

**Master of Science in
Agriculture and Natural Resources (MSANR)
The University of Tennessee at Martin**

PROCEDURES FOR ADMISSION

- Obtain an application for admission from the Graduate Studies Office, 303 Hall Moody Administration Building, The University of Tennessee at Martin, Martin, Tennessee, 38238. Phone: (731) 881-7012, or submit an **online application** at the Graduate Studies Web page: <http://www.utm.edu/departments/gradstudies>
- Return the completed application form with a check or money order for the \$30 non-refundable application fee (\$50 for international students) See also, **online payment options**.
- Request the registrars of **all** colleges and universities attended to send one **official** transcript directly to the Graduate Studies Office.
- Request that official scores on the appropriate qualifying examination be sent directly to the Graduate Studies Office by the testing agency. NTE scores may be certified by the superintendent's office of school systems in which one has worked if the score is no longer available from the testing agency.
- International students must also follow the special instructions detailed in "International Students" section of the UT-Martin catalog, <http://catalog.utm.edu/>

A decision on admission cannot be made until all of these procedures have been completed and official documents have been received. Students who have not been admitted may not register for classes.

Each applicant is responsible for arranging the appropriate qualifying examination and for requesting the transmission of scores directly to the Graduate Studies Office from the Educational Testing Service. Computer-based testing is available for the GRE General. Contact the UT Martin Test Center (731) 881-7727 or online at: <http://www.utm.edu/departments/success> for registration information.

Master of Science in Agriculture and Natural Resources The University of Tennessee at Martin

This is a synopsis of the Master of Science in Agriculture and Natural Resources (MSANR) program at the University of Tennessee at Martin. This graduate program began in August, 2001. The courses in the program are offered in a web-based format.

For more information, please check our website at:

<http://www.utm.edu/msanr/>

If you have additional questions, you may also contact:

For Academic Questions:

Joey E. Mehlhorn, Ph.D.
Coordinator of MSANR Graduate Studies
Department of Agriculture and Natural Resources
The University of Tennessee at Martin
254 Brehm Hall
Martin, TN 38238
Phone: 731-881-7275 or 731-881-7211
E-mail: mehlhorn@utm.edu

OR

For Academic Questions:

Barbara Darroch, Ph.D.
Academic Coordinator of
MSANR Graduate Studies
Dept. of Agriculture and Natural Resources
144 Brehm Hall
Martin, TN 38238
Phone: 731-881-7279 or 731-881-7211
E-mail: bdarroch@utm.edu

To Apply to UTM Graduate School:

Contact: Ms. Linda Arant
Graduate Studies
303 Hall Moody Administration Building
The University of Tennessee at Martin
Martin, TN 38238
Phone: 731-881-7012
E-mail: larant@utm.edu

Take the Graduate Record Exam (GRE):

Evy Goddard
UT-Martin Test Center
211 Clement Hall
Martin, TN 38238
Phone: 731-881-7727
Fax: 731-881-1044 Fax: 731-881-7702
E-mail: egoddard@utm.edu

For Administrative Questions:

Derrick Head
Extended Campus & Online Studies
Assistant Director
227 Hall-Moody Administration Bldg
Email: dhead@utm.edu
Phone: 731-881-7959

Admission Requirements for the Master of Science in Agriculture and Natural Resources (MSANR) The University of Tennessee at Martin

Effective Fall 2011

Applicants may be admitted as degree seeking (Unconditional, Conditional, or unclassified) or non-degree as listed below. Degree-seeking applicants must meet the university requirements listed in the Graduate Catalog under "Types of Admission". For complete information on admission procedures and requirements for graduate students, students should refer UTM University Catalog, online at: <http://catalog.utm.edu/>.

A General Record Exam (GRE) combined score of at least 950 (Verbal plus Quantitative) is required for unconditional admission. A minimum General GRE combined score (Verbal plus Quantitative) of 750 and other requirements (detailed below) may qualify a student for conditional admission.

Additional requirements for unconditional and conditional admission appear below.

A. Unconditional Admission

1. Cumulative GPA of at least 2.75 **and**
2. GRE score (verbal plus quantitative) of at least 950 **and**
3. Have earned a B.S. degree in agriculture, natural resources management, park and recreation administration, or wildlife science from a regionally accredited institution.

