

# GRADUATE PROGRAM SCHOOL OF AGRICULTURE AND CONSUMER SCIENCES

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DEPARTMENT OF AGRICULTURAL SCIENCES  
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## **CERTIFICATE: APPLIED GEOSPATIAL INFORMATION SYSTEMS**

### **MAJOR: AGRICULTURAL SCIENCES**

**DEGREE: MASTER OF SCIENCE (M.S.)**

**OPTIONS: Thesis, Non-Thesis**

**CONCENTRATIONS:**

**I. Agribusiness**

**II. Agricultural Education**

**III. Animal Science**

**IV. Plant Science**

### **MAJOR: BIOLOGICAL SCIENCE**

**DEGREE: DOCTOR OF PHILOSOPHY (Ph.D.)**

## **OBJECTIVES**

The program in Agricultural Sciences is designed to:

1. Prepare research scholars in the increasingly complex scientific field of agriculture.
2. Prepare scholars for rewarding careers in government and the agricultural industry.
3. Prepare scholars for leadership roles in professional agriculture.
4. Prepare scholars for further training in doctoral programs.
5. Provide advanced training in agricultural education for graduates working in secondary schools and vocational agriculture.

The Graduate Certificate in Applied Geospatial Information Systems (GIS) is an online stand-alone credential designed for degree-holding individuals who wish to develop their knowledge and skills in GIS for enhancement of their professional careers. The program will prepare individuals to meet the rapidly increasing need for graduates highly qualified in the application and use of GIS. Certificate courses are designed and taught with a practical, applied orientation. The Certificate program requires the completion of six courses (18 semester credit hours) in GIS and Global Positioning Systems (GPS), and can be completed by a part-time student within twelve months. The Master of Science in Agricultural Sciences is offered with four concentrations: Agribusiness, Agricultural Education, Animal Science, and Plant Science.

The degree requires a minimum of

twenty-six (26) credit hours of course work and a thesis of four (4) credit hours. The candidate for the degree must complete twelve (12) credit hours of core courses: AGSC 5060, AGSC 5110, AGSC 5120, AGSC 5610-5620; twelve (12)

credit hours minimum of required courses in the selected concentration; and six (6) hours maximum of electives. These courses must be approved by the advisor and department head. The Ph.D. in Biological Science is an interdepartmental degree program offered by the Department of Biological Sciences in the College of Arts and Sciences and the Department of Agricultural Sciences in the School of Agriculture and Consumer Sciences. Admissions procedures for the Ph.D. program are outlined under the Department of Biological Sciences. The major advisor will be appointed by the department offering the student's primary emphasis. Course descriptions are listed under the respective departments.

## **CERTIFICATE: APPLIED GEOSPATIAL INFORMATION SYSTEMS**

### **Admission Process**

Applicants for the Certificate must hold a baccalaureate degree from an accredited institution of higher education and must meet the Graduate School requirements for non-degree admission and retention as published in the University catalog. Requests for application forms and materials should be directed to the School of Graduate Studies and Research.

### **Certificate Requirements**

To earn the Graduate Certificate in Applied Geospatial Information Systems, students must satisfactorily complete the following courses:

AGSC 6510 Advanced Geospatial Information Systems 3

AGSC 6520 Advanced Spatial Analysis 3

AGSC 6530 Advanced Geospatial Metadata 3

AGSC 6540 Advanced Spatial Database Design and Management 3

AGSC 6550 Advanced Geospatial Information Systems Application and Design 3

AGSC 6560 Advanced Global Positioning Systems 3

The Certificate is awarded upon the successful completion of the six courses (18 semester credit hours).

