

COLLEGE OF AGRICULTURE AND FOOD SCIENCES

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MASTER OF SCIENCE IN AGRICULTURAL SCIENCES

Traditionally known as the land-grant arm of Florida A&M University (FAMU), the College of Agriculture and Food Sciences (CAFS) offers students majoring in agriculture sciences and engineering technology a broad spectrum of academic opportunities to continue their education and professional development. CAFS academic programs offer unique experiences for undergraduate and graduate students through incorporating aspects of teaching, research, international agriculture and business, as well as extension and community outreach.

The College of Agriculture and Food Sciences offers a MASTER OF SCIENCE DEGREE (thesis and non—thesis options) in Agricultural Sciences with concentrations in Agribusiness, Animal Science, Entomology, Food Science, Plant Science, Soil and Water Sciences, and International Programs. A minimum of thirty six (36) semester hours beyond the bachelor's degree is required for the Master of Science degree. The degree takes approximately two calendar years for its completion. The curriculum of the program is structured so that students may expand their knowledge in selected areas of agricultural sciences instead of specializing in any one field. However, the research performed by these students is specific in nature and is supervised by faculty members in their areas of expertise. Students are exposed to a full range of agricultural research problems and their management through on-campus instruction and hands-on experiential learning with the programs' faculty and off campus internships at other universities or industry partners. To ensure the success of the students in completing the degree program, each student is mentored by a four-member Thesis Supervisory Committee. The committee members guide the student's choice of core courses, electives and internships; test their problem-solving skills on a regular basis and through final oral examination. The program produces well-trained graduate students who are ready for the challenges of the changing world.

ADMISSION POLICIES

1. General

For admission into the graduate programs in the College of Agriculture and Food Sciences (CAFS), an applicant must:

- i. Have a baccalaureate or a master's degree in a related field from an accredited college or university;
- ii. Present official scores of the Graduate Record Examination (GRE) taken within the last two years. A minimum score of 1,000 points on the combined verbal and quantitative portions of the aptitude test or 300 points on the computer based GRE, or/and a minimum GPA of 3.0 (on a 4.0 scale) on the last two years of study for the baccalaureate degree or their highest awarded post-baccalaureate degree is required.
- iii. Present official copies of transcripts from all universities attended;
- iv. Have at least a GPA of 3.0 on all graduate work (Ph.D applicants);
- v. Present three letters of recommendation from someone familiar with the student's academic performance in their field of study;
- vi. Submit a one-page personal statement, discussing the student's interest in a graduate degree;
- vii. Be approved by CAFS's Graduate Admissions Committee;

2. International Students: In addition to the requirements listed above, official scores of 500 (minimum) for MS students on the Test of English as a Foreign Language (TOEFL) or a 213 on the computer based TOEFL is required for international students whose native language is not English. Students are required to purchase U.S. health insurance while at the university.

FINANCIAL ASSISTANCE

In order to obtain any financial assistance from CAFS and the School of Graduate Studies and Research, a student must maintain an overall GPA of 3.0 or better and must be a full-time student. A full credit load consists of a minimum of nine (9) hours in each of the Fall and Spring semesters and one (1) to six (6) hours in the Summer term. Continued funding of a student is contingent upon the student making satisfactory progress in the completion of his/her coursework and thesis research.

Research assistantships are available on a competitive basis. Research assistants work on externally sponsored research projects under the supervision of a faculty member. Letters of recommendation, evidence of communication skills, as well as GRE scores, are important considerations in the award of assistantships.

The assistantship awards range from \$15,000 to \$22,000 for 20-hours of work per week during

the academic year. Out-of-state tuition and matriculation fee waivers are available on a competitive basis. A student should contact the Graduate Program Coordinator for opportunities within the College and the Dean of the School of Graduate Studies and Research for possible funding at the University level.

Most assistantships are halftime and students are obligated to work 20 hours a week on whatever assignments the supervisor designates. After 18 hours of coursework, a student may be asked to work as a Teaching Assistant. Students supported by research grant funds must perform work relevant to the grant stipulations.

Additional information about the degree programs can be found at <http://www.famu.edu/> ; <http://www.famu.edu/index.cfm?graduatestudies>

REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE IN AGRICULTURAL SCIENCES: THESIS OPTION

A student must have a minimum of thirty-six (36) semester hours of graduate credit. At least twelve (12) of these must be the specified core courses, eighteen (18) in the selected area of concentration or related areas, and six (6) for the Master's Thesis, AGG 5976. A student may register for more than three hours in AGG 5976 in any one semester, only with the permission of his/her advisor and committee.

At the beginning of the first semester, the student indicates an area of concentration and begins with general coursework (AGR 5825/5827 Statistical Methods in Research I&II, AGG 5920 Colloquium, and one course from the students proposed area of concentration). The student will also seek a Major Professor and then a supervisory committee who will, in conjunction with the student finalize the student's program of study.

Any subsequent changes to the student's program must be approved by the Supervisory Committee, and filed with the Graduate Program Coordinator.

Limits for degree programs are set by the graduate school, and any requests for extension must be approved by the students Major Professor, Committee, Graduate Program Coordinator, Dean of the College, and Dean of the Graduate School.

Study for the master's degree must be completed within five years from the first semester the student registers as a graduate student.

