NATURAL RESOURCE ECOLOGY AND MANAGEMENT (NREM)

Courses primarily for undergraduates:

**NREM 104: Practical Work Experience**
Cr. R.
Three months of relevant work experience in natural resources, animal ecology, or forestry. Study at a summer biological station may be applicable. See adviser for specific requirements and approval process.

**NREM 110: Orientation in Natural Resource Ecology and Management**
Cr. 1. F.
Orientation to the University and to the Department of Natural Resource Ecology and Management. Discussion of departmental learning outcomes, strategies for academic success and academic planning. Offered on a satisfactory-fail basis only.

**NREM 111: NREM Transitions Learning Community Seminar**
(1-0) Cr. 1. Repeatable. F.S.
Enrollment limited to members of the NREM Transitions Learning Community. Designed to assist new transfer students and continuing sophomore students with their transition to the academic expectations and professional development aspects of the natural resource program. Offered on a satisfactory-fail basis only.

**NREM 120: Introduction to Renewable Resources**
(Cross-listed with AGRON, ENV S). (3-0) Cr. 3. F.S.
Overview of soil, water, plants, and animals as renewable natural resources in an ecosystem context. History and organization of resource management. Concepts of integrated resource management.

**NREM 130: Natural Resources and Agriculture**
(Cross-listed with ENV S). (3-0) Cr. 3. S.
Survey of the ecology and management of fish, forest, and wildlife resources in areas of intensive agriculture, with emphasis on Iowa. Conservation and management practices for private agricultural lands. Designed for nonmajors.

**NREM 181: Artistry in Wood**
(1-0) Cr. 1. Alt. S., offered even-numbered years.
A survey of the artistry of wood as appreciated in spatial scale from microscopic anatomy to engineered wood structures. Anatomical and physical properties that render wood as a medium for artistic expression. The works of local artists, designers and engineers will be featured. The University Museums collection and Art on Campus will be explored.

**NREM 207: Natural Resource Management under the North American Model of Conservation**
(1-0) Cr. 1. F.
Introduction to North American model of conservation, current funding for natural resource management, role of hunting and angling in the North American model, critique and refinement of the model for the 21st century, and introduction to natural resource leadership, and outdoor skills and recreation. Offered on a satisfactory-fail basis only.

**NREM 211: Careers in Natural Resources**
Cr. 1. F.S.
Prereq: Sophomore classification
Career planning exploration in natural resources. Discussion of the job application process, including techniques for successful interviewing and development of an effective resume. Offered on a satisfactory-fail basis only.

**NREM 270: Foundations in Natural Resource Policy and History**
(Cross-listed with ENV S, L A). (3-0) Cr. 3. Alt. F., offered odd-numbered years.
The development of natural resource conservation philosophy and policy from the Colonial Era to the present. North American wildlife, forestry, and environmental policy; national parks and other protected lands; federal and state agencies. Relationship to cultural contexts, including urban reform and American planning movement. Discussion of common pool resources, public and private lands.

**NREM 301: Natural Resource Ecology and Soils**
(Cross-listed with ENSCI). (3-3) Cr. 4. F.
Prereq: BIOL 211, BIOL 211L; FOR 201 or a second course in biology
Effects of environmental factors on ecosystem structure and function using forest, prairie and agricultural ecosystems as models. Special emphasis is given to soil-forming factors and the role of soil in nutrient and water cycling and ecosystem dynamics. Additional emphasis is given to human influences on natural ecosystems and the role of perennial plant communities in agricultural landscapes.

**NREM 303: Internship**
Cr. 1-3. Repeatable, maximum of 6 credits. F.S.SS.
Prereq: Permission of department mentor and sophomore standing
Placement with county conservation boards, camps, zoos, parks, etc., for experience as interpreters, rangers, and technicians.

**NREM 303I: Undergraduate Internships**
(Cross-listed with IA LL). Cr. 1-5. Repeatable. SS.
Prereq: Permission of instructor and sophomore standing
Placement with county conservation boards, camps, parks, etc. for experience as interpreters, rangers, and technicians.
NREM 305: Seminar  
(2-0) Cr. 1-3. Repeatable. F.S.  
Prereq: Permission of instructor  
Current topics in natural resources or related issues.

