

NC STATE UNIVERSITY

ACT SUPPLEMENTAL PREPARATION IN RURAL EDUCATION



NC STATE UNIVERSITY

COLLEGE OF
AGRICULTURE & LIFE SCIENCES

aspire²
higher education



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Patterson Hall has housed the Agriculture Department (now the College of Agriculture and Life Sciences) at NC State University since it was built in 1903.

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COLLEGE OF
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ACADEMICS ▾ RESEARCH ▾ EXTENSION



OVERVIEW OF THE A.S.P.I.R.E. PROGRAM



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ACADEMICS ▪ RESEARCH ▪ EXTENSION

A.S.P.I.R.E. 2 Higher Education: ACT Supplemental Preparation In Rural Education

The A.S.P.I.R.E. program is designed to bridge deficits in rural high school students' performance on the ACT College Entrance Examination in order to increase the number of students pursuing higher education. This is a cooperative initiative through the College of Agriculture and Life Sciences at North Carolina State University and North Carolina Cooperative Extension.

Traditional "Ag" departments are struggling to recruit, admit, and retain students interested in pursuing Bachelor's Degrees. Rural high school students with a rich history and interest in pursuing careers in Agriculture in the state of North Carolina are not successful in gaining admissions to 4-year institutions offering B.S. Agriculture Degrees; this is often times due to their test scores on a college entrance examination.

As a high school student, preparing for a college entrance examination like the ACT can be pretty difficult! Fortunately, your local Cooperative Extension Agent is now offering a course to prepare you for the ACT College Entrance Examination through the A.S.P.I.R.E. (ACT Supplemental Preparation In Rural Education) Program. By participating in an A.S.P.I.R.E. ACT Class, you will learn the latest tactics and strategies to improve your ACT score and increase your chances of getting into college!

The program includes The Princeton Review ACT study manual, The Princeton Review 1,296 practice question manual, 4 ACT full-length practice exams with score analysis and breakdown, The Princeton Review selective college admissions booklet, and 30 hours of class time instruction, where students will learn the skills they need to be able to tackle the ACT!

where are you going?



welcome to



This is the place to be to find
the answer to that question
you've always asked yourself:

what do I want to be when I grow up?

Your options are endless: from
studying to be an agricultural
equipment designer to a zoolo-
gist, the College of Agriculture
and Life Sciences (we call it
CALS) is where it's AT!

“ With all the principles of anatomy, physiology and cell biology I'm learning through the zoology program at CALS, I'll be well prepared for applying for medical school. Zoology for pre-med? Hey, you'd be surprised by the similarities in those three areas that are present in all living thing, including humans. ”

*Tricia Morvan
Greensboro, NC*

Infinite possibilities

As a student studying in a pre-professional health sciences program, you will be involved in cutting-edge research, innovative classroom instruction and mentoring to open the doors to infinite opportunities in the health sciences. At CALS students get an in-depth education in the key areas of animal diversity, cellular biology, anatomy and physiology. Students can major in many degree areas such as animal science, food science, microbiology and zoology. The program will prepare you for opportunities in the biological and natural resource fields, as well as further your education in preparation for health science careers in the medical, dental or veterinary disciplines by allowing you to obtain credits toward required course work for acceptance to graduate schools.



These majors

Animal Science
Biochemistry
Biological Sciences
Food Science
Microbiology
Plant Biology
Poultry Science
Zoology

These careers

Medicine/Dentistry
Medical Technician
Physical Therapist
Physician Assistant

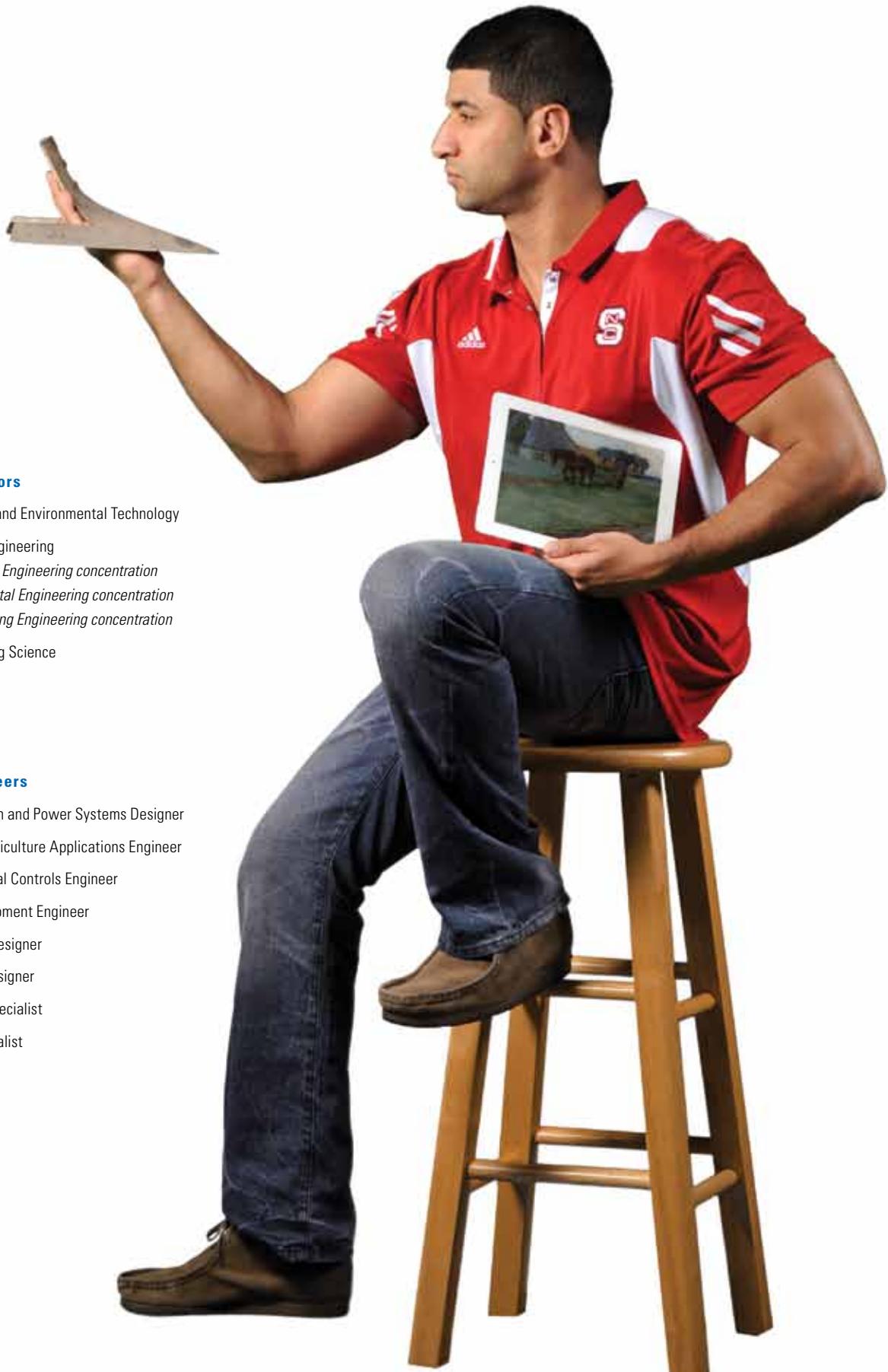
Is engineering science or is it art?

“ I've always loved inventing things to make something work better. As an ag engineer, I get to do that every day — and get paid well for it. I'll be designing machines and improving implements to save time and energy, and so farmers get the most for their money. ”

*Mike DeNardis
Hickory, NC*

As an agricultural engineer, the answer is “both.”

Agricultural engineering is based on an interdisciplinary understanding of math, physics and biology. But what really makes ag engineers different is their interest and commitment to solving agricultural problems. Ag engineers help make farming sustainable, safe and environmentally friendly. They analyze agricultural operations to increase yields, improve land use and conserve resources like seed, water, fertilizers and fuel. They recommend strategies to protect the health, safety and security of workers, animals and agricultural products. They develop methods and design equipment for land preparation, planting and harvesting, and find better ways to reduce crop loss from field damage, during handling, sorting, packing and processing.



These majors

Agricultural and Environmental Technology

Biological Engineering

Agricultural Engineering concentration

Environmental Engineering concentration

Bioprocessing Engineering concentration

Bioprocessing Science

Food Science

These careers

Electrification and Power Systems Designer

Precision Agriculture Applications Engineer

Environmental Controls Engineer

Land Development Engineer

Machinery Designer

Structure Designer

Extension Specialist

Waste Specialist

Researcher

Here to help



These majors

Biochemistry
Microbiology
Animal Science
Biological Sciences
Pre-Professional
Health Sciences Advising

These careers

Veterinarian
Kennel Manager
Farm Manager
Lab Technician
Pharmaceutical Sales Rep
Clinical Microbiologist

man's best friend



“ At CALS I've taken advantage of the nationally-recognized pre-professional health sciences program, and I'm studying to become a veterinarian. I'm majoring in Animal Science, but I'm getting all the required courses I'll need to get accepted for the professional degree necessary to become a vet. Just think, in a few years, I'll be getting paid to take care of my dog — and all my friends' pets too! ”

*Darren Fowler
Charlotte, NC*

As an animal scientist, your opportunities are endless. From the study of physiology to genetics, you can make your mark on anything from pharmaceuticals to food processing. Animal scientists can be found around the world working in all industries.

Animal Science students may become veterinarians or get involved in primary healthcare. You can also combine your studies with the CALS pre-professional programs if going on to become a doctor or dentist is what the future holds for you.

farm to fork

“

I grew up on a family farm, and just because I was a girl didn't mean I couldn't pull my own weight. At CALS, I'm gaining more in-depth knowledge about the business — and the science — of managing sustainable agricultural and environmental systems.

With the help of the course work in the Agricultural and Environmental Technology program, combined with the skills I learned growing up, I'm going to help our family farm make the transition to providing healthful food to North Carolinians while making sure the land and water remain safe and productive for the generations to come.

”

*Mary Jane Cannon
Wilson, NC*



Students can focus their studies on a number of areas to gain in-depth knowledge into the science, economic or environmental aspects of agricultural systems.

Agricultural and environmental technology graduates typically get jobs that involve the application and management of engineering designs in the conservation and utilization of natural resources, agricultural production systems, water management, structures and environmental controls, as well as agribusiness management.

These majors

- Agricultural and Environmental Technology
- Agricultural Business Management
- Agricultural Education
- Extension Education
- Agronomy

These careers

- Environmental Occupations Specialist
- Agricultural Machinery Technician
- Agricultural Research Technician
- Agribusiness Sales and Marketing
- Farm/Facilities Management
- Agriculture Teacher

which came first...

the chicken or the egg?

“ The answer to that old riddle isn’t as important as poultry is to our way of living. I’m having a blast at CALS in the Poultry Science program, where I hope to be a hatchery manager. There’s an amazing combination of sciences — biotechnology, physiology, nutrition and even genetics — all intertwined to show the way the poultry industry affects our world economy. Whether it’s chickens or eggs, I’m excited about getting involved in that global marketplace. ”

*Shannon Scarlett
Louisburg, NC*



Why not both?

The continued expansion of the poultry and animal industries is important to the economy of North Carolina and the country.

In the Poultry Science program you'll be trained to become an expert in a number of broad disciplines. With a firm, well-rounded understanding of agribusiness, you'll also be aptly prepared for a leadership role in the poultry/animal industry.

These majors

Agricultural Business Management
Animal Science
Food Science
Poultry Science

These careers

Nutritional and Feed Additive Sales
Regulatory Agency Consultant
Swine Herd Manager
Production Specialist
Feed Mill Manager
Hatchery Manager
Beef Salesperson

finding a cure

“

Test tubes and petri dishes were my toys growing up! At CALS I'm in the Biological Sciences program, and I am learning ways to use science to preserve our environment as well as develop ways to fight disease.

As a lab technician, I plan on working in the medical or pharmaceutical industry and use my expanded understanding of the basic processes of life to hopefully create innovative advancements toward finding cures.

”

*Tina Crowther
Burlington, NC*

Biology is the study of life.

The many biology-based disciplines at CALS will allow you to look at the world from a cellular level or from the point of view of an entire ecosystem.

Depending on your interests, these skills will help you forge ahead in a variety of areas — from medicine to preserving the environment.



These majors

- Biochemistry
- Microbiology
- Plant Biology
- Nutrition Science
- Biological Sciences
- Biological Engineering

These careers

- Health Professional
- Clinical Trials Manager
- Medical Lab Technician
- Chemical Waste Engineer
- Pharmaceutical Lab Technician
- Agricultural Equipment Designer



CALS is a great place to come live and learn. But it is also one of the most dynamic, encouraging, lively and stimulating communities anywhere. No matter where you come from or where you're headed, you are bound to find some fascinating people at CALS — people who are eager to meet you and help you on your journey. Quite simply, life at CALS will be your experience of a lifetime!



HONORS RESEARCH FUN MENTORS
CLUBS CAREERS

Honors Program at CALS

www.cals.ncsu.edu/honors.htm

If you're a student with exceptional academic skills, CALS offers a challenging experience through our Honors Program. Participation in special courses, seminars and independent research projects will allow you to interact with distinguished faculty and enhance your education in a way that will give you a competitive advantage for the future. If you have at least a 3.35 grade point average, you will be invited to participate in the CALS Honors Program your sophomore year.

Academic Advising at CALS

www.cals.ncsu.edu/advising.htm

There are so many different variables that will affect the success and overall enjoyment of your college experience. Because this is inevitable, at CALS we continually strive to combine meaningful and frequent faculty-student interaction. Our faculty serve as teachers, mentors and academic advisors — we are dedicated to this important commitment — and the social and intellectual growth of our students is paramount. CALS provides quality and personal academic advising that will both enrich your college experience and help you advance in your specific program of study.

Scholarships and Financial Aid at CALS

www.cals.ncsu.edu/scholarships.htm

NC State provides financial assistance to students for their college expenses. Students may apply for several types of aid including scholarships, grants, loans and work-study assistance. In addition, non-need-based loan alternatives are available for all students. CALS offers approximately \$750,000 annually in scholarships to both continuing and incoming first-year students. In addition to our many scholarships, the university also offers some merit scholarships based on financial need. We are committed to helping you any way we can.

Undergraduate Research at CALS

www.cals.ncsu.edu/ugradresearch.htm

Over the years, NC State has developed into a major research university. CALS faculty receive millions of dollars in external grants and contracts to support this initiative. The funds are allocated toward financial aid to undergraduate students through summer and academic-year jobs as well as supporting faculty-led research projects and internships.

