Student and Faculty Handbook
for
Graduate Studies
in the
Department of Animal Sciences
PREFACE

This handbook familiarizes graduate students, faculty, and staff with the policies and procedures of the Animal Health Science Program. The policies and procedures in this handbook should be read in conjunction with those of the School of Graduate Studies presented in the Graduate Catalog and Graduate Studies Handbook. Additional assistance can be obtained from the Graduate Coordinator and/or from the Chairperson of the Department of Animal Sciences.

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The M.S. Degree Program in Animal Health Science

The Department of Animal Sciences offers a program that leads to the Master of Science degree. The curriculum consists of core and elective courses in addition to thesis research. The courses are designed to provide a solid foundation of fundamental biological and biochemical principles within the areas of biotechnology, breeding and genetics, microbiology, nutrition, pathology, physiology and toxicology.

Thesis research is conducted in the laboratories of faculty research advisors in the areas of biotechnology, immunology, microbiology, nutrition, poultry, cattle, swine production, sheep, reproductive physiology and sustainable animal agriculture.

Candidates for the Master of Science degree become qualified for entry into PhD programs in relevant areas of specialization. In addition, opportunities in animal sciences related industries are abound.

Educational Objectives of the Program

Objectives of the program are:
- To advance scholarship and research in different areas of Animal Sciences
- To increase the number of minorities with graduate training in Animal Sciences;
- To provide opportunities which that prepare students to enter Ph.D. programs;

Administration of the Animal Health Science Master’s Degree Program

School of Graduate Studies

The School of Graduate Studies is responsible for admitting students to the M.S. degree program in the Department of Animal Sciences. For additional information, refer to the University’s Graduate Catalog and Graduate Studies Handbook.

School of Agriculture and Environmental Sciences (SAES)

The mission of SAES is ‘to 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’. The SAES helps to foster the emergence of NC A&T State University into a leading comprehensive university through development and expansion of premiere teaching, research, and extension programs in food, agricultural, environmental and life sciences.

The Department of Animal Sciences

The department’s mission is, “to provide first-class instruction and high quality outreach programs in animal and laboratory animal sciences, and to conduct relevant research that will
benefit students, and its local, national and international clientele."

Responsibilities of the Chairperson

The Chairperson has the overall responsibility of administering the Graduate Program in the Department of Animal Sciences.

Responsibilities of the Graduate Coordinator

The Graduate Coordinator is appointed (five year term) by the Department Chairperson. The Graduate Coordinator serves as the departmental liaison to the Graduate School and as Chairperson of the departmental Graduate Committee.

The coordinator:

- is responsible for official communications of the Graduate Committee
- Makes graduate students and department faculty aware of the current policies and procedures of graduate studies in the Department of Animal Sciences and School of Graduate Studies
- Assists all graduate students
- Serves as temporary advisor to graduate students during their first semester
- In conjunction with the Graduate Committee nominates eligible students for individual fellowships

The Graduate Committee

The Graduate Committee consists of graduate faculty in the Department of Animal Sciences and the Department Chairperson.

The Graduate Committee:
- Reviews all applications for admission or readmission to the graduate program
- Approves the Thesis Advisor through the Graduate Committee to direct the student’s program
- Recommends and oversees the distribution of departmental graduate student stipends/scholarships;
- Reviews and evaluates the progress of all graduate students, on an annual basis, using course transcripts and the Graduate Research Assistant (GRA) Evaluation Form (see Appendix)
- Approves the Graduate Advisory Committee selected by the Thesis Advisor and student Evaluates the program of study developed by the student, through the Thesis Advisor and Graduate Advisory Committee
- Makes recommendations regarding dismissal or discipline of graduate students to the department Chairperson
- Provides a forum for grievances, complaints or requests from the graduate faculty and students
- Evaluates and makes recommendations in all matters concerning the graduate curriculum to the department Chairperson
Admission to the Graduate Program

