik, Arup Kumar, Adjunct Professor, Fitts Dept Indust & Syst Engr

Maltecca, Christian, Associate Professor, Animal Science

Manfra, Meghan McGlinn, Associate Professor, TELS

Mannshardt, Elizabeth Catherine, Adjunct Assistant Professor, Statistics

Mansmann, Richard A., Clinical Professor, Dept of Clinical Sciences

Manukian, Vahagn Emil, Adjunct Professor, Mathematics

Manzoni, Anna, Associate Professor, Sociology & Anthropology

Marcellin, Denis J, Professor, Dept of Clinical Sciences

Marchant Montenegro, Hernan Pedro, Professor, Art and Design

Marchi, Dudley Michael, Professor, Foreign Languages And Literatu

Margolis, Stephen E., Professor, Economics-Poole COM

Mari, Jorge, Professor, Foreign Languages And Literatu

Maria, Jon-Paul, Professor, Materials Science &Engineering

Mariani, Christopher L., Associate Professor, Dept of Clinical Sciences

Markham, Stephen K, Professor, Mgmt, Innovation&Entrepreneur

Marks, Steven L, Clinical Professor, College Of Veterinary Medicine

Marlin, Joe A., Emeritus Professor, Mathematics

Marra, Michele C, Emeritus Professor, Ag & Resource Economics

Marshall, David S., USDA Professor, Entomology & Plant Pathology

Marshall, Patricia L, Professor, TELS

Martens, Chris, Assistant Professor, Computer Science-engr

Martin, David W, Emeritus Professor, Psychology

Martin, Donald Eugene Kemp, Associate Professor, Statistics

Martin, James D, Professor, Chemistry

Martin, Katie, Assistant Professor, For & Envir Res Acad Research

Martin, Louis A, Professor, College Of Engineering-dean's

Martin, Robert H, Professor, Mathematics

Martin, Ryan Glenn, Associate Professor, Statistics

Martinez Pelsor, Marilyn N, Adjunct Professor, Dept-Population,Health,Pathobi

Masnari, Nino A., Distinguished Professor, College Of Engineering-dean's

Mason, Jennifer Elizabeth, Adjunct Assistant Professor, Fitts Dept Indust & Syst Engr

Massad, Jordan E, Adjunct Assistant Professor, Mathematics

Mastromauro, Michael Louis, Clinical Assistant Professor, Dept of Clinical Sciences

Mathaudhu, Suveen Nigel, Adjunct Assistant Professor, Materials Science &Engineering

Mathews, Gary Lynn, Teaching Associate Professor, Foreign Languages And Literatu

Mathews, Kyle G, Professor, Dept of Clinical Sciences

Mathur, Kavita, Adjunct Professor, Textile & Apparel, Technology

Matthews, Brian, Teaching Assistant Professor, Sci, Tech, Engr & Math (STEM)

Matthews, Daniel W, Emeritus Associate Professor, Agricultural & Human Sciences

Matthews, Delisia Raychelle, Assistant Professor, Textile & Apparel, Technology

Matthews, Jessica Loock, Adjunct Assistant Professor, Mathematics

Mattingly, Carolyn J, Associate Professor, Biological Sciences

Mattingly, John Kelly, Associate Professor, Nuclear Engineering

Matzen, Vernon C., Emeritus Professor, Civil Const & Environ Engineer

Matzinger, Dale F., Emeritus Professor, Biological Sciences

Maultsby, Bevin Laurel, Teaching Assistant Professor, Mathematics

Maxa, Edward L., Emeritus Associate Professor, Agricultural & Human Sciences

Maxwell, Earl S., Professor, Biochemistry

Maxwell, Millie Gordon May, Adjunct Assistant Professor, ELPHD

May, Leila S, Professor, English

Mayer, Roger C, Professor, Mgmt, Innovation&Entrepreneur

Mayhorn, Christopher B., Professor, Psychology

Mayorga, Maria Esther, Professor, Fitts Dept Indust & Syst Engr

Maze, Benoit, Research Assistant Professor, Nonwovens Institute, Textile Engineering, Chemistry

Mazzoleni, Andre P, Associate Professor, Mechanical & Aerospace Engr

McAllister, David Franklin, Emeritus Professor, Computer Science-engr

McCall, Patricia Lou, Professor, Sociology & Anthropology

McCants, Charles B., Emeritus Professor, International Agriculture

McCarter, James B, Teaching Associate Professor, For & Envir Res Acad Research

McCarty, Gregory S, Research Associate Professor, Chemistry

McClelland, Jacquelyn W., Emeritus Professor, Agricultural & Human Sciences

McConnell, David A, Professor, Marine, Earth And Atmospheric

McCord, Marian G, Professor, College of Natural Resources

McCraw, Roger Lee, Emeritus Professor, Animal Science

McCreery, John K, Emeritus Associate Professor, Business Management-Poole COM

McCulloch, Allison Waling, Associate Professor, Sci, Tech, Engr & Math (STEM)

McDermid, Elizabeth A., Emeritus Associate Professor, Business Management-Poole COM

McDonald, Bruce, Associate Professor, Public & International Affairs

McDonald, Steven J, Professor, Sociology & Anthropology

McEachin, Andrew Josef, Adjunct Assistant Professor, ELPHD

McElroy, Michael B., Associate Professor, Economics-Poole COM

McFeeters, Roger Floyd, Emeritus USDA Professor, Food,Bioprocess & Nutrition Sc

McGahan, Mary C., Professor, Dept Molecular Biomedical Scie

McGavern, Dorian Brice, Adjunct Professor, Dept-Population,Health,Pathobi

McGill, Alicia Ebbitt, Assistant Professor, History

Mcginley, Kathleen Ann, Adjunct Assistant Professor, For & Envir Res Acad Research

McGinnis, Michelle S., Adjunct Professor, Horticultural Science

McGowan, Herle M, Teaching Associate Professor, Statistics

McGraw, Darryl Dana, Adjunct Assistant Professor, ELPHD

McGraw, Lisa Anne, Assistant Professor, Biological Sciences

McIlwee, John C., Adjunct Assistant Professor, University Theatre

McInnis, William Dale, Adjunct Assistant Professor, ELPHD

McKeand, Steven Edward, Professor, Tree Improvement Cooperative

McKenzie, Wendell Herbert, Emeritus Professor, Biological Sciences

McKeown, Julia O'Neal, Teaching Assistant Professor, TELS

McKerrow, Alexa J, Adjunct Assistant Professor, Applied Ecology

McKinney, Thearon T., Emeritus Professor, Agricultural & Human Sciences

McLaughlin, Anne Collins, Associate Professor, Psychology

McLaughlin, Gail C., Professor, Physics

McLaughlin, Levi, Assistant Professor, Philosophy & Religious Studies

McLaughlin, Richard A, Professor, Crop & Soil Sciences

McMahon, Gerard, Adjunct Professor, Applied Ecology

McManus, Shea Connolly, Assistant Professor, Sociology & Anthropology

McMillan, William Owen, Adjunct Associate Professor, Genetics

McNeal, Karen Sue, Adjunct Associate Professor, Marine, Earth And Atmospheric

McNelis, David N, Adjunct Professor, Nuclear Engineering

McNinch, Jesse E., Adjunct Assistant Professor, Marine, Earth And Atmospheric

McNulty, Steven George, USDA Professor, For & Envir Res Acad Research

McRae, David S., Emeritus Professor, Mechanical & Aerospace Engr

McRae, Gail G., Professor, Crop & Soil Sciences

McTague, John Paul, Adjunct Professor, For & Envir Res Acad Research

Meade, Adam W, Professor, Psychology

Mechem, David B, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Medhin, Negash G., Professor, Mathematics

Meeker, Rick B., Adjunct Professor, Dept Molecular Biomedical Scie

Meentemeyer, Ross Kendall, Professor, Ctr. for Geospatial Analytics

Megalos, Mark Arthur, Extension Professor, Forestry Extension

Mehlenbacher, Bradley S, Associate Professor, ELPHD

Meilleur, Flora, Associate Professor, Biochemistry

Meitzen, John Edward, Assistant Professor, Biological Sciences

Melander, Christian Corey, Professor, Chemistry

Mell, Julie L, Associate Professor, History

Mellen Charron, Katherine, Associate Professor, History

Melton, Thomas A., Named Professor, Ag And Natural Resources/comm

Menegatti, Stefano, Assistant Professor, Chemical & Biomolecular Engr

Meng, John, Adjunct Associate Professor, Textile & Apparel, Technology

Menzies, Timothy James, Professor, Computer Science-engr

Mercer, Daniel Evan, Adjunct Professor, For & Envir Res Acad Research

Meric, Ilker, Adjunct Assistant Professor, Nuclear Engineering

Merrill, Melissa Schuster, Professor, Animal Science

Mershon, Donald H., Emeritus Professor, Psychology

Mertyurek, Ugur, Adjunct Associate Professor, Nuclear Engineering

Mertz, John P, Associate Professor, Foreign Languages And Literatu

Meskhidze, Nicholas, Professor, Marine, Earth And Atmospheric

Messura, Mark Alan, Adjunct Associate Professor, Textile & Apparel, Technology

Meurs, Kathryn Montgome, Professor, College Of Veterinary Medicine

Meuten, Donald J., Emeritus Professor, Dept-Population,Health,Pathobi

Meyer, Carl, Professor, Mathematics

Meyer, John R., Professor, Entomology & Plant Pathology

Meyers, Walter E., Emeritus Professor, English

Mian, Rouf M, USDA Professor, Crop & Soil Sciences

Michael, Joan J, Emeritus Professor, Psychology

Michielsen, Stephen, Professor, Textile Engineering, Chemistry

Michnowicz, James Casimir, Associate Professor, Foreign Languages And Literatu

Mickle, James E., Professor, Plant and Microbial Biology

Middleton, Teena F, Adjunct Assistant Professor, Prestage Poultry Science

Mielke, Jeffrey Ingle, Associate Professor, English

Mikail, Rajib, Adjunct Assistant Professor, Electrical & Computer Engr.

Mila, Asimina Leonidas, Associate Professor, Entomology & Plant Pathology

Milheim, William Dryden, Adjunct Assistant Professor, ELPHD

Milholland, Robert D., Emeritus Professor, Entomology & Plant Pathology

Milla-Lewis, Susana Rita, Associate Professor, Crop & Soil Sciences

Millar, Joseph H, Assistant Professor of the Practice, English

Miller, Carolyn Rae, Emeritus Professor, English

Miller, Eric S., Professor, Plant and Microbial Biology

Miller, Grady L., Professor, Crop & Soil Sciences

Miller, Thomas Kenan, Distinguished Professor, DELTA

Miller, W J, Professor, English

Miller, William Laubach, Emeritus Professor, Biochemistry

Millhauser, John K, Assistant Professor, Sociology & Anthropology

Mills, Luther Scott, Adjunct Professor, For & Envir Res Acad Research

Minogue, James, Associate Professor, TELS

Miranda, Lilian Mia, Adjunct Assistant Professor, Crop & Soil Sciences

Mishra, Santosh Kumar, Assistant Professor, Dept Molecular Biomedical Scie

Misra, Kailash Chandra, Professor, Mathematics

Misra, Veena, Distinguished Professor, Electrical & Computer Engr.

