### COURSE DESCRIPTIONS

<table>
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<tr>
<th>COURSE CODE</th>
<th>COURSE TITLE</th>
<th>CREDITS</th>
<th>PREREQUISITES</th>
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<tr>
<td>NRE 101</td>
<td><em>Introduction to Plant Science</em> - 4 hrs.</td>
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<td>Study of the fundamental principles of science as related to the basic aspects of plant growth, morphology, physiology, ecology, propagation, and utilization. Prerequisite: None (Offered Fall)</td>
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<tr>
<td>NRE 170</td>
<td><em>Introduction to Environmental Science</em> - 3 hrs.</td>
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<td>A study of man both as a dominant force and as an inseparable part of the ecosphere. Basic ecological concepts, pollution and pollution control, resources and resource use, human manipulation of ecosystems, the law and environmental problems, the urban environment, problems of population growth, and discussion of other specific environmental issues. Prerequisite: None (Offered Spring)</td>
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<tr>
<td>NRE 223</td>
<td><em>Introduction to Environmental Health Science</em> - 3 hrs.</td>
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<td>The fundamental of environmental health, covering environmental control agencies, elements of the environment suffering from pollution, environmental pollutants and their sources, effects of environmental pollution, and methods of pollution control. Prerequisite: SPS 170, BIO 101, 101L, CHEM 101 and CHEM 101L or Instructor’s consent. Offered Fall and Spring.</td>
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<tr>
<td>NRE 251</td>
<td><em>Introduction to Soil Science</em> - 4 hrs.</td>
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<td>Fundamental principles of soil science, a comprehensive study of physical, chemical, and biological properties of soils and their applications to crop production and other land uses. (Audio-tutorial). Prerequisite: None (Offered Fall)</td>
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<td>NRE 281</td>
<td><em>Introduction to Forestry</em> - 3 hrs.</td>
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<td>Principles and practices of forestry. Brief treatment of forest tree biology, dendrology, forest ecology, hydrology, insects and diseases, mensuration, silvicultural methods, products, economics, and management. Prerequisite: None (Offered Spring &amp; Fall)</td>
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<td>NRE 282</td>
<td><em>Dendrology</em> - 3 hrs.</td>
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<td>Identification, classification, and taxonomy of the commercially and ecologically important forest plants in the United States. Prerequisite: None (Offered Fall)</td>
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<td>NRE 286</td>
<td><em>Wildlife Biology and Identification</em> – 3 hrs.</td>
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<td>Identification, distribution, life history, and behavior of North American amphibians, reptiles, birds and mammals. Emphasis on ecological and zoological aspects of special relevance to management. A laboratory and field course in species identification, techniques of age and sex determination, and behavior analysis. Prerequisite: none (Offered Spring)</td>
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<td>NRE 350</td>
<td><em>Soil Morphology, Genesis, and Classification</em> - 4 hrs.</td>
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<td>Soil characteristics used in soil survey and identification, factors and processes of soil formation and principles of soil classification systems are addressed. Prerequisite: NRE 251 (Offered Fall, Odd Years)</td>
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<td>NRE 351</td>
<td><em>Soil and Water Conservation</em> - 3 hrs.</td>
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<td>A study of soil and water conservation principles as related to wind and water erosion control, water utilization and runoff control, irrigation and drainage principles relating to crop production. Prerequisites: NRE 251 and junior or senior standing (Offered Spring, Even Years)</td>
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<td>NRE 360</td>
<td><em>Cooperative Education</em> - Credits variable, but should not exceed six semester hours. Relevant job-related experiences are arranged with federal and state government or with private industry. Prior approval by student’s advisor is required. Prerequisite: None (Offered Summer)</td>
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<td>NRE 365</td>
<td><em>Introduction to Geographic Information Systems</em> - 3 hrs.</td>
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<td>An introduction to computer-assisted geographic analysis technology used in the management, assessment, and inventory of natural resources. Prerequisite: None (Offered Fall)</td>
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<td>NRE 366</td>
<td><em>Climate and Global Change</em> - 4 hrs.</td>
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<td>Climate and global change; relationships between the sun and the earth; the global structure and variations of the atmosphere and oceans; and the influence of humans and natural processes on the climate system and its variability. (Offered Summer)</td>
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<td>NRE 370</td>
<td><em>Natural Resource Management</em> - 3 hrs.</td>
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<td>An ecological approach to basic conservation principles and techniques. Introduction to policies and techniques for intelligent management and utilization of forests and other natural resources. Prerequisite: One course in biology (Offered Fall)</td>
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<td>NRE 371</td>
<td><em>Forest Mensuration</em> - 4 hrs.</td>
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<td>An applied approach to forest measurements, including log, tree and stand measurements, as well as data analysis. Training in commonly used measuring devices is included during a weekly field laboratory. Prerequisite: NRE 380 or consent of instructor Co-requisite: NRE 375 (Offered Spring)</td>
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<td>NRE 372</td>
<td><em>Forest Fire Ecology and Management</em> – 2 hrs.</td>
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<td>This course will describe the impacts of fire on various forested ecosystems and describe tools for prediction of both the effects and behavior of forest fires. Fire prevention and management techniques will also be discussed. Prerequisite: NRE 282, NRE 374 (Offered Spring)</td>
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NRE 374  Silvics - 3 hrs. A study of the habitat, genetics, and life histories of commercially and ecologically important U.S. trees and their interaction with their environments. Prerequisite: NRE 282 (Offered Fall)