General Admission Procedures

Students that apply for entry into the Graduate Program in the Department of Animal Sciences must comply with the admission requirements established by the School of Graduate Studies which are:

- Students should have a B.S. degree in the biological, physical or agricultural sciences, or related areas, from a recognized four-year college or university.
- To qualify for unconditional admission, the applicant must have earned Grade Point Average of 2.6 on a 4.0 scale (or 1.6 on a 3.0 scale).
- Applications for admission (see Appendix) are sent to the School of Graduate Studies, and must be accompanied by two official transcripts of undergraduate and graduate work from all colleges and universities previously attended, three recommendations (see Appendix) from individuals who know the applicants academic record and potential for graduate study, and a non-refundable fee of $35.
- Although the Department of Animal Sciences does not require the GRE, the inclusion of GRE scores may be of benefit during the evaluation process.
- Application deadlines are July 1 for the fall semester, November 1 for the spring semester, and April 1 for summer sessions.
- Students, whose native language is other than English, regardless of citizenship, must submit TOEFL (Test of English as a Foreign Language) scores as evidence of their ability to use English at a level of competence sufficient for graduate work (minimum requirement for admission is a score of 550, with scores of 50 on at least two of the sections and no section score below 45).
- Admission is granted for a specific academic semester or summer term (to change the admission date, a written request must be approved by the Department of Animal Sciences and School of Graduate Studies);
- Following the review of application materials by the departmental Graduate Committee, an applicant may be admitted to the Graduate Program either unconditionally or provisionally.
- Admittance information is forwarded to the School of Graduate Studies which then forwards a letter of acceptance, if applicable, to the applicant.
- Non-degree seeking applicants may be admitted to graduate studies as special students (graduate unclassified).

Unconditional Admission

An applicant receives unconditional admission when he/she meets all of the admission requirements.

Provisional Admission

Provisional admission may be granted if the admission requirements have not been met (e.g., B.S. degree was earned from a non-accredited institution or the undergraduate transcript reveals deficiencies that can be removed during the beginning phase of the graduate program). The Graduate Committee may require students to take specific
undergraduate courses to improve their backgrounds, or demonstrate competence for graduate work by earning no grades below “B” for the first nine hours of graduate work at this institution. Following completion of the requirements of provisional status, the department Chairperson forwards a letter to the School of Graduate Studies requesting that the status of the student be changed to “unconditional.”

**Special Student or Graduate Unclassified**

Non-degree seeking students may be admitted to the School of Graduate studies by submitting an academic transcript from a 4-year college or university. Currently, there is no minimum GPA admission requirement for this classification and 12 credit hours is the maximum amount allowed while in this status. If the student desires to change his/her status in order to enter the Graduate Program, the student must submit an application package with all of the necessary supporting documents. The application package will be forwarded to the Department of Animal Sciences for review.

**Transfer of Credit**

A maximum of six credit hours may be transferred into the Graduate Program provided that the grades received for the courses were “B” or better and completed in a graduate or post-baccalaureate classification from an accredited graduate institution. Students enrolled in the program desiring to transfer credits must submit official academic transcripts to their Thesis Advisor for initial approval. Approval is also required from the Graduate Coordinator, Department Chairperson, and the Deans of the SAES and the School of Graduate Studies (see Appendix). If students desire to transfer credits during their final semester (prior to the graduation semester), it is recommended that they submit the transfer credit application at least 30 days prior to the end of that semester. In addition, only 12 credits from a previous NC A&T State University M.S. degree program may be counted toward the 30 credit hour requirement.