Mitas, Lubos, Professor, Physics

Mitasova, Helena, Professor, Marine, Earth And Atmospheric

Mitchell, Anne W, Professor, History

Mitchell, Gary E., Emeritus Professor, Physics

Mitchell, Karlyn, Associate Professor, Business Management-Poole COM

Mitchell, Philip H, Associate Professor, Forest Biomaterials

Mitchell, Roger Emmit, Emeritus Associate Professor, Psychology

Mitin, Dmitri, Teaching Assistant Professor, Public & International Affairs

Moazed, Khosrow L., Emeritus Professor, Materials Science &Engineering

Mochrie, Richard Douglas, Emeritus Professor, Animal Science

Mock, Gary N., Emeritus Professor, Textile Engineering, Chemistry

Mody, Sujata Sudhakar, Associate Professor, Foreign Languages And Literatu

Moeser, Adam James, Adjunct Associate Professor, Dept-Population,Health,Pathobi

Mohamed, Mansour H., Emeritus Distinguished Professor, Textile Engineering, Chemistry

Mohiti Asli, Mahsa, Adjunct Assistant Professor, Biomedical Program - ENG

Mokhtari, Amirhossein, Adjunct Assistant Professor, Mathematics

Monaco, Malina K., Adjunct Assistant Professor, College Of Education

Monaco, Thomas J., Emeritus Professor, Administration - Research Serv, Horticultural Science

Monahan, John F., Emeritus Professor, Statistics

Moneta, Larry, Adjunct Assistant Professor, ELPHD

Money, Eric Shane, Teaching Assistant Professor, Ctr. for Geospatial Analytics

Monks, David W., Professor, Administration - Research Serv

Monteiro-Riviere, Nancy A, Emeritus Professor, Dept of Clinical Sciences

Montgomery, Terry G, Adjunct Associate Professor, Textile & Apparel, Technology, Textile Engineering, Chemistry

Montoya, Brina Mortensen, Assistant Professor, Civil Const & Environ Engineer

Moog, Robert S., Associate Professor, Public & International Affairs

Moore, Catherine E., Emeritus Associate Professor, English

Moore, Charles Lee, Emeritus Professor, Ag & Resource Economics

Moore, Gary E., Professor, Agricultural & Human Sciences

Moore, Harry B, Emeritus Professor, Entomology & Plant Pathology

Moore, Jeannette A, Professor, Animal Science

Moore, Marguerite Murray, Professor, Textile & Apparel, Technology

Moore, Robin C., Professor, Landscape Architecture

Moore, Roger Louis, Emeritus Associate Professor, Parks, Recreation & Tourism Mg

Moore, Samuel Bascom, Adjunct Associate Professor, Textile & Apparel, Technology

Moorman, Christopher E, Professor, Fisheries and Wildlife Program

Moorman, Michelle C., Adjunct Assistant Professor, For & Envir Res Acad Research

Morais, Duarte B., Associate Professor, Parks, Recreation & Tourism Mg

Morant, Tamah Chesney, Teaching Professor, Poole COM-Acad Affairs

Moreland, Charles G., Emeritus Professor, Ofc Research, Innov & Econ Dev

Morgado, Patricia E, Associate Professor, Architecture

Morgan, Joy, Assistant Professor, Agricultural & Human Sciences

Morgan, Paul H, Adjunct Professor, Statistics

Morillo, John D, Associate Professor, English

Morrill, Melinda Sandler, Associate Professor, Economics-Poole COM

Morrill, Thayer Stephen, Associate Professor, Economics-Poole COM

Morris, James Adiel, Adjunct Assistant Professor, Applied Ecology

Morrison, John M., Adjunct Professor, Marine, Earth And Atmospheric

Morrissey, Sharon E, Adjunct Assistant Professor, ELPHD

Morrow, William M, Emeritus Professor, Animal Science

Motsinger-Reif, Alison Anne, Associate Professor, Statistics

Mott, Bradford Wayne, Adjunct Assistant Professor, Computer Science-engr

Mouat Croxatto, Cecilia, Assistant Professor, Art and Design

Mowat, Freya Margarete, Assistant Professor, Dept of Clinical Sciences

Moxley, Robert Lonnie, Emeritus Professor, Sociology And Anthropology

Moyer, James W., Emeritus Professor, Entomology & Plant Pathology

Mozdziak, Paul Edward, Professor, Prestage Poultry Science

Muddiman, David C, Professor, Chemistry

Mueller, James Paul, Emeritus Professor, Crop & Soil Sciences

Mueller, Rainer Frank, Professor, Computer Science-engr

Mulholland, James Stephen, Associate Professor, English

Mullen, Mike, Professor, Acad Stu Aff-VC and Dean Off

Muller, Marie, Assistant Professor, Mechanical & Aerospace Engr

Mulligan, James C., Emeritus Professor, Mechanical & Aerospace Engr

Mulvey, Paul W, Associate Professor, Mgmt, Innovation&Entrepreneur

Munana, Karen R, Professor, Dept of Clinical Sciences

Murphy, Joseph Paul, Professor, Crop & Soil Sciences

Murphy-Hill, Emerson R, Associate Professor, Computer Science-engr

Murray, David Seth, Teaching Associate Professor, Interdisciplinary Studies

Murty, Korukonda Linga, Professor, Nuclear Engineering

Muse, Spencer V, Professor, Statistics

Mustian, Robert David, Emeritus Professor, Agricultural & Human Sciences

Musulin, Sarah E., Clinical Assistant Professor, Dept of Clinical Sciences

Muth, John F, Professor, Electrical & Computer Engr.

Myers, Richard M., Emeritus Professor, Animal Science

Mykyta, Larysa Anna, Associate Professor, Foreign Languages And Literatu

Nacoste, Rupert W., Professor, Psychology

Nadelman, Martin H, Adjunct Assistant Professor, ELPHD

Naderman, George C, Emeritus Associate Professor, Crop & Soil Sciences

Nagel, Robert T., Emeritus Professor, Mechanical & Aerospace Engr

Nagle, H Troy, Distinguished Professor, Electrical & Computer Engr.

Nair, Ramachandran D., Adjunct Associate Professor, Marine, Earth And Atmospheric

Nalepa, Christine, Adjunct Associate Professor, Entomology & Plant Pathology

Nam, Chang S, Associate Professor, Fitts Dept Indust & Syst Engr

Nance, Mark T, Associate Professor, Public & International Affairs

Narayan, Jagdish, Named Distinguished Professor, Materials Science &Engineering

Narayan, Roger Jagdish, Professor, Biomedical Program - ENG

Narayanaswamy, Venkateswaran, Assistant Professor, Mechanical & Aerospace Engr

Nascone-Yoder, Nanette M, Associate Professor, Dept Molecular Biomedical Scie

Nason, James M, Named Distinguished Professor, Economics-Poole COM

Nassar-McMillan, Sylvia C., Professor, ELPHD

Nau, James M., Professor, Civil Const & Environ Engineer

Neal, Joseph C, Professor, Horticultural Science

Neel, Jennifer A, Associate Professor, College Of Veterinary Medicine

Nelson, Claudia, Adjunct Associate Professor, Marine, Earth And Atmospheric

Nelson, Elizabeth Atwood, Teaching Assistant Professor, Communication

Nelson, Larry Alan, Emeritus Professor, Statistics

Nelson, Paul V., Emeritus Professor, Horticultural Science

Nelson, Stacy Arnold Charles, Professor, FER-Ctr for Earth Observation

Nemanich, Robert J., Professor, Physics

Nepal, Prakash, Research Assistant Professor, For & Envir Res Acad Research

Nestor, Casey C, Assistant Professor, Animal Science

Netherland, Michael D, Adjunct Associate Professor, Crop & Soil Sciences

Neufeld, Edward B, Adjunct Associate Professor, Dept-Population,Health,Pathobi

Neunzig, Herbert H., Emeritus Professor, Entomology & Plant Pathology

Neupert, Shevaun D., Associate Professor, Psychology

Nevzorov, Alexander A, Associate Professor, Chemistry

Newcom, Douglas Wyatt, Adjunct Assistant Professor, Animal Science

Newmark, Craig M., Adjunct Associate Professor, Economics-Poole COM

Nfah-Abbenyi, Juliana Makuchi, Distinguished Professor, English

Ngale, Gracious, Professor, Mechanical & Aerospace Engr

Nguyen, Tien Khai, Assistant Professor, Mathematics

Nichols, Elizabeth Guthrie, Professor, For & Envir Res Acad Research

Niedzlek-Feaver, Marianne, Associate Professor, Biological Sciences

Nielsen, Dahlia M., Associate Professor, Biological Sciences

Nielsen, Larry Andrew, Professor, For & Envir Res Acad Research

Nietfeld, John, Professor, TELS

Nilsson, Arne, Professor, Electrical & Computer Engr.

Nilsson, Urban Jan, Adjunct Professor, For & Envir Res Acad Research

Ning, Peng, Adjunct Professor, Computer Science-engr

Niyogi, Devdutta S, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Njie, Haddy M, Teaching Assistant Professor, Interdisciplinary Studies

Noble, Richard L., Emeritus Professor, Applied Ecology

Nolan, Michael Warren, Assistant Professor, Dept of Clinical Sciences

Nolan-Stinson, Jennifer Anne, Assistant Professor, English

Nordone, Shila Kapil, Research Assistant Professor, Dept Molecular Biomedical Scie

Norris, Larry Keith, Associate Professor, Mathematics

Northcutt, Julie K, Adjunct Professor, Prestage Poultry Science

Norwalk, Kate, Assistant Professor, Psychology

Novak, Bruce M, Named Distinguished University Professor, Chemistry

Novak, Vera, Adjunct Assistant Professor, Mathematics

Nowell, Branda L, Professor, Public & International Affairs

Nunnally, Stephens W., Emeritus Professor, Civil Const & Environ Engineer

Nuttle, Henry Lee, Teaching Professor, Fitts Dept Indust & Syst Engr

Nychka, Douglas W, Adjunct Professor, Statistics

O'Brien, Gail W, Emeritus Professor, History

O'Connor, Brendan Timothy, Associate Professor, Mechanical & Aerospace Engr

O'Neal, William G., Adjunct Professor, Textile Engineering, Chemistry

Obenour, Daniel R, Assistant Professor, Civil Const & Environ Engineer

Oblinger, Diana G, Adjunct Professor, ELPHD

Oblinger, James Leslie, Emeritus Professor, Food,Bioprocess & Nutrition Sc

Odle, Jack, Named Distinguished Professor, Animal Science

Odom, Janice E, Adjunct Assistant Professor, Alumni Relations

Ogan, Kemafor, Associate Professor, Computer Science-engr

Ojiambo, Peter, Associate Professor, Entomology & Plant Pathology

Olby, Natasha J, Professor, Dept of Clinical Sciences

Olf, Heinz G., Emeritus Professor, Forest Biomaterials

Oliver, Kevin M, Professor, TELS

Oliver-Hoyo, Maria Teresa, Professor, Chemistry

Olivry, Thierry J, Professor, Dept of Clinical Sciences

Ollis, D F, Distinguished University Professor, Chemical & Biomolecular Engr

Olson, Barry A, Adjunct Professor, Acad Stu Aff-Business Adm

Olson, Jonathan W, Associate Professor, Biological Sciences

Olsson, Mats, Adjunct Professor, For & Envir Res Acad Research

Oltmans, Arnold W., Associate Professor, Ag & Resource Economics

Olufsen, Mette, Professor, Mathematics

Olukolu, Bode A, Research Assistant Professor, Horticultural Science

Oneal, John B, Emeritus Professor, Electrical & Computer Engr., Engineering-Academic Affairs

Opperman, Charles H., Professor, Entomology & Plant Pathology

Oralkan, Omer, Professor, Electrical & Computer Engr.

