

## PROVISIONAL SHEET FOR GRADUATE STUDENT

### CORE CURRICULUM FOR ONLINE MASTER OF ENVIRONMENTAL SCIENCE (M.S.) DEGREE.

#### REQUIRED CORE COURSES 14 credits):

|                   |  |                   |
|-------------------|--|-------------------|
| EVSC 0501         | Biostats II                                  | 3 credits*        |
| EVSC 0504         | EVSC II                                      | 3 credits*        |
| EVSC 0600         | Non-Thesis Graduate Project Proposal Seminar | 1 credit          |
| EVSC 0604         | Non-Thesis Graduate Project Results Seminar  | 1 credit          |
| IBSC 0601         | Research Ethics in Bioscience                | 3 credits*        |
| EVSC 0699         | Non-Thesis Graduate Project                  | 3 credits         |
| <b>TOTAL CORE</b> |  | <b>14 credits</b> |

\*Or 9 credit hours of courses in discipline approved by Advisory Committee

#### ENVIRONMENTAL SCIENCE COURSES **12 credits**

Students are required to complete 12 credits from EVSC or related courses below based on expected concentration in consulted with advisory committee, of which **6 credit hours must be in courses at 600 or above and 6 credit hours at the 500 level or above.**

#### REQUIRED ENVIRONMENTAL SCIENCES COURSES

|           |  |             |
|-----------|--|-------------|
| EVSC 0504 | Environmental Science II                       | 3 credits   |
| EVSC 0507 | Introduction to Geographic Information Systems | 3 credits   |
| EVSC 0510 | Soil Physics                                   | 3 credits   |
| EVSC 0521 | Soil and Water Conservation                    | 3 credits   |
| EVSC 0520 | Introduction to Epidemiology                   | 3 credits   |
| EVSC 0522 | Introduction to Toxicology                     | 3 credits   |
| EVSC 0555 | Soil Chemistry                                 | 3 credits   |
| EVSC 0590 | Soil/Environmental Microbiology                | 3 credits   |
| EVSC 0595 | Special Problems In Environmental Sciences     | 1-3 credits |
| EVSC 0695 | Special Topics in Environmental Sciences       | 1-3 credits |

#### ELECTIVES **6 credits**

Students are required to complete at least 6 credit hours of electives comprising any graduate level courses 500 or above outside his/her respective concentration approved by the Advisory Committee.

|           |   |           |
|-----------|---|-----------|
| AGEC 0553 | Macroeconomics and Applications in Agriculture        | 3 credits |
| AGEC 0604 | Microeconomics Theory and Applications to Agriculture | 3 credits |
| AGEC 0622 | Research Methodology                                  | 3 credits |

|           |                                      |           |
|-----------|--------------------------------------|-----------|
| ECON 0512 | Introduction to International Trade  | 3 credits |
| PLSS 0513 | Entomology                           | 3 credits |
| PLSS 0525 | Mineral Nutrition and Soil Fertility | 3 credits |
| PLSS 0530 | Plant Biotechnology                  | 3 credits |

**TOTAL CREDIT HOURS REQUIRED** **32 credits**

**VII. Course Titles and Descriptions**

**COURSE DESCRIPTIONS**

**REQUIRED CORE COURSES**

**(Online Master of Environmental Sciences)**

EVSC 0501. BIO-STATISTICS II. 1<sup>st</sup> Semester. Lect. 2, Lab 3, 3 credits. The application of advanced statistical methods in analyzing biological data to include analysis of two-way experiments, factorial experiments, covariance analysis, least-square analysis with unequal subclass numbers and curvilinear regression. Laboratory assignments require the use of the University's time share computer and departmental microcomputers. Prerequisites: EVSC 0500 or Permission of instructor.

AGSC 0600. ENVIRONMENTAL SCIENCE NON-THESIS GRADUATE PROJECT PROPOSAL SEMINAR. 1<sup>st</sup> and 2<sup>nd</sup> Semesters. Lect. 1, 1 credit. Lectures from visiting scientists, and other organizations on topics related to environmental science. Presentation of proposals for thesis/non-thesis projects and technical reports by students on research in environmental science and related areas. This is a unique type of seminar in which knowledge from different areas will be integrated and students will write technical reports from the notes of the lectures combined with literature research. (Only one credit hour for any given semester will be allowed).