**Program Requirements for the M.S. in Animal Health Science**

**Credit Hours, Course Load and Maintenance of GPA**

- A minimum of 30 credit hours, which includes thesis research, is required for completion of the M.S. degree program
- Three-fourths of the credit hours for the program must be earned in residence study at the university
- A full-time graduate course load is nine to 15 (maximum) credit hours each fall and spring semester, and three to six credit hours each summer session
- Foreign students on F-1 and J-1 visas are required by the Immigration and Naturalization Service to carry a full-time course load in order to retain visa status
- At least 50% of the courses taken for the degree must be at the 700 level (courses for graduate students only)
- The maximum load for a part-time student enrolled in the program is six credit hours for the academic
year
- Satisfactory standing in the Graduate Program requires a minimum overall GPA of 3.0, and the lowest acceptable grade is a “C” in any course.
- A student who accumulates more than nine credit hours of grades below “B” will be dismissed from the program and School of Graduate Studies.
- If a student’s GPA falls below 3.0, the student is placed on probation, taken off assistantship, and given the next two semesters in-residence to raise the GPA to 3.0 (failure to do so will result in dismissal from the program and School of Graduate Studies).

Selection of Thesis Advisor

A student must have a thesis advisor who is a member of the graduate faculty in the Department of Animal Sciences. The student selects his/her thesis advisor and the selection must be approved by the Graduate Committee prior to completion of the first semester of the program. It is highly suggested that the student begins the selection process by communicating with the faculty early during the first semester. The thesis advisor serves as the Chairperson of the student’s Graduate Advisory Committee. The advisor has the primary responsibility for designing the program of study (i.e., coursework and thesis research) for the student and providing counsel and aid to the student in the selection of a thesis research project. Together with the student’s Thesis Advisory Committee, the thesis advisor provides guidance and aid to the student for conducting the research and writing the thesis.

Thesis Advisory Committee

A student must have a Thesis Advisory Committee, consisting of three to five members of the graduate faculty. The student’s thesis advisor serves as the Chairperson and is considered one of the committee members. The selection of faculty to serve on Thesis Advisory Committee must be approved by the Graduate Committee prior to completion of the first semester of the program. The committee may consist entirely of departmental faculty, but outside participation (i.e., individuals from other departments, institutions, industry, etc.) is highly recommended. The Graduate Advisory Committees review and makes recommendations to the student regarding academic requirements and thesis research, including the thesis defense. It is the responsibility of the committee to certify that the student has completed the departmental requirements for the M.S. degree.

Graduate Student Thesis and Curriculum Work Plan

A Work Plan (see Appendix) for each student must be approved by the departmental Graduate Committee prior to completion of the first semester of the Graduate Program. The Work Plan involves the following:
- The name of Thesis Advisor
- The names of individuals on the Graduate Thesis Committee
- The proposed thesis title along with brief descriptions of the objectives, approach and resource needs
- The sequence of courses needed to complete the academic requirement
- The approved work plan is signed by the Graduate Coordinator and
Department Chairperson, and then forwarded to the School of Graduate Studies.

- Any proposed changes to this work plan must be approved by the departmental Graduate Committee and the Departmental Chairperson.

Registration for Thesis

Credit hours for thesis research (AGRI 799) varies from one to six credit hours, and students may pursue thesis credit hours at any time during their enrollment in the program. Although the credit hours are variable, the School of Graduate Studies indicates that a student must enroll for either three or six credit hours of thesis research. During the semester of expected graduation, the student must be enrolled in the university. Therefore, if a student has utilized the six credit hours and completed all coursework prior to the semester of expected graduation, but has yet to defend the thesis, the student may register for one credit hour using the code, DEPT 999. This process allows the student to meet the enrollment requirement during the semester of expected graduation.

Thesis Defense (Oral)

The student is required to successfully defend, by oral examination, his or her thesis research. The student, in conjunction with the thesis advisor and other members of the Thesis Advisory Committee, is responsible for scheduling the defense. It is up to the discretion of the thesis advisor as to the format and whether the defense is open to other students and faculty. It is highly suggested that the student forwards the final draft of the thesis to each Thesis Advisory Committee member no later than two weeks prior to the defense. The format of the draft must conform with the specifications prescribed in the Thesis and Dissertation Manual. The manual is available at the Graduate School Office. A thesis examination form (see Appendix) is completed by the thesis advisor. The form should be submitted to the School of Graduate Studies within five working days after the examination.