A student may earn no more than two (2) "C"s provided that he/she maintains an overall GPA of 3.0 or better. A third grade of "C" will result in termination from the program. A required or core course with a grade of "C" must be repeated. Any grade of "D" or "F" may be grounds for dismissal from the program;

Any grade of “U” in any phase of the coursework/thesis/research/ dissertation shall require the student to be placed on probation for one semester. A second “U” grade will result in the termination of the student’s degree seeking status;

Graduation requirements include a cumulative grade point average of 3.0 or better and the successful defense of a thesis or project report. All of the above requirements must be met within 7 calendar years.

PROGRAMS OF STUDY IN AREA OF CONCENTRATION: THESIS OPTION

AGRIBUSINESS

The academic program for the Master’s of Science in Agricultural Sciences with an emphasis in Agribusiness is as follows:

I. Select the following required courses	<i>Sem. Hrs.</i>
AGG 5825/5827 Statistical Methods in Research I &II	6
AGG 5931 Professional Seminar.....	3
AGG 5920 Colloquium (repeated each semester)	0
 II. Select one of the following core courses	
AGR 5445C Advanced Plant Sciences	3
ANS 5205C Advanced Animal Production	3
SOS 5217 Soil and the Environment	3
PMA 5407C Integrated Pest Management	3
FOS 5314 Advanced Food Processing & Storage	3
 III. Select all of the following core courses	
AEB 5307 Agricultural Marketing and Finance	3
AEB 5335 Advanced Agricultural Price Analysis.....	3
AEB 5555 Econometrics.....	3
AEB 5376 Market Research and Survey	3
AEB 5185 Advanced Agricultural Production	3
 IV. AGG 5976 Master’s Thesis	6
(The candidate must complete and successfully defend an original thesis).	
 V. Approved electives, including courses in .the area of concentration	
.....	3-5
 VI. Seminars	

Total **36**

ENTOMOLOGY

The academic program for the Master's of Science in Agricultural Sciences with an emphasis in Entomology, is as follows:

I. Select the following required courses	<i>Sem. Hrs.</i>
AGG 5825/5827 Statistical Methods in Research I &II	6
AGG 5920 Colloquium (repeated each semester)	0
AGG 5931 Professional Seminar.....	3
II. Select <u>one or two</u> of the following core courses	
AGR 5185 Advanced Agricultural Production.....	3
AGR 5445C Advanced Plant Sciences	3
ANS 5205C Advanced Animal Production	3
FOS 5314 Advanced Food Processing & Storage	3
SOS 5217 Soil and the Environment	3
AGG 5537 Invasion Biology	3
BSC 5865 Conservation Biology.....	3
III. Select <u>a minimum of 15 semester hours from</u> the following core courses:	
ENY 5105C Principles of Animal Taxonomy	4
ENY 5150 Systematic Entomology	3
ENY 5355 Insect Morphology.....	4
ENY 5500 Aquatic Entomology.....	3
PMA 5407C Integrated Pest Management	3
ENY 6663 Medical Entomology.....	3
ENY 6821 Insect Pathology.....	3
ENY 5204 Insect Ecology	3
ENY 6820 Insect Molecular Genetics	3
ENY 6215 Biological Control of Weeds.....	3
ENY 6651 Insect Toxicology.....	4
IV. AGG 5976 Master's Thesis.....	6
(The candidate must complete and successfully defend an original thesis)	
V. Approved electives, including courses in the	3-5
area of concentration.	
VI. Seminars	

Total

36

FOOD SCIENCE

The academic program for the Master's of Science in Agricultural Sciences with an emphasis in Food Science, is as follows:

I. Select the following required courses *Sem. Hrs.*

AGG 5825/5827 Statistical Methods in Research I &II	6
AGG 5920 Colloquium (repeated each semester)	0
AGG 5931 Professional Seminar.....	3

II. Select one of the following core courses

AGR 5445C Advanced Plant Sciences	3
ANS 5205C Advanced Animal Production	3
SOS 5217 Soil and the Environment	3
PMA 5407C Integrated Pest Management	3
AGR 5185 Advanced Agricultural Production.....	3

III. Select a minimum of 15 semester hours from the following core courses:

FOS 5315 Advanced Food Chemistry	3
FOS 5325 Advanced Food Analysis.....	3
FOS 5930 Seminar in Food Science	1
FOS 5314 Advanced Food Processing and Storage.....	3
FOS 5226 Advanced Food Microbiology & Safety	3
FOS 5906 Directed Individual Study.....	1-6
FOS 5940 Practical Food Experience	3
FRC 5808C Enology.....	4
FOS 5245 Meat Science and Meat Research.....	4

IV. AGG 5976 Master's Thesis.....6

(The candidate must complete and successfully defend an original thesis)

V. Approved electives, including courses in the 3-5
area of concentration.

VI. Seminars

Total

36

ANIMAL SCIENCE

The academic program for the Master's of Science in Agricultural Sciences with an emphasis in Animal Science, is as follows:

I. Select the following required courses	Sem. Hrs.
AGG 5825/5827 Statistical Methods in Research I &II	6
AGG 5931 Professional Seminar.....	3
*AGG 5920 Colloquium (repeated each Semester).....	0
 II. Select <u>one</u> of the following core courses	
AGR 5185 Advanced Agricultural Production.....	3
AGR 5445C Advanced Plant Sciences	3
EVR 5063 Elements of Environmental Biology.....	4
FOS 5314 Advanced Food Processing & Storage	3
PMA 5407C Integrated Pest Management	3
SOS 5217 Soil and the Environment	3
 III. Select all of the following core courses:	
ANS 5205C Advanced Animal Production	3
ANS 5202 Monogastric Farm Animals	3
ANS 5447 Ruminant Nutrition	4
ANS 5454 Animal Science Experimentation	3
ASC 5405 Advanced Animal Nutrition	3
 IV. AGG 5976 Master's Thesis	
(The candidate must complete and successfully defend an original thesis)	
 V. Approved Electives	
3-5	
 VI. Seminars	
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Total	36