## **MAJOR: AGRICULTURAL SCIENCES**

### **DEGREE: MASTER OF SCIENCE (M.S.)**

#### **OPTIONS: Thesis, Non-Thesis**

#### **CONCENTRATIONS: Agribusiness, Agricultural Education, Animal Science, Plant Science**

#### **Admission Requirements: M.S. Program**

Candidates must have the equivalent of the bachelor's degree with a major in one of the Agricultural Sciences and a minimum quality grade point average of 2.50 on a 4.00 point scale and a minimum score of 870 on the GRE (verbal and quantitative, or verbal, quantitative and subject), or 370 on the MAT for unconditional admission. An applicant with a bachelor's degree in areas other than the Agricultural Sciences may be recommended to the Graduate School for conditional admission and be required to take eighteen (18) credit hours of undergraduate prerequisite courses in the Agricultural disciplines: 6 hours from Animal Science, 6 from Plant Science and 6 from Agribusiness, or Agricultural Education. An applicant may also be recommended for conditional admission if he or she has a 2.25-2.49 GPA and a minimum pre-admission test score of 935 on the GRE or 383 on the MAT or 2.00-2.24 GPA and a minimum pre-admission test score of 1000 on the GRE or 394 on the MAT.

#### **Program of Study/Admission to Candidacy: M.S. Program**

The degree candidate must file a program of study after completing at least nine semester hours of graduate credit, but before completing fifteen hours of graduate credit. The program lists the courses which will be used to satisfy degree requirements, as well as detailing how other requirements will be met. The student may later change the program of study with the written approval of the Department and the Graduate School. When the candidate files the program of study, he or she must also apply for admission to candidacy. The candidate must have a grade point average of 3.0 or above to be eligible for admission to candidacy.

#### **Degree Requirements: M.S. Program Thesis**

Each student must pass Research Methods (AGSC 5110), must have a thesis guidance committee appointed, and must be advanced to candidacy before enrolling in Thesis Writing (AGSC 5120). The candidate must submit a thesis on a topic approved by the major advisor. Upon completion of the thesis, the candidate must satisfactorily pass an oral examination conducted by the Thesis Examination Committee.

## **Non-Thesis**

The option is for students who would like to focus on training in specialized areas to meet the needs of employers in agricultural product processing, marketing organizations, input supply firms, teaching, agricultural extension services, and various state and federal government agencies. This program is not recommended for students who have any aspirations toward pursuing a Ph.D. Students choosing the non-thesis option will be required to take a minimum of 35 hours of course work which will include AGSC 5350 Independent Study of Contemporary Issues and Problems.

## **Comprehensive Examination**

Upon completion of AGSC 5350 and during the semester of graduation, students choosing the non-thesis option must take a comprehensive written and oral examination administered by the student's advisory committee and other faculty members representing appropriate subject matter areas. The student's major advisor will serve as chairperson of the committee conducting the examination. If a student fails the comprehensive examination, one retake will be allowed. Should the student again fail, a third and final examination may be taken upon completion of additional course work (minimum of 6 hrs) to be selected by the student's advisory committee.

## **PROGRAMS OF STUDY**

### **Core Courses, All Concentrations—Thesis 12 hrs, or Non-Thesis 11 hrs.**

AGSC 5060 Statistics for Res.Workers 3  
AGSC 5110 Research Methods 3  
AGSC 5120 Thesis Writing 4  
or AGSC 5350 Independent Study 3  
AGSC 5610-5620 Seminar 1,1

### **CONCENTRATION I: AGRIBUSINESS**

#### **REQUIRED COURSES—12 HRS. MINIMUM, THESIS OR 15 HRS. MINIMUM NON-THESIS**

AGSC 5080 Agribusiness Management and Market Analysis 3  
AGSC 5090 Food and Fiber Industry Economics and Policy 3  
AGSC 5100 Environmental, Resource Economics and Management 3  
AGSC 5300 Decision-Making in Agribusiness Quantitative Appl. 3  
AGSC 5310 International Agricultural Trade and Marketing 3  
AGSC 5330 Agribusiness Strategy 3

#### **Electives—6 hrs. maximum, Thesis or 9 hrs. maximum, Non-Thesis with the approval of the advisor and department head.**

BISE 5020 Managerial Communication 3  
BISI 6370 Seminar in Information Systems 3  
ECON 6200 Economic Development 3  
MGMT 6120 Seminar in Managerial Problems 3  
MGMT 6090 International Management 3  
ECON 6110 Managerial Economics 3  
MGMT 6010 Organizational Theory 3  
AGSC 5040 Program Planning and Evaluation in Vocational Education 3  
AGSC 5050 Special Problems in Vocational Education 3  
AGSC 5150 Livestock Management 3  
AGSC 5180 Soil Classification 3