Submission of Thesis

Following the defense, a copy of the thesis examination form must be submitted with the thesis to the School of Graduate Studies in order to be reviewed by the thesis editor. Four unbound copies of the thesis, in final form, as approved by the thesis advisor (see approval form in Appendix), department Chairperson and Graduate Thesis Advisory Committee must be submitted to the School of Graduate Studies prior to the graduation deadline. The Graduate School publishes the dates of all thesis submission deadlines for a specific semester or summer session in each semester/summer session calendar of the schedule of classes booklet.

Graduate Student Funding Sources

Graduate Research Assistant (GRA)

The GRA is normally employed by the principal investigator, and must complete a Personal Service Agreement (see Appendix) with NC A&T State University. The GRA must be a full-time
graduate student and not hold non-degree, special or probationary status. A GRA assumes research-oriented responsibilities, which may involve library work, computer programming, statistical analysis, field work, laboratory experiments, scientific investigations and composition of thesis.

BRIDGE Program

The Bioscience Research Initiative for Doctoral Graduate Education (BRIDGE) Program is a partnership between NC A&T State University and North Carolina State University, which promotes the entrance of M.S. degree candidates into biomedical, and bioscience doctoral degree programs at North Carolina State University. Each participant receives academic benefits and also financial support during completion of their M.S. degree.

Tuition Remission for Out-of-State Students

Tuition remission assists students whose residence is out-of-state. The amount of the award is the difference between in-state and out-of-state tuition rates, and is prorated - based upon the number of hours enrolled. The student is basically responsible for paying the in-state portion of the tuition. The School of Graduate Studies provides the SAES with a specific number of potential awards, and the Department of Animal Sciences recommends students to the SAES to receive an award. The department also provides a matching contribution for the award.

Tuition Remission for In-State Students

Tuition remission is available for in-state students. The amount of the award equals the tuition cost for each semester. The Department of Animal Sciences recommends students to the SAES for these awards, and the recommendations processed through the School of Graduate Studies. The department also provides a matching contribution for the award.

Additional Funding Sources

The School of Graduate Studies lists many sources for fellowships and scholarships on its Web site (under “financial aid”). Fellowship and scholarship programs, including BRIDGE, may provide the cost of tuition and fees plus a stipend to cover living expenses. Federal work-study programs and loans comprise additional sources of funding.

Special Considerations

Change of Grade

A request for a change of grade, for any reason, must be made within one year following the date the original grade was assigned. The removal of an incomplete “I” grade must be carried out within six weeks after the beginning of the next semester. If the student has not removed the “I” within this time period, the grade is automatically changed to “F.” Thesis Research (799) is exempt from the six-week time limit.
Appeal of Grades

A student may appeal the final grade earned in a course. Initially, the student should attempt to resolve the matter with the course instructor, the Department Chairperson and/or Dean of the academic unit. If the matter is not resolved, then the student should consult the individual School/College on its written grade appeal policy. A student wishing to pursue a written appeal of a grade must demonstrate a legitimate basis for the appeal. Grade appeals are final at the level of the school/college.

Program Completion Time Limit

Irrespective of full-time or part-time status, the program must be completed within six successive calendar years. Programs remaining incomplete after this time interval are subject to cancellation, revision or special examination for out-dated work. When the program is interrupted because the student has been drafted into the armed services, the time limit shall be extended for the length of time the student was engaged in active duty, if the candidate resumes graduate work no later than one year following his/her release from military service.

Office Assignments

Students in Webb Hall have office space in the laboratories of their thesis advisors.

Mail

Graduate students have mailboxes in the mailroom, 101 Webb Hall. Upon enrollment, students must request a mailbox from the department secretary. Mail is available only during business hours (8:00 a.m. to 5:00 p.m., Monday through Friday). It is suggested that students check their mailboxes on a regular basis.