Orders, Amy Buchanan, Adjunct Assistant Professor, Environmental Health & Safety

Orgeron, Devin A., Associate Professor, English

Ormond, R. Bryan, Research Assistant Professor, Thermal Protection & Comfort C

Orndorff, Paul E., Emeritus Professor, Dept-Population,Health,Pathobi

Orr, David B, Associate Professor, Entomology & Plant Pathology

Orr, Miriam E, Professor, English

Ortiz, Alejandra Campbell, Assistant Professor, Civil Const & Environ Engineer

Osborne, Jason A., Associate Professor, Statistics

Osborne, Susan Sinclair, Emeritus Associate Professor, TELS

Osburn, Carlton M., Emeritus Professor, Electrical & Computer Engr.

Osburn, Christopher Lee, Associate Professor, Marine, Earth And Atmospheric

Osmond, Deanna L, Professor, Crop & Soil Sciences

Ottesen, Johnny T., Adjunct Professor, Mathematics

Otto, Luther B., Emeritus Distinguished Professor, Sociology And Anthropology

Otvos, James D, Adjunct Professor, Biochemistry

Overton, Margery F., Professor, Exec Vice Chancellor & Provost

Oviedo-Rondon, Edgar Orlando, Professor, Prestage Poultry Science

Oxenham, William, Named Professor, Textile Engineering, Chemistry

Ozaltin, Osman Yalin, Assistant Professor, Fitts Dept Indust & Syst Engr

Ozturk, Hatice Orun, Teaching Associate Professor, Biomedical Program - ENG

Ozturk, Mehmet Cevdet, Professor, Electrical & Computer Engr.

Pacifici, Jamian Krishna, Assistant Professor, Fisheries and Wildlife Program

Pacifici, Lara B, Teaching Associate Professor, For & Envir Res Acad Research

Padilla, Arthur, Professor, Mgmt, Innovation&Entrepreneur

Paepflow, Colleen, Adjunct Assistant Professor, ELPHD

Paerl, Ryan William, Assistant Professor, Marine, Earth And Atmospheric

Paesler, Michael, Professor, Physics

Pagach, Donald P, Professor, Accounting-Poole COM

Page, Lavon B, Emeritus Associate Professor, Mathematics

Painter, Jason L, Adjunct Assistant Professor, TELS

Pal, Lokendra, Associate Professor, Forest Biomaterials

Palmour, Hayne, Emeritus Professor, Materials Science &Engineering

Palmquist, Raymond B., Emeritus Professor, Economics-Poole COM

Pang, Tao, Associate Professor, Mathematics

Pankow, Mark R, Assistant Professor, Mechanical & Aerospace Engr

Panthee, Dilip Raj, Associate Professor, Horticultural Science

Pao, Chia Ven, Emeritus Professor, Mathematics

Papich, Mark G, Professor, Dept Molecular Biomedical Scie

Papp, David, Assistant Professor, Mathematics

Parcel, Toby L, Professor, Sociology & Anthropology

Park, John C., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Park, Soonhye, Associate Professor, Sci, Tech, Engr & Math (STEM)

Park, Sunkyu, Associate Professor, Forest Biomaterials

Park, Travis Dale, Associate Professor, Agricultural & Human Sciences

Parker, George W., Emeritus Associate Professor, Physics

Parker, Matthew David, Professor, Marine, Earth And Atmospheric

Parker, Michael L., Associate Professor, Horticultural Science

Parker, Randy Randolph, Adjunct Assistant Professor, ELPHD

Parker, Samuel Thomas, Professor, History

Parkhurst, Carmen R., Emeritus Professor, Dept Of Poultry Science, Prestage Poultry Science

Parks, Leo W., Emeritus Professor, Plant and Microbial Biology

Parks, Lisa D, Teaching Associate Professor, Biological Sciences

Parnin, Christopher Joseph, Assistant Professor, Computer Science-engr

Parrillo-Chapman, Lisa Lynne, Associate Professor, Textile & Apparel, Technology

Parrish, Erin Dodd, Adjunct Associate Professor, Textile & Apparel, Technology

Parsons, Gregory N, Named Professor, Chemical & Biomolecular Engr

Pasalar, Celen, Assistant Professor, Landscape Architecture

Paskova, Tania Milkova, Research Professor, Electrical & Computer Engr., Materials Science &Engineering

Pasquinelli, Melissa, Professor, Textile Engineering, Chemistry

Pasten, Jose Agustin, Professor, Foreign Languages And Literatu

Patala, Srikanth, Assistant Professor, Materials Science &Engineering

Patisaul, Heather B., Named Professor, Biological Sciences

Patterson, Robert P., Professor, Crop & Soil Sciences

Patty, Richard R., Emeritus Professor, Physics

Paur, Sandra, Associate Professor, Mathematics

Pawlak, Joel Justin, Associate Professor, Forest Biomaterials

Pawlowski, Roger P., Adjunct Professor, Mathematics

Payne, Gary A., Named Distinguished Professor, Entomology & Plant Pathology

Payton, Fay C, Professor, Business Management-Poole COM

Peace, Robert Lynn, Emeritus Professor, Accounting-Poole COM

Peacock, Charles H., Professor, Crop & Soil Sciences

Pearce, Douglas K., Professor, Economics-Poole COM

Pearson, Richard G., Emeritus Professor, Fitts Dept Indust & Syst Engr, Psychology

Pearson, Ronald G., Emeritus Professor, Forest Biomaterials

Peck, Emily Mann, Adjunct Professor, Mathematics

Peedin, Gerald Franklin, Emeritus Named Professor, Crop & Soil Sciences

Peet, Mary Monnig, Emeritus Professor, Horticultural Science

Pelletier, Denis, Associate Professor, Economics-Poole COM

Pemper, Richard R, Adjunct Professor, Nuclear Engineering

Pendlebury, Michael John, Professor, Philosophy & Religious Studies

Peng, Xinxia, Associate Professor, Dept Molecular Biomedical Scie

Penick, John E, Emeritus Professor, Sci, Tech, Engr & Math (STEM)

Pennell, Joan T, Professor, Ctr Fam & Community Engagement

Pennington, Robin, Associate Professor, Accounting-Poole COM

Penrose, Ann M., Professor, English

Peralta, Perry N, Associate Professor, Forest Biomaterials

Perera, Imara Y, Research Professor, Plant and Microbial Biology

Peretti, Steven W., Associate Professor, Chemical & Biomolecular Engr

Perez de Leon, Adalberto A, Adjunct Associate Professor, Entomology & Plant Pathology

Perez Diaz, Ilenys Muniz, USDA Assistant Professor, Food,Bioprocess & Nutrition Sc

Perkins-Veazie, Penelope M, Professor, Horticultural Science

Perros, Harilaos George, Professor, Computer Science-engr

Perros, Helen C., Teaching Assistant Professor, History

Peszlen, Ilona Maria, Associate Professor, Forest Biomaterials

Peters, Kara Jo, Professor, Mechanical & Aerospace Engr

Peterson, Markus Nils, Professor, Fisheries and Wildlife Program

Peterson, Matthew O, Assistant Professor, Graphic & Industrial Design

Peterson, Richard Eric, Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Peterson, Wilbur Carroll, Emeritus Associate Professor, Electrical & Computer Engr.

Petherbridge, Donna Tucker, Adjunct Assistant Professor, DELTA

Petitte, James N, Professor, Prestage Poultry Science

Petriz, Olivia Anne, Assistant Professor, Dept of Clinical Sciences

Petters, Markus Dirk Jan, Associate Professor, Marine, Earth And Atmospheric

Petters, Robert M., Professor, Animal Science

Petty, Ian T, Professor, Biological Sciences

Philbrick, C Russell, Research Professor, Marine, Earth And Atmospheric

Phillips, Richard Busbee, Adjunct Professor, Forest Biomaterials

Phillips, Shannon Elizabeth, Associate Professor, Animal Science

Phillips, Sharon Baker, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Picart, Jose' A, Professor, ELPHD

Pickworth, Carrie L, Assistant Professor, Animal Science

Piedrahita, Jorge A, Professor, Dept Molecular Biomedical Scie

Pierce, Christine M., Emeritus Professor, Philosophy & Religious Studies

Pierce, Joshua Glenn, Assistant Professor, Chemistry

Pierce, Marcela, Associate Professor, Plant and Microbial Biology

Pietrafesa, Leonard J., Emeritus Professor, Marine, Earth And Atmospheric

Pigg, Stacey L, Assistant Professor, English

Piggott, Nicholas E, Professor, Ag & Resource Economics

Pilkington, Dwain H., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Pillsbury, Harold C, Professor, Biomedical Program - ENG

Pinton, Gianmarco Francesco, Assistant Professor, Biomedical Program - ENG

Place, Wayne, Professor, Architecture

Planchart, Antonio J, Assistant Professor, Biological Sciences

Plume, Vita Karina, Emeritus Associate Professor, Art and Design

Poindexter, Julius C, Emeritus Associate Professor, Business Management-Poole COM

Poling, Edward B., Emeritus Professor, Horticultural Science

Polizzotto, Matthew L, Associate Professor, Crop & Soil Sciences

Pollack, Jeffrey M, Associate Professor, Mgmt, Innovation&Entrepreneur

Pollock, Kenneth Hugh, Emeritus Professor, Applied Ecology

Polyak, Emil, Assistant Professor, Art and Design

Pond, Samuel B., Associate Professor, Psychology

Poole, Daniel Heath, Associate Professor, Animal Science

Poore, Matt H, Professor, Animal Science

Pope, Carol A., Emeritus Professor, TELS

Porter, Stephen Robert, Professor, ELPHD

Porterfield, Jane Anne, Assistant Professor, Textile & Apparel, Technology

Posner, Lysa Pam, Professor, Dept Molecular Biomedical Scie

Post, Angela Rose, Assistant Professor, Crop & Soil Sciences

Post, Justin Blaise, Teaching Assistant Professor, Statistics

Potter, Kevin M, Research Associate Professor, For & Envir Res Acad Research

Pour-Ghaz, Mohammad, Associate Professor, Civil Const & Environ Engineer

Pourdeyhimi, Behnam, Named Distinguished Professor, College Of Textiles-dean's Off

Powell, Merle A, Emeritus Professor, Horticultural Science

Powell, Nancy C., Emeritus Professor, Textile & Apparel, Technology

Powell, Nathaniel T., Emeritus Named Professor, Entomology & Plant Pathology

Powell, Roger A., Emeritus Professor, Applied Ecology

Prak, Anco L., Emeritus Named Professor, Fitts Dept Indust & Syst Engr

Prater, John T., Adjunct Professor, Materials Science & Engineering

Prestemon, Jeffrey P, Adjunct Professor, For & Envir Res Acad Research

Presutti, David G, Teaching Assistant Professor, Biochemistry

Prioli, Carmine A., Emeritus Professor, English

Pritchard, Ewan Gareth David, Research Assistant Professor, FREEDM Center

Pritchard, Ruie J., Emeritus Professor, TELS

Proctor, Charles H., Emeritus Professor, Statistics

Proctor, Dalton R, Emeritus Professor, Agricultural & Human Sciences

Proulx, Caroline, Assistant Professor, Chemistry

Puckett, Brandon Joel, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Puckett, Paige Rollins, Adjunct Assistant Professor, Biological And Agricultural En