B. Conditional Admission

1. Cumulative GPA of at least 2.50 or Senior Year GPA of at least 3.00, **and**
2. GRE score (verbal plus quantitative) of at least 750 (950 if exempted from the university's minimum GPA requirement), **and**
3. Minimum formula points as shown below:
400 times applicant's Cumulative GPA plus GRE must equal or exceed 1,950 **or**
400 times applicant's Senior Year GPA plus GRE must equal or exceed 1,950
4. Have a B.S. degree in agriculture, natural resources management, park and recreation administration, or wildlife science from a regionally accredited institution **or**
5. Have a B.S. degree in a closely related applied or natural science (as determined by the MSANR Graduate Coordinator) and have a satisfactory score on the appropriate Department of Agriculture and Natural Resources senior exit exam as determined by the MSANR Graduate Coordinator.

C. Unclassified or Non-Degree Admission

Applicants who do not meet requirements for either **unconditional** or **conditional** admission may be eligible for **unclassified** or **non-degree** admission. See section on "Types of Admission" in the Graduate Catalog under university requirements.

Undergraduate Articulation Requirements

Students without a degree in agriculture, natural resources management, park and recreation administration, or wildlife science or closely related field (as determined by the MSANR Graduate Coordinator) may be required to take additional undergraduate prerequisite courses to enroll in advanced courses (based on a review by the MSANR Graduate Coordinator).

Master of Science in Agriculture and Natural Resources
The University of Tennessee at Martin

Degree Requirements
Effective Fall 2011

The Department of Agriculture, Geosciences, and Natural Resources offers a Master of Science in Agriculture and Natural Resources (M.S.A.N.R.). The M.S.A.N.R. program is administered through UT Online, facilitating a minimal tuition increase for non-resident students. The M.S.A.N.R. curriculum is comprised of 36 hours of graduate course work and is offered primarily via the Internet. The program features four concentrations to meet the needs of place-bound professionals seeking a graduate education. Students in the M.S.A.N.R. program select a concentration (18 hours) in either: (Ia.) Agribusiness and Risk Management, (Ib.) Agricultural Education and Leadership, (Ic.) Natural Resources Systems Management, or (Id.) Systems Science in Agriculture.

The **Agribusiness and Risk Management** (ARM) concentration provides a range of agricultural economics course work developed specifically to address risk management issues associated with agribusiness enterprises. The **Agricultural Education and Leadership*** (AEL) concentration provides education specific courses from the College of Education and Behavioral Sciences and the College of Agriculture and Applied Sciences. Students selecting the **Natural Resources Systems Management** (NRSM) concentration have access to a wide range of natural resources based graduate course work from The University of Tennessee at Martin as well as participating universities in the Natural Resources Distance Learning Consortium (NRDLC). The **Systems Science in Agriculture** (SSA) concentration features course work in agricultural engineering technology, management science, and agricultural economics providing a well-rounded graduate education for professionals seeking careers in agricultural industries and government agencies.

** The AEL curriculum does not lead to professional licensure for high school teachers of agriculture. Contact the M.S.A.N.R. Graduate Coordinator for further details on this concentration and licensure.*

Students may pursue thesis (see M.S.A.N.R. thesis qualifications) or non-thesis options in the M.S.A.N.R. program. Students pursuing the thesis option will register for and complete the requirements for Agriculture 701-702 or Natural Resources Management 701-702, while students in the non-thesis option will register for and complete requirements for Agriculture 790-791 or Natural Resources Management 790-791.

Students must satisfy the university general requirements and the following requirements specific to the degree

Master of Science in Agriculture and Natural Resources (1190)

Résumé of Degree Requirements

Ia. Agribusiness and Risk Management Concentration (1194) 18 hours

All Agribusiness and Risk Management students must complete:

Agricultural Economics 710 Commodity Futures and Options Markets (3)

Agricultural Economics 750 Agricultural Risk Analysis and Decision Making (3)

Agricultural Economics 751 Strategic Management Issues in Agriculture (3)

Agricultural Economics 780 Project Management Issues in Agriculture (3)

Agricultural Economics 784 Applied Management Science in Agricultural Systems I (3)

Agricultural Economics 785 Applied Management Science in Agricultural Systems II (3)

OR

Ib. Agricultural Education and Leadership Concentration (1191) 18 hours

All Agricultural Education and Leadership (AEL) students must complete 18 hours of course work* from the College of Agriculture and Applied Sciences or the College of Education and Behavioral Sciences (in the area of agricultural education, educational studies, or other approved education-related area). All AEL group courses must be approved by the M.S.A.N.R. Graduate Coordinator.

*Consult respective course descriptions for applicable prerequisites.