### **CONCENTRATION II: AGRICULTURAL EDUCATION**

#### **REQUIRED COURSES—12 HRS. MINIMUM, THESIS OR 15 HRS. MINIMUM NON-THESIS**

AGSC 5010 Federal Relations to Vocational Education 3  
AGSC 5020 Occupational Studies in Vocational Education 3  
AGSC 5030 Organization and Vocational Education 3  
AGSC 5040 Program Planning and Evaluation in Vocational Education 3  
AGSC 5050 Special Problems in Vocational Education 3

#### **Electives—6 hrs. maximum, Thesis or 9 hrs. maximum, Non-Thesis with the approval of the advisor and department head.**

AGSC 5080 Agribusiness Management and Market Analysis 3

AGSC 5090 Food and Fiber Industry 3  
AGSC 5100 Environmental Resource Economics 3  
AGSC 5140 Special Problems in Animal and Poultry Science 3  
AGSC 5150 Livestock Management 3  
AGSC 5220 Plant Growth Substances 3  
AGSC 5260 Soil and Plant Analysis 3  
EDCI 5260 Philosophy of Education 3  
EDCI 5270 Advanced Social Studies 3  
PSYC 5430 Advanced Educational Psychology 3

### **CONCENTRATION III: ANIMAL SCIENCE**

#### **REQUIRED COURSES—12 HRS. MINIMUM, THESIS OR 15 HRS. MINIMUM NON-THESIS**

AGSC 5130 Animal Nutrition 3  
AGSC 5140 Special Problems in Animal and Poultry Science 3  
AGSC 5150 Livestock Management 3  
AGSC 5160 Animal Genetics and Breeding 3  
AGSC 5170 Advanced Poultry Production and Management 3

#### **Electives—6 hrs. maximum, Thesis or 9 hrs. maximum, Non-Thesis with the approval of the advisor and department head.**

AGSC 5090 Food and Fiber Industry 3  
AGSC 5100 Environmental Resource Economics 3  
AGSC 5180 Soil Classification 3  
AGSC 5220 Plant Growth Substances 3  
AGSC 5260 Soil and Plant Analysis 3

### **CONCENTRATION IV: PLANT SCIENCE**

#### **REQUIRED COURSES—12 HRS. MINIMUM, THESIS OR 15 HRS. MINIMUM NON-THESIS**

AGSC 5180 Soil Classification 3  
AGSC 5190 Plant Breeding 3  
AGSC 5220 Plant Growth Substances 3  
AGSC 5230 Advanced Propagation of Horticultural Plants 3  
AGSC 5240 Advanced Pomology 3  
AGSC 5260 Soil and Plant Analysis 3

#### **Electives—6 hrs. maximum, Thesis or 9 hrs. maximum, Non-Thesis with the approval of the advisor and department head.**

AGSC 5090 Food and Fiber Industry 3  
AGSC 5100 Environmental Resource Economics 3  
AGSC 5130 Animal Nutrition 3  
AGSC 5150 Livestock Management 3  
AGSC 5160 Animal Genetics and Breeding 3

## **MAJOR: BIOLOGICAL SCIENCES DEGREE: DOCTOR OF PHILOSOPHY (Ph.D.)**

### **Admission Requirements: Ph.D. Program**

See admission requirements under Ph.D. Program - Department of Biological Sciences.

### **Program of Study: Ph.D. Program**

The degree candidate must file a program of study after completing nine semester hours of graduate work, but before completing fifteen hours of graduate work. The program lists the courses which will be used to satisfy degree requirements, as well as detailing how other requirements will be met. The student may later change the program of study with the written approval of the Department and the Graduate School.

### **Admission to Candidacy: Ph.D. Program**

The student must apply for admission to candidacy after completing the 23-hour core of required courses (See Degree Requirements: Ph.D. Program, below.) With an average of B (3.0) or better, passing the comprehensive examination, and gaining approval of the dissertation proposal.