NREM 315: Genetics for Natural Resource Managers.  
(3-0) Cr. 3. F.  
Prereq: Prereq: Biol 211 and 212.  
Introduction into how genetic techniques and technologies can aid the 
management of the earth’s biotic resources. Topics include an overview 
of DNA structure, function and inheritance; tools and techniques for 
measuring genetic diversity; genetic management of wild and captive 
populations: DNA forensics as management tool. The goal of this course 
is to prepare managers/biologists to interpret genetic data as they relate 
to natural resource conservation.

NREM 330: Principles of Interpretation  
(2-3) Cr. 3. S.  
Prereq: 6 credits in biological sciences  
History, objectives, forms, and techniques of interpretation in the 
settings of county, state, national parks, and zoos. Principles of effective 
communication as they apply to natural resource fields including wildlife 
management, forestry, and wildlife rehabilitation. Planning and use of 
effective communications and outreach campaigns to manage and 
conserves natural resources.

NREM 333: Fisheries Techniques  
(Cross-listed with A ECL). (1-3) Cr. 2. F.  
Prereq: BIOL 212  
Introduction to techniques used in the collection and interpretation of fish 
population data in the field and in the lab. Course objectives include an 
understanding of population survey methodology and improving student 
critical thinking and teamwork skills. Laboratory focuses on field trips 
and hands-on sampling experience.

NREM 345: Natural Resource Photogrammetry and Geographic 
Information Systems  
(Cross-listed with ENSCI). (2-3) Cr. 3. S.  
Prereq: Junior classification  
Measurement and interpretation of aerial photos in resource 
management. Introduction to Geographic Information Systems (GIS) 
using ArcGIS including digitizing, development and query of attribute 
tables, georeferencing, and use of multiple GIS layers in simple spatial 
analyses.

NREM 357: Midwestern Prairie Plants  
(1-2) Cr. 1. F.  
Offered 1st half semester only. Survey of the major plant families, genera, 
and representative species of Midwestern prairies with emphasis on plant 
identification. Prairie management for multiple species of plants and 
wildlife.

(Cross-listed with FOR). (0.5-1) Cr. 1. S.  
Prereq: BIOL 212  
Survey of the major plant families, general, and representative species of 
the forest herbaceous layer. Functional ecology and restoration.

NREM 385: Natural Resource Policy  
(Dual-listed with NREM 585). (3-0) Cr. 3. S.  
Prereq: Junior classification  
Development, theory and practice of natural resource policy. Integrative 
approach with topical policy studies in North American wildlife, forestry, 
and water. Policy formation, the role of science, introduction to federal 
law compliance. Readings, lectures, projects.

NREM 390: Fire Ecology and Management  
(3-0) Cr. 3. F.  
Characteristics and role of fire in forest ecosystems. Major topics covered 
include fuels, fire weather, fire behavior, fire danger rating systems, fire 
control, prescribed burning, and fire dynamics in major ecosystem types.

NREM 402: Watershed Hydrology  
(Dual-listed with NREM 502). (Cross-listed with ENSCI, GEOL, MTEOR). 
(2-3) Cr. 3. F.  
Prereq: Four courses in physical or biological sciences or engineering: junior 
standing  
Examination of watersheds as systems, emphasizing the surface 
components of the hydrologic cycle. Combines qualitative understanding 
of hydrological processes and uncertainty with quantitative 
representation. Laboratory emphasizes field investigation and 
measurement of watershed processes.

NREM 407: Watershed Management  
(Dual-listed with NREM 507). (Cross-listed with ENSCI, ENV S). (3-3) Cr. 4. 
S.  
Prereq: A course in general biology  
Managing human impacts on the hydrologic cycle. Field and watershed 
level best management practices for modifying the impacts on water 
quality, quantity and timing are discussed. Field project includes 
developing a management plan using landscape buffers.
NREM 408I: Aquatic Ecology
(Dual-listed with NREM 508I NREM 408I). (Cross-listed with IA LL). Cr. 4. SS.
Prereq: Courses in ecology, chemistry, and physics
Analysis of aquatic ecosystems; emphasis on basic ecological principles; ecological theories tested in the field; identification of common plants and animals.