Purnell, Marshall E., Professor of the Practice, Architecture

Purnell, Robert C, Adjunct Professor, For & Envir Res Acad Research

Purrington, Suzanne Townsend, Emeritus Professor, Chemistry

Puryear, Bobby Lee, Teaching Professor, Economics-Poole COM

Puryear, Stephen Montague, Associate Professor, Philosophy & Religious Studies

Putchu, Mohan Sastri, Professor, Mathematics

Qu, Rongda, Professor, Crop & Soil Sciences

Queen, Sara Glee, Associate Professor, Architecture

Quesada, Lina Maria, Assistant Professor, Entomology & Plant Pathology

Quesenberry, Charles P., Emeritus Professor, Statistics

Qurollo, Barbara Alice, Research Assistant Professor, Dept of Clinical Sciences

Rabiei, Afsaneh, Professor, Mechanical & Aerospace Engr

Race, Shaina L, Teaching Assistant Professor, Advanced Analytics

Rahman, M. Shamimur, Professor, Civil Const & Environ Engineer

Rajala, Sarah Ann, Emeritus Professor, College Of Engineering-dean's

Ralls, Robert Scott, Adjunct Professor, ELPHD

Raman, Sethu, Emeritus Professor, Marine, Earth And Atmospheric

Ramsey, J. Michael, Professor, Biomedical Program - ENG

Rand, J. Patrick, Professor, Architecture

Ranjithan, Sanmugavadivel, Professor, Civil Const & Environ Engineer

Ranney, Thomas G., Professor, Horticultural Science

Rao, Balaji M, Associate Professor, Chemical & Biomolecular Engr

Rao, S. Trivikrama, Adjunct Professor, Marine, Earth And Atmospheric

Rappa, Michael, Named Distinguished University Professor, Advanced Analytics

Rasdorf, William John, Professor, Civil Const & Environ Engineer

Rawlings, John Oren, Emeritus Professor, Statistics

Ray, Tracey E, Adjunct Assistant Professor, OIED Administration

Raymond, Dana Gordon, Emeritus Associate Professor, Art and Design

Reading, Benjamin J, Assistant Professor, Applied Ecology

Reading, Nathan P, Associate Professor, Mathematics

Reardon, Robert John, Assistant Professor, Public & International Affairs

Reaser, Jeffrey Leo, Associate Professor, English

Reavis, Dick J, Emeritus Associate Professor, English

Rebach, Steve, Research Professor, Sea Grant Program

Reberg-Horton, Samuel Christopher, Associate Professor, Crop & Soil Sciences

Redding, W Rich, Clinical Professor, Dept of Clinical Sciences

Reed, Robert E, Adjunct Assistant Professor, Applied Aquatic Ecology Center, Marine, Earth And Atmospheric

Reeves, Douglas Stephen, Professor, College Of Engineering-dean's

Reeves, Gregory T, Assistant Professor, Chemical & Biomolecular Engr

Reich, Brian J, Associate Professor, Statistics

Reichard, Donald L., Adjunct Assistant Professor, ELPHD

Reid, Jeffrey Clinton, Adjunct Associate Professor, Marine, Earth And Atmospheric

Reid, Traci V., Associate Professor, Public & International Affairs

Reif, David Michael, Associate Professor, Biological Sciences

Reiland, Thomas W., Associate Professor, Statistics

Reisig, Dominic Duane, Associate Professor, Entomology & Plant Pathology

Reiskind, Martha Burford, Research Assistant Professor, Applied Ecology

Reiskind, Michael Hay, Assistant Professor, Entomology & Plant Pathology

Rejesus, Roderick M., Professor, Ag & Resource Economics

Renkow, Mitchell Adam, Professor, Ag & Resource Economics

Reynolds Jr, Claude Lewis, Teaching Professor, Materials Science & Engineering

Reynolds, Peter J, Adjunct Professor, Physics

Reynolds, Stephen P., Professor, Physics

Rhee, Injong, Adjunct Professor, Computer Science-engr

Rice, Arthur R, Professor, Landscape Architecture

Rice, James A., Professor, Applied Ecology

Rich, Samantha Anne Rozier, Adjunct Assistant Professor, Parks, Recreation & Tourism Mg

Richards-Stallings, Jonathan Wesley, Assistant Professor, Statistics

Richardson, Robert Jeryl, Professor, Crop & Soil Sciences

Richmond, Demetrius D, Adjunct Assistant Professor, College Of Education

Ricketts, David, Associate Professor, Electrical & Computer Engr.

Riddick, Francine Piscitelli, Teaching Assistant Professor, ELPHD

Riddle, John M., Emeritus Professor, History

Rider, Traci Rose, Research Assistant Professor, Design Research

Ridgeway, Don L., Emeritus Professor, Statistics

Rieder, David M, Associate Professor, English

Rieder, Kathleen Callahan, Associate Professor, Art and Design

Riehn, Robert, Professor, Physics

Rifki, Fatih A., Emeritus Professor, Architecture

Riitters, Kurt H, Adjunct Professor, For & Envir Res Acad Research

Rindos, Andrew J, Adjunct Associate Professor, Computer Science-engr, Electrical & Computer Engr.

Riordan, Allen J., Emeritus Associate Professor, Marine, Earth And Atmospheric

Rissman, Emilie Francesca, Professor, Biological Sciences

Ristaino, Jean B., Named Professor, Entomology & Plant Pathology

Ritchie, David F., Professor, Entomology & Plant Pathology

Rittling, Mary Elizabeth, Adjunct Assistant Professor, ELPHD

Rivers, Anthony T, Adjunct Assistant Professor, Computer Science-engr

Rivers, Louie, Assistant Professor, For & Envir Res Acad Research

Riviere, Jim E., Emeritus Named Distinguished Professor, Dept-Population,Health,Pathobi

Rizkalla, Sami, Distinguished Professor, Civil Const & Environ Engineer

Ro, Paul I, Professor, Mechanical & Aerospace Engr

Robarge, Wayne P., Emeritus Professor, Crop & Soil Sciences

Roberson, Gary T, Associate Professor, Biological And Agricultural En

Roberts, David L, Associate Professor, Computer Science-engr

Roberts, John F, Emeritus Professor, Applied Ecology

Roberts, Malcolm C., Emeritus Professor, Dept-Population,Health,Pathobi

Roberts, Reade Bruce, Assistant Professor, Biological Sciences

Roberts, William L, Adjunct Professor, Mechanical & Aerospace Engr

Robertson, Ian Douglas, Clinical Professor, Dept Molecular Biomedical Scie

Robertson, Robert L., Emeritus Professor, Entomology & Plant Pathology

Robertson, Sabrina Elizabeth, Teaching Assistant Professor, Dept Molecular Biomedical Scie

Robins, Nicholas A, Teaching Associate Professor, History

Robinson, Mendel L, Emeritus Associate Professor, Textile & Apparel, Technology

Robinson, Stefanie Mora, Assistant Professor, Business Management-Poole COM

Robinson, Walter A, Professor, Marine, Earth And Atmospheric

Robison, Odis Wayne, Emeritus Professor, Animal Science

Rockenbach, Alyssa Nicole, Professor, ELPHD

Rodriguez, Jesus, Professor, Mathematics

Rodriguez-Puebla, Marcelo, Associate Professor, Dept Molecular Biomedical Scie

Roe, R. Michael, Named Distinguished Professor, Entomology & Plant Pathology

Roe, Simon C, Professor, Dept of Clinical Sciences

Roelle, Paul A., Adjunct Assistant Professor, Marine, Earth And Atmospheric

Rogers, John, Adjunct Professor, Dept Molecular Biomedical Scie

Roise, Joseph Peter, Professor, For & Envir Res Acad Research

Rojas, Orlando Jose, Research Professor, Forest Biomaterials

Roland, Christopher M, Professor, Physics

Rollins, Yvonne B., Professor, Foreign Languages And Literatu

Romo, Lynsey Kluever, Assistant Professor, Communication

Ronquest, Rebecca Ellen, Assistant Professor, Foreign Languages And Literatu

Rose, Robert B., Associate Professor, Biochemistry

Ross, Ann Helen, Professor, Biological Sciences

Rotenberg, Eric, Professor, Electrical & Computer Engr.

Rothenberg, Lori Fay, Associate Professor, Textile & Apparel, Technology

Rotunno, Richard, Adjunct Professor, Marine, Earth And Atmospheric

Rouphail, Nagui M, Professor, Civil Const & Environ Engineer

Rouse, Lawrence Lee, Adjunct Assistant Professor, ELPHD

Roush, William B, Adjunct Professor, Prestage Poultry Science

Rouskas, Georgios, Professor, Computer Science-engr

Rowe, John E, Research Professor, Physics

Rowe, Jonathan P., Adjunct Assistant Professor, Computer Science-engr

Royal, Kenneth Darrell, Assistant Professor, Dept of Clinical Sciences

Royster, Larry H., Emeritus Professor, Mechanical & Aerospace Engr

Ru, Hongyu, Clinical Assistant Professor, Dept-Population,Health,Pathobi

Rubilar, Rafael Alejandro, Adjunct Assistant Professor, The Forest Nutrition Cooperati

Rubin, Eva R., Emeritus Professor, Public & International Affairs

Rudek, Joseph, Adjunct Associate Professor, Marine, Earth And Atmospheric

Rudolph, Julia E, Professor, History

Rufty, Rebeca C., Professor, Graduate School-Dean's Office

Rufty, Thomas W, Named Professor, Crop & Soil Sciences

Rushing, John E., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Russell, Burton Lester, Emeritus Associate Professor, Communication

Russell, Dale A, Emeritus Research Professor, Marine, Earth And Atmospheric

Russell, Phillip E., Research Professor, Materials Science &Engineering

Russo, Marc Ernest, Associate Professor, Art and Design

Rust, Jon Paul, Professor, Textile Extension

Rutherford, Teomara Alexandra, Assistant Professor, TELS

Sabornie, Edward J., Professor, TELS

Safley, Charles D., Emeritus Professor, Ag & Resource Economics

Sagui, Maria C, Professor, Physics

Saibaba, Arvind Krishna, Assistant Professor, Mathematics

Saker, Korinn Edna, Associate Professor, Dept Molecular Biomedical Scie

Saloni, Daniel Erique, Associate Professor, Forest Biomaterials

Salstad, M. Louise, Emeritus Associate Professor, Foreign Languages And Literatu

Samatova, Nagiza Faridovna, Professor, Computer Science-engr

San Miguel Delgadillo, Adriana, Assistant Professor, Chemical & Biomolecular Engr

Sandeep, K P, Professor, Food,Bioprocess & Nutrition Sc

Sanders, Michael G., Adjunct Professor, Psychology

Sanders, Timothy H, Emeritus USDA Professor, Food,Bioprocess & Nutrition Sc

Sang, Shengmin, Adjunct Assistant Professor, Food,Bioprocess & Nutrition Sc

Sanii, Ezat, Emeritus Associate Professor, Fitts Dept Indust & Syst Engr

Sannes, Philip L., Professor, Dept Molecular Biomedical Scie

Sanoff, Henry, Emeritus Professor, Architecture

Santiso, Erik Emilio, Assistant Professor, Chemical & Biomolecular Engr

Saravitz, Carole H, Research Assistant Professor, Phytotron

Sargent, Frank D., Emeritus Professor, Animal Science

Saul, Katherine, Associate Professor, Mechanical & Aerospace Engr

Savage, Carla Diane, Professor, Computer Science-engr

Saveliev, Alexei V., Associate Professor, Mechanical & Aerospace Engr

Sawhney, Man M., Emeritus Professor, Sociology & Anthropology

Sawyers, Roby B, Professor, Accounting-Poole COM

Sayde, Chadi, Assistant Professor, Biological And Agricultural En

Sazdanovic, Radmila, Assistant Professor, Mathematics

Scafuro, Alessandra, Assistant Professor, Computer Science-engr

Scales, Alice Y, Teaching Assistant Professor, Sci, Tech, Engr & Math (STEM)