## **Degree Requirements: Ph.D. Program**

Degree candidates must complete the core of required graduate courses (24 hours) with a grade of B or better in each course, pass the comprehensive examination, and gain approval of their dissertation proposal prior to obtaining admission to candidacy for the doctoral degree. After gaining admission to candidacy the student must complete an approved curriculum (24 hours minimum of electives set by the student's research advisory committee), enroll in Graduate Seminar (BIO 5010, 5020) or the Seminar in Biology every semester (BIO 7010, 7020), complete a dissertation (24 hours), and successfully defend the dissertation prior to gaining the Ph.D. degree.

### **Required Courses: 24 Hours To be completed prior to Admission to Candidacy**

BIOL 5100 Literature and Methods in Research 3  
BIOL 5180 Cell Biology 3  
BIOL 6100 Frontiers in Molecular Science 3  
BIOL 7120 Molecular Biology 3  
CHEM 5410, 5420 Advanced Biochemistry I, II 6  
CHEM 5600 Spectroscopic Methods in Chemistry 3  
STAT 5210 Statistical Methods I 3

### **After Admission to Candidacy: 52 Hours**

Electives 24  
BIOL 5010, 5020 Graduate Seminar I, II 1, 1  
BIOL 7010, 7020 Seminar in Biology I, II 1, 1  
BIOL 8110 Dissertation Research 24

### **Graduate Elective Courses**

AGSC 5160 Animal Genetics and Breeding 3  
AGSC 5190 Plant Breeding 3  
AGSC 7010 Advancements In Agricultural Biotechnology 3  
AGSC 7020 Economic, Regulatory and Ethical Issues in Biotechnology 3  
AGSC 7030 Gene Expression and Regulation In Higher Plants 3  
AGSC 7040 Plant Tissue Culture Methods and Applications 3  
AGSC 7050 Biotechnology in Animal Reproduction 3  
AGSC 7060 Advanced Soil Technology 3  
AGSC 7070 Molecular Genetics Ecology 3

## **COURSE DESCRIPTION**

**AGSC 5010. FEDERAL RELATIONS TO VOCATIONAL EDUCATION. (3)** The historical development of legislative efforts toward the encouragement of a national structure of vocational education, educational and societal needs pertinent to legislative consideration; program development resulting from legislative guidelines.

**AGSC 5020. OCCUPATIONAL STUDIES IN VOCATIONAL EDUCATION (AGRICULTURE). (3)** Study of procedures and practices for determining manpower needs; analysis of occupational clusters; study of identification and development of manpower sources.

**AGSC 5030. ORGANIZATION AND MANAGEMENT OF VOCATIONAL EDUCATION PROGRAMS. (3)** Study of the organization of vocational and occupational programs; study of principles and concepts of program management; study of the techniques and procedures for program development.

**AGSC 5040. PROGRAM PLANNING AND EVALUATION IN VOCATIONAL EDUCATION. (3)** Concepts and principles of planning vocational and technical programs at the local, regional, and state level; utilization of advisory councils and citizen committees; study of the administrative structure and legislative mandates, principles and techniques of program evaluation.

**AGSC 5050. SPECIAL PROBLEMS IN VOCATIONAL EDUCATION. (3)** Students will be allowed to select a problem of interest, conduct and exhaustive literature search and present findings in written form. Discussion of progress will prevail during class periods.

**AGSC 5060. STATISTICS FOR RESEARCH WORKERS. (3)** Training and skills in research design, analyzing data, presentation of data, and drawing conclusions, with special emphasis on descriptive inferences.

**AGSC 5080. AGRIBUSINESS MANAGEMENT AND MARKET ANALYSIS. (3)** Introduction to and growth of the U.S. agribusiness industry, its scope and composition. Evolution and composition of basic managerial principles, organization, operation, and administration of agribusiness firms especially under situation of risk and uncertainty. Managerial Methodology Application of economic theory and Statistical methods, the analysis of prices, and marketing of agribusiness products.

**AGSC 5090. FOOD AND FIBER INDUSTRY: ECONOMICS & POLICY. (3)** The economics of production, competition, markets, and policy for the food and fiber sector of the economy. While the course stresses functional relationships and theoretical principles, descriptive material is included to enhance one's understanding of current problems and the interrelationships between agricultural and general economy, identification of relevant issues, review of criteria for evaluating program development of policies.

