ESSM Ecosystem Science & Mgmt

Courses

ESSM 102 Introduction to Natural Resources and Ecosystem Management
Credit 1. 1 Lecture Hour.
Introduction to natural resources and ecosystem system approach to wildland management; survey of the field of natural resources and related industries.

ESSM 201 Exploring Ecosystem Science and Management
Credit 1. 1 Lecture Hour.
Exploration of knowledge, skills and abilities required for varied careers within ecosystem science and management; development of a professional portfolio and résumé; exploration of career options through team approach; conduct one service project.

ESSM 203 Forest Trees of North America
Credits 3. 2 Lecture Hours. 2 Lab Hours.
(FORE 1314) Forest Trees of North America. Taxonomy, phylogeny, and identification of the important forest trees of North America and their ecological and social uses and benefits.
Prerequisites: BIOL 101, BIOL 107, BIOL 111 or BIOL 113 and BIOL 123 or equivalent.

ESSM 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in ecosystem science and management. May be repeated 2 times for credit.
Prerequisites: Freshman or sophomore classification and approval of instructor.

ESSM 300 Field Studies in Forest Ecosystems
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Field-oriented focus on forest ecosystem science and management; problem-solve management questions through data collection and team-based research; investigate the relationships between landowner objectives, mensuration, silviculture, ecology, soils, and regeneration-focused harvesting systems; foster the development of student-faculty relationships; enhance professional knowledge and skills.
Prerequisite: Junior or senior classification or approval of instructor.*

ESSM 304 Rangeland Plant Taxonomy
Credits 4. 2 Lecture Hours. 6 Lab Hours.
Interpretation of plant morphology for keying and identification of important flowering rangeland plants; vegetative and floral characters for important plant families including toxic compounds affecting domestic livestock. Plant collection required.
Prerequisites: Junior or senior classification or approval of instructor.*

ESSM 305 Watershed Analysis and Planning
Credits 3. 3 Lecture Hours.
Provide an integrated framework for watershed planning that addresses the related biophysical, social and economic issues; comprehensive in scope and approach giving students the tools and techniques for developing sound watershed management policy and practice; water issues, problems and regulations for Texas.
Prerequisite: Junior or senior classification.*

ESSM 306 Plant Functional Ecology and Adaptation
Credits 3. 3 Lecture Hours.
Investigation of physiological mechanisms influencing ecological patterns and processes, including plant acclimation and adaptation in contrasting habitats; abiotic controls on species productivity and distribution; underlying genetic and evolutionary mechanisms contributing to the occurrence of specific genotypes and phenotypes in unique environments.
Prerequisites: RENR 205, any BIOL course, junior or senior classification or approval of instructor.

ESSM 307 Forest Protection
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Destructive agents in forestry as related to importance, identification, cause, extent of losses and protective measures.
Prerequisites: RENR 205, AGEC 105 or equivalent, junior or senior classification or approval of instructor.

ESSM 308 Fundamentals of Environmental Decision-Making
Credits 3. 3 Lecture Hours.
Introduction to environmental issues in natural resources management; fundamental principles and methods for understanding biosocial interdependencies in complex environmental issues; use of computer-aided group decision-making techniques to develop cooperative strategies for resolving local or global environmental issues.
Prerequisite: Junior or senior classification or approval of instructor.*

ESSM 309 Forest Ecology
Credits 3. 3 Lecture Hours.
Life history and general characteristics of trees; structure and function of forest ecosystems; fundamental principles of forest tree physiology and ecology applied to an analysis of tree growth in relation to environmental factors and present day forest management; global changes and forests.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 311 Biogeochemistry and Global Change
Credits 3. 3 Lecture Hours.
Framework for understanding biogeochemical cycles, their significance at both global and ecosystem levels of organization, and their contemporary relevance to ecosystem science and management.
Prerequisites: RENR 205, RENR 215, any BIOL and/or CHEM course, junior or senior classification or approval of instructor.
ESSM 313 Vegetation Sampling Methods and Designs in Ecosystems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Basis for vegetation sampling in ecosystems; methods for conducting sampling; selection of sampling unit appropriate for vegetation type; sampling statistics; mean comparisons; regression analysis; sampling design principles; development of sampling plan; presentation and interpretation of sampling data.
Prerequisites: Any MATH course satisfying university core curriculum, junior or senior classification or approval of instructor.