Scandalios, John G., Emeritus Professor, Biological Sciences

Scattergood, Ronald O, Professor, Materials Science &Engineering

Scearce, J Mark, Professor, Art and Design

Schaefer, Thomas M, Professor, Physics

Schaeffer, Blake, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Schaffer, Henry E, Emeritus Professor, Advanced Computing, Biological Sciences

Schaffer, Kristen J, Associate Professor, Architecture

Schal, Coby J, Named Distinguished Professor, Entomology & Plant Pathology

Scharf, Frederick S, Adjunct Professor, Applied Ecology

Scharf, Valery Fairfax, Clinical Assistant Professor, Dept of Clinical Sciences

Schlenger, William, Adjunct Professor, Psychology

Schlosser, Paul M, Adjunct Professor, Mathematics

Schmidt, Andrew Philip, Associate Professor, Accounting-Poole COM

Schmidt, Jessica Young, Teaching Assistant Professor, Computer Science-engr

Schnabel, Lauren V, Assistant Professor, Dept of Clinical Sciences

Schnetzer, Astrid, Associate Professor, Marine, Earth And Atmospheric

Schoen, Martin, Adjunct Professor, Chemical & Biomolecular Engr

Schoenfeld, Regina M, Associate Professor, Dept Molecular Biomedical Scie

Scholle, Frank, Associate Professor, Biological Sciences

Schrag, Robert Laurence, Professor, Communication

Schreck, Carl James, Adjunct Assistant Professor, NC Inst of Climate Studies

Schreiner, Anton F., Emeritus Professor, Chemistry

Schrimper, Ronald A., Emeritus Professor, Ag & Resource Economics

Schroeder, Bastian Jonathan, Adjunct Associate Professor, Civil Const & Environ Engineer

Schroeder-Moreno, Michelle Shawn, Associate Professor, Crop & Soil Sciences

Schulman, Michael D., Named Distinguished Professor, Agricultural & Human Sciences

Schulte, Ann C, Emeritus Professor, Psychology

Schultheis, Jonathan R., Professor, Horticultural Science

Schunert, Sebastian, Adjunct Assistant Professor, Nuclear Engineering

Schwalbe, Michael L., Professor, Sociology & Anthropology

Schwartz, Justin, Named Professor, Materials Science & Engineering

Schwartz, Steven J., Emeritus Professor, Food, Bioprocess & Nutrition Sc

Schwarz, Michael Richard, Adjunct Professor, Entomology & Plant Pathology

Schweitzer, Mary Higby, Professor, Biological Sciences

Sciaudone, Elizabeth J., Research Assistant Professor, Civil Const & Environ Engineer

Scott, Maxwell J, Professor, Entomology & Plant Pathology

Scott, Stephen Carlos, Adjunct Assistant Professor, ELPHD

Scroggs, Jeffrey Scott, Associate Professor, Mathematics

Seater, John J., Professor, Economics-Poole COM

Sederoff, Heike Inge Ada, Professor, Plant and Microbial Biology

Sederoff, Ron Ross, Emeritus Distinguished Professor, For & Envir Res Acad Research

See, Miles T, Professor, Animal Science

Seekamp, Erin Lynn, Associate Professor, Parks, Recreation & Tourism Mg

Selgrade, James Francis, Emeritus Professor, Mathematics

Semazzi, Fredrick H, Professor, Marine, Earth And Atmospheric

Sequeira, Ron A., Adjunct Associate Professor, Entomology & Plant Pathology

Seracino, Rudolf, Professor, Civil Const & Environ Engineer

Serenari, Christopher, Adjunct Assistant Professor, For & Envir Res Acad Research

Seth Carley, Danesha Gita, Research Associate Professor, Horticultural Science

Setser, Bryan Howard, Teaching Assistant Professor, TELS

Setzer, Rhyne Woodrow, Adjunct Professor, Statistics

Setzer, Sharon M., Professor, English

Severin, Laura R., Professor, English

Seyam, Abdel-fattah Mohamed, Professor, Textile & Apparel, Technology

Shafer, Steven Ray, Adjunct Professor, Entomology & Plant Pathology

Shah, Sanjay Bikram, Professor, Biological And Agricultural En

Shahzad, Muhammad, Assistant Professor, Computer Science-engr

Shamblin, Leigh, Professor of the Practice, Mgmt, Innovation&Entrepreneur

Shamey, Renzo, Professor, Textile Engineering, Chemistry

Shane, Simon M., Adjunct Professor, Dept-Population,Health,Pathobi, Prestage Poultry Science

Shannon, Steven Christopher, Associate Professor, Nuclear Engineering

Sharma-Shivappa, Ratna Rani, Adjunct Associate Professor, Biological And Agricultural En

Shaw, Ping-Tung, Emeritus Professor, Marine, Earth And Atmospheric

Shea, Damian, Professor, Biological Sciences

Shear, Theodore Henry, Associate Professor, For & Envir Res Acad Research

Shearer, Michael, Professor, Mathematics

Shearon, Ronald Wilson, Professor, Agricultural & Human Sciences

Sheats, Mary Katherine, Assistant Professor, Dept of Clinical Sciences

Sheldon, Brian W., Emeritus Professor, Prestage Poultry Science

Shelhamer, James Henry, Adjunct Professor, Dept-Population,Health,Pathobi

Shelley, Rowland M, Adjunct Associate Professor, Applied Ecology

Shen, Tengming, Adjunct Professor, Materials Science &Engineering

Shen, Xipeng, Associate Professor, Computer Science-engr

Sheppard, John Douglas, Professor, Food,Bioprocess & Nutrition Sc

Sherk, Julieta Trevino, Associate Professor, Horticultural Science

Sherman, Barbara Lynn, Clinical Professor, Dept of Clinical Sciences

Sherry, Barbara, Professor, Dept Molecular Biomedical Scie

Shertzer, Kyle W, Adjunct Assistant Professor, Applied Ecology

Sherwood, Bruce A., Research Professor, Physics

Shew, Barbara B., Research Assistant Professor, Entomology & Plant Pathology

Shew, Howard D., Named Professor, Entomology & Plant Pathology

Shi, Wei, Professor, Crop & Soil Sciences

Shih, Jason C., Emeritus Professor, Prestage Poultry Science

Shim, Eunkyong, Assistant Professor, Textile Engineering, Chemistry

Shimura, Fumio, Adjunct Professor, Materials Science &Engineering

Shirwaiker, Rohan Ajit, Associate Professor, Fitts Dept Indust & Syst Engr

Shoemaker, Paul B., Emeritus Professor, Entomology & Plant Pathology

Shore, Scott Harold, Adjunct Associate Professor, Plant and Microbial Biology

Showalter, David Scott, Teaching Professor, Accounting-Poole COM

Showers, William J., Professor, Marine, Earth And Atmospheric

Shriver, Thomas Eugene, Professor, Sociology & Anthropology

Shultz, David A, Professor, Chemistry

Shumaker Jeffrey, Penny Michelle, Teaching Assistant Professor, Sci, Tech, Engr & Math (STEM)

Sichitiu, Mihail Lorin, Professor, MS Comp Networking-ECE

Siciliano, Paul David, Professor, Animal Science

Siderelis, Chrys D., Professor, Parks, Recreation & Tourism Mg

Siewert, Charles Edward, Professor, Mathematics

Sikes, Michael L., Associate Professor, Biological Sciences

Silber, Robert, Emeritus Associate Professor, Mathematics

Silliman, Benjamin, Professor, Agricultural & Human Sciences

Sills, Erin Odonnell, Professor, For & Envir Res Acad Research

Sills, Robert C., Adjunct Associate Professor, Dept-Population,Health,Pathobi

Silverberg, Lawrence M, Professor, Mechanical & Aerospace Engr

Silverman, Jules, Named Distinguished Professor, Entomology & Plant Pathology

Silverstein, Jack William, Professor, Mathematics

Simmons, Chip DeBruhl, Research Assistant Professor, Horticultural Science

Simmons, Susan Jeanne, Professor, Advanced Analytics

Simons, Theodore R, USDI Professor, Applied Ecology

Simons-Rudolph, Joseph M, Teaching Assistant Professor, Psychology

Simpson, Michael F, Adjunct Associate Professor, Nuclear Engineering

Simpson, Robert M, Adjunct Professor, Dept-Population,Health,Pathobi

Simunovic, Josip, Research Professor, Food,Bioprocess & Nutrition Sc

Sinclair, Geoffrey Allan, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Sinclair, Thomas R, Adjunct Professor, Crop & Soil Sciences

Singer, Michael F., Professor, Mathematics

Singh, Munindar P, Professor, Computer Science-engr

Singh, Nadia Dolly, Associate Professor, Biological Sciences

Sinha, Tushar, Adjunct Assistant Professor, Civil Const & Environ Engineer

Siopes, Thomas David, Emeritus Professor, Prestage Poultry Science

Sirota, Brent S, Associate Professor, History

Sit, Timmy L, Adjunct Assistant Professor, Entomology & Plant Pathology

Sitar, Zlatko, Named Distinguished Professor, Materials Science &Engineering

Sivaramakrishnan, Kartik Krishnan, Adjunct Assistant Professor, Mathematics

Skaar, David Allen, Research Assistant Professor, Biological Sciences

Skaggs, Richard W., Emeritus Named Distinguished Professor, Biological And Agricultural En

Skroch, Walter A., Emeritus Professor, Horticultural Science

Slankas, John Botious, Adjunct Assistant Professor, Lab for Analytic Sciences

Slatta, Richard Wayne, Professor, History

Slenning, Barrett D, Associate Professor, Dept-Population,Health,Pathobi

Sliwinska-Bartowiak, Malgorzata, Adjunct Professor, Chemical & Biomolecular Engr

Small, Judy Jo, Emeritus Professor, English

Smallwood, James E., Professor, Dept Molecular Biomedical Scie

Smart, Robert Charles, Professor, Biological Sciences

Smirnov, Alexej I., Professor, Chemistry

Smirnova, Tatyana I., Associate Professor, Chemistry

Smith, Adrian Alan, Research Assistant Professor, Biological Sciences

Smith, Angela Carmella, Teaching Associate Professor, ELPHD

Smith, Carl B., Emeritus Named Professor, Textile Engineering, Chemistry

Smith, Charles Eugene, Associate Professor, Statistics

Smith, Craig Allen, Emeritus Professor, Communication

Smith, Craig Randall, Adjunct Professor, Marine, Earth And Atmospheric

Smith, Donald E., Emeritus Professor, Applied Ecology

Smith, Frank J., Emeritus Professor, Psychology

Smith, Gary W., Emeritus Associate Professor, Textile & Apparel, Technology

Smith, Geoffrey W, Professor, Dept-Population,Health,Pathobi

Smith, J C, Emeritus Associate Professor, Civil Const & Environ Engineer

Smith, James W., Adjunct Associate Professor, Entomology & Plant Pathology

Smith, Jared D., Assistant Professor, Business Management-Poole COM

Smith, Jordan William, Adjunct Assistant Professor, Parks, Recreation & Tourism Mg

Smith, Lee, Emeritus Professor, English

Smith, Nicole Tripp, Lecturer, ELPHD

Smith, Ralph Conover, Professor, Mathematics

Smith, V. Kerry, Emeritus Distinguished University Professor, Ag & Resource Economics

Smith, William A, Emeritus Professor, Fitts Dept Indust & Syst Engr

Smith, William David, Emeritus Named Professor, Administration - Research Serv

Smith, William R, Associate Professor, Sociology & Anthropology

Smoot, Jean J, Emeritus Professor, English

Smyth, Thomas J., Professor, Crop & Soil Sciences

Snyder, Amy Marie, Clinical Assistant Professor, Dept of Clinical Sciences

Snyder, Wesley E., Emeritus Professor, Electrical & Computer Engr.