Career Services at CALS

www.cals.ncsu.edu/career

With all your hard work, late-night study sessions and hours of dedication toward earning your degree, make sure that all that effort pays off. The Career Services Office at CALS is here to help steer you in the right direction and help you find the right job after you

graduate. We have peer and professional counselors to help guide you through the whole career exploration process. Our staff will help you with everything from résumé writing to job interviewing skills, as well as job market networking techniques and professional internship opportunities. With just a little planning and preparation, we can help you open the door to the right career.

Clubs and Organizations at CALS

www.cals.ncsu.edu/clubs.htm

You'll never be at a loss to expand and express yourself with the many clubs and organizations for you to participate in at CALS — activities that will help broaden your social and academic experience. At CALS we take special pride in getting our students involved in various groups and activities. We feel it makes you part of the 'CALS Family' and brings you closer to other students and faculty, as well as provide you with insights into your particular career goals and areas of interest.

Pre-Professional Programs at CALS

HealthPAC: harvest.cals.ncsu.edu/health_pac

VetPAC: harvest.cals.ncsu.edu/vetpac

Students at CALS are ultimately focusing their attention on a variety of career paths: from feeding the world to fighting disease. An important academic path found within the CALS major programs of study is the Pre-Professional Advising Program. Students receive specialized advising in a number of areas of study so they can continue their academic careers as future dentists, optometrists, physicians or veterinarians. The primary goal of this noble pursuit is to prepare our future healthcare providers by assuring them disciplined study and preparation for professional or graduate schools — as they will be the caregivers of tomorrow.

Pay Us a Visit at CALS

www.cals.ncsu.edu/spendaday

Give us a call, set up an appointment and see what you're getting yourself into. Check out our Spend a Day at State program and see why CALS IS where it's at! You can obtain a request form by calling our office at (919) 515-3248 or visiting our website.

Academic Programs at CALS

www.cals.ncsu.edu

Undergraduate Majors and Concentrations

Agricultural Business Management	Genetics
Biological Sciences	Horticultural Science
Agricultural Education	Floriculture
Agricultural Education Teacher Certificate	Ornamental
Agricultural and Environmental Technology	Fruits and Vegetables
Agricultural Systems	General Horticulture
Environmental Systems	Landscape Horticulture
Animal Science	Microbiology
Biochemistry	Nutrition Science
Biological Engineering	Applied Nutrition
Agricultural Engineering	Animal Nutrition*
Environmental Engineering	Plant Biology
Bioprocessing Engineering	Plant and Soil Science
Biological Sciences	Agroecology
Ecology, Evolution and Conservation	Agronomic Business
Human Biology	Agronomic Sciences
Integrative Physiology and Neurobiology	Crop Production
Molecular, Cellular and Developmental Biology	Soil Science
Bioprocessing Science	Poultry Science
Extension Education	Soil and Land Development
Youth Leadership Development Concentration	Turfgrass Science
Food Science	Zoology

Undergraduate Minors

Agricultural Business Management*	Genetics
Agricultural Environmental Technology	Horticultural Science
Agroecology	Leadership in Agriculture and Life Sciences
Animal Science	Microbiology
Applied Sociology	Nutrition
Biological Sciences	Plant Biology
Biotechnology	Plant Biosecurity and Regulatory Science
Crop Science	Poultry Science
Entomology	Soil Science
Environmental Toxicology	Turfgrass Science
Extension Education	Wetland Assessment
Feed Milling	Zoology
Food Science	

*Available via Distance Education

it's all at!
CALS!

www.cals.ncsu.edu

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COLLEGE OF AGRICULTURE AND LIFE SCIENCES' LIST OF DEGREES AND CAREERS**NC STATE**

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Agricultural Business Management.....	24 & 25
Agricultural Education.....	26 & 27
Agricultural and Environmental Technology.....	28 & 29
Agricultural Science.....	30 & 31
Animal Science.....	32 & 33
Biological and Agricultural Engineering.....	34 & 35
Bioprocessing Sciences.....	36 & 37
Extension Education.....	38 & 39
Food Science.....	40 & 41
Horticultural Science.....	42 & 43
Natural Resources.....	44 & 45
Plant Biology.....	46 & 47
Plant and Soil Science.....	48 & 49
Poultry Science.....	50 & 51
Soil and Land Development.....	52 & 53
Turfgrass Science.....	54 & 55
Biochemistry.....	56 & 57
Genetics.....	58 & 59
Microbiology.....	60 & 61
Nutrition Science.....	62 & 63

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AGRICULTURAL BUSINESS MANAGEMENT

www.ag-econ.ncsu.edu

A senior ABM major pauses on the steps of the state Agriculture Building, where she has interned with the National Agriculture Statistics Service and worked with hurricane relief efforts.

Agriculture in today's world is a business. The Department of Agricultural and Resource Economics addresses important issues regarding management of agricultural and related businesses, functioning of agricultural markets, protection and use of natural resources and development of government policies affecting agricultural and related industries. The department offers an undergraduate degree and a minor in agricultural business management and a biological sciences business management concentration within the agricultural business management degree. Concentrations in natural resources economics and management and in environmental sciences economic policy are also offered under two university-wide degree programs.

**Career Opportunities**

Graduates find career opportunities in a wide variety of employment environments such as: marketing, agribusiness management, brokerage and merchandising, production agriculture, agricultural finance, and biological business. Each year graduates enter employment in marketing and sales, stocks, commodities, and real estate, purchasing, production, retail, and management.

Research

The department conducts major research programs on agricultural commodities important in North Carolina; on the use of natural, human and financial resources in agricultural and related industries; on the structure and development of agricultural and agribusiness sectors; and on international trade and economic development. Research emphasis pertinent to agriculture include:

- issues in farm management and production economics
- the effects of agricultural, trade and resource policies
- the impact of general economic events on the agricultural and resource sectors
- management and policy issues related to natural resources and the environment
- the efficiency of various agricultural and resource market systems.

Course Work/Curriculum

There are three major components:

- general requirements of the university and the college
- core business and economics courses required by the department
- a block of technical agriculture, business and economics electives.

This curriculum prepares students for management careers in agricultural, resource and related industries.

Graduate Study

The Master of Science degree in Agricultural Economics and Ph.D. in Economics are research-oriented degrees. Students pursuing these degrees learn to apply economics and related disciplines to agricultural and resource production, marketing, finance and policy issues relevant to state, national and international economies.

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AGRICULTURAL BUSINESS MANAGEMENT CAREERS



This Commercial Agriculture Loan Officer is looking over paperwork to develop one of his loans.

Agriculture in today's world is a business, whether it is farm production, processing and marketing agricultural products, or supplying agricultural inputs.

Sample Career Title	Sample Work Settings
Merchandising Representative	Brokerage and Merchandising
Claims Processor	Private Agencies
Marketing Coordinator	Supply Firms
Field Sales Associate	National Corporations
Loan Officer	Financial Institutions
Compliance Analyst	Government

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011 \$36,271

Financial

- **Accountant, AgCarolina Financial**

Primary responsibilities consist of accounting functions related to loan systems, online general ledger, bank account reconciliations, and asset management system. Requires completion of significant college level accounting courses, proficiency with Microsoft Word & Excel, good verbal, written communication skills.

Sales & Marketing

- **Dairy Sales Representative, Sedona AG Services**

Key responsibilities include: direct sales to producers, demand creation, education & networking activities with industry professionals and customer care. Requires sales experience, industry & product knowledge, ability to learn & present technical information, enthusiasm & self-motivation.

Management

- **Retail Facility Superintendent, Southern States Cooperative, Inc.**

Responsibilities include: supervision of facility staff, assist with cash management & inventory control, implement & oversee equipment maintenance program, manage expenses within budget, enforce corporate policies & procedures, ensure accurate billings to customers.

Human Resources

- **Recruiter, Aerotek Inc.**

Responsible for: developing recruiting strategies, evaluating candidates' strengths compared with clients' requirements, negotiate wage rates & other terms of employment with candidates, oversee completion of necessary pre-employment processes, assess & investigate contractor related programs, administer performance counseling & disciplinary measures when necessary, maintain relationships with existing & potential client contacts to provide customer service, gain industry knowledge, and get referrals and sales leads.

AGRICULTURAL EDUCATION

www.cals.ncsu.edu/agexed

These students work together to plan an informative group project for the high school where they're student teaching.

The primary purpose of the agricultural education program at North Carolina State University is to prepare graduates for positions as agriculture teachers at the secondary and community college level, as county extension agents and as leaders in the agricultural industry. Completion of the B.S. in Agricultural Education leads to teacher licensure in Agricultural Education, grades 6-12. Careers such as these require not only a knowledge of agricultural subject matter but also the ability to communicate that information effectively to others.

The groups that need agricultural information are extremely diverse, as are the settings in which this information is provided. But regardless of whether information is provided in a formal classroom setting or to an individual in an agricultural setting, the focus is on providing service to the agricultural community in the form of accurate and up-to-date information about agriculture.

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Career Opportunities

Agriculture continues to be an important part of the high school curriculum in North Carolina. There are over 350 agriculture teachers in approximately 260 high schools and middle schools located throughout the state. Positions are usually available for graduates in almost any area of North Carolina. In recent years there has been a shortage of agriculture teachers, and graduates often may select from several available positions. In addition, other states in the area have experienced teacher shortages, making teaching positions available in neighboring states. Several community colleges in North Carolina also have positions available in their agriculture-related programs, which include livestock management, horticulture, forestry and preprofessional programs. Usually a master's degree is required for employment at this level.

Course Work/Curriculum

The agricultural and extension education curricula has four components:

- general education courses that are required for all students at NC State University
- a broad understanding of agriculture. Students complete introductory courses in animal or poultry science, plant science, soil science, agricultural

economics, agricultural engineering and forestry in order to develop the background in agriculture essential to providing information to a wide variety of clients.

- a concentration in one area of agriculture.
- either the teaching option, agricultural communications option or the extension option, but each curriculum culminates in a semester-length practicum experience in which students apply their knowledge and skills in a real-world setting.

The primary focus is to provide graduates with the skills they need in order to be successful as teachers, as extension agents or as leaders in the agricultural industry.

Graduate Study

The Department offers programs of graduate study leading

to the Master of Agricultural Education and the Master of Extension Education degree. (both have thesis and non-thesis options determined on the student's interests).

Co-Curricular Activities

The Agricultural and Extension Education Club and the national agricultural education honorary society, Alpha Tau Alpha, provide opportunities for leadership development and professional and social activities. Students are encouraged to participate in the collegiate 4-H Club and Collegiate FFA Chapter at NC State.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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AGRICULTURAL EDUCATION CAREERS



This Agricultural Education teacher uses hands on learning experiences to teach his students.

Agriculture continues to be an important part of the high school curriculum in North Carolina. The Agricultural Education Instructors utilize both formal classrooms and other settings. A broad understanding of agriculture is required so that Agricultural Educators will be able to communicate effectively agricultural information to a variety of audiences.

Sample Career Title	Sample Work Settings
High School Teacher	Education
Middle School Teacher	Public Schools
Community College Instructor	Community Colleges
Extension Agent	Government
4-H Agent	Government
Training Consultant	Private Industry

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$32,661

Education

- **Agricultural Education teachers** prepare students in secondary schools to either enter the industry of agriculture directly after high school or to continue their advanced study at a two-year or four-year institutions. In addition to classroom and laboratory instruction in agriculture, they assist students in developing and conducting supervised agricultural experience programs that reinforce what is learned in the classroom. Many Agricultural Education teachers also serve as an FFA advisor and provide leadership and career development opportunities for their students.

In addition to traditional teaching roles with the NC school system, Agricultural Education majors might also consider programs like Citizen Schools or Teach For America.

Cooperative Extension

- **County Extension Agent, 4-H; NC Cooperative Extension Service** Responsibilities include planning, implementing and evaluating programs for youth ages 5-19. Objectives include developing and maintaining community 4-H clubs, special interest programs, 4-H projects, after-school programs, summer day camp programs, school enrichment programs and other traditional 4-H and youth activities.

Agricultural Business

- **Hands On Health Program Coordinator; Inter-Faith Food Shuttle** Assist with planning and implementation of program aimed at integrating healthy food provision, community activities, nutrition and cooking classes, community gardens, physical activity, and tutoring & mentoring services as guided by community input & participation.

AGRICULTURAL & ENVIRONMENTAL TECHNOLOGY

www.bae.ncsu.edu

Above student calibrates the shop equipment. Both male and female students enjoy the shop exercises in tooling in the AET shop class.

Precision farming is a necessity. Today all the ramifications of a high-tech society beckon us to apply new technologies with speed and accuracy. Agriculture is feeding an ever growing world population with better quality food. The means to produce, ship and protect this food supply demands technology and people who can employ these technologies successfully.

The AET program is geared to make individuals think ahead using technology responsibly with an eye on the global needs. The program uniquely prepares students in the application of science, technology and business principles to effectively manage agricultural and environmental systems. Students can focus their studies to attain depth in science, the environment, or business areas related to agricultural systems. The AET program is about hands-on technologies applied to developing, integrating, implementing, and problem-solving agricultural and environmental situations.

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Career Opportunities

Employment opportunities for graduates are highly diverse. Jobs in biological engineering and the technology program fields frequently involve a combination of indoor and outdoor work. Engineering jobs may involve product design and development, plant engineering and management, engineering consulting, design of systems dealing with biological and natural resources and the environment, graduate study, research and teaching.

Agricultural and environmental technology graduates are typically employed in jobs that involve the application and management of engineering designs in the conservation and utilization of natural resources, agricultural production systems, water and animal waste management, structures and environmental controls, and agribusiness management.

Research

The Department has strong research programs in a number of areas. These include environmental engineering, bioprocessing, machine systems, and controlled environment agriculture.

Course Work/Curriculum

The AET degree places emphasis on basic science and technology with courses such as mathematics, physics, chemistry, biology, machinery, conservation, safety, and business. The AET degree provides a solid

technological and management foundation of the application of basic agricultural engineering technology including new emerging technologies. Students participate in hands-on skills training, developing their own potential to solve challenging agricultural problems. The flexibility of the program allows the students to focus their interest in Machinery Systems, Environmental Systems, and Agribusiness.

Graduate Study

The Department offers graduate study leading to the Master of Biological and Agricultural Engineering, the master of science, and the doctor of philosophy degrees. Candidates normally prepare for such study by completing an ABET accredited biological and agricultural engineering curriculum; however, nonengineering graduates may be accepted in these graduate programs after completing specified additional undergraduate engineering requirements.