PLANT SCIENCE

The academic program for the Master's of Science in Agricultural Sciences with an emphasis in Plant Science (Viticulture and Enology, Plant Biotechnology), is as follows:

I. Select the following required courses	Sem. Hrs.
AGG 5825/5827 Statistical Methods in Research I &II	6
AGG 5931 Professional Seminar	3
AGG 5920 Colloquium (repeated each semester)	0
II. Select one of the following core courses	
ANS 5205C Advanced Animal Production	3
SOS 5217 Soil and the Environment	3
PMA 5407C Integrated Pest Management	3
AEB 5185 Advanced Agricultural Production	3
FOS 5314 Advanced Food Processing & Storage	3
III. Select all of the following core courses:	
AGR 5322 Plant Breeding	3
AGR 5445C Advanced Plant Science.....	3
AGR 5616 Seed Science and Technology	3
BOT 5506 Advanced Plant Physiology	3
BOT 5937 Selected Topics in Plant Biotechnology	3
IV. AGG 5976 Master's Thesis	6
(The candidate must complete and successfully defend an original thesis)	
V. Approved electives including courses in the area of concentration or related areas	3-5
VI. Seminars	

Total

36

SOIL AND WATER SCIENCE

The academic program for the Master's of Science in Agricultural Sciences with an emphasis in Soil and Water Science is as follows:

I. Select the following required courses	Sem. Hrs.
AGG 5825/5827 Statistical Methods in Research I &2.....	6
AGG 5931 Professional Seminar	3
AGG 5920 Colloquium (repeated each semester)	0

II. Select one of the following core courses	
CHS 5610 Environmental Chemistry	3
EVR 5260 Sources and Control of Environmental Pollution	3
ENY 5500 Aquatic Entomology	3
AGG 5330 Advanced GIS	3

III. Select a minimum of 15 credit hours from the following core courses:

AGR 5445C Advanced Plant Science	3
SWS 5217 Soil and the Environment	3
SWS XXXX Hydrology and Watershed Management	3
AGG 5930 Special Topics in SWS (Cli Chg., Irrigat.& Water Cons).....	3
SWS 5305 Soil Microbiology	3
SWS 5405C Soil Chemistry	3

IV. AGG 5976 Master's Thesis	6
(The candidate must complete and successfully defend an original thesis)	

V. Approved electives including courses in the area of concentration or related areas	3-5
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VI. Seminars

Total	36
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REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE IN AGRICULTURAL SCIENCES: NON-THESIS OPTION

The non-thesis option differs from the existing Master of Science degree program by replacing the six (6) hours of thesis with a research project and two directed electives and administering written and oral comprehensive exit exams designed and administered by the student's graduate committee. The replacement courses will not include supervised research or thesis and will be selected by the student with the approval of their graduate committee and the Graduate Coordinator. These additional courses will permit students to further focus their graduate training in specialties they and their committee believe are important to their professional development. The only exception to this is that students will be required to take one (1) hour of supervised research in their final semester of enrollment for the expressed purpose of taking their written and oral exit exams. The exit exam will permit the committee to assess the student's overall level of professional competency and assure that graduates leave the program with a consistent level of proficiency. At the discretion of the student's graduate committee and the Graduate Coordinator, the written and oral exit exams could include a multiple-semester research project designed to allow students following the non-thesis option an opportunity to conduct applied research.

Number of Credits Required

The non-thesis track requires additional course offerings. Instead, the present requirement of six (6) hours of thesis is replaced with two additional directed electives selected by the student and approved by the student's Supervisory Committee and the Graduate Coordinator.

The Master of Science Non-Thesis includes concentrations in Agribusiness, Animal Science, Entomology, Food Science, Soil and Water Science and Plant Science. Candidates are required to successfully complete at least thirty-six (36) semester hours including the six (6) hours of course work and a research project, MS candidates in all concentrations are required to take AGR 5825 (Fundamentals of Research Design) or Statistical Methods in Research 1 and 2, AGG 5931 (Professional Seminar) and AGG 5920 (Colloquium) and three (3) to five (5) courses (varying by concentration) in their major field of study and several electives approved by their Supervisory Committee. A minimum GPA of 3.0 is required to remain in the graduate program.

Exit Seminar and Final Examination

The students must give an exit seminar and pass a final examination administered by the Supervisory Committee. The exam has both written and oral components and each member of the committee participates in both exams. The oral portion of the exam is administered by the student's full committee. The Graduate Coordinator and a representative of the Graduate Council with questioning and voting privileges must participate in the oral exam. The examination cannot be taken earlier than the term before the degree is to be awarded.

Exit E-mail to Associate Dean

All students must either send an e-mail to the Associate Dean (copied to the Graduate Coordinator) with a short statement of the quality of her /his experience as a student in the College and information regarding plans for the immediate future regarding employment (Academia or Industry) or continued education.

Financial Assistance

Students enrolled in the Master of Science degree program with Non-thesis option are not eligible for financial assistance (tuition waiver and assistantship).