So, Franky, Distinguished Professor, Materials Science & Engineering

Solari, Anthony G., Teaching Assistant Professor, Public & International Affairs

Solihin, Yan, Professor, Electrical & Computer Engr.

Somers, Leslie A, Associate Professor, Chemistry

Sonenshine, Daniel E, Adjunct Professor, Entomology & Plant Pathology

Song, Rui, Associate Professor, Statistics

Sorensen, Kenneth A., Emeritus Professor, Entomology & Plant Pathology

Sorenson, Clyde E, Professor, Entomology & Plant Pathology

Soroos, Marvin Stanley, Emeritus Professor, Public & International Affairs

Sorrell, Furman Y, Emeritus Professor, Mechanical & Aerospace Engr

Southern, Phillip S., Emeritus Professor, Entomology & Plant Pathology

Soyarslan, Sanem, Assistant Professor, Philosophy & Religious Studies

Sozzani, Ross, Assistant Professor, Plant and Microbial Biology

Spafford, Anne McCombe, Associate Professor, Horticultural Science

Spayd, Sara Elizabeth, Emeritus Professor, Horticultural Science

Spears, Janet F, Emeritus Professor, Crop & Soil Sciences

Spencer, Stephanie Laine, Professor, History

Spires, Hiller A, Professor, TELS

Spontak, Richard J, Distinguished Professor, Chemical & Biomolecular Engr

Spooner, Jean, Emeritus Extension Professor, Biological And Agricultural En

Sprinthall, Norman A, Emeritus Professor, Curr, Instr & Counselor Ed-CED

Spurr, Harvey Wesley, Emeritus USDA Professor, Entomology & Plant Pathology

Srogl, Jiri, Research Associate Professor, Chemical & Biomolecular Engr, Nonwovens Institute

St. Amant, Robert A, Professor, Computer Science-engr

Staddon, Jessica Nicola, Adjunct Associate Professor, Computer Science-engr

Stafford, Thomas Hugh, Adjunct Assistant Professor, Acad Stu Aff-VC and Dean Off

Stage, Scott Andrew, Associate Professor, Psychology

Staicu, Ana-Maria, Associate Professor, Statistics

Stalker, Harold T, Professor, Crop & Soil Sciences

Stallmann, Matthias F.M., Professor, Computer Science-engr

Stancil, Daniel D, Named Professor, Electrical & Computer Engr.

Stanko, Michael A, Associate Professor, Business Management-Poole COM

Stansbury, Kim L, Associate Professor, Social Work

Stark, Charles Robert, Adjunct Associate Professor, Prestage Poultry Science

Starly, Binil, Associate Professor, Fitts Dept Indust & Syst Engr

Steelman, Toddi Angela, Adjunct Professor, For & Envir Res Acad Research

Steer, Michael B., Named Professor, Electrical & Computer Engr.

Stefanski, Leonard A., Professor, Statistics

Stein, Allen Frederick, Professor, English

Stein, Sarah R, Associate Professor, Communication

Stepanova, Anna N., Assistant Professor, Plant and Microbial Biology

Stephenson, James L., Adjunct Assistant Professor, Microbiology

Stevenson, Clinton Dale, Assistant Professor, Food,Bioprocess & Nutrition Sc

Stevenson, Kathryn Tate, Assistant Professor, Parks, Recreation & Tourism Mg

Stewart, Amanda Janis, Assistant Professor, Public & International Affairs

Stewart, Katharine Elaine, Professor, Exec Vice Chancellor & Provost

Stewart, Ralsa Marshall, Emeritus Associate Professor, Agricultural & Human Sciences

Stewart, William James, Professor, Computer Science-engr

Stiff, Lee V., Professor, Sci, Tech, Engr & Math (STEM)

Stikeleather, Larry F., Professor, Biological And Agricultural En

Stiles, Curtis Alexander, Clinical Assistant Professor, Dept of Clinical Sciences

Stiles, Phillip J, Emeritus Professor, Physics Grads & Temps

Stinner, Ronald Edwin, Emeritus Professor, Integrated Pest Mgmt-Research

Stinson, Timothy Linwood, Associate Professor, English

Stitzinger, Ernest Lester, Professor, Mathematics

Stoddard, Edward F., Emeritus Associate Professor, Marine, Earth And Atmospheric

Stokely, Matthew H., Adjunct Associate Professor, Nuclear Engineering

Stolee, Kathryn Thomasset, Assistant Professor, Computer Science-engr

Stoll, Regina, Adjunct Associate Professor, Fitts Dept Indust & Syst Engr

Stone, Eric A, Adjunct Professor, Biological Sciences

Stone, John R., Emeritus Professor, Civil Const & Environ Engineer

Stonebraker, Jeffrey S, Associate Professor, Business Management-Poole COM

Storberg-Walker, Julia, Adjunct Associate Professor, ELPHD

Stoskopf, Michael K., Professor, Dept of Clinical Sciences

Stowe, Deborah Ann Marks, Clinical Assistant Professor, Dept-Population,Health,Pathobi

Strenkowski, John S., Professor, Mechanical & Aerospace Engr

Stringer, Andrew Peter, Clinical Assistant Professor, Dept-Population,Health,Pathobi

Strote, Noah B, Associate Professor, History

Struble, Raimond A., Emeritus Distinguished University Professor, Mathematics

Struett, Michael John, Associate Professor, Public & International Affairs

Stuart, Bryan Lynn, Adjunct Associate Professor, Biological Sciences

Stubbs, Harriett S, Research Associate Professor, Dept Of Math & Science Educ -

Stuber, Charles William, Emeritus USDA Professor, Administration - Research Serv, Genetics

Stuckey, William C, Emeritus Professor, Textile & Apparel, Technology

Stucky, Jon M., Emeritus Professor, Plant and Microbial Biology

Stumpf, Mitzi Nichole, Extension Assistant Professor, 4-H Youth Dev & Fam & Cons Sci

Sturgill, David Brian, Teaching Associate Professor, Computer Science-engr

Subbareddy, Pramod Kumar Veera, Assistant Professor, Mechanical & Aerospace Engr

Suh, Minyoung, Assistant Professor, Textile & Apparel, Technology

Suh, Moon Won, Emeritus Named Professor, Textile & Apparel, Technology

Suiter, Karl Arthur, Adjunct Assistant Professor, Integrated Pest Mgmt-Research

Sullivan, Gene A., Emeritus Professor, Crop & Soil Sciences

Sullivan, Vida Blair Dowling, Associate Professor, Computer Science-engr

Sullivant, Seth M., Professor, Mathematics

Sumerel, Marie B., Adjunct Assistant Professor, ELPHD

Sun, Dali, Assistant Professor, Physics

Sun, Ge, USDA Professor, For & Envir Res Acad Research

Supak, Stacy Kathleen, Teaching Assistant Professor, Ctr. for Geospatial Analytics

Surh, Gerald, Emeritus Associate Professor, History

Suter, Steven E, Associate Professor, Dept of Clinical Sciences

Sutton, Rhonda S. Craver, Adjunct Assistant Professor, TELS

Sutton, Turner Bond, Emeritus Professor, Entomology & Plant Pathology

Swaigood, Harold E., Emeritus Distinguished Professor, Food, Bioprocess & Nutrition Sc

Swallow, William H., Emeritus Professor, Statistics

Swangnetr, Manida, Adjunct Assistant Professor, Fitts Dept Indust & Syst Engr

Swanson, Clifford Richard, Emeritus Associate Professor, Dept Molecular Biomedical Scie

Swarts, Jason, Professor, English

Swartz, Paul Douglas, Research Assistant Professor, Biochemistry

Swartzel, Kenneth R., Emeritus Named Distinguished Professor, Food, Bioprocess & Nutrition Sc

Swiss, James E., Associate Professor, Public & International Affairs

Switzer, William Lawrence, Associate Professor, Chemistry

Sylla, Edith D., Emeritus Professor, History

Szanto, Agnes, Associate Professor, Mathematics

Sztajn, Paola, Professor, College Of Education

Tacker, Robert C., Adjunct Assistant Professor, Marine, Earth And Atmospheric

Taheri, Javad, Research Associate Professor, Fitts Dept Indust & Syst Engr

Tai, Eiko, Professor, Foreign Languages And Literatu

Taliaferro, Jocelyn, Associate Professor, Social Work

Taliercio, Earl, USDA Assistant Professor, Crop & Soil Sciences

Tarpy, David R., Professor, Entomology & Plant Pathology

Tate, Lloyd Patrick, Emeritus Professor, Dept of Clinical Sciences

Tateosian, Laura Gray, Research Assistant Professor, Ctr. for Geospatial Analytics

Taubenberger, Jeffrey K, Adjunct Professor, Dept-Population, Health, Pathobi

Tayebali, Akhtarhusein A, Professor, Civil Const & Environ Engineer

Taylor, Andrew J, Professor, Public & International Affairs

Taylor, Bradley William, Assistant Professor, Applied Ecology

Taylor, Eileen Z, Associate Professor, Accounting-Poole COM

Taylor, Laura O., Professor, Ag & Resource Economics

Taylor, Linda Reinders, Lecturer, For & Envir Res Acad Research

Taylor, Nicholas Thiel, Assistant Professor, Communication

Taylor, Raymond G, Emeritus Professor, ELPHD

Tector, John O., Associate Professor, College of Design

Tefft, Karen Michele, Clinical Assistant Professor, Dept of Clinical Sciences

Temple, Traci Lyn, Teaching Assistant Professor, DELTA

Templin, Robert Grant, Professor of the Practice, ELPHD

Terando, Adam J., Adjunct Assistant Professor, Applied Ecology

Terry, Stephen D, Research Assistant Professor, Mech & Aerospace Engr Contract

Tesar, Paul, Emeritus Professor, Architecture

Thakur, Siddhartha, Associate Professor, Dept-Population,Health,Pathobi

Tharp, Alan Lee, Emeritus Professor, Computer Science-engr

Thayer, Paul W, Emeritus Professor, Psychology

Theil, Elizabeth C., Emeritus Professor, Biochemistry

Theil, Michael Herbert, Emeritus Professor, Textile Engineering, Chemistry

Theriot, Casey Michelle, Assistant Professor, Dept-Population,Health,Pathobi

Theuer, Richard C., Adjunct Professor, Food,Bioprocess & Nutrition Sc

Theyson, Thomas W, Adjunct Professor, Textile & Apparel, Technology

Thies-Sprinthall, Lois M, Emeritus Associate Professor, TELS

Thigpen, John F, Adjunct Associate Professor, Sea Grant Program

Thomas, Carrie J, Research Associate Professor, Marine, Earth And Atmospheric

Thomas, Erik R, Professor, English

Thomas, John E, Professor, Physics

Thomas, Judith F., Emeritus Professor, Plant and Microbial Biology

Thomas, Melvin E, Associate Professor, Sociology & Anthropology

Thomas, Rachael, Research Assistant Professor, Dept Molecular Biomedical Scie

Thomas, Richard J, Emeritus Professor, Forest Biomaterials

Thompson, Donald Barry, Research Associate Professor, Thermal Protection & Comfort C

Thompson, Donald L., Emeritus USDA Professor, Crop & Soil Sciences

Thompson, Jon F, Professor, English

Thompson, Maxine S, Associate Professor, Sociology & Anthropology

Thompson, William F., Distinguished University Professor, Plant and Microbial Biology

Thomson, Margareta Maria, Associate Professor, TELS

Thomson, Randy J., Emeritus Associate Professor, Sociology & Anthropology

Thorne, Jeffrey L, Professor, Biological Sciences

Thrall, Donald E., Emeritus Professor, Dept Molecular Biomedical Scie

Threadgill, David W, Adjunct Professor, Biological Sciences

Thuente, David J., Professor, Computer Science-engr

Thuente, Mary Helen, Emeritus Professor, English

Thurman, Walter N., Named Distinguished Professor, Ag & Resource Economics

Tiezzi Mazzoni Della Stella Ma, Francesco, Research Assistant Professor, Animal Science

Tilley, David R., Emeritus Professor, Physics

Tilotta, David C, Professor, Forest Biomaterials

Ting, Siu-Man, Professor, ELPHD

Tittle, Charles Ray, Emeritus Professor, Sociology & Anthropology

Tomasino, Charles, Emeritus Professor, Textile Engineering, Chemistry

Tommerdahl, Mark A, Associate Professor, Biomedical Program - ENG

Tompkins, Mary B, Emeritus Professor, Dept-Population,Health,Pathobi

Tompkins, Wayne, Emeritus Professor, Dept-Population,Health,Pathobi

Tonelli, Alan E, Named Professor, Textile Engineering, Chemistry

Tong, Quansong, Adjunct Assistant Professor, Marine, Earth And Atmospheric

Tonkonogy, Susan, Associate Professor, Dept-Population,Health,Pathobi

Toomer, Ondulla Tyvette, USDA Assistant Professor, Food,Bioprocess & Nutrition Sc

Toplikar, Susan Margaret, Emeritus Associate Professor, Art and Design

Townsend, J K, Professor, Electrical & Computer Engr.