Co-Curricular Activities

Both biological and agricultural and environmental technology students have departmental clubs that are affiliated with the state and national organizations of the American Society of Agricultural Engineers. In addition, students are involved with both the Agri-Life and Engineer's councils. Both programs have departmental honor societies. Alpha Epsilon for the engineering students and Alpha Mu for the technology students.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:

Undergraduate Programs

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AGRICULTURAL AND ENVIRONMENTAL TECHNOLOGY CAREERS



An Agricultural and Environmental Technologist secures grass matting along a stream bed.

The **Agricultural and Environmental Technology** discipline is about hands-on technologies applied to developing, integrating, implementing, and problem-solving agricultural and environmental situations. Agricultural and Environmental Technologists utilize new and traditional agricultural machinery, tools, and computer programs to solve today's agricultural and environmental problems

Sample Career Title	Sample Work Settings
Agricultural Research Technician	Government
Energy Conservationist	Government
Land Reclamation Inspector	Private Industry
Environmental Specialist	Private Industry
Waste Management Technician	Private Industry
Water Quality Specialist	Government

National Association of Colleges & Employers National Salary Survey
Average salary gathered from recent graduates in this field at the national level

2011 \$44,333

Agribusiness

- **Production Supervisor, Case Farms**

Key responsibilities include: overseeing department personnel, including staffing, training, evaluating, and developing team members; monitoring production process and periodically adjusting equipment or work practices according to standard operating procedures; ensuring equipment is in working order and working conditions are safe; managing overall product quality, assisting employees with troubleshooting problems and coaching them through appropriate adjustments.

Environmental

- **Environmental Specialist, Corblu Ecology, LLC**

The position includes extensive fieldwork in relation to mitigation bank monitoring, i.e., vegetation surveys, fish surveys, groundwater well monitoring, and GIS/GPS mapping. Other duties may include wetland/stream delineations and assessments, natural resource mapping, wildlife management, and assisting with sediment and erosion control monitoring, including field inspection of Best Management Practices and monitoring and turbidity analysis associated with construction site activity. Experience with GIS/GPS and plant identification will make you more competitive for this position.

Machinery/Technology

- **Milling Operative/Food Processor, Lindley Mills Inc.**

Responsible for processing products to specifications and maintaining HACCP and QC records. Involves hands-on work with machinery, material flow, automated computerized systems, troubleshooting pneumatic and mechanical problems. Requires attention to detail, willingness to learn, and desire to work.

AGRICULTURAL SCIENCE

www.cals.ncsu.edu/agexed

Working to add new value to traditional commodity by developing new product-yielding varieties of tobacco.

Agriculture is an exciting and dynamic field involving a wise range of disciplines. Agricultural sciences is a broad multidisciplinary field that encompasses the parts of exact, natural, economic, and social sciences that are used in the practice and understanding of agriculture. Students in this degree program will study all aspects of the food and fiber industry, developing the skills needed to improve yields with less labor, control pests safely and effectively, conserve soil and water, manage or administer research and development programs, and manage marketing or production operations in agribusinesses. Successful and sustainable agriculture production systems and enterprises require knowledgeable and proficient leaders. The B.S. degree in Agricultural Science is our response to the growing need in the agriculture industry for professionals with a broad range of knowledge and experience in the agricultural sciences.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▪ R E S E A R C H ▪ E X T E N S I O N

Career Opportunities

Agriculture continues to be an important industry in North Carolina. Students in this program are taught to manage or lead in an agricultural setting. A graduate with a Bachelor of Science in Agricultural Science can move quickly into the research or teaching fields or choose from a variety of other careers. With experience, an agricultural science graduate may advance to jobs such as supervisors of research programs or managers of other agriculture-related activities.

Course Work/Curriculum

The agricultural sciences curriculum has three components:

- general education courses that are required for all students at NC State University
- a broad understanding of agriculture. Students complete coursework in both basic agricultural courses (animal or poultry science, plant science, and shop processes and management) as well as agricultural specialty areas. Students must select two of the following specialty areas to study: animal science, agricultural business management, agricultural environmental technology, crop science, horticultural science, poultry science, soil science, or feed mill management.

- courses in leadership and communication courses.

The typical student in this program will complete a program of study that includes communications, mathematics, economics, business, physical and life science course, in addition to a variety of technical agricultural science courses. Beyond the technical knowledge, students will learn leadership skills that help them learn how to work independently and as part of a team, communicate effectively, solve problems and understand basic business concepts.

primary focus is to provide graduates with the skills they need in order to be successful as teachers, as extension agents or as leaders in the agricultural industry.

Graduate Study

The Department offers programs of graduate study leading to the Master of Agricultural Education and the Master of Extension Education degree.

(both have thesis and non-thesis options determined on the student's interests).

Co-Curricular Activities

The Agricultural and Extension Education Club and the national agricultural education honorary society, Alpha Tau Alpha, provide opportunities for leadership development and professional and social activities. Students are encouraged to participate in the collegiate 4-H Club and Collegiate FFA Chapter at NC State.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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Leadership Program Minor

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AGRICULTURAL SCIENCE CAREERS



This Agricultural Science graduate is now an Agronomist, and is measuring and recording corn growth.

Agricultural Scientists are familiar with all aspects of the food and fiber industry. Leadership skills that help them learn how to work independently and as part of a team, communicate effectively, solve problems and understand basic business concepts. Agricultural Scientist can move quickly into the research or teaching fields or choose from a variety of other careers. With experience, an agricultural science graduate may advance to jobs such as supervisors of research programs or managers of other agriculture-related activities.

Sample Career Title	Sample Work Settings
Agricultural Research Technician	Government
Energy Conservationist	Government
Land Reclamation Inspector	Private Industry
Environmental Specialist	Private Industry
Waste Management Technician	Private Industry
Water Quality Specialist	Government

National Association of Colleges & Employers National Salary Survey
Average salary gathered from recent graduates in this field at the national level

2011 \$52,934

Agribusiness Sales

- **Agribusiness Sales Specialist; Corn Products International**
Key responsibilities: assist and participate in the management of sales & take-away of agri-products; build supply relationships, develop new customer accounts, and search for new sales opportunities while optimizing pricing; coordinate shipment and delivery; maintain records of sales contracts; participate in determining best marketing strategies.

Cooperative Extension

- **Agriculture Extension Agent, NC Cooperative Extension Service**
Responsible for developing informal educational programs for farmers, farm families, and related organizations and businesses. Programs should be designed to enhance profitability and economic viability of the agricultural economy. The agent will provide leadership for the development, implementation, evaluation, and marketing of effective and successful educational programs. Programs should address current and future agricultural production and profitability issues, challenges, and changes.

Research

- **Trials Manager, Stacy's Greenhouses**
Responsible for managing the perennial trials. Works with breeders/suppliers to identify new & improved perennials, grows & collects data throughout trial, and presents trial results to management and customers. Requires good communication skills, ability to collect and manage large amounts of data.

ANIMAL SCIENCE

www.cals.ncsu.edu/an_sci/home/home.html

An Animal Science student and alumni interact at the Club Day Livestock show, a two-day event held at the Beef Education Unit. The showmanship event was won by this senior.

The North Carolina State University Department of Animal Science is one of the largest and most progressive departments of its kind in the United States. The department is dedicated to excellence in teaching, research and extension. Animal science is a broad field centered on the biology, production, management and care of animals. Animal scientists are involved in all phases of domestic animal production, research, sales, service, business and education.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▪ R E S E A R C H ▪ E X T E N S I O N

Career Opportunities

Animal scientists can be found across the nation and around the world in all phases of production, research, sales, service, business, health, and education. Some graduates own their own enterprises.; some consult. Others are qualified for positions in:

- pharmaceutical and biotechnology research and development
- livestock, horse or companion animal management/ marketing
- animal breeding and production
- feed and animal health-care products sales and service
- departments of agriculture
- breed associations
- animal technical services
- extension services, education, and public relations.

Research

The primary research emphasis in the Department is to develop projects that lead to new technology in the disciplines of physiology, nutrition, genetics, genomics, biotechnology, production and management. While several areas of emphasis exist, our overarching goal is to study basic biological principles and ask "Why?" Then we determine how research results can be applied for the betterment of humans and animals.

Course Work/Curriculum

As an NCSU animal science major, you can earn degrees at the associ-

ate, bachelor, master, or doctoral level. Many students in preveterinary medicine are enrolled in this curriculum. You will take course in:

- Anatomy & Physiology, Genetics, Reproduction, and Nutrition
- Management of Companion Animals, Horses, Swine, Beef or Dairy Cattle
- Diseases and Selection of Domestic Animals
- Advanced Reproductive Physiology, Growth and Development
- Lactation, Milk & Nutrition

Graduate Study

The Department offers the master of animal science, master of science, and doctor of philosophy degrees. A program of courses and a research project is developed to meet each student's educational objectives.

Co-Curricular Activities

Opportunities abound outside the classroom for students to

gain experience such as:

- the Animal Science, Companion Animal, Dairy Science, Rodeo, and Equestrian clubs
- the Collegiate Horseman's and Preveterinary Medical associations
- the Horse, Livestock and Dairy Judging teams as well as the Academic Quadrathlon Team
- Swine, small ruminant, dairy cattle and metabolism educational units located within 6 miles of campus.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

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ANIMAL SCIENCE CAREERS



This Animal Science graduate is taking physiological measurements to assess the health status of this dairy cow.

Animal Science is a diverse and complex field, covering not only the traditional production and management areas of livestock, horses, and companion animals, but also the basic sciences such as reproduction, physiology, genetics, and nutrition. Animal science is a broad field centered on the biology, production, management, and care of animals. Animal scientists are involved in all phases of domestic animal production, research, sales, service, business, and education.

Sample Career Title	Sample Work Settings
Research Technician	Government, Pharmaceutical Company
Farm Manager	Horse, Beef, Dairy, Small Ruminant, Swine
Kennel Manager	Private Industry
Writer/Reporter for Animal-Related Publication	Private Industry
Marketing Specialist	Department of Agriculture, Cooperative Extension
Animal Technician	Universities, Government, Private Sector

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$34,324

Agribusiness

- **Production Supervisor, Case Farms**

Key responsibilities include: overseeing department personnel, including staffing, training, evaluating, and developing team members; monitoring production process and periodically adjusting equipment or work practices according to standard operating procedures; ensuring equipment is in working order and working conditions are safe; managing overall product quality, assisting employees with troubleshooting problems and coaching them through appropriate adjustments.

Cooperative Extension

- **Agriculture Extension Agent, NC Cooperative Extension Service**

Responsible for all livestock and forage educational programming, certification of animal waste operators, assisting with maintaining waste management plans, and providing recommendations on pasture management.

Laboratory/Research

- **Research Assistant II, Integrated Laboratory Systems, Inc.**

Primary responsibilities: Animal receipt and housing; Dose administration; Acquire and calculate food and water consumption data; Acquire and report body weight and clinical observation data; Allocation of study animals; Blood collection (cardiac puncture, vena cava, retro-orbital, submandibular); Animal Identification (tail tattoo, ear punch, ear tag); Morbidity/Mortality checks; Breeding (mating, weaning, verification of gender, tail biopsies); Collection of samples in support of health surveillance program; Humane euthanasia, rodent necropsy.

BIOLOGICAL ENGINEERINGwww.bae.ncsu.edu

This BAE student created a device to assist her client in playing bass drums and cymbals in spite of his paralysis.

The world today is dependent on biological and agricultural systems in the production of food, feed and fiber and the conservation of our natural resources. Today's engineering and technology graduates must be qualified to contribute to our rapidly expanding technology base and to play an integral part in the decision-making process.

The Department offers the BS in Biological Engineering. The three concentrations within the major are in agricultural engineering, environmental engineering and bioprocessing engineering. The biological engineering program is jointly administered by the College of Agriculture and Life Sciences and the College of Engineering. Graduates of this program are engineers who develop engineering solutions to problems in food and biological product processing and preservation, water and waste management, air and water quality control, environmental control for animal and plant production systems, and machine systems for agricultural and biological systems.

COLLEGE OF AGRICULTURE & LIFE SCIENCES

ACADEMICS ▾ RESEARCH ▾ EXTENSION

Career Opportunities

Employment opportunities for graduates are highly diverse. Jobs in biological engineering and the technology program fields frequently involve a combination of indoor and outdoor work. Engineering jobs may involve product design and development, plant engineering and management, engineering consulting, design of systems dealing with biological and natural resources and the environment, graduate study, research and teaching.

Agricultural and environmental technology graduates are typically employed in jobs that involve the application and management of engineering designs in the conservation and utilization of natural resources, agricultural production systems, water and animal waste management, structures and environmental controls, and agribusiness management.

Research

The Department has strong research programs in a number of areas. These include environmental engineering, bioprocessing, machine systems, and controlled environment agriculture.

Course Work/Curriculum

The biological engineering degree is accredited by the Accreditation Board for Engineering and Technology (ABET) and is strong in the basic sciences, mathematics, engineering

sciences, engineering design, and the humanities and social sciences. Specialization takes place through the selection of electives, a biological engineering concentration, basic and engineering sciences, and a year-long senior design project.

In the agricultural and environmental technology curriculum, a series of applications-oriented courses are taken in the various areas of agricultural engineering technology and the physical, biological, and applied sciences.

Graduate Study

The Department offers graduate study leading to the Master of Biological and Agricultural Engineering, the master of science, and the doctor of philosophy degrees. Candidates normally prepare for such study by completing an ABET accredited biological and agricultural engineering curriculum; however, nonengineering graduates may be accepted in

these graduate programs after completing specified additional undergraduate engineering requirements.

Co-Curricular Activities

Students in both programs have departmental clubs that are affiliated with the state and national organizations of the American Society of Agricultural Engineers. In addition, students are involved with both the Agri-Life and Engineer's councils. Both programs have departmental honor societies. Alpha Epsilon for the engineering students and Alpha Mu for the technology students.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

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BIOLOGICAL ENGINEERING CAREERS



Biological engineers often work outdoors to plan projects and determine environmental impacts.

Biological Engineering brings engineering to life. Conceptualizing, designing, and developing systems for the application of engineering principles to biological systems while maintaining and improving the environment provide diverse opportunities for graduates of this curriculum.

Sample Career Title	Sample Work Settings
Design Engineer	Agricultural Machinery
Process Engineer	Government
Biological Engineer	Private Industry
Consulting Engineer	Private Industry
Water Resource Engineer	Natural Resources Conservation
Waste Specialist	Environmental Control

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$55,197

Environmental

- **Water Resources Engineer, Williamsburg Environmental Group, Inc.**
Primary responsibilities relate to the planning and design of water resources projects including watershed management, environmental planning, storm water management, stream restoration, and wetland mitigation. Tasks would include technical writing, hydrologic and hydraulic analysis, watershed planning, low impact development and design, floodplain studies, and water quality assessments.