**AGSC 5100. ENVIRONMENTAL, RESOURCE ECONOMICS AND MANAGEMENT. (3)** The course analyzes major environmental and resource issues in relation to operations of agribusinesses using economic principles and alternative management scenarios. Market and non-market approaches to valuation of environmental and natural resources will be discussed in conjunction with the regulatory framework and management institutions.

**AGSC 5110. RESEARCH METHODS. (3)** The objectives of this course are: (1) to develop an understanding of research philosophies, methods, and procedures; (2) to gain experience in developing and designing research projects, organizing and analyzing research data.

**AGSC 5120. THESIS WRITING. (4)** This course is designed to provide instruction that will enable the student to adequately prepare a thesis from his or her on-going thesis research under the direction of the major advisor and guidance committee. The format of the thesis must conform to that of the subject matter area and the requirements of the Graduate School.

**AGSC 5130. ANIMAL NUTRITION. (3)** Devoted to the study of nutrients and their metabolism; studies of recent developments in animal nutrition, experimental procedures and application in commercial feeding.

**AGSC 5140. SPECIAL PROBLEMS IN ANIMAL AND POULTRY SCIENCE. (3)** Students will be allowed to select a problem of interest, conduct an exhaustive literature search and present findings in written form. Discussions on progress will prevail during class periods.

**AGSC 5150. LIVESTOCK MANAGEMENT. (3)** Provides an opportunity for the student to receive advanced training in the care and management of purebred herds, commercial herds, and herd development.

**AGSC 5160. ANIMAL GENETICS AND BREEDING. (3)** A study of the principles of genetics with emphasis on breed improvement involving change of gene frequency, role of selection, selection table of contents, importance of pedigree and methods of estimating heritability.

**AGSC 5170. ADVANCED POULTRY PRODUCTION AND MANAGEMENT. (3)** Devoted to studying the principles and current practices in production, management and marketing of eggs, broilers, and turkeys; recognition of field problems, and how to solve such problems economically.

**AGSC 5180. SOIL CLASSIFICATION. (3)** A study of the basis of soil classification, genesis and morphology of zonal soils of the United States. Emphasis placed on the important series of Tennessee. Prerequisites: AGSC 2200, 4230. Two lectures and one laboratory.

**AGSC 5190. PLANT BREEDING. (3)** A study of the methods, principles and results of plant improvement work, hereditary variation and the general principles of plant breeding. Prerequisite: AGSC 1200. Three lectures. **AGSC 5220. PLANT GROWTH SUBSTANCES. (3)** A general study of the organic substances which affect plant growth and development. Special emphasis will be placed on the auxins and cytokinins.

**AGSC 5230. ADVANCED PROPAGATION OF HORTICULTURAL PLANTS. (3)** A study of the methods of propagating horticultural plants, including seedage, cuttage, and grafting of both economic and ornamental plants. Two lectures and one laboratory period.

**AGSC 5240. ADVANCED POMOLOGY. (3)** A study of the development and performance of fruit plants as influenced by inheritance and environment. Two field trips required. Two lectures and one laboratory period.

**AGSC 5260. SOIL AND PLANT ANALYSIS. (3)** Fundamental principles involved in analyzing soils and plants. Current techniques and methods of interpretation of soil testing and plant analysis.

**AGSC 5300. DECISION-MAKING IN AGRIBUSINESS: QUANTITATIVE APPLICATIONS. (3)** This course develops expertise in quantitative problem-solving techniques necessary for decision-making in agribusiness with extensive use of computers. Introduction to the concepts and methods of applying econometric analyses to problems of economic research. Emphasis will be placed on the formulation and solution of business problems using selected quantitative tools such as linear programming, simulation, game theory, and inventory models.

**AGSC 5310. INTERNATIONAL AGRICULTURAL TRADE AND MARKETING. (3)** The course emphasizes economic development, trade theory, and its application to agricultural trade. Review of the fundamental trade theory, changing structure of international trade markets, U.S. trade policies for agriculture, and the role of international commodity trading agreement.