NRE 375  Silviculture - 4 hrs. A study of silvicultural systems in the U.S. Includes basic forest ecology, regeneration practices, intermediate cuts, and site preparation. Prerequisite: NRE 380 or consent of instructor Co-requisite: NRE 371 (Offered Spring)

NRE 376  Forest Pest Management – 3 hrs. An introductory course on the biology, ecology and management of forest pests, with particular emphasis on insects and tree disease pathogens. The course includes a weekly three-hour laboratory, where students develop skills in insect and pathogen identification and learn to recognize pest problems via associated host tree symptoms. Prerequisite: BIO 101 and BIO 204 or NRE 101 (Offered Spring)

NRE 380  Forestry Field Techniques - 6 hrs. A six-week, full-time summer course including timber harvesting techniques, field mensuration, and silvicultural practices. Prerequisite: NRE 281 or consent of instructor (Offered Summer)

NRE 381  Wood Products - 3 hrs. A study of the physical and chemical composition of wood and the products derived from wood. Prerequisite: NRE 281 (Offered Fall)

NRE 385  Forest Recreation - 3 hrs. An introduction to forest recreation from the planning, policy, legal, and technical standpoints. Campgrounds, picnic areas, trail construction, visitor, and operations management are a few of the major areas covered. Specific information and recommendations on how to perform forest recreation jobs at the technical level are also provided. Prerequisite: NRE 281 (Offered Spring)

NRE 386  Principles of Wildlife Management - 3 hrs. An introduction to the life history requirements, behavioral adaptations, habitat selection, population dynamics, community relationships, and management strategies of terrestrial vertebrates in North America. History of wildlife management, current wildlife policies, and survey of wildlife field techniques are also included. Prerequisite: NRE 281 (Offered Spring)

NRE 387  Wildlife-Forestry Relationships – 3 hrs. An in-depth course on the relationships between forest habitat conditions and the abundance, diversity, and physiological condition of wildlife. Examination of wildlife effects on forest regeneration and management practices with consideration of vertebrate pest control strategies. Discussion of wildlife-habitat relationships models, habitat suitability models, and assessment of beneficial and detrimental impacts of forest management on wildlife conservation. Prerequisite: NRE 281 (Offered Spring)

NRE 388  Principles of Fisheries Science– 3 hrs. Hands-on introduction to fisheries science. Overview of the nature of fisheries, brief introduction to the physiological ecology of aquatic organisms, methods in the capture and identification of local fishes, introduction to trophic interactions, bioassessment, and habitat and water quality assessment. Fall


NRE 400  Fundamentals of Epidemiology 3 hrs. Students will learn the fundamentals of epidemiology. Areas of emphasis include epidemiology definitions and practical applications, measures of morbidity and mortality, descriptive epidemiology, observational and experimental study designs, data interpretation issues, infectious disease epidemiology, environmental epidemiology, and chronic disease epidemiology. Prerequisites: CHEM 101 and CHEM 101L Offered Spring.