Students who are already enrolled in the Master of Science degree program with thesis option, but switch to a non-thesis option will immediately become ineligible for financial assistance.

PROGRAMS OF STUDY IN AREA OF CONCENTRATION: NON-THESIS OPTION

The following courses are required by all concentrations:

	Hours
a. AGG 5825 and AGG 5827 Statistical Methods in Research 1 and 2	6
b. AGG 5931 Professional Seminar	3
c. AGG 5920 Colloquium (repeated)	<u>0</u>
Total	7-9

AGRIBUSINESS

i. Select one of the following courses	
a. AGR 5442 Advanced Plant Sciences	3
b. ANS 5205C Advanced Animal Production	3
c. SOS 5217 Soil and the Environment	3
d. PMA 5407C Integrated Pest Management	3
e. FOS 5314 Advanced Food Processing & Sto.	3
ii. Core classes	
a. AEB 5307 Agricultural Marketing and Fin.	3
b. AEB 5335 Advanced Agricultural Price Anal.	3
c. AEB 5555 Econometrics	3
d. AEB 5375 Market Research and Survey	3
e. AEB 5185 Advanced Ag. Production	3
iii. Approved electives in concentration:	11
iv. Graduate exit exam (Supervised Research)	<u>1</u>
Total	37-39

FOOD SCIENCE

i. Select one of the following courses	
a. AGR 5442 Advanced Plant Sciences	3
b. ANS 5205C Advanced Animal Production	3
c. SOS 5217 Soil and the Environment	3
d. PMA 5407C Integrated Pest Management	3
e. FOS 5314 Advanced Food Processing & Sto.	3
ii. Core classes (select a minimum of 15 hours)	
a. FOS 5314 Adv. Food Processing & Storage	3
b. FOS 5315 Adv. Food Chemistry	3
c. FOS 5325 Adv. Food Analysis	3
d. FOS 5930 Seminars in Food Science	3
e. FOS 5226 Adv. Food Microbiology & Safety	3
f. FOS 5906 Directed Individual Study	1 - 6
g. FOS 5940 Practical Food Experience	3
h. FRC 5808C Enology	4
i. FOS 5245 Meat Science and Meat Research	4
iii. Approved electives in concentration:	11
iv. Graduate exit exam (Supervised Research)	<u>1</u>
Total	37-39

PLANT SCIENCE

i. Select one of the following courses	
a. AGR 5442 Advanced Plant Sciences	3
b. ANS 5205C Advanced Animal Production	3
c. SOS 5217 Soil and the Environment	3
d. PMA 5407C Integrated Pest Management	3
e. FOS 5314 Advanced Food Processing & Sto.	3
ii. Core classes	
a. AGR 5322 Plant Breeding	3
b. AGR 5445C Advanced Plant Science	3
c. ARG 5616 Seed Science and Technology	3
d. BOT 5506 Advanced Plant Physiology	3
e. BOT 5937 Selected Topics in Plant Biotech.	3
iii. Approved electives in concentration:	11
iv. Graduate exit exam (Supervised Research)	<u>1</u>
Total	37-39

ANIMAL SCIENCE

i. Select one of the following courses	
a. AGR 5442 Advanced Plant Sciences	3
b. AEB 5185 Advanced Agricultural Production	3
c. EVR 5063 Elements of Environmental Bio.	3
d. SOS 5217 Soil and the Environment	3
e. PMA 5407C Integrated Pest Management	3
f. FOS 5314 Advanced Food Processing & Sto.	3
ii. Core classes	
a. ANS 5202 Monogastric Farm Animals	3
b. ANS 5202C Advanced Animal Production	3
c. ANS 5447 Ruminant Nutrition	3
d. ANS 5454 Animal Science Exp.	3
e. ANS 5446 Advanced Animal Nutrition	3
iii. Approved electives in concentration:	11
iv. Graduate exit exam (Supervised Research)	<u>1</u>
Total	37-39

ENTOMOLOGY

i. Core courses	
a. ENY 5155C Systematic Entomology	3
b. ENY 5355 Insect Morphology	3
c. ENY 5204 Insect Ecology	3
d. ENY 5407 Integrated Pest Management	3
e. ENY 6821 Insect Pathology	3
ii. Select one of the following courses.	
a. AGR 5185 Advanced Agriculture Prod.	3
b. AGR 5445C Advanced Plant Sciences	3
c. ANS 5205C Advanced Animal Production	3
d. FOS 5314 Advanced Food Processing & Sto.	3
e. SOS 5217 Soil and the Environment	3
f. BOT 5937 Selected Topics in Plant Biotech.	3
iii. Approved electives in concentration:	11
iv. Graduate exit exam (Supervised Research)	<u>1</u>
Total	37-39

GRADUATE COURSE DESCRIPTIONS

AEB 5185 Advanced Agricultural Production (3) Prereq: Basic knowledge of differential and integral calculus. Emphasis on production theory and the theory of the firm, Technical aspects of agricultural production dealing with input-output input-input, output-output production cost, etc.

AEB 5307 Agricultural Marketing and Finance (3) Application of concepts and theories to facilitate financial analysis of agricultural production; capital theory and investment analysis; risk theory and portfolio analysis. Liquidity management; policy issues in agricultural financial marketing concepts, strategies, management and organizational requirements of marketing agriculture products. By permission only.