**AGSC 5330. AGRIBUSINESS STRATEGY. (3)** The course is designed to enhance learning through presentations of case studies and analyses of relevant issues by students and guest speakers from agribusinesses. Topics to be covered include but are not limited to location of business, supply of inputs, and international marketing tools.

**AGSC 5350. INDEPENDENT STUDY-CONTEMPORARY ISSUES AND PROBLEMS. (3)** A required course for students choosing the non-thesis option for a Master of Science Degree in Agricultural Sciences. Individual Study and Research under faculty guidance, resulting in a substantial piece of writing. The intent of this course is to broaden students understanding of theory and methods and apply them to analyze selected issues and problems in a broader context in various areas of agriculture. The students will apply (synthesize) knowledge gained in various courses in presenting issues and problems and integrating the materials learned so as to apply them in his/her area of interest or problem at hand. The course will reflect students' ability to analyze, explore, and synthesize knowledge and skill as well as communication skills.

**AGSC 5610-5620. GRADUATE SEMINAR IN AGRICULTURAL SCIENCES. (1-1)** Critical review of current literature in Agricultural Sciences. Required of all M.S. graduate students.

**AGSC 6510 ADVANCED GEOSPATIAL INFORMATION SYSTEMS (3 CREDIT HOURS).** Introduction to GIS principles and technology. This course presents a foundation for creating, editing, querying, and presenting geospatial data. Laboratory exercises use a hands-on approach to learning GIS software and hardware. This course is multidisciplinary and is designed for students in any field of study. Prerequisite: Good working knowledge of personal computers and the Microsoft Windows(r) operating system. This is an online course offered to candidates for the Graduate Certificate in Applied Geospatial Information Systems.

**AGSC 6520 ADVANCED SPATIAL ANALYSIS (3 CREDIT HOURS).** Fundamental concepts and analytical procedures used to abstract and simplify complex systems using geospatial information systems. This course emphasizes geometric, coincidence, and adjacency models as applied to surface analysis, linear analysis, raster analysis, topological overlay, and contiguity analysis. Spatial modeling will be used to describe, simulate, predict, and resolve real-world problems, issues, and systems. This is an online course offered to candidates for the Graduate Certificate in Applied Geospatial Information Systems. Prerequisite: AGSC 6510.

**AGSC 6530 ADVANCED GEOSPATIAL METADATA (3 CREDIT HOURS).** Data make up the most expensive component of a GIS and account for billions of dollars of expenditures annually. Metadata is data about data. It documents critical information about the data and the procedures used to create and maintain the data. This course explains metadata and its components, and teaches GIS users the how and why of documenting their data. Methodology and standards will follow the Federal Geographic Data Committee's Content Standard for Digital Geospatial Metadata and will conform to the National Spatial Data Infrastructure. This is an online course offered to candidates for the Graduate Certificate in Applied Geospatial Information Systems. Prerequisite: AGSC 6510.

**AGSC 6540 ADVANCED SPATIAL DATABASE DESIGN AND MANAGEMENT (3 CREDIT HOURS).** The accuracy and usability of data determine the analysis, output, and cost of any geospatial information system. This course presents the principles and techniques of geodatabase design, editing, and management needed to obtain required functionality from a GIS. This is an online course offered to candidates for the Graduate Certificate in Applied Geospatial Information Systems. Prerequisite: AGSC 6510.

**AGSC 6550 ADVANCED GEOSPATIAL INFORMATION SYSTEMS APPLICATION AND DESIGN (3 CREDIT HOURS).** Concepts and procedures used to successfully assess needs, evaluate requirements, design, and implement geospatial information systems. Emphasis will be placed on the data and technology needed to produce desired information products, and on cost-benefit analysis and project proposal development. This is an online course offered to candidates for the Graduate Certificate in Applied Geospatial Information Systems. Prerequisites: AGSC 6510, AGSC 6520.

**AGSC 6560 ADVANCED GLOBAL POSITIONING SYSTEMS (3 CREDIT HOURS).** Advanced principles, technology, and use of Global Positioning Systems. This course will present the advanced principles of navigation and positioning, GPS instrumentation, collection and processing of data, and integration with geospatial information systems. This online course is multidisciplinary and is designed for students in any field of study. Prerequisites: None