NRE 401  Floral and Garden Center Management (formerly Nursery and Greenhouse Management) - 4 hrs. Management of garden centers, including financing, selecting a location, designing of facilities, greenhouse construction, selection of plant materials, personnel management, selling and advertising, and maintaining plant materials. Principles and practices of establishment and management of a retail flower shop, including store location, buying, floral design, pricing and merchandise control. Prerequisite: NRE 101 or consent of instructor (Offered Spring, Odd Years)

NRE 406  Soil Microbiology - 4 hrs. A study of the properties and classes of microorganisms as related to soil and crop production. Effects of microorganisms on the fertility, and chemical, and physical properties of soil, are emphasized. Prerequisites: BIO 101, BIO 101L, BIO 102, BIO 102L, BIO 330, and BIO 330L. Seniors and graduate students only (Offered Spring)
NRE 410  
*Forage Management* - 3 hrs. A study of the soil - plant - animal complex as it relates to the morphology, physiology, and utilization of forages. Emphasis will be on agronomic practices and physiological considerations in forage management in Alabama. **Prerequisite:** NRE 101 or BIO 204 and BIO 204L (Offered Spring, Odd Years)

NRE 411  
*Weed Science and Herbicide Technology* - 3 hrs. Phenology of weeds, habitat management by cultural, mechanical, biological and chemical means, dissipation and phytotoxicity of herbicides. Application and physiological relationships of herbicides and recent advances in weed control problems. **Prerequisite:** NRE 101 or BIO 204 and BIO 204L (Offered Fall, Odd Years)

NRE 417  
*Sustainable Crop Production* – 3 hrs. Principles of sustainable agriculture with modern crop production practices, management of biological, physical, and human resources to optimize field crop production in a sustainable and cost-effective manner. Emerging biotechnologies, precision agriculture, etc. are highlighted. **Prerequisite:** NRE 101 or equivalent (Offered Spring)

NRE 421  
*Plant Propagation* - 3 hrs. A study of the principles, processes, methods, and materials involved in sexual and asexual propagation of plants. **Prerequisites:** NRE 101 or consent of instructor (Offered Spring, Odd Years)

NRE 422  
*Landscape Design and Construction* - 4 hrs. A study of the principles of landscape design, including symbols, styles, finished drawings, selection and arrangement of plants, sections and elevations design of construction features and computer-aided drawing. **Prerequisite:** NRE 423 (Offered Spring, Even Years)

NRE 423  
*Ornamentals I – Trees and Shrubs* - 3 hrs. Type, characteristics, adaptation, maintenance, and functional uses of ornamental plants used in landscape design, with a special emphasis on trees, shrubs, vines, and groundcovers. **Prerequisites:** NRE 101, or consent of instructor (Offered Fall, Odd Years)

NRE 425  
*Lawn and Turf Management* - 3 hrs. Methods and principles of establishing and maintaining residential lawns as well as special-purpose turf grasses for commercial landscapes, golf courses or athletic fields, including weed and pest control. **Prerequisite:** NRE 101 or equivalent (Offered Spring, Even Years)

NRE 427  
*Ornamentals II – Flowers and Foliage Plants* - 3 hrs. Identification, culture, and use of herbaceous annuals and perennials, bulbs, herbs and ornamental grasses. Flower bed and border preparation and maintenance; selection, installation, and care of tropical foliage plants in interior settings; use of light, plant acclimatization, growing media, fertilizers, containers, and pest control. **Prerequisite:** NRE 101 or consent of instructor (Offered Fall, Even Years)