OR

Ic. Natural Resources Systems Management Concentration (1192) 18 hours

All Natural Resources Systems Management students must complete 18 hours of course work from the following courses:

Agricultural Engineering Technology 720 Advanced Soil and Water Conservation Engineering (3)

Agricultural Engineering Technology 760 Comprehensive Nutrient Management Planning and System Design (3)

Agricultural Engineering Technology 782 GIS for Agricultural and Natural Resources Management (3)

Geography 755 Global Climate and Climate Change (3) **or**

Natural Resources Management 755 Global Climate and Climate Change (3)

Geoscience Education 700 Earth Systems Science (3)

Geoscience Education 710 Physical Geology (3)

Geoscience Education 750 Global Climate Change (3)

Natural Resources Management 722 Production of Biorenewable Resources (3) **or**

Plant Science 722 Production of Biorenewable Resources (3)

Natural Resources Management 730 Advanced Natural Resources Economics (3)

Natural Resources Management 740 Natural Resources Policy and Administration (3)

Natural Resources Management 760 Management of Interpretive Resources (3) **or**

Park and Recreation Administration 760 Management of Interpretive Resources (3)

Natural Resources Management 765 Conservation and Preservation of Historic Structures (3) **or**

Park and Recreation Administration 765 Conservation and Preservation of Historic Structures (3)

Natural Resources Management 770 Topics in Natural Resources Management (1-6)

Park and Recreation Administration 770 Topics in Park and Recreation Administration (1-6)

Soil Science 630 Wetland Science (3)

Wildlife Biology 730 Wildlife Policy (3)

Wildlife Biology 770 Topics in Wildlife Biology (1-6)

A 600 level or higher course (3 hours) in agriculture, agricultural engineering technology, geosciences, natural resources, park and recreation administration, wildlife biology or other science-related area approved by the M.S.A.N.R. Graduate Coordinator.

or

Graduate courses from member institutions of the Natural Resources Distance Learning Consortium (NRDLC) approved by the M.S.A.N.R. Graduate Coordinator (up to 12 hours).

OR

Id. Systems Science in Agriculture Concentration (1193) 18 hours

All Systems Science in Agriculture students must complete:

Management Science (6 hours)

Agricultural Engineering Technology 784 Applied Management Science in Agricultural Systems I (3) **or**

Agricultural Economics 784 Applied Management Science in Agricultural Systems I (3)

Agricultural Engineering Technology 785 Applied Management Science in Agricultural Systems II (3) **or**

Agricultural Economics 785 Applied Management Science in Agricultural Systems II (3)

and choose three courses (9 hours) from the following:

Agricultural Systems Technology (9 hours)

Agricultural Engineering Technology 710 Safety and Ergonomic Sciences in Agriculture (3)

Agricultural Engineering Technology 720 Advanced Soil and Water Conservation Engineering (3)

Agricultural Engineering Technology 760 Comprehensive Nutrient Management Planning and Design (3)

Agricultural Engineering Technology 782 GIS for Agricultural and Natural Resources Management (3)

Natural Resources Management 722 Production of Biorenewable Resources (3) **or**

Plant Science 722 Production of Biorenewable Resources (3)

A 600 level or higher course (3 hours) in agricultural engineering technology or related applied science approved by the M.S.A.N.R. coordinator.

and choose one course (3 hours) from the following:

Agricultural Economics (3 hours)

Agricultural Economics 705 Advanced Agricultural Marketing (3)

Agricultural Economics 710 Commodity Futures and Options Markets (3)

Agricultural Economics 745 Agricultural Production Economics (3)

Agricultural Economics 750 Agricultural Risk Analysis and Decision Making (3)

Agricultural Economics 751 Strategic Management Issues in Agriculture (3)

Agricultural Economics 780 Project Management Issues in Agriculture (3)

II. Agriculture, Geosciences, and Natural Resources Electives 9 hours*

Choose 9 hours of course work from 600 level or higher courses in agriculture, agricultural economics, geosciences, natural resources, education, natural or physical sciences, or other graduate course approved by the M.S.A.N.R. Graduate Coordinator. **Three hours in this category must include a globalization component.*

III. Statistics/Advanced Mathematics Group 3 hours

Agriculture 741 Statistical Methods in Agriculture and Natural Resources (3) **or**

A graduate-level statistics or mathematics course approved by the M.S.A.N.R. Graduate Coordinator (3)