Photocopying

In cooperation with advisors and departmental secretaries, graduate students may photocopy research materials.

Computer Usage

Computers are located in the Learning Resources Center and in research laboratories.

Students are expected to adhere to the policy associated with computer usage in each particular laboratory.

After Hours Building Policy

Due to the nature of research in the Department of Animal Sciences, it may be necessary for graduate students to have access to research facilities both before and after business hours (8:00 a.m. and 5:00 p.m. Monday through Friday) on weekdays, and weekends. The student’s thesis advisor is responsible for informing the student of the laboratory policies and procedures presented in the University’s Chemical Hygiene Plan and Radiation Safety Program with regard to treatment of laboratory accidents and spills. In addition, the names of persons to contact in case of an emergency are posted in each laboratory.

The thesis advisor, taking into consideration the requirements of the
research and the training of the students, will determine the level of supervision for each student (i.e., student will be supervised by the thesis advisor, laboratory technician, or will work alone while in compliance with university policies and procedures).

Keys

The current departmental policy prevents distribution of building keys to graduate students. The level of supervision for each graduate student needing to work in the building after business hours is determined by the student’s thesis advisor (refer to the After Hours Building Policy). The duplication of keys to the building or any room in the building is strictly prohibited and is unlawful.

Academic Dishonesty Policy

NC A&T State University is committed to a policy of academic honesty for all faculty, staff, and students. Examples of academic dishonesty include, but are not limited to:

- Cheating or knowingly assisting another student in committing an act of academic dishonesty
- Plagiarism, which includes but is not limited to, submitting examinations, theses, reports, drawings, laboratory notes or other materials as one’s own work when such work has been prepared by another person or copies from another person
- Unauthorized possession of examinations or reserve library materials, destroying or hiding of source materials, library or laboratory materials, or experiments, or any other similar action;
- Unauthorized changing of grades, or marking on an examination or in an instructor’s grade book, or any other similar action
- Aiding and abetting in the infraction of any of the provisions anticipated under the general standards of student conduct
- Assisting another student in violating any of the above rules.

A student who has committed an act of academic dishonesty has failed to meet a basic requirement of satisfactory academic performance. Thus, academic dishonesty is not only a basis for disciplinary action but may also affect the evaluation of the student’s level of performance. Any student who commits an act of academic dishonesty is subject to the following disciplinary action. In instances where a student has clearly been identified as having committed an academic act of dishonesty, the instructor may take punitive action including a loss of credit for an assignment, an examination or project, or awarding a grade of “F” for the course. This action is subject to the review and endorsement of the Department Chairperson and Dean of the SAES. Repeated offenses can lead to dismissal from the university.

Setting Expectations and Conflict Resolution

If academic problems arise, the student should first contact the thesis advisor. In the advisor’s absence, the student should consult with the Graduate Coordinator. If the Graduate Coordinator is unavailable or the student does not wish to consult with the coordinator,
then the student may consult with another member of his or her graduate committee, and/or the Department Chairperson. Faculty and students should be aware of the five guiding principles:

- All issues in graduate education are not negotiable;
- Faculty set standards for quality and progress;
- It is unnecessary to avoid conflict, for conflict over ideas advances knowledge
- The power differential between graduate students and faculty will not become equal, nor should it; and
- The graduate program should not aim for 100% retention and completion for there are appropriate reasons why students leave graduate programs. Students leave programs because of faculty conflict (i.e., interpersonal relationships with faculty/lack of integration into the department), lack of adequate financial support, decide that graduate school is not for them, serious conflict arises (personal reasons, etc.), employment and academic failure.