NRE 428  
*Fruit and Vegetable Production* - 3 hrs. Commercial fruit and vegetable culture, including site selection and preparation, classes of vegetables, species of fruits, establishment, pest control, and harvesting are emphasized in this course. **Prerequisite:** NRE 101 or consent of instructor (Offered Spring, Even Years)

NRE 430  
*Biometrics* - 3 hrs. Introductory statistics, with emphasis on the biological sciences. Includes a study of natural distribution systems, sampling techniques, data arrangement, tests of significance, and logical inferences. **Prerequisites:** MTH 112 and MTH 113 (Offered Fall)

NRE 431  
*Principles of Plant Breeding* - 3 hrs. Principles, methods, and techniques involved in plant breeding, and their application to field crops. **Prerequisites:** BIO 204, BIO 204L, BIO 311 and BIO 311L (Offered Spring)

NRE 432  
*Plant Disease Diagnosis* - 4 hrs. A study of the general principles and methods applied in identification, epidemiology, etiology, and control of major plant diseases. **Prerequisite:** None (Offered Fall)

NRE 433  
*Introduction to Molecular Genetics* - 3 hrs. The study of prokaryotic DNA structure and replication, restriction analysis, sequencing, transcription, translation, gene regulation and gene expression. **Prerequisite:** Consent of instructor (Offered Fall)

NRE 433L  
*Introduction to Molecular Genetics Laboratory* - 1 hr. This course emphasizes the basic techniques used in molecular genetics and provides a step-by-step approach and hands-on experience in the field of recombinant DNA technology. **Co-require: NRE 433** (Offered Fall)

NRE 435  
*Introduction to Bioinformatics* – 4 hrs. An interdisciplinary course melding information and biological sciences. Structure and function of proteins and nucleic acids; retrieval and interpretation of bioinformation, algorithms and software for sequence alignment, similarity searching of sequence databases. **Prerequisite:** General Biology/Biochemistry, some familiarity with computer programming (Offered Fall)

NRE 440  
*Seed Production Practices* - 4 hrs. A study of the principles and practices in the production of pure seeds, with emphasis on harvesting, drying and storage; crop and weed seed identification and laboratory practices in seed testing; and official rules for testing seeds and seed laws or marketing. **Prerequisites:** NRE 101 or NRE 310 (Offered Fall, Even Years)

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NRE 441  Phyto-physiology - 4 hrs. A study of the environment-plant growth interaction in the physiology of plants with emphasis on whole plant processes. **Prerequisite:** NRE 101 (Offered Fall).

NRE 445  Bioinformatics Applications. 4 hrs. Analysis of vast amounts of data generated due to the recent advances in genomic technologies such as, high-throughput sequencing, functional genomics and proteomics, is essential for the understanding of biological function and variation. This course emphasizes mastering of various tools used for analyzing DNA, RNA and protein data, understanding of underlying algorithms, and their application to biological problems. **Prerequisites:** BIO103 or equivalent upon Instructor’s consent. (Offered Spring)

NRE 450  Earth Science - 3 hrs. An advanced level overview of earth science concepts, processes, and categories, with emphasis on plate tectonics, volcanism, weathering and erosion, global weather and climate, vegetation, and soil. Emphasis on human interactions and relationships with the physical environment and resulting public policy and management conflicts, (e.g., biodiversity as an issue) as well as management strategies are addressed. **Prerequisite:** None (Offered Fall, Odd Years)

NRE 451  Environmental Toxicology - 3 hrs. Toxic effects of environmental chemicals on living systems, the chemical and biological characteristics of major pollutants, their origins and uses, and the exposure, transformation and elimination of toxic substances by biological systems. **Prerequisites:** CHE 102, CHE 302, or consent of instructor (Offered Fall, Odd Years)

NRE 452  Soil Fertility and Fertilizers - 3 hrs. A study of the relationship of soil chemistry, forms of nutrients in soils, and role of plant nutrients in crop production, as well as other factors associated with soil productivity; and basic concepts of fertilizer application and manufacturing. **Prerequisites:** CHE 102 and NRE 251 (Offered Fall, Even Years)