IV. Research 6 hours

Non-Thesis Option

Agriculture 790 Scientific Writing and Presentations (3) **or**

Natural Resources Management 790 Scientific Writing and Presentations (3)

and

Agriculture 791 Master's Research Project in Agriculture (1-3) **or**

Natural Resources Management 791 Master's Research Project in Natural Resources Management (1-3)

OR

Thesis Option

Agriculture 701-702 Master's Thesis (3, 1-3) **or**

Natural Resources Management 701-702 Master's Thesis (3, 1-3)

M.S.A.N.R. students seeking to qualify for the Thesis Option must have a GRE writing score of 3.5 or greater, and must complete a Writing Qualification Exam (WQE) developed and administered by the M.S.A.N.R. Graduate Coordinator. The M.S.A.N.R. Graduate Coordinator, in consultation with the M.S.A.N.R. Graduate Supervisory Committee, will grade the WQE: Pass or Fail. Students receiving a "Fail" grade on the WQE may schedule a second attempt on the WQE without taking remedial writing course work. M.S.A.N.R. students receiving a Fail grade on their first and second WQE attempts must take remedial writing course work prior to taking the WQE a third and final time. M.S.A.N.R. students must receive a "Pass" grade on the WQE no later than the end of the second semester of M.S.A.N.R. course work to be considered for the M.S.A.N.R. Thesis Option. The WQE does not apply to Non-Thesis Option students in the M.S.A.N.R. program. M.S.A.N.R. students who do not qualify for the Thesis Option may continue in the M.S.A.N.R program in the Non-Thesis Option.

Thesis option students will complete a research study in an approved area of agriculture or natural resources management. The thesis research director must have a terminal degree and be actively involved in research or extension. The student, in consultation with the thesis research advisor, must submit a written research proposal to the graduate thesis committee for approval prior to collecting thesis data. The graduate thesis committee will be composed of a minimum of three faculty members with graduate faculty status.

Minimum hours required for degree..... 36 hours

A minimum of 70 percent of the degree requirements must be taken at the 700 level. All M.S.A.N.R. students must complete a written comprehensive final examination during the semester they expect to graduate. The comprehensive final exam will be administered and graded (Pass/Fail) by the M.S.A.N.R. Graduate Supervisory Committee. Thesis students receiving a Pass score on the comprehensive final exam will schedule an oral thesis defense at least three weeks prior to graduation. All M.S.A.N.R. students must receive a Pass score on the written comprehensive exam to graduate. Thesis students must also receive a Pass score on the oral thesis defense to graduate. Thesis students must meet all of the requirements listed above and requirements as outlined in the section of this catalog entitled Thesis Option.

Other MSANR Requirements

1. Retention

Regulations governing graduate programs are contained in the UTM Catalog. Program continuation standards require the maintenance of a grade point average of 3.0 in all courses taken for graduate credit and completion of the program in no more than six years.

2. Academic Advisor and Supervisory Committee

All MSANR students are advised by the MSANR academic coordinator in the Department of Agriculture and Natural Resources. The academic coordinator will:

- Guide, inform, and counsel the student
- Advise students on a Plan of Study (POS)
- Review progress of courses, grades, and research projects once per semester

For non-thesis students:

The MSANR Graduate Supervisory Committee shall consist of the MSANR Graduate Coordinator and no fewer than two faculty members with UTM graduate faculty status. The MSANR Graduate Coordinator will serve as chairman of the committee.

The purposes of the supervisory committee are to:

- Discuss and approve the Plan of Study (POS)
- Discuss and approve the research project and research report
- Conduct final written comprehensive exams

For thesis students:

The MSANR Graduate Supervisory Committee shall consist of the MSANR Graduate Coordinator and no fewer than two faculty members with UTM graduate faculty status. The thesis research director, who will also chair the Graduate Supervisory Committee, must have a terminal degree and be actively involved in research or extension.

The purposes of the graduate committee are to:

- Discuss and approve the Plan of Study (POS)
- Discuss and approve the written research proposal
- Provide guidance related to the research project and thesis
- Conduct final written comprehensive
- Conduct the thesis oral defense

Students are encouraged to develop a close working relationship with their advisor and committee. They should communicate academic and department interests and concerns to them. Each student is expected to meet with his/her advisor periodically, at least once per semester. This meeting may be conducted over the phone or in person.

3. Additional Regulations:

A minimum of 70 percent of the degree requirements must be taken at the 700 level. All M.S.A.N.R. students must complete a written comprehensive final examination during the semester they expect to graduate. The comprehensive final exam will be administered and graded (Pass/Fail) by the M.S.A.N.R. Graduate Supervisory Committee.