AEB 5335 Advanced Agricultural Price Analysis (3) Application of economic theory and statistical techniques to study price determination and methods used to analyze factors affecting agricultural prices; analysis of agricultural prices movements with respect to time, space and form; and examination of empirical and analytical methods used in price forecasting and techniques of time series analysis. By permission only.

AEB 5375 Market Research and Survey Sampling (3) Prereq: An introductory statistics course. Marketing research methods used to evaluate market potential, problems and marketing decisions. Course includes sampling techniques of data collection and analysis. Selected nonparametric statistical techniques used to illustrate research methods and statistical inference of market data. By permission only.

AEB 5555 Econometrics (3) Application of economic and a linear algebra course. Emphasis on social and behavioral sciences research problems. Empirical research methods in estimating the basic linear model and hypothesis testing, statistical inference and problems involved in regression analysis and extensions of the general linear model. By permission only.

AGG 5825 Fundamentals of Research Design (4) Prereq: An introductory statistics course and a linear algebra course. Probability theory, random variables and sampling distribution, experimental design and analysis of variance, survey techniques, regression analysis, and nonparametric statistics. Permission of Graduate Program Coordinator.

AGG 5900 Directed Individual Study (1-4) Independent study or research under the supervision by faculty members. May be repeated up to a maximum of six hours. By permission only.

AGG 5910 Supervised Research (1-3) Students collect and analyze data on particular subject, under the supervision of a member of the area staff (not to exceed 6 semester hours). By permission only.

AGG 5920 Colloquium (0)

AGG 5930 Special Topics in Agricultural Science (1-4) Topics in agricultural sciences showing an interrelationship between subject matter areas. Content and credit may vary. May be repeated up to a maximum of six semester hours. By permission only.

AGG 5931 Professional Seminar (3) This course is designed to prepare students to understand and evaluate scientific research and provide the opportunity for them to plan and conduct research with the guidance of other professionals in the field.

AGG 5976 Master's Thesis (1-9) The student selects a topic in consultation with his advisor, collects data, writes and defends a thesis. By permission only.

AGR 5234 Forage Crops (4) Detailed study and agronomic characteristics of tropical and temperate improved and rangeland forage species; function and use of improved pastures and natural grassland in animal production systems.

AGR 5322 Plant Breeding (4) Plant improvement, methodologies for breeding fielding crops and horticultural crops will be discussed; cultivar development and multiplication of asexually propagated crop species, new plant breeding techniques such as plant cell selection, applications of haploidy and genetic engineering.

AGR 5442 Advanced Plant Sciences (3) Physiological processes associated with crops and crop production. Factors influencing crop yield potentials. Influence of environmental factors on photosynthesis, water movement, fruit set and yields.

AGR 5616 Seed Science and Technology (3) Examination of basic metabolic process related to seed development, maturation, dormancy and germination. Post-harvest processing, curing and storage of seeds, and its effects on seed quality. Principles and practices in pure seed production and crop and weed seed identification. Laboratory methods in seed testing, certification, laws for marketing seeds. By permission only.

ANS 5202 Monogastric Farm Animals (3) Prereq: ANS 3006. A comprehensive study of monogastric animals on the farm, mainly swine and equine as related to breed, reproduction, feeds and nutrition, production, health and sanitation, management, and marketing.

ANS 5205C Advanced Animal Production (3) Prereq: ANS 3006. Survey of the latest systems of production and the use of modern technology in breeding, feeding and managing meat animals, emphasis will be on the anatomical and physiological systems of the animal and their relationships to efficient livestock production.

ANS 5446 Advanced Animal Nutrition (3) Prereq: ANS 4445. The thrust of this course is to integrate the physiology and biochemistry of protein, carbohydrate, lipid, vitamin and mineral metabolism in the whole animal.

ANS 5447 Ruminant Nutrition (3) Prereq: ANS 4445. Physiological and microbiology of ruminant digestion, biochemical process in the utilization of absorbed nutrients and the manipulation of biochemical processes to improve/enhance animal productivity.

ANS 5454 Animal Science Experimentation (3) Prereq: ANS 3006; ANS 4445. Discussion and application of laboratory procedures frequently used in nutrition and physiology research. Introduce students to various analytical procedures including analysis, surgery, collection and handling of blood and tissues and hormones/enzymes measurements. By permission only.

BOT 5506 Advanced Plant Physiology (3) Prereq: Plant Physiology, Organic Chemistry (two semesters), This course focuses on a detailed investigation of plant hormones including biological and chemical essays. Biosynthesis, metabolism, and physiological effects of plant hormones, Nitrogen asphyxiation, nutrient translocation, juvenility, photoperiodism, vernalization, germination and dormancy will be covered.

BOT 5604 Advanced Plant Ecology (3) A study of the environmental conditions controlling plant growth, response of plants to their habitat, a study of the climatic, physiographic, edaphic, and historic factors of the environment in relation to plant growth.

BOT 5937 Selected Topics In Plant Biotechnology (3) Prereq: A basic knowledge of plant biology. Advanced plant and cell culture, using plant tissue and culture for crop improvement, genetic transformation, plant genome organization, structure and properties of DNA. Recombinant DNA procedures and associated methods; plant genome mapping, genome mapping and gene mapping and breeding.

ENY 5101C. Principles of Animal Taxonomy (4) Prereq: ENY 4004. Advanced study of elements of classification and phylogeny, taxonomic writing and International Code of Zoological Nomenclature.