NRE 453  Hazardous Waste Management - 3 hrs. The impact, technologies, problems and issues associated with hazardous wastes, and management practices are emphasized in this course. Case studies of hazardous waste spills, risk assessments, and remediation techniques are included. **Prerequisite:** None (Offered Spring, Odd Years)

NRE 460  Soil Chemistry - 3 hrs. Chemical and mineralogical composition of soil; fundamental chemical properties of soils; nature and properties of soil colloids; cation exchange phenomena in soils; soil reaction, and soil acidity are addressed in this course. **Prerequisites:** CHE 101, CHE 101L, CHE 102, CHE 102L, and NRE 251 (Offered Spring, Odd Years)

NRE 461  Soil Physics - 4 hrs. A study of physical make-up and properties of soil, including structure, thermal relationships, consistency, plasticity, water and their interrelatedness. **Prerequisites:** PHY 103 and NRE 251 (Offered Fall, Even Years)

NRE 465  Applications of Geostatistics – 3 hrs. Use of geostatistical models in sampling experimental design, mapping contaminant concentration, risk analysis, remediation, planning and probability analyses. Conceptual development of theory and action in managing natural resources. **Prerequisites:** MTH 112, MTH 113, and NRE 430 or equivalent statistics (Offered Spring, Even Years)

NRE 470  Soil, Plant, and Water Analysis - 4 hrs. Chemical and instrumental methods in the analysis of soil, plant, and water samples; experimental and descriptive inorganic and organic analyses; atomic and molecular absorption and emission spectroscopy, mass spectrometry, X-ray diffraction and fluorescence, gas and ion chromatography, and ion-selective electrodes. **Prerequisites:** CHE 102, CHE 202 and NRE 251 (Offered Spring, Even Years)

NRE 471  Aerial Photo-Interpretation - 3 hrs. Detection, identification and analysis of objects or features from aerial photographs. Sensing devices and other equipment related to photogrammetry application are utilized. Interpretation of terrain, vegetation, and cultural features is emphasized. **Prerequisite:** Consent of instructor (Offered Fall)

NRE 472  Soil, Water and Air Pollution - 3 hrs. The fate of chemical fertilizers, pesticides, and other agricultural and industrial pollutants in relation to environmental quality as well as the effects of these factors on checks and balances of natural terrestrial and aquatic ecosystems. **Prerequisites:** CHE 102, CHE 102L, and NRE 251 (Offered Spring, Even Years)

NRE 475  Principles of Wetlands - 3 hrs. The importance of wetlands for wildlife, waste treatment, flood control, and water quality is emphasized. Biological, chemical, and physical processes, which occur in natural and constructed wetlands, are addressed. Field trips are required. **Prerequisites:** CHE 102, CHE 102L, and NRE 251 (Offered Fall, Even Years)
NRE 476  
*Remote Sensing of the Environment I* - 4 hrs. The principles of remote sensor systems and their utility, natural resource inventory and management, land use planning, and environmental monitoring, as well as, interpretation of color infrared photos, multispectral and thermal scanners, and radar imagery are emphasized in this course. **Prerequisite: Consent of instructor** (Offered Fall)

NRE 477  
*Insect Biology and Pest Management* - 3 hrs. Biology of insects, taxonomy, basic structure and function, ecology and the management of insect pest populations. The course includes a weekly three-hour laboratory, where students develop insect identification and collecting skills. **Prerequisite: Consent of instructor** (Offered Spring, Odd Years)

NRE 478  
*GIS, Spatial Analysis, and Modeling* – 3 hrs. This intermediate Geographic Information Systems course prepares students for advanced principles of GIS class. Principles and methods of spatial analysis and their application to different disciplines such as urban planning, environmental science, and natural resource management. Integrate geographic concepts and techniques used in spatial analysis, network analysis and 3D analysis with both raster and vector data structures. **Prerequisite: NRE 365** (Offered Spring)