Production/Machinery Systems

- **Engineer I, Engineered BioPharmaceuticals, Inc**
Design and development of aseptic manufacturing lines for the production and filling of dry powder pharmaceuticals. eBio is engaged in the production of dry powder pharmaceuticals for vaccine, therapeutic and bio-defense applications. Dry powders are an increasingly important formulation methodology as the pharmaceutical industry begins to capitalize on the vast proteomics work of the past couple of decades. Protein based pharmaceuticals must be carefully engineered to maximize stability and enable a wide array of state-of-the-art delivery modes.

Research, Development, Biomanufacturing

- **Process Engineer, Greer Laboratories Inc.**
The Process Engineer will coordinate with Production, Quality, Maintenance, Validation, and contractors to manage capital projects, capacity increases, and process improvements. And be responsible to plan, manage, and execute the start-up and commissioning of new equipment, will assist in writing and executing validation protocols, and will provide support and troubleshooting to manufacturing operations as well as identify process improvements and capacity constraints and design and execute projects to support corporate goals.

BIOPROCESSING SCIENCE

www.ncsu.edu/foodscience/bioprocessing/

The Food Science Department intends to draw from its expertise in training professionals with a breadth of knowledge in microbiology, biotechnology, engineering, and biochemistry.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▪ R E S E A R C H ▪ E X T E N S I O N

Bioprocessing is a broad term encompassing the research, development, manufacturing, and commercialization of products prepared from or used by biological systems, including food, feed, biopharmaceutical, and cosmetics. Currently, the bioprocessing industries top \$35 billion annually worldwide, with \$86 billion in sales projected for the US market alone within the next two decades.

Today, 20,000 North Carolinians work as biotechnologists in the pharmaceutical and biopharmaceutical industries. The BBS program is a melding of the University's historic strengths, with the anticipation of delivering a highly trained and experienced workforce to the agribiotechnology industries.

Career Opportunities

Continued growth in North Carolina's biomanufacturing industry will require new employees with complex training and technical skills tailored to these highly regulated positions. Close to 2,500 new employees will be needed each year in biopharmaceutical and pharmaceutical manufacturing industries. Students will be prepared for jobs ranging from entry-level manufacturing operators to research engineers. Jobs that are essential to biomanufacturing are: Maintenance and/or Instrument Technician, Process Technician, Quality Control Assistant/Associate, Quality Assurance Associate, Process Development Associate/Scientist, and Process Engineer.

Research

The BBS program in coordination with other University efforts, specifically the Biotechnology program (BIT) and the Biomanufacturing Training and Education Center (BTEC), uniquely positions the University to help attract new businesses and business relocations to North Carolina, ultimately enhancing the state's economic welfare.

Course Work/Curriculum

Solving problems in the food and bio-industries has been a long-standing strength of the Food Science Department. In addition to a strong technical background, students earning a B.S. in Bioprocess-

ing Science will understand other subject matter relevant to the bio-industries, including quality control and assurance, validation procedures, as well as ethical and regulatory issues. This unique collection of courses is designed to provide bioprocessing students with a special skill set specific to bioprocessing and pharmaceutical manufacturing needs, skills which to date have not been taught by U.S. universities.

Graduate Study

The Department offers graduate programs leading to nonthesis Master of Food Science, Master of Science, and Doctor of Philosophy degrees. Three university-industry cooperative research centers, the Center for Advanced Processing and Packaging Studies, the Southeast Dairy Foods Research Center and the Center for Marine Science and Technology provide unique opportunities.

Co-Curricular Activities

Student life at North Carolina State University extends far beyond the classroom. Participation in the Food Science Club provides an opportunity to meet other students. Club activities have included tours of food industries, operation of a dairy bar at the State Fair, and various social events. Students are encouraged to get involved with the Biomanufacturing and Pharmaceutical Training Consortium and the North Carolina Biosciences Organization .

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:

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BIOPROCESSING SCIENCE CAREERS



Bioprocessing Science uses a combination of the basic biological sciences with the applied sciences of microbiology, analytical chemistry and process engineering to develop commercial products using living cells.

Bioprocessing is a broad term encompassing the research, development, manufacturing, and commercialization of products prepared from or used by biological systems, including food, feed, fuels, biopharmaceuticals, and cosmetics. Graduates earning a Bioprocessing Science degree will have the technical competence and hands-on experience to immediately contribute to the North Carolina biomanufacturing and pharmaceutical industries

Sample Career Title	Sample Work Settings
Quality Assurance Scientist	Pharmaceutical Company
Process Development Scientist	Biotechnology Company
Product Development Scientist	Biomanufacturing Company

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$47,760

Laboratory, Research

- **Research Associate; Novozymes North America**

As a Research Associate within our Customer Solutions team, you will focus on assisting with developing new technical insights and supporting our customers with analytical expertise for industrial enzyme applications within the biofuels industry. You will plan and carry out lab studies under the guidance of scientist staff. You will also implement new methods to simulate industrial applications, evaluate enzyme performance and interpret and summarize experimental results.

Biomanufacturing

- **Manufacturing Associate II, Novartis Vaccines & Diagnostics, Inc.**

Major responsibilities: Become an expert in manufacturing processes and equipment; Conduct all assigned activities in a safe and cGMP compliant manner. Tasks will include, but are not limited to: Implement process steps according to defined Standard Operating Procedures(SOPs) and Batch Production Records (BPRs); Interface with process automation systems (e.g., PAS, BAS, PLCs); Interface with production computer systems (e.g., Document Management); Assemble, set-up, and disassemble production equipment; Clean, prepare, and sterilize production equipment in a compliant manner; Clean and disinfect production rooms; Properly document activities in accordance with cGMPs.

Regulatory

- **Quality Assurance Technician, Nestle USA**

Responsible for monitoring the quality of the product during manufacture. Inspecting process control points as defined by HACCP & Division Quality Management Minimum Requirements. This involves recognizing and making recommendations to resolve non-compliant product or situations through interaction with production personnel/employee involvement teams and/or USDA.



This extension student intern participates in a collaborative education program to teach financial management lessons to help Cherokee youth understand their share of tribal profits.

The primary purpose of the agricultural education program at North Carolina State University is to prepare graduates for positions as agriculture teachers at the secondary and community college level, as county extension agents and as leaders in the agricultural industry. Careers such as these require not only a knowledge of agricultural subject matter but also the ability to communicate that information effectively to others.

The groups that need agricultural information are extremely diverse, as are the settings in which this information is provided. But regardless of whether information is provided in a formal classroom setting or to an individual in an agricultural setting, the focus is on providing service to the agricultural community in the form of accurate and up-to-date information about agriculture.

COLLEGE OF AGRICULTURE & LIFE SCIENCES

ACADEMICS ▾ RESEARCH ▾ EXTENSION

Career Opportunities

Cooperative Extension agents are located in every county in North Carolina. Careers in extension are both exciting and rewarding. There are usually several entry level extension positions available each year in North Carolina. With other states experiencing a shortage of extension agents, opportunities exist for employment outside of North Carolina as well. Graduates also find career opportunities throughout the agricultural industry in agricultural communication fields. The ability and desire to work with people along with a broad understanding of agriculture provide the skills necessary for success in many areas of agriculture.

Course Work/Curriculum

The agricultural and extension education curricula has four components:

- general education courses that are required for all students at NC State University
- a broad understanding of agriculture. Students complete introductory courses in animal or poultry science, plant science, soil science, agricultural economics, agricultural engineering and forestry in order to develop the background in agriculture essential to providing information to a wide variety of clients.
- a concentration in one area of

agriculture.

- either the teaching option, agricultural communications option or the extension option, but each curriculum culminates in a semester-length practicum experience in which students apply their knowledge and skills in a real-world setting.

The primary focus is to provide graduates with the skills they need in order to be successful as teachers, as extension agents or as leaders in the agricultural industry.

Graduate Study

The Department offers programs of graduate study leading to the Master of Agricultural Education and the Master of Extension Education degree. These are professional, nonthesis masters degree programs. Master of Science degrees in Agricultural Education and in Extension Education are also available for students interested in

conducting thesis research as part of their graduate program.

Co-Curricular Activities

The Agricultural and Extension Education Club and the national agricultural education honorary society, Alpha Tau Alpha, provide opportunities for leadership development and professional and social activities. Students are encouraged to participate in the collegiate 4-H Club and Collegiate FFA Chapter at NC State.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

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EXTENSION EDUCATION CAREERS



Extension Educators teach others how to apply agricultural research.

COLLEGE OF
AGRICULTURE & LIFE SCIENCES
ACADEMICS ▾ RESEARCH ▾ EXTENSION

Extension Education focuses on teaching others how to apply agricultural research. Graduates in this major enjoy working with people and have a broad understanding of agriculture. Extension Education prepares students for multiple professional environments including agricultural education, Cooperative Extension, and agricultural communications. Graduates participate effectively in planning, promoting, and initiating educational programs in agriculture.

Sample Career Title	Sample Work Settings
Home Horticulture Agent	Cooperative Extension
Extension Specialist	Government
County Coordinator	Government
Environmental Specialist	Private Industry
Crop Protection specialist	Private Industry
Marketing Specialist	Private Industry

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011	\$36,000
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Cooperative Extension

- **County Extension Agent, Agriculture; NC Cooperative Extension Service.** Responsibilities for this position include developing innovative, informal educational programs for farmers, farm families, and related organizations and businesses. Programs should be designed to enhance profitability and economic viability of the agricultural economy. Programs should address current and future agricultural production and profitability issues, challenges, and changes.

Agribusiness

- **Retail Facility Superintendent; Southern States Cooperative, Inc.** Responsible for: supervising employee staff; dispatching application and delivery services (spreaders and sprayers) to the field; assisting with cash management and inventory control utilizing daily reports; performing inventories in compliance with RSS schedule; implementing and overseeing equipment maintenance program; managing expenses within budgeted limits; coordinating GPS sampling and recordkeeping; enforcing corporate policy and procedures; ensuring accurate billings to customers; making recommendations on facility and staffing needs.

Community Outreach

- **Hands on Health Program Coordinator; Inter-Faith Food Shuttle** Assist with planning and implementation of program aimed at integrating healthy food provision, community activities, nutrition and cooking classes, community gardens, physical activity, and tutoring & mentoring services as guided by community input & participation..

FOOD SCIENCE

www.ncsu.edu/foodscience

Improved succulence and texture is the goal. These graduate students will ensure this bird stays juicy during cooking by injecting it with a marinade containing natural meat protein.

Food Science is the study of the chemical, biological, microbiological, nutritional, engineering and economic aspects of food and food components. It is the application of principles from diverse scientific disciplines to develop new methods of processing, packaging and distributing food. Food scientists seek to improve food flavor, color, texture, nutritional value, safety and cost through an understanding of the basic sciences.

Food product development, preservation and distribution are essential in meeting society's needs without imposing unreasonable stress on the environment. Today the many facets of Food Science and technology create a variety of opportunities in industry, education and government.

**Career Opportunities**

A Food Science degree prepares the graduate to work in the world's largest industry in quality assurance, production management, new product or process development, regulatory testing and enforcement, or sales. Food Science acquaints students with new processes such as freeze drying, high-temperature processing, aseptic packaging and preservation by ionizing radiation. The application of science and new computer-age techniques in the food industry offers a wide range of opportunities to the graduate.

Research

Food scientists often approach research problems with a team effort. Priorities in the Department of Food Science are centered on:

- food safety
- adding value to commodities
- environmental impacts of processing and packaging
- nutrition and health.

Food chemists understand the interactions and functions of enzymes, proteins, lipids and carbohydrates responsible for flavor, texture and nutrients of food.

Food microbiologists investigate the metabolism, genetics and control of organisms pertinent to food fermentation technology, safety or spoilage.

Food engineers design, develop and optimize processes for flavor, texture, nutritive characteristics, efficiency, and safety.

Nutrition scientists determine the nutritive value of food components and the effects of processing and storage conditions on nutritive properties.

Course Work/Curriculum

Courses of study encompass both a scientific and liberal education designed to meet the career demands of the food industry. Double majors are encouraged. Minors in related curricula are also available.

Graduate Study

The Department offers graduate programs leading to nonthesis Master of Food Science, Master of Science, and Doctor of Philosophy degrees. Three university-industry cooperative research centers, the Center for Advanced Processing and Packaging Studies, the Southeast Dairy Foods Research Center and the Center for

Marine Science and Technology provide unique opportunities. The web site has more details.

Co-Curricular Activities

Student life at North Carolina State University extends far beyond the classroom. Participation in the Food Science Club provides an opportunity to meet other students. Club activities have included tours of food industries, operation of a dairy bar at the State Fair, and various social events. Students are encouraged to join a national organization, the Institute of Food Technologists.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

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FOOD SCIENCE CAREERS



Food Scientist use scientific principles to improve the food science industry through processing, packaging, and distributing food.

Food Science is the combined study of science and engineering to process, evaluate, package and distribute food. It is the application of principles from diverse scientific disciplines to develop new methods of processing, packaging, and distributing food. Food scientists seek to improve food flavor, color, texture, nutritional value, safety, and cost through an understanding of the basic sciences.

Sample Career Title	Sample Work Settings
Research Technician	Product Development
Product Demo Coordinator	Private Industry
Sensory Scientist	Regulatory Agencies
Product Development Scientist	Food Research
Food Science Technician	Food Processing
Quality Assurance Technician	Production and Operations Management

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011	\$47,760
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Sensory Testing

- Sensory Analyst; National Starch and Chemical Company**
Within assigned projects understand business and project objectives and against these develop the appropriate sensory test plans/designs, and execute sensory testing that is valid and reliable; lead descriptive panels in support of projects, which include: development of texture lexicon (Texicon) and appropriate use of scaling to effectively evaluate products; construction of presentation designs - set-up and execution of tests; and delivery of valid data analysis; Prepare and conduct effective presentations to internal clients and external customers. Write concise reports for sensory research that convey valid results and recommendations.

Quality Assurance

- Quality Assurance Technician, Nestle USA**
Responsible for monitoring the quality of the product during manufacture. Inspecting process control points as defined by HACCP & Division Quality Management Minimum Requirements. This involves recognizing and making recommendations to resolve non-compliant product or situations through interaction with production personnel/employee involvement teams and/or USDA.

Production, Operations, Management

- Operations Trainee; Kerry Ingredients and Flavours**
Essential duties and functions for this position include: Coach, motivate, train and effectively manage the performance of production staff; Ability to create and present information on various training topics, line stats, and production data to employees/managers/buyers; coordinate with engineering, maintenance or others as appropriate to solve production-related problems; ensure adherence to proper safety and sanitation regulations and policies/procedures; actively identify and initiate process improvements to positively impact financial viability, service and product quality and customer satisfaction of the facility; Develops, recommends, and implements measures to improve production methods, equipment performance, and quality of product.