NREM 446: Integrating GPS and GIS for Natural Resource Management
(Dual-listed with NREM 546). (Cross-listed with ENSCI). (2-3) Cr. 3. F.
Prereq: 12 credits in student’s major at 300 level or above, NREM 345 or equivalent experience with ArcGIS
Emphasis on the use of GPS as a data collection tool for GIS. Basic theory of GPS. Use of Global Positioning System technology for spatial data collection and navigation. Post-processing and real-time correction of GPS data. GPS data transfer to GIS for mapping applications. Use of GIS to construct waypoints for use in GPS navigation.

NREM 452: Ecosystem Management
(Dual-listed with NREM 552). (Cross-listed with FOR). (2-3) Cr. 3. S.
Prereq: Senior classification, and NREM 120 or its equivalent
Principles of planning, regulating, and decision-making associated with public and private lands, with consideration of forest, grassland, wetland, and freshwater aquatic ecosystems. Integrated natural resources management within ecological, social, economic and policy constraints.

NREM 456: Landscape Change and Conservation
(Dual-listed with NREM 565). (Cross-listed with LA). (3-0) Cr. 3. F.
Prereq: L A 202
Exploration of issues in landscape ecology and conservation biology relevant to landscape change, design, and planning. Examination of foundational principles and their applications across a continuum of land uses, from wilderness to urban areas.

NREM 466: Ecosystem Service Management
(Dual-listed with NREM 566). (Cross-listed with ENSCI, ENT). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: permission of instructor
Land use and conservation techniques for improving ecosystem services including: pollination of crops, biological control of pests, prevention of erosion and water quality improvement.

NREM 471: Agroforestry Systems; Local and Global Perspectives
(Dual-listed with NREM 571). (2-3) Cr. 3. Alt. S., offered even-numbered years.
Prereq: 6 credits in biological science at 300 level or above
Concepts of sustainable land use, agroecological dynamics, and component interactions of agroforestry systems. Agroforestry systems in temperate and tropical regions. Design and evaluation techniques for agroforestry systems. Ecological, socioeconomic and political aspects of agroforestry.
Meets International Perspectives Requirement.

NREM 485: Undergraduate Seminar
Cr. 1. Repeatable, maximum of 2 times. F.S.
Prereq: Junior or Senior classification in Animal Ecology or Forestry majors (instructor may grant permission for students in other majors to register for course)
Weekly seminars on current research topics in natural resource ecology and management. Style and best practice in oral research communication. Skills and principles for evaluating research merit and quality of technical communication. Offered on a satisfactory-fail basis only.

NREM 489: Survey of Remote Sensing Technologies
(Dual-listed with NREM 589). (Cross-listed with E E, GEOL, MTEOR). (3-0) Cr. 3. F.
Prereq: Four courses in physical or biological sciences or engineering
Electromagnetic-radiation principles, active and passive sensors, multispectral and hyperspectral sensors, imaging radar, SAR, thermal imaging, lidar. Examples of applications. Also offered online S.

NREM 489L: Satellite Remote Sensing Laboratory
(Dual-listed with NREM 589L). (Cross-listed with E E, GEOL, MTEOR). (0-3) Cr. 1. S.
Prereq: Completion or concurrent enrollment in MTEOR/GEOL/NREM/EE 489/589
Processing and analysis of satellite sensor data (optical and radar). Provides practical applications in an environmental context.

NREM 490: Independent Study
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Junior or senior classification, permission of instructor

NREM 490A: Independent Study: Animal Ecology
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Junior or senior classification, permission of instructor

NREM 490B: Independent Study: Forestry
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Junior or senior classification, permission of instructor
NREM 490E: Independent Study: Entrepreneurship  
Cr. 1-4. Repeatable, maximum of 4 credits.  
Prereq: Junior or senior classification, permission of instructor

NREM 490H: Independent Study: Honors Program  
Cr. 1-4. Repeatable, maximum of 4 credits.  
Prereq: Junior or senior classification, permission of instructor

NREM 490I: Iowa Lakeside Laboratory  
(Cross-listed with ANTHR, IA LL). Cr. 1-6. Repeatable, maximum of 9 credits.  
Prereq: 8 credits in biology and permission of instructor  
Research opportunities for undergraduate students in the biological sciences. No more than 9 credits in Biol 490 may be counted toward graduation and of those, only 6 credits may be applied to the major.

NREM 496: Travel Course  
(Dual-listed with NREM 596). Cr. 1-5. Repeatable, maximum of 3 times.  
Prereq: Permission of instructor  
Limited enrollment. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students.