AGSC 0604. ENVIRONMENTAL SCIENCE NON-THESIS GRADUATE PROJECT PROPOSAL SEMINAR. 1<sup>st</sup> and 2<sup>nd</sup> Semesters. Lect. 1, 1 credit. Lectures from visiting scientists, and other organizations on topics related to environmental science. Presentation of project results for non-thesis graduate projects by students on research in environmental science

and related areas. This is a unique type of seminar in which knowledge from different areas will be integrated and students will write technical reports from the notes of the lectures combined with literature research. (Only one credit hour for any given semester will be allowed).

IBSC 0601. RESEARCH ETHICS IN BIOSCIENCE. 1<sup>st</sup> Semester Lec. 2 hours. 3 credits. This course is open only to graduate students. A special focus will be ethical problems in bioscience related to race/ethnicity and work of minority bioscientists. Instructors will primarily serve as learning guides. Extensive student preparation prior to class is essential. Students are expected to participate significantly in class discussion and conscientiously contribute to group work. Independent student research will be required. There are no prerequisites.

EVSC 0699. NON-THESIS GRADUATE PROJECT. 1<sup>st</sup> and 2<sup>nd</sup> Semesters, Summer, 3 credits. Research, preparation and production of final project paper under the directions of a major advisor. Students in this program will be required to select research problems on a specific topic concentrating on the investigation of problems in agricultural, environmental and related sciences.

### **ENVIRONMENTAL SCIENCES AND RELATED COURSES**

PLSS 0501. FIELD AND FORAGE CROP PRODUCTION. 1<sup>st</sup> Semester. Lect. 3, Lab 0, 3 credits. Principles and practices involved in the growth and production of major field and forage crop production. Prerequisites: PLSS 0210, 0211, and 0401.

EVSC 0504. ENVIRONMENTAL SCIENCE II. 2<sup>nd</sup> Semester. Lect. 3, 3 credits. Problems related to the presence of biologically active substances and potential hazardous synthetic chemicals in the environments. Strategies in minimization and management of these hazards will be discussed. Pesticides, radiation hazards, industrial chemical and potential biological hazards will be considered. Prerequisites: CHEM 0320 or Permission of Instructor.

EVSC 0507. INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS. 1 Semester. Lect. 2, Lab 1, 3 credits. Introductions to GIS concepts. Basic theoretical concepts, computer cartography, database systems, getting maps into digital form and geocoding. Familiarity with Arc-GIS software.

PLSS 0510. SOIL PHYSICS. 2<sup>nd</sup> Semester (Even years). Lect. 3, 3 credits. Theory and practice of quantifying soil particle and pore distributions, soil structure, soil water content, soil water potential, saturated and unsaturated flow, infiltration, drainage, energy balance, evapotranspiration and irrigation. Prerequisites, PLSS 210 and 211.

EVSC 0520. INTRODUCTION TO EPIDEMIOLOGY. 1<sup>st</sup> Semester, Lect. 3, 3 credits. This course is designed to teach students how to study the determinants and distribution of disease frequency in human populations, along with the associated risk factors. Students will study how

to design a research project, ethics involving data collection and dissemination, descriptive epidemiology, quantitative measures and terminology. Completion of this course will allow the students to devise and applying epidemiologic principles to address relevant environmental health problems in their communities. Prerequisites: EVSC 0404. BIOL 140 or the permission of the instructor.

PLSS 0521. SOIL AND WATER CONSERVATION. 2<sup>nd</sup> Semester. Lect. 2, Lab 3, 3 credits. Theory and practice of soil and water conservation and management for temperate, tropical and arid region soils; land use planning. Prerequisite: PLSS 210.