HORTICULTURAL SCIENCEwww.cals.ncsu.edu/hort_sci

The art of horticulture is apparent to anyone who appreciates quality of life. Students gain hands-on experience while studying this curriculum.

Horticulture is a science, a business, an art, an avocation and a multi-billion dollar industry. As a scientific discipline, horticulture uses all the tools of modern science to investigate the complex growth and developmental responses of horticultural crops and to develop solutions for problems confronting the horticulture industry.

Horticulture is a big business that affects our lives in many ways. Horticultural businesses include producers, landscaping firms, agrichemical corporations, florist shops, plant brokerages, interior plantscape operations, botanical gardens and arboreta. There are more people engaged in horticultural pursuits than in all other segments of agriculture combined. It is estimated that Americans engaged in horticulture as an avocation spend approximately \$8 billion annually for goods and services.

Career Opportunities

Opportunities in horticultural businesses are almost limitless. Garden centers, florists, nursery and greenhouse producers, and fruit and vegetable producers have offered long-standing career opportunities.

Expanded opportunities in areas such as landscape design, pesticide application, golf course and landscape maintenance, interior planting design and maintenance, and tissue culture. Graduates also find employment in research, government service, education, and journalism.

Research

Applied and basic research done to enhance and expand the informational base of the vegetable, fruit, ornamental and floriculture industries, include:

- plant breeding and weed control
- tissue culture
- biochemistry and molecular biology.

Whether it be the post-harvest quality of blueberries, variety trials for sweet potatoes, genetic studies to produce blight-resistant tomatoes or studies into the propagation of better adapted woody ornamentals, research benefits the horticulture industry and the environment.

Course Work/Curriculum

The university offers a two-year Agricultural Institute program, which leads to an associate of applied

science degree and a four-year bachelor of science program with curricula in technology and science. Studies may be oriented toward ornamentals, vegetables, pomology, floriculture or landscaping.

The bachelor of science program provides a background in communication skills and mathematics along with basic plant science courses and:

- plant propagation, plant identification, and greenhouse management
- flower, vegetable and fruit production, nursery management
- landscape maintenance and landscape design.

Graduate Study

The Department offers graduate study leading to the master of science and the doctor of philosophy degrees. A professional degree, Master of Horticultural Science, may be earned by substituting

additional course work for the research requirements of graduate study. Potential areas of study and more details can be found on the web site.

Co-Curricular Activities

The Horticulture Club is extremely active, with events such as plant sales, club trips, landscape projects, dinners and banquets. Students may also become a member of the landscape competition team or attend state, regional, or national professional meetings. At the JC Raulston Arboretum at NC State University students may meet local horticulture professionals.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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HORTICULTURAL SCIENCE CAREERS



Horticultural Science graduates often find careers working in greenhouses.

Horticulture is an exciting segment of agriculture that is growing ever more popular in the global economy. Horticultural Science uses all the tools of modern science to investigate the complex growth and developmental responses of horticultural crops and to develop solutions for problems confronting the horticulture industry. The North Carolina climate is conducive to the production and use of a wide variety of horticultural crops and services.

Sample Career Title	Sample Work Settings
Landscape Technician	Landscape Construction
Owner, Retail Garden Center	Private Industry
State Extension Specialist	Government
Horticultural Sales Representative	Crop Production and Sales
Horticulture Teacher	Education
Technical Writer	Gardening Magazines

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011	\$27,180
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Research

- **Research Assistant; Costa Farms**

Responsibilities relate to supervising aspects of growing trial or experimental plant materials, recording data and evaluating experiment results as directed by the Director of Research and Development, and conducting experiments and evaluating other trials as directed.

Business

- **Field Supervisor; Spruce Landscape Management, Inc.**

Responsibilities relate to overseeing landscape maintenance at commercial and residential sites. Requires experience in maintenance, applications, installation or landscapes, and an eagerness to learn.

Cooperative Extension

- **Extension Agent, Agriculture; NC Cooperative Extension Agent**

Responsible for planning, implementing, evaluating and marketing educational programs and activities with measurable impacts in the areas of home and commercial horticulture and forestry. Primary responsibilities include the development of educational programs for green industry professionals, commercial horticultural commodities, and home horticultural programs. The agent will conduct horticultural demonstrations, educational seminars and mass media programs to reach diverse audiences. Programs must address current and future horticultural production and environmental issues and challenges.

Landscape Design/ Maintenance

- **Rose Garden Design/Service Technician; The Perfect Rose, LLC**

Successful candidate will install and maintain private and public rose gardens in the Charlotte Metro Area. Work includes bed design, bed preparation, planting, mulching, spraying, pruning and general care of rose gardens.

NATURAL RESOURCES

www.soil.ncsu.edu/

Soils are an integral part of all agricultural production systems in North Carolina. Students may focus on a specific resource such as soil, forests, wildlife or water.

Natural resources include our soil, water, air, minerals, flora, fauna and people. Wise use or improvement of natural resources for the benefit of society is the goal of resource management. This important challenge recognizes the interdependence of people with their environment and requires an integrated, multi-disciplinary approach to solve society's resource challenges.

Population growth, rising incomes, life-style changes and urbanization lead to more intensive use of all natural resources. These trends present challenges to resource managers, who must be trained in the basic principles of several disciplines in order to apply sound management strategies to make wise use of our resources.

COLLEGE OF AGRICULTURE & LIFE SCIENCES

ACADEMICS ▾ RESEARCH ▾ EXTENSION

Career Opportunities

The breadth and complexity of resource management, along with the need to formulate public policy and to communicate resource information, afford a variety of career opportunities. Some graduates will work in remote areas in forest production, water quality monitoring or wildlife management. Others may be employed in public or business planning offices, working with engineers and planners in the development of residential, commercial and industrial complexes.

Research

The Department provides basic and applied information on soil science and management for optimum productivity with minimal impact on environmental degradation, has a progressive research and education program in non-agricultural use of soils, and maintains state-of-the-art chemical, physical, and biological analytical instrumentation, as well as computer technologies to facilitate research and education programs.

Course Work/Curriculum

The breadth and complexity of natural resource management requires the input of many disciplines. To accommodate this diversity this campus-wide program involves three colleges and four departments. Within CALS, three concentrations are available:

Economics and Management is designed to equip students with the

skills to apply economics and business principles to natural resource use, preservation, and enhancement. In addition to economics courses, students will take business courses.

Soil Resources prepares students to understand the physical, chemical, and biological properties of soils and to evaluate capabilities and limitations for a broad spectrum of land uses. The role of soil as a basis for all ecosystem understanding will be emphasized.

Soil and Water Systems provides students with a framework for understanding land management factors that will influence the quantity and quality of water that runs off the land and reaches surface waters or filtrates and becomes groundwater. Basic soil science courses and water management science courses provide the framework.

Graduate Study

Students completing the natural

resources curriculum with a strong academic record would be very qualified to pursue a graduate study program. Both master of science and doctoral programs are available.

Co-Curricular Activities

A variety of campus clubs and organizations can provide social and leadership skills. The Agribusiness Club, Agronomy Club, Wildlife Club, Forestry Club, National Agricultural Marketing Association Club, are available on campus. Activities of these groups also extend to experience at regional and national levels.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:

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Soil Resources or Soil & Water Systems

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NATURAL RESOURCES CAREERS



You'll find career opportunities in just about any aspect of science and natural resources that interests you — and many of those careers take you out of the office and into a lab or the great outdoors.

Natural resources include our soil, water, air, minerals, flora, fauna and people. Wise use or improvement of natural resources for the benefit of society is the goal of resource management. Managing natural resource for the sustained benefit of society requires knowledge of soils, hydrology, geology, plant and animal life, as well as resource policy, economics and environmental law.

Sample Career Title	Sample Work Settings
Natural Resource Consultant	Self-Employed
Natural Resource Policy Analyst	State or Federal Government
Soil Conservationist	State or Federal Government
Natural Resource Educator	Private Natural Resource Organization
Water Quality Specialist	State or Federal Government
Research Technician	University

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011	\$29,120
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Consulting

- **Environmental Consultant; Corblu Ecology, LLC**

The position will initially include extensive fieldwork in relation to mitigation bank monitoring, i.e., vegetation surveys, fish surveys, groundwater well monitoring, and GIS/GPS mapping. Other duties may include wetland/stream delineations and assessments, natural resource mapping, wildlife management, and assisting with sediment and erosion control monitoring, including field inspection of Best Management Practices and monitoring and turbidity analysis associated with construction site activity.

Conservation

- **Fish & Wildlife Biologist; US Fish & Wildlife Service**

Plan and conduct investigations of moderate complexity to determine the impact of various land and water development projects upon the fish and/or wildlife resources of an area; review and report on permit applications under the Corps of Engineers, Environmental Protection agency, or state permit programs; conduct private land habitat restorations including landowner contacts, mapping, surveying, staking, construction monitoring, seeding, etc., and prepares management plans for restored areas; assist in developing comprehensive fish and/or wildlife management plans to insure conservation, protection, and enhancement of fish and/or wildlife and their habitat for a geographic area having a variety of habitat conditions.

Research

- **Student Research Contract; US Environmental Protection Agency**

Human Exposure and Atmospheric Sciences Division's Method Development and Application Branch (MDAB) develops, modifies, improves, evaluates, and validates methods and instrumentation for measuring human and ecosystems exposures, and provides data input for human exposure models. The tasks associated with this position include sample processing (drying, weighing, sieving, riffling soils and/or dusts) for bioavailability research, tracking samples and maintaining sample database, environmental and biological sample extractions, and preparation of chemicals for bioavailability studies.

PLANT BIOLOGY

www.cals.ncsu.edu/plantbiology/

A student works in a lab that features custom-designed space and state-of-the-art equipment for the group's studies of genetic means to make crops resistant to disease.

Plants are an integral part of our world. From microscopic algae to giant sequoia trees, plants are essential for all life on the planet. Thousands of different organisms have been classified as plants. Impacting our lives by providing us with oxygen, food, shelter, fuel and medicines, they make up the environment in which we live and are the foundation for many modern technological and biotechnological innovations.

Plant biologists may study the structure, function, classification and habitats of specific plant species, biotechnological manipulation of plants, or the ethnobotanical impacts of plants on society and culture. Plant biologists use the tools of environmental sciences, cell and molecular biology, biotechnology and genomics, and computers and bioinformatics.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▪ R E S E A R C H ▪ E X T E N S I O N

Career Opportunities

Plant biologists play a unique and major role in providing us with more and better foods, in helping to preserve the quality of our environment and in learning more about plants and how they can be used to make life more enjoyable. Plant biologists work in areas of:

- research, teaching, and administration
- conservation planning and environmental monitoring
- biotechnology and pharmaceuticals
- sales, service, and management

Educational institutions employ the majority of plant biologists, with federal and state agencies constituting the second largest employer.

Research

The Department serves students and the public through teaching, research and extension activities in plant biology. Faculty research encompasses: ecology, plant diversity, plant cell and molecular biology, genomics, plant biotechnology, evolution and systematics, and ethnobotany.

Course Work/Curriculum

Undergraduate majors select their plan of work in consultation with their advisor, who helps them select the courses appropriate to their individual objectives and interests. Students may choose from tracks tailored to their specific interests:

- ecology and biodiversity
- cell and molecular biology
- ethnobotany
- pre-professional studies (pre-dental, pre-medical)

Courses provide hands-on laboratory experience, field trips and basic understanding of most aspects of our current plant knowledge. Learn about:

- plant life, plant biology, and local flora
- medicinal plants, kingdom of fungi, ethnobotany (plants and civilizations)
- cell biology, space biology, plant morphology and diversity, and ecology

Graduate Study

The Department offers Master of Science, Master of Botany (nonthesis) and Doctor of Philosophy degrees. Course work and research are designed by the student and major professor in consultation with a graduate

advisory committee. Most graduate students are members of a national scientific organization, depending on the student's specialized interests. Visit the web site for additional information.

Co-Curricular Activities

Botany majors have many opportunities to participate in campus organizations to develop their professional interests and to gain leadership experience. The Botany Club offers guest speakers, field trips, service projects and fellowship with other students.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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PLANT BIOLOGY CAREERS



This Plant Biologist is conducting research on wound signaling in plants.

Plant Biologists play a unique and major role in providing us with more and better foods, in helping to preserve the quality of our environment and in learning more about plants and how they can be used to make life more enjoyable.

Sample Career Title	Sample Work Settings
Research Technician	Government
Field Botanist	State Agencies
Naturalist	Government
Scientific Technical Writer	Private Industry
Plant Geneticist	Research
Biology Teacher	Education

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$47,760

Biotechnology

- **Biotech Greenhouse Associate Specialist; Medicago USA**
This position will be part of a team that will be responsible for the seeding, maintenance, propagation and transfections of plants in a state of the art greenhouse. He or she will also provide critical support in the operation and maintenance of the greenhouse. The candidate will be responsible for documenting all results in support of manufacturing operations and following written procedures. Requires good observation skills, good manual dexterity, ability to work well as a part of a team and perform a variety of duties with minimal supervision, good organizational skills, excellent documentation skills, knowledge of cGMP or GLP principles, and experience with greenhouse automation is a plus.

Sales

- **Pro Turf Territory Manager; Pennington Seed, Inc**
We are seeking an aggressive, assertive, self starter that can detail products and sell based on competitive advantages. This position has a customer base including: Park and Recreation Departments, Government Agency Public Works departments, High School and College Athletics, Golf Courses, Erosion Control customers, Contractors, Sod Farms, etc. This position includes both established customers and a large pool of potential business through established businesses needing these services. Also requires a clear understanding of Microsoft Office products, and a willingness to travel.

PLANT AND SOIL SCIENCE

www.soil.ncsu.edu

Students gain hands-on experience in the Agronomy curriculum. These students are learning from their professor in a nearby field.

The Plant and Soil Science Degree involves the development and practical application of plant and soil sciences to produce abundant, high-quality food, feed and fiber crops. As a discipline, plant and soil science represents the integration of crop, soil and related sciences. Concentrations are available in Agroecology, Agronomic Business, Agronomic Science, Crop Biotechnology, Crop Production, and Soil Science. Students will be required to integrate many factors associated with the goal of improving food, feed, and fiber production.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
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Career Opportunities

Students may use their knowledge of basic sciences to help solve important agricultural problems in an ecologically sound manner. Agronomy students pursue careers as:

- research scientists, farm producers, soil conservationists and consultants
- crop advisers, extension agents, technical sales representatives
- farm service center managers, agronomic consultants, sod production and management specialists.