Townsend, Scott, Associate Professor, Graphic & Industrial Design

Townsend, Tricia Walker, Teaching Assistant Professor, Friday Institute

Tracy, Joseph B., Associate Professor, Materials Science &Engineering

Tran, Chau Minh, Teaching Associate Professor, Mechanical & Aerospace Engr

Tran, Hien Trong, Professor, Mathematics

Traum, Nora J, Associate Professor, Economics-Poole COM

Tredway, Lane Patrick, Adjunct Professor, Entomology & Plant Pathology

Treme, Julianne, Teaching Assistant Professor, Ag & Resource Economics

Trettin, Carl, Adjunct Professor, For & Envir Res Acad Research

Trew, Robert James, Named Distinguished Professor, Microelectronics Research Cent

Triantaphyllou, Hedwig Hirschm, Emeritus Professor, Entomology & Plant Pathology

Trivedi, Shweta, Teaching Associate Professor, Animal Science

Trundle, Kathy Cabe, Professor, Sci, Tech, Engr & Math (STEM)

Truong, Van Den, USDA Professor, Food,Bioprocess & Nutrition Sc

Trussell, Henry J., Professor, Electrical & Computer Engr.

Tryggvason, Gretar, Adjunct Professor, Nuclear Engineering

Tseng, Hung-Wei, Assistant Professor, Computer Science-engr

Tsiatis, Anastasios A, Named Professor, Statistics

Tsuji, Jun, Professor, Biological Sciences

Tsuji, Yoshiaki, Professor, Biological Sciences

Tsynkov, Semyon Victor, Professor, Mathematics

Tu, Juei Feng, Professor, Mechanical & Aerospace Engr

Tuck, James, Associate Professor, Electrical & Computer Engr.

Tucker, Paul Arthur, Emeritus Professor, Textile Engineering, Chemistry

Tucker, William P., Emeritus Professor, Chemistry

Tung, Chi C., Emeritus Professor, Civil Const & Environ Engineer

Tupler, Larry A, Adjunct Assistant Professor, Fitts Dept Indust & Syst Engr

Turinsky, Paul J., Professor, Nuclear Engineering

Turner, Lynn G., Emeritus Professor, Food,Bioprocess & Nutrition Sc

Tyler, Beverly B, Professor, Mgmt, Innovation&Entrepreneur

Tyler-Walker, Richard Edward, Adjunct Assistant Professor, Counseling Services

Tzeng, Jung-Ying, Professor, Statistics

Ullrich, David F., Emeritus Associate Professor, Mathematics

Umbach, Paul David, Professor, ELPHD

Umstead, Kelly Ann, Assistant Professor, Graphic & Industrial Design

Underwood, Herbert A., Emeritus Professor, Applied Ecology

Uni, Zehava, Adjunct Professor, Prestage Poultry Science

Unrath, Claude R., Emeritus Professor, Horticultural Science

Unruh Snyder, Lori June, Associate Professor, Crop & Soil Sciences

Unsal, Mithat, Associate Professor, Physics

Upchurch, Robert G., USDA Associate Professor, Entomology & Plant Pathology

Uzsoy, Reha, Named Distinguished Professor, Fitts Dept Indust & Syst Engr

Vaden, Shelly L., Professor, Dept of Clinical Sciences

Valacchi, Giuseppe, Associate Professor, Kannapolis Research

Valek, Millicent Ann, Adjunct Assistant Professor, ELPHD

Van Bloem, Skip Judson, Adjunct Associate Professor, For & Envir Res Acad Research

van der Lelie, Daniel, Adjunct Professor, Plant and Microbial Biology

van Kempen, Theo A, Adjunct Professor, Animal Science

Van Landeghem, Laurianne Chantal, Assistant Professor, Dept Molecular Biomedical Scie

van Zanten, John H., Teaching Assistant Professor, BTEC-Biomfg Training Ed Ctr

Vandenbergh, John G., Emeritus Professor, Applied Ecology

VanDerWall, William J., Emeritus Assistant Professor, Sci, Tech, Engr & Math (STEM)

VanDuyn, John W., Emeritus Named Professor, Entomology & Plant Pathology

VanDyke, C Gerald, Emeritus Professor, Plant and Microbial Biology

VanHeugten, Eric, Professor, Animal Science

Vann, Matthew Christopher, Assistant Professor, Crop & Soil Sciences

Vashae, Daryoosh, Associate Professor, Electrical & Computer Engr.

Vasu, Michael L., Emeritus Associate Professor, Public & International Affairs

Vatsavai, Ranga Raju, Associate Professor, Computer Science-engr

Vaughan, George B, Emeritus Professor, Adult & Higher Education

Velev, Orlin Dimitrov, Named Professor, Chemical & Biomolecular Engr

Veliadis, John Victor, Professor, NG Pwr Elec Natl Mfg Innovatio

Venditti, Richard A, Professor, Forest Biomaterials

Vepraskas, Michael John, Named Distinguished Professor, Crop & Soil Sciences

Verghese, Kuruvilla, Emeritus Professor, Nuclear Engineering

Vick, Candace Goode, Associate Professor, Parks, Recreation & Tourism Mg

Vickery, Kenneth P., Emeritus Professor, History

Vigani, Alessio, Clinical Assistant Professor, Dept of Clinical Sciences

Vila-Parrish, Ana Raquel, Adjunct Associate Professor, Fitts Dept Indust & Syst Engr

Villani, Sara Michelle, Extension Assistant Professor, Entomology & Plant Pathology

Vincent, Kenneth Steven, Professor, History

Viniotis, Ioannis, Professor, Electrical & Computer Engr.

Vinueza Benitez, Nelson Rodrigo, Assistant Professor, Textile Engineering, Chemistry

Vinzant, Cynthia Leslie, Assistant Professor, Mathematics

von Haefen, Roger H., Associate Professor, Ag & Resource Economics

Vose, James M, Adjunct Professor, For & Envir Res Acad Research

Vouk, Mladen A, Distinguished Professor, Computer Science-engr, Ofc Research, Innov & Econ Dev

Vukina, Tomislav, Professor, Ag & Resource Economics

Vukomanovic, Jelena, Assistant Professor, Parks, Recreation & Tourism Mg

Wade, Robert W, Teaching Assistant Professor, Parks, Recreation & Tourism Mg

Wages, Dennis P., Professor, Dept-Population,Health,Pathobi

Wahls, Harvey E., Emeritus Professor, Civil Const & Environ Engineer

Walden, Michael L., Named Distinguished Professor, Ag & Resource Economics

Waldvogel, Michael Gerard, Extension Associate Professor, Entomology & Plant Pathology

Walek, Mary L., Emeritus Associate Professor, Sociology & Anthropology

Walgenbach, James F., Professor, Entomology & Plant Pathology

Walker, Christopher Scott, Assistant Professor, Dept Molecular Biomedical Scie

Walker, Glenn M, Associate Professor, Biomedical Program - ENG

Walker, John T, Lecturer, Crop & Soil Sciences

Walker, Mark D, Professor, Business Management-Poole COM

Walkowiak, Temple A, Associate Professor, TELS

Wall, John N., Professor, English

Wallace, James M., Associate Professor, Sociology & Anthropology

Walls, Douglas M., Assistant Professor, English

Walsh, Rebecca Ann, Associate Professor, English

Walter, William M., Emeritus USDA Professor, Food,Bioprocess & Nutrition Sc

Wang, Gufeng, Assistant Professor, Chemistry

Wang, Hong, Associate Professor, Physics

Wang, Kai, Research Assistant Professor, Marine, Earth And Atmospheric

Wang, Wenye, Professor, MS Comp Networking-ECE

Wang, Xiaogang, Adjunct Associate Professor, Electrical & Computer Engr.

Ward, Donn R., Emeritus Professor, Food, Bioprocess & Nutrition Sc

Ward, Michael E., Professor of the Practice, ELPHD

Ward, Stephanie Hill, Assistant Professor, Animal Science

Warner, John Christopher, Adjunct Associate Professor, Marine, Earth And Atmospheric

Warner, Wendy J, Associate Professor, Agricultural & Human Sciences

Warr, Richard S, Professor, Business Management-Poole COM

Warren, Carrol Lynn, Teaching Assistant Professor, ELPHD

Warren, Catherine A, Professor, English

Warren, Sarah Timberlake, Associate Professor, For & Envir Res Acad Research

Warsing, Donald P, Associate Professor, Business Management-Poole COM

Waschka, Rodney Anthony, Professor, Interdisciplinary Studies

Washburn, Steven Paul, Professor, Animal Science

Wasik, John L., Emeritus Professor, Statistics

Wasiolek, Sue J, Adjunct Assistant Professor, ELPHD

Waters, William M., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Watson, Benjamin Allen, Associate Professor, Computer Science-engr

Watson, David W, Professor, Entomology & Plant Pathology

Watson, Larry W., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Watzin, Mary, Professor, College of Natural Resources

Wear, David N, Adjunct Professor, For & Envir Res Acad Research

Weare, Walter Warren, Assistant Professor, Chemistry

Weber, Jerome B., Emeritus Professor, Crop & Soil Sciences

Wechsberg, Wendee Mara, Adjunct Professor, Psychology

Wegmann, Karl William, Associate Professor, Marine, Earth And Atmospheric

Wehner, Todd Craig, Professor, Horticultural Science

Wehring, Bernard William, Research Professor, Nuclear Engineering

Wei, Qingshan, Assistant Professor, Chemical & Biomolecular Engr

Weinhold, Paul S, Research Associate Professor, Biomedical Program - ENG

Weisel, Deborah Lamm, Teaching Assistant Professor, Public & International Affairs

Weiss, Ira R, Professor, Mgmt, Innovation&Entrepreneur

Weissinger, Arthur K., Emeritus Professor, Crop & Soil Sciences

Weisz, P Randall, Emeritus Professor, Crop & Soil Sciences

Welby, Charles W., Emeritus Professor, Marine, Earth And Atmospheric

Wells, J C, Emeritus Professor, Entomology & Plant Pathology

Wells, Randy, Professor, Crop & Soil Sciences

Wenig, Robert E., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Weninger, Keith R., Professor, Physics