In order to preempt conflict, thesis advisors or other faculty and students should seek to resolve, early in the program, information that is incorrect or not universally shared or understood, the lack of commonly shared and agreed upon expectations, or the lack of specific expectations between individual faculty and individual students regarding possible areas of conflict and their resolution.
Curriculum - M.S. Degree in Animal Health Science

Core Courses. Core courses provide the student with an understanding of the relationships between the animal and its environment, within specific biological disciplines. Core courses constitute 14 credit hours. Each student in the program is required to take the core courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit (Lec.-Lab.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 701</td>
<td>Environmental Topics in Animal Health</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 702</td>
<td>Seminar in Animal Health</td>
<td>1(1-0)</td>
</tr>
<tr>
<td>AGRI 799</td>
<td>Thesis Research in Agriculture &amp; Environmental Science</td>
<td>6(1-6)</td>
</tr>
<tr>
<td>AGRI 604</td>
<td>Research Design and Analysis</td>
<td>3(2-2)</td>
</tr>
</tbody>
</table>

Elective Courses.

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credit (Lec.-Lab.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSC 604</td>
<td>Administrative and Regulatory Policies Governing Animal Use</td>
<td>2(2-0)</td>
</tr>
<tr>
<td>ANSC 611</td>
<td>Principles of Animal Nutrition</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 614</td>
<td>Animal Breeding</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 624</td>
<td>Physiology of Reproduction</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 637</td>
<td>Environmental Toxicology</td>
<td>3(2-3)</td>
</tr>
<tr>
<td>ANSC 641</td>
<td>Disease Management of Livestock and Poultry</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 665</td>
<td>Biotechnology</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>ANSC 712</td>
<td>Nutrition and Disease</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 723</td>
<td>Animal Physiology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 782</td>
<td>Cellular Pathobiology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>ANSC 771</td>
<td>Advanced Design of Experiments</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>LASC 653</td>
<td>Laboratory Animal Management and Clinical Techniques</td>
<td>4(2-6)</td>
</tr>
<tr>
<td>ANSC 660</td>
<td>Special Techniques in Specimen Preparation, Immunological Techniques, Electron Microscopy, Radioisotopes, Radiology or Histotechnology</td>
<td>3(1-6)</td>
</tr>
<tr>
<td>BIOL 671</td>
<td>Principles of Immunology</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>CHEM 651</td>
<td>General Biochemistry</td>
<td>3(3-0)</td>
</tr>
</tbody>
</table>
COURSES WITH DESCRIPTION IN ANIMAL SCIENCES

For Advanced Undergraduate and Graduate Students

ANSC-604. Administrative and Regulatory Policies Governing Animal Use  
Credit 2 (2-0)  
Regulations that impact the use of animals for research, education and testing. Federal, state and local regulations and polices. Regulations, facilities, and practices involving the use of hazardous agents (biological, chemical, and physical), which affect the safety of humans and animals.  
Prerequisite: Permission of instructor.

ANSC-611. Principles of Animal Nutrition  
Credit 3 (3-0)  
Fundamentals of modern animal nutrition. Nutrient metabolism and role in productive functions.  
Prerequisite: Animal Science 212.

ANSC-613. Livestock and Meat Evaluation  
Credit 2(1-2)  
Selection and evaluation of desirable animals in both market and breeding classes. Identification and evaluation of wholesale and retail cuts of meat. Prerequisite: ANSC 412 and ANSC 413.

ANSC-614. Animal Breeding  
Credit 3 (3-0)  
Genetic and breeding principles of livestock production and improvement. Phenotypic and genotypic effects of selection methods and systems of mating. Prerequisite: Animal Science 111 and 214.

ANSC-615. Selection of Meat and Meat Products  
Credit 3(2-2)  
Identification, grading and cutting of meats. Prerequisite: ANSC 421 or ANSC 416.

ANSC-618. Seminar in Animal Science  
Credit 1(1-0)  
A review and discussion of selected topics and recent advances in the fields of animal and food sciences. Prerequisite: Senior standing.