Thesis students receiving a Pass score on the comprehensive final exam will schedule an oral thesis defense at least three weeks prior to graduation. All M.S.A.N.R. students must receive a Pass score on the written comprehensive exam to graduate. Thesis students must also receive a Pass score on the oral thesis defense to graduate. Thesis students must meet all of the requirements listed above and requirements as outlined in the section of this catalog entitled Thesis Option.

Students achieving less than satisfactory on written or exams will be given one of the indicators from the supervisory committee:

- courses or activities to accomplish prior to another exam attempt **or**
- notice of failure.

In no event will a student be given more than one repeated examination unless additional coursework prescribed by the MSANR Graduate Supervisory Committee has been taken.

All forms must be submitted to the MSANR Graduate Coordinator prior to deadlines.

Each POS must meet all UTM requirements as stated in the "Graduate Catalog" unless appropriate exceptions have been approved.

5. Credit from Other Universities

With MSANR Graduate Coordinator approval, up to 12 hours of course work may be taken from other universities.

MSANR Course Descriptions

(See also, current graduate catalog available at:
<http://catalog.utm.edu/> for complete listing of courses)

Agricultural Economics (AGEC)

AGEC 705 – Advanced Agricultural Marketing (3) Analytical and empirical treatment of consumer behavior related to food and fiber commodities. Specific topics include creating customer value, market penetration strategies, product positioning, vertical and horizontal integration and market growth.

AGEC 710 – Commodity Futures and Options Markets (3) Economic theory and methods for analyzing agricultural production decisions and the underlying relationship to futures and options markets. Specific topics include the institutional structure, price formation, producer and agribusiness strategies, and financial instruments associated with U.S. and international markets.

AGEC 735 - Seminar in International Agricultural Trade (3) Theory and practice in international trade in agricultural and food products with emphasis on real world problems. Trade policy, trade law, customs practices, exchange rates and their impact on trade in U.S. and world agriculture. Developing real world export marketing plans including research, pricing, distribution systems, financing, and pro forma invoicing. Discussions of major global trade issues.

AGEC 745 - Agricultural Production Economics (3) Resource allocation, production selection, scale of operation of agricultural firms including risk and uncertainty associated with agricultural production. *Prereq: MATH 160 and ECON 202 or instructor's approval.*

AGEC 750 – Agricultural Risk Analysis and Decision-Making (3) Application of current risk management techniques to issues specific to the U.S. agribusiness system. Elements include: production risk; crop insurance; diversification; contract production; integration of systems; market risk; futures and options; minimum price contracts; personal risk; estate planning; organizational concerns; interest rate risk; policy risk.

AGEC 751 - Strategic Management Issues in Agriculture (3) Application of current strategic management techniques to agribusiness problems. Emphasis on viewing management from a broad organizational perspective through an integrated approach. The ability to assimilate and analyze information from all aspects of the organization (i.e. management, marketing, information systems, production, finance, accounting, etc.) to analyze complex problems, develop plans and propose recommendations on a top management perspective.

AGEC 784 – Applied Management Science in Agricultural Systems I (3) Mathematical programming and constrained optimization research methods for applied decision making in agriculture. Development of computer and writing skills necessary for finding optimal solutions to complex applied problems in addition to succinctly communicating results in the proper format and context. Theory, implementation and optimal solution sensitivity of linear and integer programming as well as network and project scheduling models are examined (*Same as AGET 784*).

Text: Management Science – The Art of modeling with Spreadsheets. 2nd Ed. with Excel 2007 Update. 2009. Authors: Stephen G. Powell and Kenneth R. Baker. ISBN-13: 978-0-470-39376-5.

AGEC 785 – Applied Management Science in Agricultural Systems II (3) Probability concepts, decision making under uncertainty and forecasting for applied decision making in agriculture. Continued development of computer and writing skills necessary for finding and communicating results professionally. The theory and implementation of decision analysis and forecasting techniques as well as inventory, queuing, and simulation models are examined (*Same as AGET 785*). *Prereq: AGET 784 or AGECE 784.*

Text: Management Science – The Art of modeling with Spreadsheets. 2nd Ed. with Excel 2007 Update. 2009. Authors: Stephen G. Powell and Kenneth R. Baker. ISBN-13: 978-0-470-39376-5.