Wentworth, Thomas R., Professor, Plant and Microbial Biology

Werner, Dennis J., Named Distinguished Professor, Horticultural Science

Wernsman, Earl A., Emeritus Named Distinguished Professor, Crop & Soil Sciences

Wertz, Dennis W., Associate Professor, Chemistry

Wescott, Joseph Warren, Adjunct Assistant Professor, ELPHD

Wessels, Walter J., Emeritus Professor, Economics-Poole COM

West II, Harvey A, Research Associate Professor, Ctr Addit Manf & Log-CAMAL

West, Andre J, Assistant Professor, Textile & Apparel, Technology

West, Harry C., Emeritus Associate Professor, English

Westermeyer, Hans Daniel, Assistant Professor, Dept of Clinical Sciences

Westmoreland, Phillip R, Professor, Chemical & Biomolecular Engr

Whangbo, Myung H., Professor, Chemistry

Wheatley, John H., Emeritus Associate Professor, Sci, Tech, Engr & Math (STEM)

Wheeler, Elisabeth A., Emeritus Professor, Forest Biomaterials

Whetten, Ross W., Professor, Tree Improvement Cooperative

Whipker, Brian E, Professor, Horticultural Science

Whitacre, Michael David, Emeritus Associate Professor, Dept of Clinical Sciences

White, Jeffrey G., Associate Professor, Crop & Soil Sciences

White, Leonard Wilson, Professor of the Practice, FREEDM Center

White, Robert E., Emeritus Professor, Mathematics

White, Susan Norma, Adjunct Associate Professor, Marine, Earth And Atmospheric

Whitlow, Lon Weidner, Emeritus Professor, Animal Science

Whitted, John Turner, Adjunct Professor, Electrical & Computer Engr.

Whitten, Jerry Lynn, Emeritus Professor, Chemistry

Widman, Laura Marie, Assistant Professor, Psychology

Wiebe, Eric N, Professor, Sci, Tech, Engr & Math (STEM)

Wiegmann, Brian M, Named Professor, Entomology & Plant Pathology

Wiener, Russell W, Adjunct Associate Professor, Marine, Earth And Atmospheric

Wiese, Dennis Eugene, Adjunct Assistant Professor, ELPHD

Wiley, Stephen B, Associate Professor, Communication

Wilk, John C, Emeritus Professor, Animal Science

Wilkinson, Richard R., Emeritus Professor, Landscape Architecture

Williams, Antony J, Professor, Textile Engineering, Chemistry

Williams, Billy M, Professor, Civil Const & Environ Engineer

Williams, Cathy Chada, Teaching Assistant Professor, ELPHD

Williams, Charles Michael, Emeritus Professor, Prestage Poultry Science

Williams, Christopher J., Adjunct Assistant Professor, Prestage Poultry Science

Williams, Cranos M, Associate Professor, Electrical & Computer Engr.

Williams, Gavin John, Associate Professor, Chemistry

Williams, James O., Emeritus Professor, Public & International Affairs

Williams, Laurel E, Adjunct Professor, Dept of Clinical Sciences

Williams, Laurie A, Professor, Computer Science-engr

Williams, Linda R., Emeritus Clinical Associate Professor, Social Work

Williams, Paul F., Professor, Accounting-Poole COM

Williams, Sandra W, Adjunct Assistant Professor, ELPHD

Williams, Stelfanie, Adjunct Assistant Professor, ELPHD

Williamson, John D, Associate Professor, Horticultural Science

Willits, Daniel H., Emeritus Professor, Biological And Agricultural En

Wilson, Alyson Gabbard, Professor, Lab for Analytic Sciences, Statistics

Wilson, Elizabeth B, Professor, CALS - Academic Programs

Wilson, James Reed, Professor, Fitts Dept Indust & Syst Engr

Wilson, Jonee, Assistant Professor, TELS

Wilson, Lorenzo G., Emeritus Professor, Horticultural Science

Wilson, Mark A, Associate Professor, Psychology

Winchester, Samuel Clyde, Emeritus Named Professor, Textile & Apparel, Technology

Winderman, Emily Marietta, Assistant Professor, Communication

Winner, William E, Professor, Environmental Sciences

Winston, Hubert, Extension Associate Professor, Chemical & Biomolecular Engr, Chemical & Biomolecular G&T

Wiseman, Angela Michelle, Associate Professor, TELS

Witt, Mary Ann, Emeritus Professor, Foreign Languages And Literatu

Wogalter, Michael S, Emeritus Professor, Psychology

Wohlgenant, Michael K., Named Distinguished Professor, Ag & Resource Economics

Wolcott, Donna Lee, Research Associate Professor, Marine, Earth And Atmospheric

Wolcott, Thomas G., Research Professor, Marine, Earth And Atmospheric

Wolfe, Barbara A., Adjunct Assistant Professor, Dept of Clinical Sciences

Wolfinger, Russell D., Adjunct Professor, Statistics

Wolfram, Walter A, Named Distinguished University Professor, English

Wollenzien, Paul L, Professor, Biochemistry

Wood, Michael William, Adjunct Assistant Professor, Dept of Clinical Sciences

Woodrum, Eric M., Emeritus Professor, Sociology & Anthropology

Woodward, Carol S, Adjunct Professor, Mathematics

Wormsley, William E, Adjunct Associate Professor, Sociology & Anthropology

Worrall, Louise Gail, Adjunct Assistant Professor, Nuclear Engineering

Worsham, Arch D., Emeritus Professor, Crop & Soil Sciences

Wright, Charles Gerald, Emeritus Professor, Entomology & Plant Pathology

Wright, David R, Adjunct Assistant Professor, Computer Science-engr

Wright, Fred Andrew, Professor, Statistics

Wright, Ruth Lorraine, Emeritus Associate Professor, Accounting-Poole COM

Wu, Fen, Professor, Mechanical & Aerospace Engr

Wu, Qingqing, Assistant Professor, Business Management-Poole COM

Wu, Tianfu, Assistant Professor, Electrical & Computer Engr.

Wu, Yichao, Associate Professor, Statistics

Wust, Valerie Ann, Associate Professor, Foreign Languages And Literatu

Wyer, Mary B, Associate Professor, Psychology

Wynne, Johnny Calvin, Emeritus Named Professor, Dean's Office - CALS

Wysk, Richard A, Named Professor, Fitts Dept Indust & Syst Engr

Xi, Lin, Research Associate Professor, Animal Science

Xiang, Qiuyun, Professor, Plant and Microbial Biology

Xiao, Luo, Assistant Professor, Statistics

Xie, Deyu, Professor, Plant and Microbial Biology

Xie, Lian, Professor, Marine, Earth And Atmospheric

Xie, Tao, Adjunct Associate Professor, Computer Science-engr

Xin, Yufeng, Adjunct Assistant Professor, Computer Science-engr

Xu, Guozhou, Assistant Professor, Biochemistry

Xu, Xu, Assistant Professor, Fitts Dept Indust & Syst Engr

Xu, Yingjiao, Associate Professor, Textile & Apparel, Technology

Yadav, Meeta, Adjunct Associate Professor, Electrical & Computer Engr.

Yang, Shu, Assistant Professor, Statistics

Yao, Yuan, Assistant Professor, Forest Biomaterials

Ye, Weimin, Adjunct Assistant Professor, Entomology & Plant Pathology

Yelverton, Fred H., Professor, Crop & Soil Sciences

Yencho, George C, Named Professor, Horticultural Science

Yeom, Bong-Yeol, Research Assistant Professor, Textile Engineering, Chemistry

Yingling, Yaroslava G, Professor, Materials Science &Engineering

Yoder, Jeffrey A., Associate Professor, Dept Molecular Biomedical Scie

Yoon, Intae, Associate Professor, Social Work

York, Alan Clarence, Emeritus Named Professor, Crop & Soil Sciences

York, James W, Research Professor, Physics

Yoshikawa, Hiroto, Assistant Professor, Dept of Clinical Sciences

Young, Albert R., Professor, Physics

Young, Carl A, Associate Professor, TELS

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 M, Adjunct Professor, Computer Science-engr

Young, Robert V., Emeritus Professor, English

Young, Sidney S, Adjunct Professor, Statistics

Young, Tamara V., Associate Professor, ELPHD

Youngblood, Curtis Edmund, Teaching Assistant Professor, Economics-Poole COM

Youngblood, Robert Walker, Adjunct Professor, Nuclear Engineering

Youssef, Mohamed A, Associate Professor, Biological And Agricultural En

Yu, Donna G, Teaching Associate Professor, Electrical & Computer Engr.

Yu, Shaocai, Adjunct Professor, Marine, Earth And Atmospheric

Yu, Ting, Adjunct Associate Professor, Computer Science-engr

Yu, Wensong, Research Associate Professor, FREEDM Center

Yuan, Fuh-Gwo, Named Professor, Mechanical & Aerospace Engr

Yuan, Wenqiao, Professor, Biological And Agricultural En

Yuter, Sandra E., Professor, Marine, Earth And Atmospheric

Zagacki, Kenneth S., Professor, Communication

Zaharoff, David A., Associate Professor, Biomedical Program - ENG

Zanno, Lindsay E, Research Assistant Professor, Biological Sciences

Zavada, John M, Adjunct Professor, Electrical & Computer Engr.

Zeldin, Darryl C, Adjunct Professor, Toxicology

Zelna, Carrie L, Adjunct Assistant Professor, Academic Success

Zelter, Barbara A., Clinical Assistant Professor, Social Work

Zeng, Zhaobang, Named Distinguished Professor, Statistics

Zenkov, Dmitry Valerievich, Professor, Mathematics

Zering, Kelly D., Professor, Ag & Resource Economics

Zhang, Daowen, Professor, Statistics

Zhang, Qiang, Adjunct Assistant Professor, Mathematics

Zhang, Xiangwu, Professor, College Of Textiles-dean's Off

Zhang, Yang, Professor, Marine, Earth And Atmospheric

Zheng, Xiaoyong, Professor, Ag & Resource Economics

Zhirnov, Victor, Adjunct Associate Professor, Materials Science &Engineering

Zhou, Hua, Adjunct Assistant Professor, Statistics

Zhou, Huiyang, Professor, Electrical & Computer Engr.

Zhou, Yihui, Research Assistant Professor, Biological Sciences

Zhu, Yong, Professor, Mechanical & Aerospace Engr

Zhu, Yuntian T, Named 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, Named Professor, Mechanical & Aerospace Engr

Zink, James Richard, Associate Professor, Public & International Affairs

Zobel, Richard W, USDA Professor, Crop & Soil Sciences

Zonderman, David Aaron, Professor, History

Zorner, Paul S., Adjunct Professor, Horticultural Science

Zorowski, Carl F., Emeritus Named Professor, College Of Engineering-dean's

Zublena, Joseph P.J., Emeritus Professor, Administration - Extension Ser

Zuckerman, Gilroy J., Associate Professor, Accounting-Poole COM

Zuiches, James J, Emeritus Professor, Sociology & Anthropology

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 Cir. 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](#)

[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 \(2016-2017\)](#)
[Graduate Catalog \(2015-2016\)](#)
[Graduate Catalog \(2014-2015\)](#)
[Graduate Catalog \(2013-2014\)](#)
[Graduate Catalog \(2012-2013\)](#)
[Graduate Catalog \(2011-2012\)](#)
[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 \(Fall 2003\)](#)