ENY 5150 Systematic Entomology (3) Prereq: General Entomology. Recognition of all major families of insects in North America. Laboratory class featuring microscopic study of specimens.

ENY 5355 Insect Morphology (4) Prereq: ENY 3004. Comprehensive study of the external and internal anatomy of the major groups of insects, with some considerations of physiology.

ENY 5500 Aquatic Entomology (3) Prereq: General Entomology. Taxonomy and the adaptations of major orders of aquatic insects. Ecology and biological role of aquatic insects in freshwater ecosystem. Their role as a bioassessment tool for evaluation freshwater quality, By permission of Graduate Program Coordinator.

ENY 6215 Biological Control of Weeds (3). Prereq: ENY 3004 or consent of instructor. Students are encouraged to have taken insect ecology and insect classification. Principles of biological control of weeds will be presented, and examples of terrestrial and aquatic weeds with their biological control agents will be discussed. Invertebrate agents will be emphasized, but vertebrates and pathogens also will be discussed. A term paper will be assigned for completion during the semester, and a one hour seminar will be required on the same topic. There will be one or more field trips to biological control facilities in Florida.

ENY 6663 Medical Entomology (3). Prereq.: General Entomology. Theory, methodology and elucidation of pests of public health importance; biology, identification and pest management or medically important arthropod pests.

EVR 5063 Elements of Environmental Biology (4) Prereq: BSC 1011 or equivalent. Aspects of environmental biology at the biochemical and cellular level. Selected topics in cell structure and function, biochemistry, kinetics, genetics at the molecular chromosomal levels, embryology, blood and its function as well as coverage of green plant biology. Finally aspects of integration between plants, animals, and the environment will be presented. Lectures and laboratory.

FOS 5226 Advanced food Microbiology and Safety (3) Prereq: FOS 4222C. Food production, spoilage, preservation, sanitation and poisoning. Bioprocessing, public health significance, safety aspects related to food production and safety. Current literature reviews on topical issues in these areas. By permission only.

FOS 5245 Meat Science and Meat Processing (4) Physical and chemical characteristics of meat and meat products, meat processing methods, and testing and identification. By permission only.

FOS 5314 Advanced Food Processing and Storage (3) Prereq: FOS 4311. Study of and justification of food processing methods used in preservation of major food commodities. Principles of all the different methods with laboratory demonstration. Relationship of these methods to “future foods”. By permission only.

FOS 5315 Advanced Food chemistry (3) Prereq: FOS 4311. In this class the focus of discussion will be the chemical composition of foods as related to food properties and function. Reaction mechanisms, interrelationships, and chemical processes affecting food quality from raw to processed states. By permission only.

FOS 5325 Advanced Food Analysis (3) Prereq: FOS 4321 C. Advanced application of physical and chemical analytical methods for the quantitative determination of various food constituents and additives. Fundamental concepts underlying food analysis and comparison and justification of research methodologies. By permission only.

FOS 5906 Directed Individual Study (1-6) Individual study or research in food science under

the supervision of faculty member. By permission only.

FOS 5930 Seminars in Food Science (1) Discussion of high priority food research areas which includes extensive library research, critical evaluation and class presentation. By permission only.

FOS 5940 Practical Food Experience (3) Supervised attachments at various food institutions in the research areas primarily. Student gets an exposure to equipment, methodologies and production principles. By permission only.

FRC 5805C Viticulture (4) Introduces the students to the art and science of grape growing. The history of grape production and utilization, is discussed with emphasis on North American and Florida grapes. A comprehensive survey of modern grape production practices is augmented with discussions of grapevine development, morphology and physiology of flowering and fruit maturation. Field experience in vineyard management will be provided. By permission only.

FRC 5808C Enology (4) Introduces the student to the origin and practices of enology, yeast fermentations and fruit processing. The course includes discussions on the chemistry of fermentation reactions, compositional evaluations, utilization and preservation of fermented beverages. Principles and products as related to grape cultivars used, and vinification technology employed. Use of Southeastern grapes is highlighted. By permission only.

HUN 5249 Advanced Human Nutrition (3) Prereq: HUN 2401 or FOS 3042. Topical issues in human nutrition research and relationships to food science.

PMA 5407c Integrated Pest Management (3) Prereq: General Entomology. An introduction to integrated pest management (IPM) dealing with theoretical and applied aspects of modern pest control strategies. The course consists of lectures and is divided into four sections. History of pest control and philosophy of IPM, modern pest control strategies, case histories of IPM programs. By permission only.

SOS 5217 Soil and the Environment (3) Prereq: Undergraduate physical sciences, mathematics, and basic soil sciences. Interpretation of soil chemical, physical, morphological and biological properties; information extraction from published soil survey data; laboratory analyses and testing of soils; soil classification and engineering applications; agricultural land classifications; soils and water conservation; and sustainable agroecosystems.

SOS 5305 Soil Microbiology (3) Prereq: General Chemistry, General Soils. The course contains the following topics: Soil Microbial Population, Decomposition of Organic Matter, Degradation of Pesticides and Other Chemicals in Soil, Nitrogen Fixation, Nitrogen Cycle, Microbial Population and Soil Fertility, and Biochemical Processes in Soil. By permission only.