Interesting opportunities ranging from technical to applied, from the laboratory to the field and from the private sector to government await. Nearly 20 percent of agronomy graduates continue on to graduate studies.

Research

Plant and soil science research includes the use of molecular, cellular and quantitative genetic techniques to improve plants; systems agriculture; weed management; agroecology and sustainable agriculture; turfgrass science and management; integrated pest management; crop modeling; seed technology; plant chemistry and biochemistry; crop and forage management systems; and basic and applied physiology of crop plants.

Research programs are augmented by well-equipped laboratories, greenhouses, access to the NC State University Phytotron for controlled

environmental work, and an excellent field station system with a variety of environments and soils ranging from the mountains to the piedmont and the coastal plain and black lands of Eastern North Carolina.

Course Work/Curriculum

Plant and soil scientists work in a profession that is extremely relevant to national and global food sources and economic security. They receive a broad education in the basic physical, biological, and natural sciences. Advanced course work includes weed science, soil fertility, crop ecology, plant disease and insect control, plant breeding and genetics, integrated pest management, agroecology, soil classification, soil physical properties, and soil-crop management.

To excel as a plant or soil scientist, students must be adequately prepared in the sciences, computer systems, mathematics, and statistics.

Graduate Study

Graduate level studies in Agronomy at NCSU are conducted within the departments of Crop Science and Soil Science. Both offer instruction leading to M.S. and Ph.D. degrees, as well as a nonthesis Master of Crop Science and nonthesis Master of Soil Science, respectively.

Co-Curricular Activities

Several organizations exist for agronomy students, including the Agronomy Club, the crop judging team, the soil judging team and the student chapter of the Golf Course Superintendent's Association of America.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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PLANT AND SOIL SCIENCE CAREERS



Agronomist help educate the public on producing abundant, high-quality food, feed, and fiber crops.

Plant and Soil Science deals with field-crop production and soil management. Through the development and practical application of plant and soil sciences to, these graduates produce abundant, high-quality food, feed, and fiber crops.

Sample Career Title	Sample Work Settings
Consultant	Agribusiness Sales
Cotton Specialist	Crop Production
Soil Conservationist	Private Industry
Agronomist	International Agriculture
Plant and Soil Scientist	Government
Weed Specialist	Plant Protection

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011 \$27,180

Research

- Assistant Research Technician; Bayer Environmental Science**
Responsibilities relate to Conducting ornamental and/or field turf grass trials (fungicide, herbicide, insecticide) under supervision of Bayer scientist. Conducting such trials includes laying out the test plots, calibrating the application devices, weigh out chemicals, scout for weeds, insects, diseases, plant & maintain ornamentals, read and record test results.

Cooperative Extension

- Extension Agent, Agriculture; NC Cooperative Extension Service**
This position will be responsible for educational programming and informational assistance related to Field Crops (tobacco, cotton, corn, soybeans, and small grains). In addition, this person will be expected to aggressively maintain interactive programs with highly technical producers, minority and limited resource farmers, agribusinesses, and groups traditionally involved with Extension programming in the county.

Consulting

- Agricultural Consultant/Agronomist; Protech Advisory Services, Inc.**
Deliver agronomic services to established clientele of 26 year old consultancy firm which provides pest management, nutrient management, GPS equipment and software, variety selection services. Includes crop and soil surveys and travel to perform services within an eight county area of southeastern North Carolina.

POULTRY SCIENCEwww.cals.ncsu.edu/poultry/index.htm

These students are examining the external anatomy of chickens. Either as a source of protein, or a human biomedical model, poultry serves as a valuable contributor to human well-being.

During the past five decades the poultry industry has achieved unparalleled success, becoming the model for efficient production of high-quality protein. This dynamic agribusiness provides the United States with its single greatest source of animal protein. Approximately 712 million broiler chickens and 43 million turkeys are produced annually in North Carolina, making the state a national leader in poultry production.

Beyond an excellent source of nutritious food, various poultry species have played a significant role in increasing our understanding of basic biological principles. Avian models have been used to make advances in biomedical research in the areas of nutrition, genetics, immunology, developmental biology, toxicology and biotechnology. One example is vaccinations from chick and duck embryo systems.

C O L L E G E O F
AGRICULTURE & LIFE SCIENCES
A C A D E M I C S ▾ R E S E A R C H ▾ E X T E N S I O N

Career Opportunities

The Department of Poultry Science produces approximately 20% of all poultry science graduates in the United States annually. Employment opportunities include:

- Researchers & managers of large production complexes
- Corporate executives & bankers
- College deans & faculty

Nationally, the poultry industry is a \$24 billion agribusiness annually. Graduates may work in areas related to the production, processing, and marketing of poultry and poultry products.

Research

- Physiology, including photophysiology, stress physiology, neurophysiology and reproductive physiology
- Nutrition, including feeding program improvement, trace element interactions and metabolism, effects of feed alternatives, and experimental atherosclerosis and body composition analysis
- Microbiology and toxicology (These programs operate both independently from other disciplinary programs in the department and dependently with other programs in the areas of nutritional mycotoxicology and physiological toxicology.)

- Biotechnology, including gene transfer and the development of methanogenic strains of bacteria for anaerobic degradation of animal waste products
- Immunology, various aspects of avian immunology

Course Work/Curriculum

Students will obtain a basic understanding of the world around them. Completing the technology or science degree in poultry science, will include:

- 2 years in basic sciences (biology, chemistry, math, genetics, and zoology)
- 2 years in your major (poultry production, avian physiology, comparative endocrinology, and comparative nutrition)

An accelerated bachelor's/master's program is also available for exceptional undergraduates; students complete a master's degree within 12-18 months of the baccalaureate.

Graduate Study

The Department offers the Master of Science (thesis), Master of Poultry Science (nonthesis), and doctoral degrees in Poultry Science. Research is conducted with multiple poultry species. See the web site for more details.

Co-Curricular Activities

The Poultry Science Club sponsors numerous events throughout the academic year, including an annual Thanksgiving smoked turkey sale, an annual awards banquet in the spring, and a week's trip to the beach or mountains after graduation.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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POULTRY SCIENCE



This hatchery manager is inspecting the eggs and checking the equipment on his incubators.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▾ R E S E A R C H ▾ E X T E N S I O N

Poultry Science is a discipline which focuses on the efficient and low cost production of protein for the global marketplace. In addition to providing an excellent source of nutritious food, poultry research has also made significant contributions to our understanding of many basic principles of biology. Advances in human nutrition, genetics, immunology, developmental biology, toxicology, biotechnology, and health have often been made possible by the use of avian models. For example, many of our human vaccines were developed in chick/duck embryo systems. Either as a source of protein or as a basic avian research or human biomedical model, poultry serves as a valuable contributor to human well-being.

Sample Career Title	Sample Work Settings
Processing Plant Supervisor	Research
Feed Mill Manager	Private Industry
Hatchery Manager	Production Technology
Commodity Broker	Business
Nutritional and Feed Additive Sales	Sales and Services
Flock Health Supervisor	Management

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$34,324

Production

- **Beginning Trainee; Sanderson Farms**

Offers trainees the opportunity of development, training and supervising experiences at all levels of the organization, from breeder/hatchery operations to slaughter operations. The Trainee learns management skills and gains knowledge about the poultry industry and Sanderson Farms. This is an entry level position for the trainee to gain the skills and knowledge they need to become Supervisors and above in our facilities.

Research

- **Research Contractor; Pfizer Poultry Health Division**

Primary responsibilities include: assisting in experiments designed for development of new products for the poultry industry; perform detailed laboratory procedures, embryo and bird experiments; follow SOPs and adhere to proper lab practices, animal care and handling; record and maintain detailed records of experimental data in accordance with GLP or GCP; assist in writing experimental protocols, coordinating and performing egg-based studies and lab experiments; gather scientific information from published articles or websites as needed for research and analysis.

Regulatory

- **Quality Assurance Specialist; Butterball, LLC**

Will perform complex technical duties relative to auditing turkey production processes and systems and providing guidance for compliance as well as directing QA Tech 1 activities and actions. Will assist with product and process audits. Will participate on various problem solving teams as well as confer and organize with management on audit findings, corrective actions, and verification of such actions. Provides guidance and support to production associates and to QA Tech 1.

SOIL & LAND DEVELOPMENTwww.soil.ncsu.edu/

North Carolina is a rapidly urbanizing state where land that was historically used for agriculture is now being converted to new housing developments, golf courses, and shopping centers.

COLLEGE OF AGRICULTURE & LIFE SCIENCES
ACADEMICS ▪ RESEARCH ▪ EXTENSION

Soil and land development prepares students for careers in the real estate industry. Land development (new housing, golf courses, and shopping centers) requires that the land be evaluated for its suitability for on-site waste disposal and the presence of wetlands. In North Carolina, these evaluations can only be performed by a licensed soil scientist. There are two concentrations:

- Land Development: designed with a focus on the business and financial aspects of the development of the land.
- Soil Science: designed to prepare students to work as soil scientists, either for a consulting company or for a state or federal government.

Career Opportunities

The breadth and complexity of resource management, along with the need to formulate public policy and to communicate resource information, afford a variety of career opportunities. Some graduates will work in remote areas in forest production, water quality monitoring or wildlife management. Others may be employed in public or business planning offices, working with engineers and planners in the development of residential, commercial and industrial complexes.

Research

The Department of Soil Science conducts research in all the ways that land can be managed. The Department has a long history of interdisciplinary cooperation providing basic and applied information on land management techniques that minimize environmental degradation. Because of the department's breadth of programs and national and international reputations, it has attracted outstanding undergraduate and graduate students from around the world.

These students have been attracted to the Department's state-of-the-art chemical, physical, and biological analytical instrumentation, as well as to its computer technologies that facilitate research and education programs.

Course Work/Curriculum

Land developers work in an industry that is one part business and one part science. To be successful in this chosen career, students will need a blend of courses in mathematics, natural science, writing, and humanities. Depending on the concentration chosen, there also opportunities for students to complete courses in the areas of accounting, ecology, economics, engineering, environmental policy, finance, geographic information systems, plant science, site assessment, and wetland science.

Graduate Study

Students completing the undergraduate degree have additional options for higher education. Students planning to earn an MBA should consider the land development concentration. Students wanting to pursue masters or Ph.D. degrees in soil science should consider the soil science concentration.

Co-Curricular Activities

A variety of campus clubs and organizations can provide social and leadership skills. Depending on interest and future plans, students may wish to pursue the Agribusiness Club, Agronomy Club, Wildlife Club, Forestry Club, or National Agricultural Marketing Association Club, all which are available on campus. Activities of these groups also extend to experience at regional and national levels.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:**Soil & Land Development**

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SOIL AND LAND DEVELOPMENT CAREERS



This Soil Conservationist Technician is monitoring the growth of a Black Hills Spruce.

The **Soil and Land Development** Degree prepares graduates for careers in the real estate industry. Land developments require that the land be evaluated first for its suitability for on-site waste disposal and the presence of wetlands. In North Carolina, such evaluations can only be performed by a soil scientist licensed by the State, which means graduates of Soil and Land Development will be prime candidates for some jobs.

National Association of Colleges & Employers National Salary Survey *Average salary gathered from recent graduates in this field at the national level*

2011	\$34,320
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Soil Scientist; STANTEC

Managing, directing and conducting soil-discipline related project teams; conducting field activities for soil resource inventory and soil sampling; data compilation and management; interpreting data for various end-uses; interacting with and communicating effectively within multi-disciplinary teams.

Soil Conservationist; USDA Natural Resource Conservation Service

Work with landowners and operators, individually and in groups, to develop natural resource conservation program activities in cooperation with the Natural Resources Districts, partner agencies and other organizations. Resolve natural resource issues within the Natural Resources District arising from landowners' development of conservation plans. Plan, apply, and/or direct the planning and application of structural, vegetative, cultural, and management practices.

Soil Scientist; The Timber/Fuels Planning Staff of the Canyon Lakes Ranger District

Provide technical advice for protection of soil resources for assigned projects; use soil surveys and conduct field verification of soil information, field and/or laboratory examination, description, classification and mapping of soils. Projects include fuels reduction. Timber harvest, watershed protection, wildlife habitat improvement, grazing, minerals, oil and gas, recreation, special use permits, land exchanges etc.. Prepare soil reports detailing existing condition, evaluation of effects of the proposal and alternatives, soil resource protection measures and monitoring guidelines.

Soil Scientist/GIS Specialist; USDA Natural Resource Conservation Service

Member of team developing soil survey information; work with geospatial technologies to manipulate and maintain digital and analog geospatial data such as soil survey and soil investigations, climate vegetation, geology, land use, topography in order to examine, identify and delineate areas of different kinds of soils. Study the characteristics of soils, geology, topography and landforms over large regions to ensure consistency of soil map units.

Ecological Site Inventory Specialist; USDA Natural Resource Conservation Service

Staff position in a Major Land Resource Soil Survey Office to collect information for the development and improvement of the utility of Ecological Site Descriptions of the area. Work with relevant Natural Resource Conservation Service (NRCS) employees, contacts from universities, and other agencies and interest groups to develop protocols and methodologies for the inventory and classification of plant communities within the framework of existing and ongoing soil surveys and ecological sites. Collect, analyze, interpret and coordinate information related to the inventory and classification of ecological sites. Use analytical tools and methods to correlate and coordinate ecological site information with soils information.

TURFGRASS SCIENCE

www.cropsci.ncsu.edu

This student is working on Bermudagrass genetics in a program boasts cutting-edge research and management practices.

Turfgrass Science is the development and practical application of plant and soil sciences to produce abundant, high-quality food, feed and fiber crops. As a discipline, it represents the integration of crop, soil and related sciences. The Turfgrass science degree is an integrated program of basic and applied science courses necessary to understand and apply plant management techniques specific to turfgrasses.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▾ R E S E A R C H ▾ E X T E N S I O N

Career Opportunities

Turfgrass management is a billion dollar industry and a reliable employer of NCSU graduates. Graduates may find employment in the major sectors of the turfgrass industry such as:

- single family dwellings
- lawn care services
- commercial properties
- golf courses
- schools and churches
- cemeteries
- athletic fields
- roadside vegetation

Career options for students include the golf course industry, lawn care, athletic field management, sod production, turfgrass equipment, or supply sales.

Research

Research programs are augmented by well-equipped laboratories, greenhouses, access to the NC State University Phytotron for controlled environmental work, and an excellent field station system with a variety of environments and soils ranging from the mountains to the piedmont and the coastal plain and black lands of Eastern North Carolina.