NRE 480  
*Natural Resource Policy* - 3 hrs. Evaluation of land and forest problems and policies in the United States, including an analysis of current social and resource characteristics that have shaped policy in the United States. **Prerequisite: Consent of instructor** (Offered Spring)
NRE 481 Hydrology and Watershed Management - 3 hrs. This course addresses the occurrence and movement of water over the earth’s surface. The hydrologic cycle, surface runoff relations, relationship of precipitation to stream flow with frequency analysis, unit hydrograph theory, flood routing, probability in hydrology, hydrologic simulation and stochastic methods in hydrology are covered. **Prerequisite: Consent of instructor** (Offered Spring, Odd Years)

NRE 482 Forest Tree Improvement – 3 hrs. Practical problems, concepts and techniques to genetic improvement of forest trees. **Prerequisite: Consent of instructor** (Offered Spring, Even Years)

NRE 483 Forest Resources Economics - 3 hrs. A discussion of the market, price, and cost affecting factors as they relate to timber-harvesting techniques used for determining the best economic alternative. **Seniors only. Prerequisite: Senior classification and consent of instructor** (Offered Fall)

NRE 484 Ecological Processes - 3 hrs. A review of ecological concepts and processes. Investigations into the ecological role of fire and wetlands are also included. **Prerequisite: NRE 374 or consent of instructor** (Offered Fall, Odd Years).

NRE 486 Environmental Policy and Law - 3 hrs. An understanding of the environmental law system by examining various laws, policies, and cases within the U.S. legal system that are used to minimize, prevent, or remedy the consequences of actions which damage or threaten the environment, public health or safety. **Prerequisite: Consent of instructor**

NRE 488 Wildlife Techniques: - 3 hrs. Field and lab procedures for determining sex and age, capture and marking, physiological indices, harvest surveys, population estimation procedures, and habitat evaluation. Includes mapping with geographic information systems, orienteering and field safety. Introduce students to a broad range of methods and equipment used by wildlife professionals to gather information on wild animals and their habitat. In addition, this course will emphasize the characteristics of a particular technique that might make it superior to others in practical situations. Prerequisite: None (Offered Fall)

NRE 489 Forest Ecological Management - 3 hrs. A study of the integrated management of forest resources including plant, site and landscape processes, as well as interrelationships of forestry practices, wildlife and range management, hydrology, recreation, and other demands. **Prerequisite: NRE 371** (Offered Spring)

NRE 490 Special Problems - 1-3 hrs. The student selects a problem within his or her major interest that is planned and executed under the supervision of a faculty member. **Prerequisite: Consent of instructor** (Offered Fall, Spring and Summer)

NRE 491 Seminar - 1 hr. A course designed to help students develop skills and techniques associated with data gathering and presentation by using audiovisual equipment. Guest speakers will also present topics of general interest in agriculture and environmental science. **Prerequisite: Senior classification and consent of instructor** (Offered Fall, Spring and Summer)

NRE 493 Student Exchange – 6-16 hrs. Students entering into this program will register for 6-16 credit hours at the home institution and pay fees at the home institution, but actually take a load equivalent to the credit hours for which they registered at one of the cooperating international institutions. Courses will be determined between home institution advisor, student, and host institution mentor. **Prerequisite: Consent of instructor** (Offered Fall, Spring and Summer).

NRE 494 Irrigation and Drainage Systems - 4 hrs. Students will learn designing and construction of irrigation and drainage structures. This course integrates soil and water physics; irrigation development; crop water requirements & scheduling; irrigation planning and design; drainage criteria; design discharges; surface/sub-surface drainage systems design; irrigation drainage structures; land grading and excavation; lab and field exercises and measurements. **Prerequisite: For NRES students: NRE 351; For Civil Engineering students: EGC 305; CE 305; or Instructor’s permission.** Offered Spring.


NRE 496 Environmental Health Internships 3 hrs. Those students enrolled in Environmental Health Science program will gain additional field experience, career mentoring, and research opportunities through summer employment/internships with partners such as state and local Departments of Public Health, Environmental Protection Agency (EPA), the Centers for Disease Control (CDC), National Institutes of Environmental Health Sciences (NIEHS), and biotech industries involved in biomedical research, etc. **Prerequisites: Must have completed all course requirements and Consent of Instructor.**