SOS 5405C Soil Chemistry (3) Prereq: General Chemistry, General Soils, The inorganic and organic constituents of soils, The chemical and electrochemical phenomena in soil. By

DOCTOR OF PHILOSOPHY IN ENTOMOLOGY (IN COOPERATION WITH THE UNIVERSITY OF FLORIDA)

Florida is unique as it is the only state having 1862 and 1890 Land- Grant Universities with established entomology programs, and Florida A&M University is the only Historically Black Land-Grant University that offers a B.S. and MS. degree in entomology. Cooperation between the two Universities in developing this innovative minority program represents a historic achievement in the profession of entomology and a landmark in higher education for both

Universities. The cooperative Ph.D. in entomology has received strong support from a number of state and national societies, government agencies and industrial leaders.

Professors at Florida A&M University offer a broad spectrum of aquatic, agricultural, medical and veterinary entomology courses in Tallahassee and the research laboratories on the main campus at the Center for Biological Control, and at the Center for Air and Water Quality are available for thesis research. Graduate students can take course work at both universities depending on their interests and their major professor can be any regular faculty member at either university. Scholarships and assistantships are available for qualified students.

ADMISSION POLICIES

1. General

For admission into the graduate program in the College of Agriculture and Food Sciences (CAFS) at Florida A&M University, and the Department of Entomology and Nematology at the University of Florida, an applicant must:

viii. Have a baccalaureate or a master's degree in a related field from an accredited college or university;

ix. Present official scores of the Graduate Record Examination (GRE) taken within the last two years.

. For admission to the Ph.D. degree program, a minimum score of 1,000 points on the combined verbal and quantitative portions of the aptitude test or 300 points on the computer based GRE, and a minimum GPA of 3.0 (on a 4.0 scale) on the last two years of study for the baccalaureate degree or their highest awarded post-baccalaureate degree is required;

x. Present official copies of transcripts from all universities attended;

xi. Have at least a GPA of 3.0 on all graduate work;

xii. Present three letters of recommendation from someone familiar with the student's academic performance in their field of study;

xiii. Submit a one-page personal statement, discussing the student's interest in a graduate degree;

7. The student must have a major professor prior to being admitted for graduate studies.

2. International Students: In addition to the requirements listed above, official scores of 500 (minimum) for MS students or 550 (minimum) for Ph.D students on the Test of English as a Foreign Language (TOEFL) or a 213 on the computer based TOEFL is required for international students whose native language is not English. Students are required to purchase U.S. health insurance while at the university.

A minimum of 90 semester credits beyond the B.S. degree is required to obtain the cooperative Ph.D. degree. A maximum of 30 graduate credits may be transferred into a cooperative Ph.D. program from other universities. If a minor is taken, at least 12 credits in the minor subject are required, all of which must be courses 5000 and above. If two minors are taken, at least eight credits in each are required. It is policy that all cooperative Ph.D. students will take statistics through at least a beginning graduate course (STA 6166 or equivalent) and at least a beginning biochemistry course at the undergraduate level. Doctoral students will be held responsible for a broad range of basic knowledge in their discipline. The qualifying examination includes questions on morphology, physiology, taxonomy, ecology and applied entomology. Further information can be obtained from the Coordinator for the Cooperative Ph.D. in Entomology, Florida A&M University, Tallahassee, Florida 32307, Telephone (850) 599-8725, Fax (850) 599-8854.

GRADUATE COURSE DESCRIPTIONS

ENY 6135 Taxonomy of the Major Orders of Holometabola (4) Prereq: General Entomology. Identification of families of orders Coleoptera, diptera, Hymenoptera, and Lepidoptera; field trapping techniques, and common holometabolous families in North Florid ecosystems.

ENY 6166 Principles of Animal Taxonomy (3) Prereq: General Entomology or Biology. Principles involved in taxonomy and classification of animals; modern systematic techniques.

ENY 6215 Biological Control of Weeds (3) Prereq: General Entomology. Principles of biological control of weeds. Examples of terrestrial and aquatic weeds currently being treated or under study for treatment with biological control agents. Invertebrate agents will be emphasized and vertebrates and pathogens will be discussed. A term paper and a one-hour seminar on the topic are required. One or more field trips to biological control facilities in Florida.

ENY 6505 Aquatic Entomology (3) Prereq: General Entomology or Invertebrate Zoology. Abundance, diversity and function of aquatic insects in freshwater ecosystems; general ecology, biology, and taxonomy of major aquatic insect orders.

ENY 6507 Ecology of Freshwaters (3) Prereq: General Ecology Physical and chemical nature of freshwaters and their relationships to aquatic insects and other macroinvertebrates.

ENY 6508 Biological Monitoring of Freshwater Ecosystems (3) Prereq: Invertebrate Zoology, General Ecology, or General Entomology. Biomonitoring strategies for evaluating the health of freshwater ecosystems; importance of benthic macroinvertebrates as indicators of water quality.

ENY 6595 Mosquito Biology and Control (4) Prereq: General Entomology and/or Medical Entomology. Economic imrtance and taxonomy of mosquitoes with emphasis on state and municipal regulations and methods for mosquito control and arthropod-borne disease abatement.

ENY 6663 Medical Entomology (3) Prereq: General Entomology. Identification, biology, disease epidemiology and control of arthropods affecting human health.

ENY 6664 Veterinary Entomology (3) Prereq: General Entomology. Various disease relationships, biology and control of arthropods affecting the health of domestic animals.

ENY 6665 Integrated Pest Management for Public Health (3) Prereq: General Entomology, General Ecology. Introduction to methods of public health pest control using chemical and nonchemical techniques. Review of various types of public health abatement practices and how they may be integrated to manage pests in an efficacious and environmentally sound manner.