PLSS 0522. PHYSIOLOGY OF PLANT GROWTH AND DEVELOPMENT. 2 Semester. Lect. 3, Lab 3, 3 credits. Dealing with all essential and beneficial nutrient elements, absorption, translocation and their metabolic association in plants.

PLSS 0525. MINERAL NUTRITION AND SOIL FERTILITY. 2<sup>nd</sup> Semester. Lect. 3, Lab 3, 3 credits. Dealing with all essential and beneficial nutrient elements, absorption, translation and their metabolic association in plants.

PLSS 0530. PLANT BIOTECHNOLOGY. 2<sup>nd</sup> Semester. Lect. 3, 3 credits. A lecture discussion course for upper-level undergraduate and graduate students in agronomy and horticulture. The purpose is to introduce students to principles and applications of plant molecular and cellular genetics with emphasis on research developments including plant gene transfer, RFLP mapping, and plant gene expression.

EVSC 0555. SOIL CHEMISTRY. 1st Semester, even years. Lect. 3, 3 credits. Theory and practice of the inorganic chemical reactions involved in soil development and nutrient availability and cycling; topics include chemical ion exchange equilibria and kinetics, colloidal systems, solubility diagrams and oxidation reduction. Prerequisites: CHEM 0231, 0232, PLSS 0210. Same as PLSS 0555.

PLSS 0565. BIOTECHNOLOGY. 2<sup>nd</sup> Semester. Lect. 2, Lab 6, 4 credits. Same as Biology 565. This course is designed to introduce advanced undergraduates and graduate students to basic recombinant DNA techniques including growth and manipulation of plasmids and their bacterial hosts; isolation, quantitation, and electrophoretic analysis of DNA; restriction and ligation of DNA; cloning in lambda; MS and plasmid vectors; site-specific mutagenesis. The focus of the course is hands-on experimentation; however, time will be devoted to discussion of application of these and other techniques to variety of research problems. By the end of the course, the students should have a working knowledge of basic recombinant technology, should have an introductory knowledge of more specialized techniques, and should be familiar with the terminology and resource literature of genetic engineering.

EVSC 0590. SOIL/ENVIRONMENTAL MICROBIOLOGY. 1st Semester, Odd year. Lect. 3, 3 credits. Description, location, taxonomy, abundance and significance of the major groups of soil microorganisms, major biochemical transformations carried out by the organisms; major biochemical transformations carried out by the soil micro flora and their relationships to soil fertility and environmental pollution are examined. Prerequisites: CHEM 0320 or Permission of Instructor. Same as PLSS 0590.

## **ELECTIVE COURSES**

AGEC 553. MACROECONOMICS AND APPLICATIONS IN AGRICULTURE: 1<sup>st</sup> Semester. Lect. 3. An advanced look at theory and applications to agriculture of the circular flow framework, supply and demand in the macroeconomy, labor and factor markets, aggregate real supply and demand analysis; effects of fiscal and monetary policy on the price level, real output, and unemployment; budget deficits, and stability of the banking system. Prerequisites: ECON 353.

AGEC 604. MICROECONOMICS THEORY AND APPLICATIONS TO AGRICULTURE: 2<sup>nd</sup> Semester. Lect. 3. This is an advanced microeconomics course that develops the theoretical structure of microeconomics principles and application to economic policy and decision making. The course covers the microeconomics of consumer choice, theory of the firm, general equilibrium, welfare economics, externalities and public goods. Prerequisites: ECON 352.

AGEC 615. QUANTITATIVE METHODS. 1<sup>ST</sup> Semester. Lect. 3. Statistical methods and their applications: probability density and distribution functions as background studying principles of economic models analyses; prediction problems, programming, scheduling and network; special topics of current interest 3 credits. Prerequisites: AGECE 553; ECON 352, 353.

AGEC 622. RESEARCH METHODOLOGY. 2<sup>nd</sup> Semester. Lect. 3. Selection, planning and conduct of research; alternative approaches, role of theory, beliefs and values; critical appraisal of research tools and studies; empirical development, presentation and defense of researchable problems by students. Prerequisite: one year of graduate work, including statistics. 3 credits.