NREM 496A: Travel Course: International  
(Dual-listed with NREM 596A). Cr. 1-5. Repeatable, maximum of 3 times.  
Prereq: Permission of instructor  
Limited enrollment. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students.  
Meets International Perspectives Requirement.

NREM 496B: Travel Course: Domestic  
(Dual-listed with NREM 596B). Cr. 1-5. Repeatable, maximum of 3 times.  
Prereq: Permission of instructor  
Limited enrollment. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students.

NREM 498: Cooperative Education  
Cr. 1-3.  
Prereq: Permission of departmental chair  
Required of all cooperative education students. Students must register prior to commencing each work period.

Courses primarily for graduate students, open to qualified undergraduates:

NREM 502: Watershed Hydrology  
(Dual-listed with NREM 402). (Cross-listed with ENSCI, GEOL, MTEOR).  
(2-3) Cr. 3. F.  
Prereq: Four courses in physical or biological sciences or engineering; junior standing  
Examination of watersheds as systems, emphasizing the surface components of the hydrologic cycle. Combines qualitative understanding of hydrological processes and uncertainty with quantitative representation. Laboratory emphasizes field investigation and measurement of watershed processes.

NREM 504: Forest Landscapes, Wildlife, and Silviculture  
(2-3) Cr. 3. Alt. S., offered odd-numbered years.  
Prereq: Permission of instructor  
Desired forest habitat conditions for fish and wildlife. Silvicultural approaches to protecting/improving such habitats. Focus on key forest elements related to animal species, groups and overall diversity. The lab focuses on team observations and discussions of diverse habitats including one weekend field trip.

NREM 505: Seminar  
(2-0) Cr. 1-3. Repeatable, maximum of 3 times. F.S.  
Prereq: Permission of instructor or graduate classification  
Current topics in natural resources research and management.

NREM 507: Watershed Management  
(Dual-listed with NREM 407). (Cross-listed with ENSCI). (3-3) Cr. 4. S.  
Prereq: A course in general biology  
Managing human impacts on the hydrologic cycle. Field and watershed level best management practices for modifying the impacts on water quality, quantity and timing are discussed. Field project includes developing a management plan using landscape buffers.

NREM 508I: Aquatic Ecology  
(Cross-listed with ENSCI, IA LL). Cr. 4. SS.  
Prereq: Courses in ecology, chemistry, and physics  
Analysis of aquatic ecosystems; emphasis on basic ecological principles; ecological theories tested in the field; identification of common plants and animals.

NREM 533: Erosion and Sediment Transport  
(Cross-listed with ABE, ENSCI). (2-3) Cr. 3. F.  
Prereq: CE 372 or GEOL/ENSCI/MTEOR 402, MATH 166 or equivalent  
Soil erosion processes, soil loss equations and their application to conservation planning, sediment properties, initiation of sediment motion and over land flow, flow in alluvial channels and theory of sediment transport, channel stability, reservoir sedimentation, wind erosion, BMPs for controlling erosion.
NREM 535: Restoration Ecology (Cross-listed with EEOB, ENSCI). (2-3) Cr. 3. Alt. F., offered odd-numbered years.
Prereq: BIOL 366 or BIOL 474 or graduate standing
Theory and practice of restoring animal and plant diversity, structure and function of disturbed ecosystems. Restored freshwater wetlands, forests, prairies and reintroduced species populations will be used as case studies.

Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only.

Prereq: Graduate classification
Techniques. Includes: fermentation, protein isolation, protein purification, SDS-PAGE, Western blotting, NMR, confocal microscopy and laser microdissection, immunophenotyping, and monoclonal antibody production. Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only.

Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. Offered on a satisfactory-fail basis only.

Includes: Agrobacterium and particle gun-mediated transformation of tobacco, Arabidopsis, and maize, and analysis of transformants. Offered on a satisfactory-fail basis only.

Includes: two-dimensional electrophoresis, laser scanning, mass spectrometry, and database searching. Offered on a satisfactory-fail basis only.

Includes: metabolomics and the techniques involved in metabolite profiling. For non-chemistry majoring students who are seeking analytical aspects into their biological research projects. Offered on a satisfactory-fail basis only.

Offered on a satisfactory-fail basis only.