ANSC-619. Special Problems in Livestock Management  
Credit 3(3-0)  
In depth study of problems in feeding, breeding, and management in the production of beef cattle, sheep and swine. Prerequisite: Senior standing.

ANSC-624. Physiology of Reproduction  
Credit 3 (3-0)  
Mechanisms of reproductive processes with special emphasis on their interaction with the disciplines of nutrition, immunology and biochemistry. Prerequisites: LASC 461 or ANSC 723 or permission of instructor.

ANSC-629. Special Problems in Dairy Management  
Credit 3(3-0)  
Problems in dairy cattle production. Prerequisite: ANSC 421 or senior standing.

ANSC-637. Environmental Toxicology  
Credit 3 (2-3)  
Sources, distribution, and toxicity of chemicals which are hazardous to the environments man, and animals. Prerequisites: LASC 636 or permission of instructor.

ANSC-641. Disease Management of Livestock and Poultry  
Credit 3 (3-0)  
Prevention and control of diseases are discussed in livestock species and poultry; Micro- and macro-environments that result in disease. Prerequisites: ANSC 451 or permission of instructor.

ANSC-657. Poultry Anatomy and Physiology  
Credit 3(2-2)  
Structure and function of tissues, organs, and systems of the domestic fowl. Prerequisite: ANSC 451.

ANSC-659. Special Problems in Poultry  
Credit 3(3-0)  
Assignment of work in a student’s area of interest; project method in Poultry Science. Prerequisite: Three advanced courses in Poultry Science.

ANSC-665. Techniques in Biotechnology  
Credit 3 (2-2)  
Basic principles and laboratory experiences in biotechnology. Concepts of DNA structure, function, related applications in biotechnology. Isolating DNA and RNA; genomic DNA and plasmid DNA analysis, gel electrophoresis, Southern hybridizations, gene probes. Prerequisite: ANSC 214, CHEM 251, BIOL 466 or permission of instructor.
LASC-653. Laboratory Animal Management and Clinical Techniques Credit 4 (2-6)
Principles, theories and current concepts of laboratory animal science. Government regulations, ethical consideration, animal facility management and animal health surveillance. Prerequisite: Permission of instructor.

LASC-660. Special Techniques in Specimen Preparation, Immunological Techniques, Electron Microscopy, Radioisotopes, Radiology or Histotechnology Credit 3 (1-6)
Special expertise in either preparation of animal models for classroom, museum and special display, the theoretical and practical aspects of immunological techniques, electron and light microscopy, radiology, tissue culture or histochemistry. Prerequisite: permission of instructor.

BIOL-671. Principles of Immunology Credit 3 (3-0)
A study of mammalian immune responses; particularly in humans. Special emphasis will be placed on the physiology, genetics, and regulation of immune responses. Interrelationships between nonspecific and specific immune reactions, humoral and cell-mediated immunity, effector cells, and diseases are also stressed; along with research and diagnostic methodologies. Prerequisites: BIOL 221 and BIOL 466; CHEM 221 and CHEM 222.

CHEM-651. General Biochemistry Credit 3 (3-0)

GRADUATE STUDENTS ONLY

ANSC-701. Environmental Topics in Animal Health Credit 3 (3-0)
Influence of the environment upon the health status of animals within the disciplines of epidemiology, toxicology, pathobiology, reproductive physiology, nutrition and microbiology.

ANSC-702. Seminar in Animal Health Credit 1 (1-0)
Seminar includes faculty and guest lectures on the philosophy of research and utilization of the scientific method, preparation for research and general research methodology. Presentations will be given by students on special topics in the field of animal health.

ANSC-708. Special Problems in Animal Health Credit 2 (2-0)
Independent investigations to strengthen the student’s knowledge of scientific methods. Investigations may be conducted within a variety of research areas congruent with the environmental focus of the Animal Health Science program.