Agricultural Education (AGED)

AGED 770 – Program Development for Agricultural Mechanics Instruction (3) Development of instruction and managerial competencies needed in conducting agricultural mechanics programs through an in-depth study of program components and activities related to each including skills development for FFA contest. *Taught only by arrangement prior to registration.*

Agricultural Engineering Technology (AGET)

AGET 710 - Safety and Ergonomic Sciences in Agriculture (3) Designing, fitting, adjusting equipment and tools to suit individuals so that agricultural tasks can be done safely, efficiently, productively, and without discomfort, pain, injury, and disability; includes comfort and well-being.

AGET 720 – Advanced Soil and Water Conservation Engineering (3) Engineering principles for hydrologic analysis and design for small catchments including: hydrologic frequency analysis, rainfall runoff estimation, open channel hydraulics, hydraulics of control structures, sediment properties and transport, erosion and sediment yield, sediment control structures, groundwater, monitoring of hydrologic systems, and hydrologic modeling. Students are required to complete a written term report on a current topic associated with soil and water engineering.

AGET 760 - Comprehensive Nutrient Management Planning & System Design (3) Application of agronomic sciences and engineering technology for developing Comprehensive Nutrient Management Plans (CNMPs) for livestock production. Elements include: environmental law and regulatory policy; watershed planning considerations; animal waste characteristics; role of soils; role of plants; geologic and ground water concerns; facilities location; waste treatment systems design; land application of wastes; and agricultural waste management system design.

AGET 782 – GIS for Agricultural and Natural Resources Management (3) Principles and application of Geographic Information Systems (GIS) technologies with emphasis on the use of GIS for collecting, storing and analyzing spatial data associated with agricultural and natural resource-based enterprises. GIS software techniques are developed using an interactive/inductive learning process. Students will collect and analyze data to complete a research project using GIS to answer questions related to an agricultural or natural resources topic.

Text: Mastering ArcGIS, 4th Edition. Author: Maribeth Price. McGraw Hill Co. ISBN-13: 978-0-007-729332-1.

AGET 784 – Applied Management Science in Agricultural Systems I (3) Mathematical programming and constrained optimization research methods for applied decision making in agriculture. Development of computer and writing skills necessary for finding optimal solutions to complex applied problems in addition to succinctly communicating results in the proper format and context. Theory, implementation and optimal solution sensitivity of linear and integer programming as well as network and project scheduling models are examined (*Same as AGEC 784*).

Text: Management Science – The Art of modeling with Spreadsheets. 2nd Ed. with Excel 2007 Update. 2009. Authors: Stephen G. Powell and Kenneth R. Baker. ISBN-13: 978-0-470-39376-5.

AGET 785 – Applied Management Science in Agricultural Systems II (3) Probability concepts, decision making under uncertainty and forecasting for applied decision making in agriculture. Continued development of computer and writing skills necessary for finding and communicating results professionally. The theory and implementation of decision analysis and forecasting techniques as well as inventory, queuing, and simulation models are examined (*Same as AGEC 785*). *Prereq: AGET 784 or AGEC 784*.

Text: Management Science – The Art of modeling with Spreadsheets. 2nd Ed. with Excel 2007 Update. 2009. Authors: Stephen G. Powell and Kenneth R. Baker. ISBN-13: 978-0-470-39376-5.

Agriculture (AGRI)

AGRI 701-702 – Master’s Thesis (3, 1-3) Thesis proposal and research; thesis writing, presentation and defense. May repeat enrollment. P/N only.

AGRI 732 - International Travel Study (3) International travel course to study topics in agriculture or natural resources. Requires travel to another country, oral and written reports.

AGRI 741 - Statistical Methods in Agriculture and Natural Resources (3) Statistical techniques used in design and analysis of experiments in agriculture and natural resources management. T-tests, analysis of variance, mean separation, regression and correlation, experimental design and analysis, interpretation of research results, analysis and interpretation of survey information. *Prereq: Math 210 or equivalent or instructor’s approval*.

AGRI 77- Topics in Agriculture: [Selected Area] (1-6) Topics in selected areas of agriculture. For graduate students in the Master of Science in Agriculture and Natural Resources program. Can be used to meet requirements in the MSANR curriculum. The subject matter area is indicated by the third digit: 0 for Agriculture, 1 for Agricultural Economics, 2 for Agricultural Engineering Technology, 3 for Animal Science, 5 for Plant and Soil Science. *May repeat enrollment up to six credit hours. Prereq: Graduate coordinator and instructor’s approval*.