Course Work/Curriculum

The Turfgrass Science degree program is a curriculum designed to integrate basic and applied science

courses necessary to understand and apply plant management techniques specific to turfgrasses. Students will study:

- general education courses as required by North Carolina State University
- science courses in biology, chemistry, botany, and soil science
- major courses such as Turf Cultural Systems, Soil Fertility & Fertilizers, Plant Genetics, Plant Physiology, Environmental Issues in Turf Management , General Entomology, Soil Physical Prop of Plant Grow, Weed Science
- specialized electives such as Landscape Horticulture, Trees & Grounds, or Golf Course Design.

Graduate Study

Graduate level studies in Agronomy at NCSU are conducted within the departments of Crop Science and Soil Science. Both

offer instruction leading to M.S. and Ph.D. degrees, as well as a nonthesis Master of Crop Science and nonthesis Master of Soil Science, respectively. Details explaining areas of concentration can be found online.

Co-Curricular Activities

Several organizations exist for agronomy students, including the Agronomy Club, the crop judging team, the soil judging team and the student chapter of the Golf Course Superintendent's Association of America.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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Graduate Programs

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TURFGRASS SCIENCE CAREERS



This turfgrass graduate examines a plot of turfgrass that is part of a research project to determine the best varieties for soccer and football fields.

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ACADEMICS ▾ RESEARCH ▾ EXTENSION

Turfgrass Scientists serve the entire turfgrass industry by evaluating new and existing cultivars, production practices, fertility systems and pest management systems including weed, insect and disease management. Turfgrass production and management programs are constantly being created or updated and improved as a result of these research efforts.

National Association of Colleges & Employers National Salary Survey *Average salary gathered from recent graduates in this field at the national level*

2011	\$40,093
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Management

- **Parks Superintendent**

Performs intermediate technical work overseeing the care & improvement of public grounds, parks, & recreation facilities. Planning & supervising parks & facilities maintenance & repair, planting, care & maintenance of trees, shrubs & flowers. Designs & builds community appearance projects. Supervises grounds crew. Advises & assists Appearance Commission; works directly with garden clubs & private citizens. Maintains records & prepares reports; enforces tree ordinance & other applicable City ordinances. Prepares budget & monitors expenditures; works with the Director of Parks & Recreation on the Capital Improvement Program; provides input on needed repairs.

- **Assistant Golf Course Superintendent; TPC Wakefield Plantation**

Assisting with recruiting, hiring, scheduling and performance management of employees; making daily golf course maintenance assignments in accordance with agronomic/turf management plan; managing a crew of operators; ensuring proper pesticide/fertilizer application and calibration; assisting Director of Golf Course Maintenance Operations with maintaining budgets.

Research

- **Assistant Research Technician; Bayer Environmental Science**

Responsibilities relate to Conducting ornamental and/or field turfgrass trials (fungicide, herbicide, insecticide) under supervision of Bayer scientist. Conducting such trials includes laying out the test plots, calibrating the application devices, weigh out chemicals, scout for weeds, insects, diseases, plant & maintain ornamentals, read and record test results.

Sales

- **Pro Turf Territory Manager; Pennington Seed, Inc.**

We are seeking an aggressive, assertive, self starter that can detail products and sell based on competitive advantages. This position has a customer base including: Park and Recreation Departments, Government Agency Public Works departments, High School and College Athletics, Golf Courses, Erosion Control customers, Contractors, Sod Farms, etc.

BIOCHEMISTRY

<http://biochem.ncsu.edu>

Students use new lab equipment; the lab facilities in the department are well equipped to carry out research in biochemistry, biophysics, molecular biology, and molecular genetics.

Biochemistry is a science in which the principles of chemistry, biology, mathematics and physics are focused on investigations of biomolecules, cells, tissues and organisms. Biochemistry prepares students for careers in many areas of science, medicine, agriculture and industry.

C O L L E G E O F
A G R I C U L T U R E & L I F E S C I E N C E S
A C A D E M I C S ▪ R E S E A R C H ▪ E X T E N S I O N

Career Opportunities

Students who earn degrees in biochemistry may choose from numerous employment opportunities. Most graduates work in research at:

- universities, medical schools, and veterinary medical schools
- state and federal research institutions
- pharmaceutical companies and biotechnology firms
- agribusiness companies, food industries, and hospitals.

Careers in pharmaceutical, medical and other industrial sales are also available to biochemists. Some graduates select teaching careers in high schools, colleges and universities or administrative careers in science, industry or academic institutions.

As a preprofessional curriculum, an undergraduate major in biochemistry prepares students for careers in medicine, dentistry, veterinary medicine, optometry or pharmacy.

Research

Research is focused in the following areas of common interest:

- structure and function of RNA and RNA:protein complexes
- structural biology of proteins
- animal and plant viruses
- plant molecular biology

- transcriptional and translational regulation of gene expression.

Course Work/Curriculum

The biochemistry Bachelor of Science curriculum is a rigorous program that requires 124 hours to graduate. A faculty adviser will help you plan your program from the following course work areas to fulfill your desired career objectives.

Biochemistry (15-17 hours): general biochemistry, biochemistry laboratory; biochemistry research (3-6 hours); honors research, special studies

Chemistry (23-25 hours): general chemistry, organic chemistry, physical chemistry, laboratory analysis

Physics (8 hours): general physics

Mathematics (12-15 hours): calculus and statistics and/or computer science

Life Sciences (22-24 hours): general biology, genetics,

microbiology, life sciences electives (11-12 hours)

Graduate Study

The Department offers programs of graduate study and research leading to the Ph.D. and Master's degrees. The graduate program is designed to prepare Ph.D. scientists for careers in research and teaching. Additional information can be found on the web site.

Co-Curricular Activities

Students are invited to join the Biochemistry Club. The club is designed to foster fellowship, stimulate awareness of career opportunities, and provide advice for students seeking professional careers.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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Graduate Programs

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BIOCHEMISTRY CAREERS



A Biochemistry graduate working in a lab on pharmaceutical development.

Biochemists study the discrete characteristics of every organism and biological process. Biochemistry prepares students for careers in many areas of science, medicine, agriculture, and industry.

Sample Career Title	Sample Work Settings
Assistant Scientist	Hospital Laboratories
Biochemist	Research Facilities
Technical Sales Representative	Private Industry
Business Process Analyst	Biotechnology Firms
Research Assistant	Pharmaceutical Companies
Acquisition Logistics Manager	Agribusiness Companies

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011 \$38,384

Laboratory Research

- **Research Technician II, Duke Human Vaccine Institute**

Will isolate DNA and RNA from human specimens, enter and maintain all relevant data within the repository database, and will coordinate with DHVI Program Management and the DHVI Accessioning Unit to order, organize, and label samples.

Regulatory

- **Drug Safety Case Manager, Drug Safety Alliance**

Responsible for activities relating to the collection, processing, follow-up, analysis, and regulatory reporting of adverse events (AEs) and serious adverse events (SAEs) for marketed products and investigational compounds. Requires excellent written and verbal communication skills and analytical skills.

Clinical Research

- **Clinical Research Coordinator, Wake Heart Research**

Responsibilities include screening/enrolling patients in current clinical trials, collecting patient data, completing case report forms, regulatory document organization, conducting follow-up as required for the specific protocols, and more. This position will provide substantial patient exposure, research and clinical experience in a hospital setting. Requires self-motivation, organization, critical thinking skills, and team work. Experience in a research setting or clinical certifications like CNA or EMT are preferred but not required for this position.

Biomaterials

- **Associate II, Novartis Vaccines and Diagnostics, Inc.**

Implement process steps according to defined Standard Operating Procedures (SOP's) and Batch Production Records (BPR's); assemble, set-up, and disassemble production equipment; clean, prepare, and sterilize production equipment in a compliant manner; clean and disinfect production rooms.

GENETICS

<http://cals.ncsu.edu/genetics/index.php>

The Department consists of a highly interactive group of scientists with foci in quantitative, developmental and computational genetics. They also administer outstanding undergraduate and graduate training programs in genetics, partly supported by an NIH training grant on 'The Genetic Architecture of Quantitative Traits'.

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ACADEMICS ▪ RESEARCH ▪ EXTENSION

Genetics is the study of how DNA is passed down from one generation to the next. The degree in genetics is a unique program that offers undergraduate majors classroom training in fundamentals of genetics and other sciences, as well as opportunities for meaningful research experience. The new degree in genetics will be the first major in genetics in the UNC system. The genetics major complements other degree programs in the biological and life sciences at N.C. State, as it prepares students for further graduate study, professional schools (such as, medical, dental, veterinary) or careers in industries whose products are based on biological and agricultural research, including biopharmaceutical and biotechnology companies

Career Opportunities

The genetics major complements other degree programs in the life sciences, as it prepares students for further graduate study, professional schools (such as, medical, dental, veterinary) or careers in industries whose products are based on biological and agricultural research, including biopharmaceutical and biotechnology companies. Building on the strength of N.C. State as a leader in science and technology, graduates from the program easily may earn a concurrent minor in any of the other life sciences curricula, as well as other programs such as statistics or biotechnology.

Research

Research groups in the behavioral and biomedical genetics focus area investigate genetic and environmental factors contributing to phenotypes with relevance to human health and disease. Research groups in the computation and bioinformatics focus area develop new approaches for the management, analysis, and modeling of large, complex data sets. Research groups in the molecular, cellular and developmental genetics focus area study how the expression and function of genes and gene products govern cellular and developmental process in animals and plants. Research groups in the population and quantitative genetics focus area study of how genetic processes

evolve to generate genetic variation in populations of organisms, and the effects on the patterning of variation within and between populations and species.

Course Work/Curriculum

Responsible conduct as a scientist and citizen will be emphasized in the genetics coursework, and students will also have the opportunities for public service and engagement through participation in the departmental genetics outreach program. Students will be challenged to master their coursework while practicing hands-on problem-solving in both the classroom and active research settings.

Graduate Study

The Department provides a strong and well-balanced program of graduate study and research training leading to the PhD degree and two types of

Masters degrees. The Master of Science is a research degree and the Master of Genetics is a non-thesis degree. The Department also offers a graduate minor for selected students in other NC State graduate programs.

Co-Curricular Activities

Student life at North Carolina State University extends far beyond the classroom. Participation in the Genetics Club provides an opportunity to meet other students.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:*Undergraduate Programs*

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GENETICS CAREERS



This genetics graduate is working in the lab, and working with gene expression.

Geneticists study genetic and environmental factors relevant to human health and disease, how the expression and function of genes regulate biological processes and development, and how genetic processes affect genetic variation in populations. Geneticists also develop new approaches for the management, analysis and modeling of large, complex sets of genetic data.

Sample Career Title	Sample Work Settings
Research Technician	University, private industry, or government laboratory
Gene and Paternity Testing	Private Industry
DNA Forensics	State and Federal Government
Pharmacogenomics	University, private industry, or government laboratory
Marketing and Sales	Private Industry

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$47,760

Agriculture

- **Research Assistant, Molecular Assisted Breeding**

This position has an emphasis in classical genetics and molecular genetic linkage and QTL mapping approaches and will function in the marker-assisted breeding program under the supervision of the scientist. Key responsibilities include: Initiate, plan, design, and execute marker development and marker application projects; perform plant tissue sample collection and laboratory work, including nucleic acid isolation, PCR, agarose and polyacrylamide electrophoresis; evaluate and incorporate emerging marker-related technologies into existing program; data analysis and interpretation for the development of new molecular markers and genetic linkage maps; perform quantitative trait loci (QTL) mapping; facilitate marker-assisted selections; management of assigned outsourced projects.

Health, Pharmaceutical

- **Research Associate - Toxicogenomics: The Hamner Institutes for Health Sciences**

Key responsibilities relate to support of ongoing research in a fast-paced toxic genomics lab. Projects requiring support range from the genomic assessment of mRNAs released in the blood following liver injury to the application of in vitro assays in the toxicology assessment of environmental chemicals. The successful candidate will assist in conducting preclinical toxicology studies and will perform a variety of genomic and biochemical experiments, data analysis and collation and literature searches.

- **Cytogenetic Technologist I, Alere**

In this role you will be responsible for assisting the Laboratory Manager and Team with Genetic Laboratory processing, analysis and diagnostics. This role will include: in-take & logging of laboratory specimens; accessioning of samples; coordinating tissue culture send out and testing; tissue culture of specimens; screening for authenticity before interpretation; setting up serum specimens in the DXI6000 Beckman Coulter Analyzer; general Microscopy and Microscopy of G-banded chromosomes; automated Karyotyping of captured images and cells; set up FISH and scope work; entering data or chart information for prepping samples; working with Genetic Counselors to obtain missing specimen information; running daily log-in maintenance reports and priority lists; creating send-out labels and paperwork; and operating balances and centrifuges.



This senior is part of research zeroing in on a new therapeutic target in the types of bacteria that cause anthrax, strep throat, gangrene, pneumonia, sepsis, tetanus and other diseases.

Microbiology is the study of microscopic organisms, including bacteria, viruses, fungi, algae and protozoa. Students in the Department of Microbiology learn about the basic life processes of these organisms, their genetics, biochemical pathways, structural features and reproduction. Applied areas such as industrial, food, sanitary and pathogenic microbiology are also part of the curriculum. The Department of Microbiology prepares students to better understand and solve problems in agriculture, environmental quality, medicine and genetic engineering.

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ACADEMICS ▾ RESEARCH ▾ EXTENSION

Career Opportunities

Graduates find employment in many sectors of the economy.

- Biotechnology
- Sales or management positions
- Quality assurance for pharmaceutical or food companies
- Medical research involving cancer, inherited diseases, infectious diseases, and immunology
- Solving problems in agriculture and improving the quality of the environment.

Many graduates pursue further education at graduate schools, medical schools or other professional schools.

Research

Most undergraduates in microbiology gain valuable research and work experience before they graduate. Students may intern in government and industrial laboratories or work in University departmental research labs.

Students in the college honors program participate in a two semester research project that culminates in a presentation at the University Undergraduate Research Symposium.

Course Work/Curriculum

Students work closely with faculty advisers to choose courses in line

with their interests and career goals. The BS degree (128 hours to graduate) includes:

- Microbiology (21 hours)
General Microbiology,
Medical Microbiology,
Microbial Diversity,
Metabolic Regulation and
Senior Seminar. Plus two
additional courses in basic
or applied areas of
microbiology, including
special research projects,
internships or College hon-
ors research.
- Biology (12 hours)
Introductory Biology, Cell
Biology, Genetics
- Chemistry and
Biochemistry (21 hours)
General Chemistry, Or-
ganic Chemistry,
Biochemistry
- Physics (8 hours)
General Physics
- Mathematics (10-11 hours)
Calculus, Statistics
- Additional courses are
required in humanities and
social sciences.

A first year seminar is available for students who begin their college studies as a microbiology major.