AGRI-604. Research Design and Analysis Credit 3 (2-2)
Experimental designs, methods and techniques of experimentation; application of experimental design to plant and animal research; interpretation of experimental data.

ANSC-712. Nutrition and Disease Credit 3 (3-0)
The effect of altering the levels and ratios of nutrients upon health of an animal and resultant biochemical or biological processes. The effects of disease upon altered nutrient supply. Prerequisite: ANSC 611 or permission of instructor.

ANSC-713. Global Livestock Production Credit 3(2-2)
Theoretical constructs of livestock systems in different agro-ecological zones and farming systems in the US and the World. Discussion of literature and research techniques related to animal production in various systems. Economic contributions, environmental, and socio-political impact of domestic animals.
ANSC-723. Animal Physiology  Credit 3 (3-0)
An in-depth study of function and interrelationships among nervous, muscular, circulatory, respiratory, digestive, urinary and reproductive systems of laboratory and farm animals.
Prerequisite: Permission of instructor.

ANSC-771. Advanced Design of Experiments  Credit 3 (3-0)
Research designs suitable for investigation of multifactor experiments. Designs used in the agricultural sciences will be evaluated and emphasis placed on general linear models.
Prerequisite: AGRI 604 or permission of instructor.

ANSC-782. Cellular Pathobiology  Credit 3 (3-0)
Current concepts of the structure, function and pathobiology of the cell. Methodologies used to study the cell and its processes. Prerequisite: CHEM 651 or permission of instructor.

AGRI-799. Thesis Research in Agriculture & Environmental Science Credit Variable (1-6)
Research is conducted in an area of interest to the student under the guidance of a graduate faculty advisor.
## Graduate Faculty Listing

<table>
<thead>
<tr>
<th>Name</th>
<th>Rank</th>
<th>Specialty Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>John W. Allen, PhD</td>
<td>Adjunct Assistant Professor</td>
<td>Environmental Biotechnology</td>
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<tr>
<td>University of North Carolina</td>
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<tr>
<td>Doris G. Fultz, DVM</td>
<td>Associate Professor</td>
<td>Animal Anatomy</td>
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<tr>
<td>Tuskegee University</td>
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<tr>
<td>Tracy L. Hanner, DVM</td>
<td>Adjunct Assistant Professor</td>
<td>Animal Diseases</td>
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<tr>
<td>NC State University</td>
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<tr>
<td>Marion Ray McKinnie, PhD</td>
<td>Administrator and Associate Dean</td>
<td>Radioactive Tracers/Physiology</td>
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<tr>
<td>NC State University</td>
<td>Cooperative Extension</td>
<td></td>
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<tr>
<td>Radiah Corn Minor, PhD</td>
<td>Assistant Professor</td>
<td>Immunology</td>
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<td>MeHarry Medical College</td>
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<tr>
<td>Ralph C. Noble, PhD</td>
<td>Associate Professor and Chairperson</td>
<td>Reproduction Physiology/Livestock Management</td>
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<tr>
<td>University of Illinois-Champaign-Urbana</td>
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<tr>
<td>Sang Hyon Oh, PhD</td>
<td>Adjunct Assistant Professor</td>
<td>Animal Statistical Breeding</td>
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<td>NC State University</td>
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<tr>
<td>Jenora Waterman, PhD</td>
<td>Assistant Professor</td>
<td>Functional Genomics</td>
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<td>NC State University</td>
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<tr>
<td>Abraham Woldeghebriel, PhD</td>
<td>Associate Professor</td>
<td>Animal Nutrition</td>
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<td>New Mexico State University</td>
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<tr>
<td>Willie Willis, PhD</td>
<td>Professor</td>
<td>Poultry Science/Management</td>
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<tr>
<td>Colorado State University</td>
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<tr>
<td>Mulumebet Worku, PhD</td>
<td>Associate Professor</td>
<td>Biotechnologist</td>
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<tr>
<td>University of Maryland</td>
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APPENDIX

Graduate Student Forms