AGRI 790 – Scientific Writing and Presentations (3) A course designed to give graduate students the skills necessary to write a thesis, and to prepare other professional materials for presentation or publication. Topics covered in this course include: searching the scientific literature; scientific writing style; writing graduate level papers, proposals, projects, and thesis components; preparing scientific presentations; presentation of data; using visual aids; and using word processing, spreadsheet, and presentation software. (*Same as NRM 790*)

Texts: (1) How to Write and Publish a Scientific Paper. 6th Edition. Authors: Robert A. Day and Barbara Gastel. ISBN: 0-313-33040-9 and (2) The Craft of Scientific Presentations. Critical Steps to Succeed and Critical Errors to Avoid. Author: Michael Alley. ISBN: 0-387-95555-0.

AGRI 791 – Master’s Research Project in Agriculture (1-3) A major research project associated with agriculture. Research projects shall include: a review of literature, data collection methodology, data presentation and a final written report. *May repeat enrollment. No more than three semester hours credit will be counted toward requirements for the MSANR degree. P/N only.*

Geoscience Education (GEDU)

GEDU 700 – Advanced Earth Systems Science (3) Investigations in Earth Systems Science is a detailed exploration of Earth’s interacting global processes and environments including the lithosphere, atmosphere, biosphere, hydrosphere and astrosphere. The course uses problem-based and student-centered learning techniques and is taught completely online. A combination of individual and group coursework via an asynchronous discussion board is utilized.

GEDU 710 – Advanced Physical Geology for Educators (3) An advanced study of physical geology intended to provide teachers with the foundation knowledge of Earth’s internal structure, plate tectonics, rock cycle, weathering and earth materials; natural resources, geochemical cycles; and the basis for geologic time and the history and nature of science. *Prereq: GEDU 700 and permission of instructor.*

GEDU 750 Global Climate Change (3) Detailed study of the geographic patterns and physical processes of global climate change throughout Earth’s history and assessments of future climate change scenarios. The course will examine the evidence of climate change in the geologic and fossil record and investigate the various types of models that predict future climate changes. *Prereq: GEDU 700 and permission of the instructor.*

Natural Resources Management (NRM)

NRM 701-702 – Master’s Thesis (3, 1-3) Thesis proposal and research; thesis writing, presentation and defense. May repeat enrollment. P/N only.

NRM 722 – Production of Biorenewable Resources (3) An exploration of plant species with potential as crops for industrial uses including biofuels. An overview of the chemistry of plant products and extraction techniques for useful products including biofuels, unique fatty acids and pharmaceuticals from new and existing crops. Will include a review of fundamental concepts in bioenergy and biobased products including engineering thermodynamics and organic chemistry. *(Same as PLSC 722)*

NRM 724 – Advanced Grazing Management Techniques (3) An in depth discussion of the integral biological and physical components of pasture systems. Students will learn how soil chemical and physical properties interact with plant growth in the production of forage crops. The focus of the course will be to examine the impact of management practices on the ecology of grazing livestock in pasture systems. Students will evaluate grazing systems and develop a management plan as a part of the course activities. A paper dealing with pasture ecology will be a required component of the course. *(Same as PLSC 724)*

Text: Grazing Management, Second Edition. Author: John F. Vallentine. ISBN: 9780127100012

NRM 730 – Advanced Natural Resources Economics (3) Economic principles associated with natural resource use and preservation. Emphasis on economic analysis and policy decision-making tools for natural resources and non-market goods. Valuation techniques such as benefit cost analysis, willingness to pay, willingness to accept, hedonic pricing, travel cost models, inter-temporal substitution, and issues related to economic and social efficiency will be discussed.

NRM 740 – Natural Resource Policy and Administration (3) This course is designed to provide an understanding of how natural resource policy in the United States is developed. The course examines the intersection of human dimensions and natural systems. The evolution of natural resource policy and participants in policy development will also be studied. Through the use of student led discussion and writing projects, students will examine the application of management decisions within a policy context.

NRM 760 – Management of Interpretive Resources (3) Principles of interpretation and an examination of the resources used for interpretive services. There will be an overview of the application of management principles to interpretive services. Sociological concepts, relevant innovations, resource inventory, and master planning will be explored. Emphasis will be placed on the role of interpretation to accomplish an organization's mission. (*Same as PRAD 760*)

NRM 765 – Conservation and Preservation of Historic Structures (3) Principles and methods related to the use, preservation, and interpretation of historic structures. This will include the application of technology for the identification and cataloging of structures that have historical significance. Relevant laws and regulations will be reviewed. Special attention will be given to construction methods and materials as they apply to preservation. (*Same as PRAD 765*)

NRM 770 Topics in Natural Resources Management (1-6) Topics in selected areas of natural resources management. For graduate students in the Master of Science in Agriculture and Natural Resources program. Can be used to meet requirements in the MSANR curriculum.