ESSM 314 Principles of Rangeland Management Around the World
Credits 3. 3 Lecture Hours.
Basic knowledge of world rangeland ecosystems, how these systems are managed in diverse cultural settings; principles of underlying ecological processes influenced by various land management practices; foster understanding of the values that people in different countries place on rangeland resources; use of these values to enhance geologically sustainable and socially acceptable rangeland management practices.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 315 Rangeland Inventory and Monitoring
Credit 1. 2 Lab Hours.
Theory and methods to inventory rangeland vegetation; sampling design; analysis of inventory data; interpretation of sampling data; preparation of a technical report; presentation of inventory data in text, tables, and graphs using the style of the Rangeland Ecology and Management discipline.
Prerequisites: ESSM 313, junior or senior classification or approval of instructor.

ESSM 316 Range Ecology
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Organization and distribution of rangeland ecosystems of the world, with emphasis on North America; community dynamics and functions stressed including biotic history, succession, disturbance regimes, competitive interactions, herbivory, energy flow and nutrient cycling; conservation of rangeland resources.
Prerequisites: RENR 205, RENR 215, ESSM 302, ESSM 314, ESSM 315, junior or senior classification or approval of instructor.

ESSM 317 Vegetation Management
Credits 3. 3 Lecture Hours.
Familiarization with practices that cause changes in rangeland vegetation composition for multiple uses; understanding of criteria for range improvement practices; comparison of expected responses of livestock forage production, watershed parameters and wildlife to vegetation changes following range improvements; systems concept for planning, analysis and implementation of range improvement practices.
Prerequisites: ESSM 314, junior or senior classification or approval of instructor.

ESSM 318 Coupled Social and Ecological Systems
Credits 3. 3 Lecture Hours.
Resilience-based stewardship of social-ecological systems; ecological concepts of resilience, sustainability, ecosystem services, and vulnerability; investigation of linkages among social and ecological system components; contribution to sustainability and provisioning of ecosystem services; evaluation of multiple knowledge sources as the basis for adaptive ecosystem management.
Prerequisites: RENR 205, AGEC 105 or equivalent, junior or senior classification or approval of instructor.

ESSM 319 Principles of Forestry
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Theory and practice of forestry in controlling forest establishment, composition, structure and growth; principles of natural and artificial regeneration; intermediate cultural operations; silvicultural systems; use and control of fire in forests; principles of sustainable stand management.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 320 Ecosystem Restoration and Management
Credits 3. 3 Lecture Hours.
A basic conceptual framework for restoration ecology and ecological restoration; major principles of ecology related to practical problems confronting humankind, such as, environmental pollution and degradation, exotic species invasions, land use and management trade-offs and consequences; importance of biological diversity.
Prerequisite: RENR 205, RENR 215 or equivalent, junior or senior classification or approval of instructor.

ESSM 351 Geographic Information Systems for Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Geographic Information Systems (GIS) approach to solving spatial problems and managing natural resources, including the capture, analysis, manipulation and mapping of spatial and non-spatial databases; identification of natural and cultural features from aerial photography and remote sensing products; integration of GIS technologies; extensive use of GIS software to solve real-world problems.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 398 Interpretation of Aerial Photographs
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Identification and evaluation of natural and cultural features on aerial photographs; methods for extracting information concerning land use, vegetative cover, surface and structural features, urban/industrial patterns and archaeological sites.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 405 Forest Resource Assessment and Management
Credits 3. 1 Lecture Hour. 4 Lab Hours.
Integration of biophysical, economic and social factors in forest resource analysis, management planning and decision making; applications of interdisciplinary knowledge and multiple-use principles to practical forest management problems.
Prerequisite: Senior classification or approval of instructor.

ESSM 406 Natural Resources Policy
Credits 3. 3 Lecture Hours.
Natural resources and forest policy development in the United States and review of current issues in forest and related natural resource policy.
Prerequisite: Junior or senior classification or approval of instructor.

ESSM 415 Range Analysis and Management Planning
Credits 4. 3 Lecture Hours. 2 Lab Hours.
Basic concepts and theories of range management systems. Resource inventory, analysis and management planning.
Prerequisite: ESSM 314, junior or senior classification or approval of instructor.

ESSM 416 Fire Ecology and Natural Resource Management
Credits 3. 3 Lecture Hours.
Behavior and use of fire in the management of natural resources; principles underlying the role of weather, fuel characteristics and physical features of the environment related to the development and implementation of fire management plans.
Prerequisite: RENR 205 or equivalent, junior or senior classification or approval of instructor.
ESSM 420 Ecological Restoration of Wetland and Riparian Systems
Credits 3. 2 Lecture Hours. 2 Lab Hours.
How wetland and riparian areas link terrestrial and aquatic systems and function hydrologically and ecologically within watersheds; integrated approaches for restoration of degraded wetland and riparian systems; improving water resources through vegetation management with a special interest in rangelands.
**Prerequisites:** RENR 205, junior or senior classification or approval of instructor.