ENY 6814 Entomology Seminar (1). How to prepare and present scientific information to others.

ENY 6815 Biometry and Experimental Design in Entomology (3) Prereq: General Entomology and a basic course in Statistics. In-depth survey and philosophy of experimental design through the use of entomological examples as models,

ENY 7979 Advanced Research (1-9). Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not open to students who have been admitted to candidacy.

ENY 7980 Research for Doctoral Dissertation (1-15). Research for doctoral students who have received admission to candidacy.

FACULTY

Anderson, Lee E., Professor (Ph.D., University of Florida); Monogastric Nutrition (Vitamin E), Reproductive Physiology, Animal Production.

Bloem, Kenneth, Adjunct Associate Professor (Ph.D., University of California-Davis); Sterile Insect Technique, Insect Rearing and Biological Control of Invasive Pests.

Bloem, Stephanie, Adjunct Associate Professor (Ph.D., University of California-Davis); Sterile Insect Technique, Taxonomy, Systematics, Insect Rearing, Area-Wide Pest Management, Biological Control.

Colova-Tsolova, Violeta, Professor (Ph.D. Institute of Genetic Engineering, Bulgaria); Cell Biology, Embryology, Plant Biotechnology, Plant Genetics and Breeding, Viticulture.

Duke Edwin, Associate Professor (Ph.D. University of Florida); Ornamental Horticulture.

Flowers, Ralph W., Professor Emeritus (Ph.D., University of Wisconsin); Water Quality, Aquatic Insects and Taxonomy of Chrysomelidae (Leaf Beetles).

Gardner, Cassel S., Professor (Ph.D., University of Florida); Alternative and Sustainable Agriculture Practices and their Interaction with the Environment, Nutrient Management and Water Quality.

Gitau, Margaret, Assistant Professor (Ph.D., Purdue University); Biological and Agricultural Engineering.

Hight, Stephen, Adjunct Professor (Ph.D., University of Maryland); Biological Control of Invasive Weeds.

Hsieh, Yuch P., Professor (Ph.D., Rutgers University); Organic Matter Dynamics and Nutrient Cycling, Sulfur Geochemistry, Bioremediation of Heavy Metals and Organic Pollutants

James, Neil A., Professor (Ph.D., University of Leeds, England); Nutritional Evaluation of Food Processing, Convenience Food Development, Quality Changes in Meat Products.

Kanga, H.B. Lambert, Professor (Ph.D. Texas A&M University); Insect Toxicology, Insect Pathology, Biological Control, Insecticide Resistance Management.

Keawin, Sarjeant. Assistant Professor (Ph.D., University of Florida). Nutrition and Animal Production.

Legaspi, Jesusa, Adjunct Professor (Ph.D. Purdue University); Biological Control and Integrated Pest Management (IPM) of Insect Pests of Vegetables.

Leong, Stephen, Professor (Ph.D., Louisiana State University); Agricultural Economics, Farm Management, Market Analysis, Experimental Design and Data Analysis.

Lorenzo, Alfredo B., Professor (Ph.D., Louisiana State University); Forestry and Natural Resource Management and Economics, Urban Forestry, Wildland Resources Science

Mbuya, Odemari, Professor (Ph.D., University of Florida); Nutrient Management, Water Quality, Phytoremediation, Computer Simulation Modeling and Remote Sensing.

Milla, Katherine, Professor, (Ph.D., Florida State University); Geology, GIS and Remote Sensing.

Muchovej James, Professor (Ph.D., Virginia Tech); Plant Pathology, Plant Physiology, Taxonomy of Fungi.

Musingo, Mitwe, Professor (Ph.D. University of Florida): Food Science. Fruit and Vegetable Processing with Emphasis on Juice and Wine Processing.

Olorunnipa, Zacch, Professor (Ph.D., University of Illinois); Agricultural Economics, Agricultural Marketing, International Agricultural Development, Agribusiness Management.

Onokpise, Oghenekome, Professor (Ph.D., Iowa State University); Tree Breeding and Forest Genetics; Crop Breeding, Biotechnology, Agroforestry, Plant Sciences, International Development in Agriculture, Forestry and Natural Resources.

Pescador, Manuel L., Professor Emeritus (Ph.D., Florida State University); Systematics, Ecology and Biodiversity of Aquatic Insects; Bioassessment of Water Quality.

Phills, Bobby R., Professor (Ph.D., Louisiana State University); Horticulture/Plant Breeding; Plant Breeding and Genetics/Veg. Crop.

Sheikh, Mehboob B., Professor (Ph.D., University of Oklahoma); Molecular Biology and Biochemistry of Legume Seeds, particularly Peanuts, Aflatoxin Resistance and Improving Nutritional Quality.

Taylor, Robert W., Professor (Ph.D., Michigan State University East Lansing); Soil and Environmental Chemistry, Heavy Metal and Nutrient Interactions with Soil Surfaces.

Thomas, Michael, Professor (Ph.D., Ohio State University); Agricultural Economics, Environment Resource Economics.

Thomas, Verian D., Professor (Ph.D., University of Leeds, England); Food Chemistry, Food Processing: Nutrient Composition of Ethnic Foods.

Solis, Daniel., Assistant Professor (Ph.D.; University of Connecticut); Agricultural Production, Climate Economics, and Environmental Economics.