NRM 790 – Scientific Writing and Presentations (3) A course designed to give graduate students the skills necessary to write a thesis, and to prepare other professional materials for presentation or publication. Topics covered in this course include: searching the scientific literature; scientific writing style; writing graduate level papers, proposals, projects, and thesis components; preparing scientific presentations; presentation of data; using visual aids; and using word processing, spreadsheet, and presentation software. (*Same as AGRI 790*)

Texts: (1) *How to Write and Publish a Scientific Paper*. 6th Edition. Authors: Robert A. Day and Barbara Gastel. ISBN: 0-313-33040-9 and (2) *The Craft of Scientific Presentations. Critical Steps to Succeed and Critical Errors to Avoid*. Author: Michael Alley. ISBN: 0-387-95555-0.

NRM 791 – Master's Research Project in Natural Resources Management (1-3) A major research project associated with natural resources management. Research projects shall include: a review of literature, data collection methodology, data presentation, and a final written report. May repeat enrollment. No more than three semester hours credit will be counted toward requirements for the MSANR degree.

Park and Recreation Administration (PRAD)

PRAD 760 – Management of Interpretive Resources (3) Principles of interpretation and an examination of the resources used for interpretive services. There will be an overview of the application of management principles to interpretive services. Sociological concepts, relevant innovations, resource inventory, and master planning will be explored. Emphasis will be placed on the role of interpretation to accomplish an organization's mission. *(Same as NRM 760)*

PRAD 765 – Conservation and Preservation of Historic Structures (3) Principles and methods related to the use, preservation, and interpretation of historic structures. This will include the application of technology for the identification and cataloging of structures that have historical significance. Relevant laws and regulations will be reviewed. Special attention will be given to construction methods and materials as they apply to preservation. *(Same as NRM 765)*

PRAD 770 Topics in Park and Recreation Administration (1-6) Topics in selected areas of park and recreation administration. For graduate students in the Master of Science in Agriculture and Natural Resources program. Can be used to meet requirements in the MSANR curriculum.

Plant Science (PLSC)

PLSC 722 – Production of Biorenewable Resources (3) An exploration of plant species with potential as crops for industrial uses including biofuels. An overview of the chemistry of plant products and extraction techniques for useful products including biofuels, unique fatty acids and pharmaceuticals from new and existing crops. Will include a review of fundamental concepts in bioenergy and biobased products including engineering thermodynamics and organic chemistry. *(Same as NRM 722)*

PLSC 724 – Advanced Grazing Management Techniques (3) An in depth discussion of the integral biological and physical components of pasture systems. Students will learn how soil chemical and physical properties interact with plant growth in the production of forage crops. The focus of the course will be to examine the impact of management practices on the ecology of grazing livestock in pasture systems. Students will evaluate grazing systems and develop a management plan as a part of the course activities. A paper dealing with pasture ecology will be a required component of the course. *(Same as NRM 724)*

Text: Grazing Management, Second Edition. Author: John F. Vallentine. ISBN: 9780127100012

Soil Science (SOIL)

SOIL 630 - Wetland Science (3) An introduction to the conservation and management of wetland environments. Emphasis will be placed on the role of wetlands in maintaining water quality and strategies for multiple use management of wetland resources. Students will become familiar with basic and applied concepts in hydrology, soils, and vegetation of both constructed and natural wetlands. *Prereq: CHEM 111 or 121, BIOL 120 or 140, or consent of the instructor. It is the assumption of the instructor that the student has a basic understanding of biological chemistry, for example the processes of photosynthesis and respiration.*

Wildlife Biology (WBIO)

WBIO 730 – Wildlife Policy (3) An examination of external social influences on wildlife management and administration. This course utilizes guest lectures and case studies to explore how private and political influences impact science-based management of wild animal populations. Content includes, but is not limited to, policy research and written reviews and analyses

WBIO 770 – Topics in Wildlife Biology (1-6) Topics in selected areas of wildlife biology. For graduate students in the Master of Science in Agriculture and Natural Resources program. Can be used to meet requirements in the MSANR curriculum.