Graduate Study

The Department offers the Master of Science, Master of Microbiology, Master of Microbial Biotechnology and the Doctor of Philosophy degrees. Active research programs exist. See the web site for details.

Co-Curricular Activities

The Microbiology Club is active in educational programs on campus and also provides a place for social interaction among students.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:

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MICROBIOLOGY CAREERS



Microbiologists are concerned with the growth and development, physiology, classification, ecology, genetics and other aspects of the life processes.

Microbiology is the study of microscopic organisms, including bacteria, viruses, fungi, algae, and protozoa. Microbiologists have a strong foundation in mathematics, chemistry and physics. Graduates will have a broad general knowledge of molecular and cellular biology as well as foundation in the basic areas of microbiology, virology and immunology.

Sample Career Title	Sample Work Settings
Laboratory Research Analyst	Medical Research Laboratory
Lab Technician	Private Industry
Research Technician	Hospitals
Clinical Microbiologist	Private Industry
Microbiologist	Education
Clinical Trials Manager	Contract Research Organization

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011	\$47,760
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Research

- **Associate Scientist, RDS; bioMerieux, Inc.**

Participate in timely completion of development and support projects. The context of the job involves performing routine experiments. It is essential to understand and follow written protocols and verbal instructions.

Administrative

- **Project Coordinator Trainee; Cato Research Ltd.**

Works in conjunction with the Project Manager to coordinate logistics and procedures relating to the evaluation, conduct and close-out of clinical trials. Lliaises with sponsors regularly. Prepares for and participates in meetings and conference calls.. Maintains project and regulatory files, both paper and electronic. Updates files and tracks reports when necessary. Coordinates the overall submission schedules with the project manager to assure meeting project timelines. Creates and monitors project budgets in conjunction with the project manager, prepares project productivity tracking reports and attends project reviews.

Biomanufacturing

- **Manufacturing Associate II, Novartis Vaccines & Diagnostics, Inc.**

Major responsibilities: Become an expert in manufacturing processes and equipment; Conduct all assigned activities in a safe and cGMP compliant manner. Tasks will include: Implement process steps according to defined Standard Operating Procedures (SOPs) and Batch Production Records (BPRs); Interface with process automation systems (e.g., PAS, BAS, PLCs); Interface with production computer systems (e.g., Document Management); Assemble, set-up, and disassemble production equipment; Clean, prepare, and sterilize production equipment in a compliant manner; Clean and disinfect production rooms; Properly document activities in accordance with cGMPs.

NUTRITION SCIENCE

www.cals.ncsu.edu/food_science/acdprg/index.html

This student knows the value of a well-balanced meal thanks to his nutrition classes. He's reviewing his notes one last time before taking an exam.

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Health professionals in many fields need a good understanding of nutrition because of the key role that diet plays in the prevention, development, and treatment of most of today's major diseases. Nutrition science examines the ways in which what we eat affects our physical and even our psychological well-being, determining optimal intake of individual nutrients, specific foods, and food groups. Nutritionists provide guidance in how much and what we should be eating; they also explain as well as study the relationships between diet and health.

Career Opportunities

Nutrition-related jobs are increasing due to the growing and aging population, public interest, especially related to obesity, and the food industry's desire to develop nutritious products. Nutritionists may be employed in a variety of settings such as:

- **Clinical/Private Practice**
These individuals would be "registered dietitians" and might be employed by a hospital, nursing home, physicians' group, outpatient clinic or have their own business. They might apply medical nutrition therapy to treat a disease or condition, or provide more general guidance on healthy eating.
- **The Community** Responsibilities for community nutritionists vary from developing and providing nutrition education and chronic disease prevention programs to overseeing food assistance programs. They might work in an HMO, health club, wellness center, or for a health-related government agency or non-profit organization.
- **The Food Industry**
Nutritionists hold jobs in the public relations and marketing departments of food companies, commodity groups, and major restaurant and supermarket chains. They might develop print and audio/visual materials and make presentations to other organizations.

Many graduates continue on to graduate or professional schools to fulfill career goals in nutrition, medicine, dentistry, allied health, or the food industry.

Research

As an interdepartmental program, research opportunities are offered in conjunction with Animal Science, Crop Science, Family and Consumer Sciences, Food Science, Poultry Science, and Toxicology.

Course Work/Curriculum

The educational objectives for Nutrition majors are to provide:

- a strong foundation in basic science (chemistry, physics, math, statistics, biochemistry, microbiology, anatomy, genetics, and physiology)
- a sound understanding of nutrient functions, sources, and requirements; and nutrition in disease processes and across the life cycle

- knowledge in related areas such as public policy, psychology, and sociology

Graduate Study

Graduate degree programs in Master of Nutrition (Non-thesis), Master of Science in Nutrition, and Ph.D. in Nutrition are available. Programs of study fall mainly in two general areas: Nutritional Biochemistry & Experimental Animal Nutrition.

Co-Curricular Activities

Students have many opportunities to participate in campus organizations to develop their professional interests and to gain leadership experience.

Career Services

In addition to faculty advisers, CALS Career Services is available to provide information about career and employment opportunities. The office assists students and alumni with a variety of career needs such as choosing a major, resume tips, and job search strategies.

For more information:

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NUTRITION SCIENCE CAREERS



Many Nutrition Scientist help the public know about what foods they should be eating, and to help them make changes in their diets.

Nutrition Scientist have a good understanding of nutrition because of the key role that diet plays in the prevention, development, and treatment of most of today's major diseases. Nutrition science examines the ways in which what we eat affects our physical and even our psychological well-being, determining optimal intake of individual nutrients, specific foods, and food groups. Nutritionists provide guidance in how much and what we should be eating and develop effective programming to help individuals and groups make changes in eating behavior; they also explain as well as study the relationships between diet and health.

Sample Career Title	Sample Work Settings
Registered Dietitian	Hospital or Physician Group
Public Health Nutritionist	Government Agency
Consulting Nutritionist	Private Practice
Research Assistant	Food Industry
Public Relations Manager	Food Companies

National Association of Colleges & Employers National Salary Survey

Average salary gathered from recent graduates in this field at the national level

2011

\$47,760

Community Outreach

- **National Program Coordinator, Evaluation & Research; Share Our Strength**
Share Our Strength's Operation Frontline is a cooking-based nutrition education program that connects families with food by teaching them how to prepare healthy, tasty meals on a limited budget. The program coordinator will work to support the program evaluation, reporting, and monitoring systems. This position is critical to the program's ability to demonstrate the impact of its high-quality, effective programming.

Pharmaceutical

- **Clinical Research Coordinator, Wake Heart Research**
Responsibilities include screening/enrolling patients in current clinical trials, collecting patient data, completing case report forms, regulatory document organization, conducting follow-up as required for the specific protocols, and more. This position will provide substantial patient exposure, research and clinical experience in a hospital setting.

Clinical

- **Personal Wellness Coach; Carolina Nutrition**
This position performs metabolism tests on clients, recommends nutritional programs and meal plans, and advises clients in their weight loss and wellness goals. Potential to teach group classes as well. Requires strong work ethic, initiative, willingness to learn, and a love of working with people. Background in nutrition or fitness will make you more competitive for this position.

RALEIGH, NC



Downtown Raleigh lies in the heart of the Triangle. Raleigh is the second largest city in the Carolinas. It is also the fastest growing major city in the state, adding more than 10,000 residents annually.

Best known for its world-class museums, best of Broadway shows and live concerts, Capital area historic sites, professional and amateur sporting events and shopping Mecca status with 11 major retail areas, Greater Raleigh truly offers a variety of entertainment all in one park-like, scenic setting.



Just outside the city of Raleigh, are neighboring cities and towns that make up Wake County. There are 11 cities and towns in all, each just minutes away. Each has its own historic downtowns, tree-lined main streets, concerts in the park, golf course communities, and one-of-a-kind boutiques.

- Apex
- Cary
- Fuquay-Varina
- Garner
- Holly Springs
- Knightdale
- Morrisville
- Rolesville
- Wake Forest
- Wendell
- Zebulon

If you're a professional sports fan, then the Raleigh area has great choices for you. From the Carolina Hurricanes NHL hockey team and the Carolina Mudcats minor league baseball team to the Wake County Speedway, plus PGA Tour golf tournaments, there's an exciting venue for every season. Grab your tickets and come see the highest level of athletic competition.



The Raleigh area is the best spot in North Carolina for collegiate sports. With Universities like North Carolina State, and the University of North Carolina at Chapel Hill and Duke University down the road, there's always an edge-of-your seat football or basketball rivalry in store.



CAMPUS LIFE



The Brickyard at NC State is located in the middle of campus, and is often where students congregate between classes.

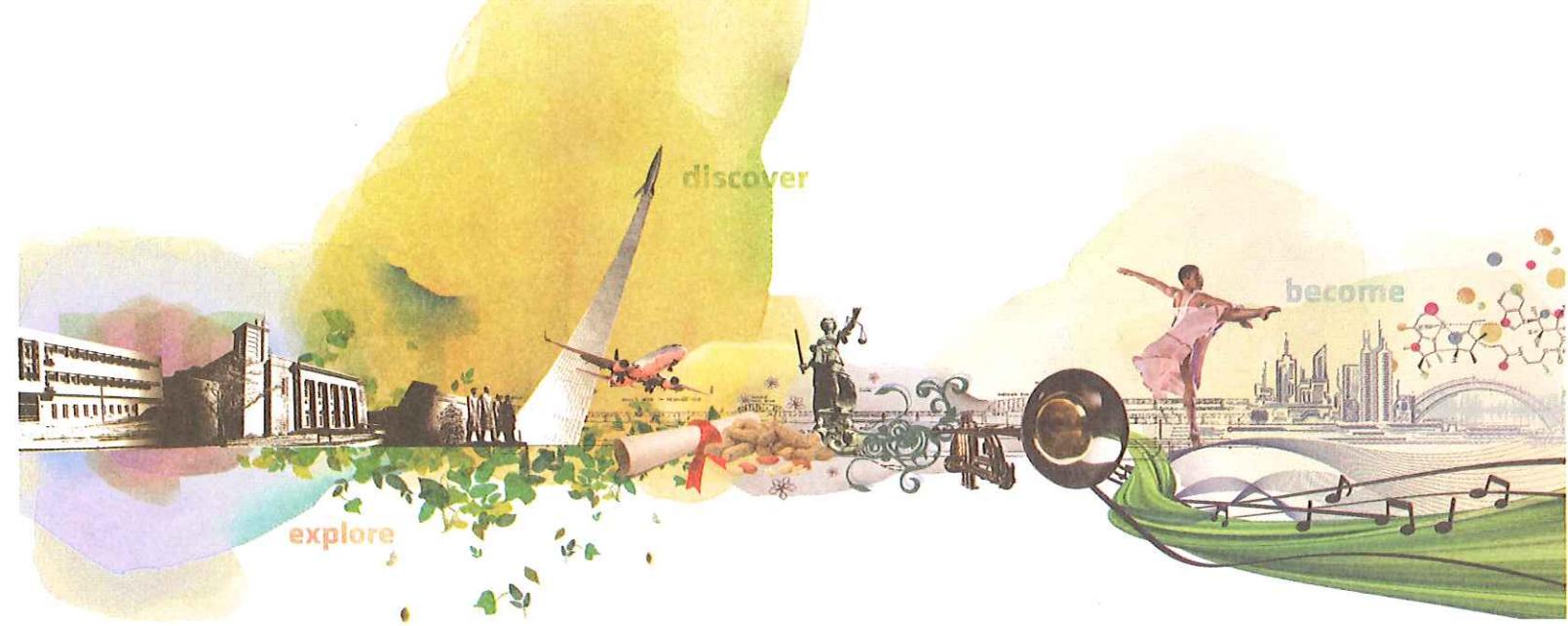
COLLEGE OF
AGRICULTURE & LIFE SCIENCES
ACADEMICS ▪ RESEARCH ▪ EXTENSION

Beyond the Books

"College is all about discovering who you are—and who you want to be. That's why, at NC State, you'll find there's more to college life than just attending class."

The Division of Student Affairs supports all NC State students with hundreds of extracurricular learning, recreational and cultural activities. Campus life at NC State offers more than 40 different **intramural and Division I varsity sports**, a thriving **Greek community**, more than 400 **student organizations**, and a variety of student **publications and media outlets**. **Study-abroad opportunities** are available in most any country imaginable. If you are ready to grow your experience, skills and resume, job internships and co-ops are great ways to learn and have fun!

- There is **a student organization** to meet most any special, professional, political, ethnic or other diverse academic, career and social interests.
 - Arts & Cultural Activities
 - Academic
 - Service-focused
 - Fraternities/Sororities
 - Honorary Societies
 - Internationally-focused Groups
 - Political & Social Action
 - Religious & Spiritual Organizations
 - Student Governing Boards
 - Professional & Career Suppose
 - Special Interest Opportunities
- Hundreds of **sports and recreational opportunities** keep you fit physically and mentally.
 - Nearly 50 club sports
 - 18 intramural leagues
 - 23 intercollegiate varsity sports
- Choose the best housing for you from dozens of on- and off-campus options that meet a variety of lifestyles and academic or special interests. There are on-campus communities reserved specifically for students who share the same academic focus or special interest like the **University Honors Program Village**, the **Arts Village**, **WISE Village**, for freshman and sophomore women in science and engineering, and **SAY Village**, for students interested in advocating for youth.
- Review our **student programs** to find out if ROTC (all major branches of the armed forces) or another academic program is right for you.
 - 65 Departments
 - Undergraduate Degree Programs
 - Graduate Degree Programs
 - Distance education Programs
 - Interdisciplinary Studies
- Crave a little organized culture? Expand your horizons by being a part of our many **arts activities**.
- Hone your leadership skills and make a difference with **community service initiatives**.
- Strengthen your physical health and emotional well-being by taking advantage of student **support services**.



North Carolina Agricultural and Technical State University School of Agriculture and Environmental Sciences

The School of Agriculture and Environmental Sciences will provide opportunities for individuals from diverse backgrounds to achieve excellence, through intellectual and technological advancements, in the food, agricultural, environmental and life sciences that will cultivate and enhance their potential for global leadership, productivity and competitiveness.

Career Programs:

- Agribusiness
- Agricultural Education
- Animal Industry
- Animal Science
- Biological Engineering
- Birth-Kindergarten Licensure
- Child Development and Family Studies
- Child Development Early Education and Family Studies
- Earth & Environmental Science
- Family and Consumer Sciences Education
- Fashion Merchandising and Design
- Food and Nutritional Sciences (Dietetics & Food Science)
- Laboratory Animal Science
- Landscape Architecture
- Natural Resources (Environmental Horticulture, Soil Science)

Contact Us:

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