ESSM 430 Advanced Restoration Ecology
Credits 3. 3 Lecture Hours.
A dynamic discipline relying heavily on the fundamentals of ecology; practice translating and communicating key ecological concepts to advanced case studies in ecological restoration; enhance skills for professional applications.
**Prerequisites:** RENR 205 and ESSM 320 or ESSM 420; junior or senior classification.

ESSM 440 Wetland Delineation
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Covers the application of the 1987 Wetland Delineation Manual in use by the Army Corps of Engineers (CORPS); field indicators of hydrophytic vegetation; hydric soils, wetland hydrology, methods for making jurisdictional determinations in non-disturbed and disturbed areas, recognition of problem wetlands and technical guidelines for wetlands.
**Prerequisite:** Junior or senior classification.*

ESSM 444 Remote Sensing of the Environment
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Principles and techniques necessary for applying remote sensing to diverse issues in studying and mapping land uses and land covers of the terrestrial environment; emphasizes a hands-on learning approach with theoretical foundations and applications in both aerial and satellite remote sensing, using optical and lidar datasets.
**Prerequisite:** Junior or senior classification or approval of instructor.

ESSM 459 Spatial Databases and Programming
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Computational tools for creating new data, sharing, integrating that data with other databases; conducting analyses and interpretation of information ranging from spreadsheets to advanced scientific workflow processing systems; tools to create higher quality, more useful data.
**Prerequisite:** Junior or senior classification or approval of instructor.

ESSM 460 Spatial Data Acquisition with Field Methods
Credits 2. 1 Lecture Hour. 2 Lab Hours.
Laboratory-oriented advanced field-based vegetation and soil mensuration methods; sampling design, vegetation and soil parameters, and data collection; use of global positioning systems (GPS), ultrasound distance measurement and plant diameter, laser hypsometers, digital cameras, ground penetrating radar (GPR), spectroradiometers, leaf area meters, soil moisture meters, terrestrial laser scanners (TLS).
**Prerequisites:** ESSM 300 or ESSM 313, junior or senior classification or approval of instructor.

ESSM 462/GEOG 462 Advanced GIS Analysis for Natural Resource Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Advanced topics in Geographic Information Systems (GIS) to solve natural resource problems; manipulation of raster data types; three-dimensional modeling; emphasis on geoprocessing as it relates to applied projects, particularly with habitat suitability models; field and lab use of Global Positioning Systems (GPS); internet-based GIS modeling.
**Prerequisites:** ESSM 351 or AGSM 461/SPSC 461 or equivalent or approval of instructor; junior or senior classification.
**Cross Listing:** GEOG 462/ESSM 462.

ESSM 464 Spatial Project Management
Credits 3. 2 Lecture Hours. 2 Lab Hours.
Integration of key components of spatial project management to ensure a successful project implementation using life-cycle methodology and spatial project management; strategy and planning, requirements analysis, design, development, deployment, and operations and maintenance; term project working with real world data to develop and manage a spatial project for practical applications.
**Prerequisites:** A minimum of two GIS and/or remote sensing courses at 300 or 400-level, junior or senior classification or approval of instructor.

ESSM 481 Senior Seminar
Credit 1. 1 Lecture Hour.
Completion of professional e-portfolio, résumé and job application; exploration of job search, application, and interview; discipline competency exams; program evaluation.
**Prerequisite:** Senior classification in ESSM degree program.*

ESSM 484 Internship
Credits 1 to 4. 1 to 4 Other Hours.
Supervised experience program conducted in the student's area of specialization.
**Prerequisite:** Approval of student's advisor.

ESSM 485 Directed Studies
Credits 1 to 3. 1 to 3 Other Hours.
Individual study and research upon a selected range problem.
**Prerequisite:** Approval of student's advisor.

ESSM 489 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours. 0 to 4 Lab Hours.
Selected topics in an identified area of rangeland ecology and management. May be repeated for credit.
**Prerequisite:** Approval of instructor.*

ESSM 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of faculty member in ecosystem science and management. May be repeated 3 times for credit. Registration in multiple sections of this course is possible within a given semester provided that the per semester credit hour limit is not exceeded.
**Prerequisites:** Junior or senior classification and approval of instructor.