NREM 546: Integrating GPS and GIS for Natural Resource Management (Dual-listed with NREM 446). (Cross-listed with ENSCI). (2-3) Cr. 3. F.
Prereq: 12 credits in student's major at 300 level or above, NREM 345 or equivalent experience with ArcGIS
Emphasis on the use of GPS as a data collection tool for GIS. Basic theory of GPS. Use of Global Positioning System technology for spatial data collection and navigation. Post-processing and real-time correction of GPS data. Use of GIS to construct waypoints for use in GPS navigation.

NREM 552: Ecosystem Management (Dual-listed with NREM 452). (Cross-listed with FOR). (2-3) Cr. 3. S.
Prereq: Senior classification, and NREM 120 or its equivalent
Principles of planning, regulating, and decision-making associated with public and private lands, with consideration of forest, grassland, wetland, and freshwater aquatic ecosystems. Integrated natural resources management within ecological, social, economic and policy constraints.

NREM 565: Landscape Change and Conservation (Dual-listed with NREM 465). (Cross-listed with L A). (3-0) Cr. 3. F.
Prereq: L A 202
Exploration of issues in landscape ecology and conservation biology relevant to landscape change, design, and planning. Examination of foundational principles and their applications across a continuum of land uses, from wilderness to urban areas.
NREM 566: Ecosystem Service Management
(Dual-listed with NREM 466). (Cross-listed with ENSCI, ENT). (3-0) Cr. 3.
Alt. S., offered odd-numbered years.
Prereq: permission of instructor
Land use and conservation techniques for improving ecosystem services including: pollination of crops, biological control of pests, prevention of erosion and water quality improvement.

NREM 570: Advanced Decision-making in Natural Resource Allocation
(2-2) Cr. 3. Alt. S., offered even-numbered years.
Prereq: FOR 451 or two courses in economics
Analytical approach to economic aspects of forest resource management problems. Theory and application of economic decision-making criteria to traditional and modern forest resource management issues. Current problems in the allocation of forest resources.

NREM 571: Agroforestry Systems
(Dual-listed with NREM 471). (Cross-listed with SUSAG). (2-3) Cr. 3. Alt. S., offered even-numbered years.
Prereq: 6 credits in biological science at 300 level or above
Concepts of sustainable land use, agroecological dynamics, and component interactions of agroforestry systems. Agroforestry systems in temperate and tropical regions. Design and evaluation techniques for agroforestry systems. Ecological, socioeconomic and political aspects of agroforestry.
Meets International Perspectives Requirement.

NREM 580: Research Orientation
(2-0) Cr. 2. F.
Prereq: 20 credits in biological sciences and a course in statistics
Research design, proposal preparation, and technical writing.

NREM 585: Natural Resource Policy
(Dual-listed with NREM 385). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: Graduate classification or permission of instructor
Development, theory and practice of natural resource policy. Integrative approach with topical policy studies in North American wildlife, forestry, and water. Policy formation, the role of science, introduction to federal law compliance.

NREM 589: Survey of Remote Sensing Technologies
(Dual-listed with NREM 489). (Cross-listed with E E, GEOL, MTEOR). (3-0) Cr. 3. F.
Prereq: Four courses in physical or biological sciences or engineering
Electromagnetic-radiation principles, active and passive sensors, multispectral and hyperspectral sensors, imaging radar, SAR, thermal imaging, lidar. Examples of applications. Also offered online S.

NREM 589L: Satellite Remote Sensing Laboratory
(Dual-listed with NREM 489L). (Cross-listed with E E, MTEOR). (0-3) Cr. 1. S.
Prereq: Completion or concurrent enrollment in MTEOR/GEOL/NREM/EE 489/589
Processing and analysis of satellite sensor data (optical and radar). Provides practical applications in an environmental context.

NREM 590: Special Topics
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Permission of instructor

NREM 590A: Special Topics: Animal Ecology
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Permission of instructor

NREM 590B: Special Topics: Forestry
Cr. 1-4. Repeatable, maximum of 4 credits.
Prereq: Permission of instructor

NREM 593: Workshop
Cr. 1-3. Repeatable.
Prereq: Graduate classification

NREM 596: Travel Course
(Dual-listed with NREM 496). Cr. 1-5. Repeatable, maximum of 3 times.
Prereq: Permission of instructor
Limited enrollment. Extended field trips to study ecological topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students.

NREM 596A: Travel Course: International
(Dual-listed with NREM 496A). Cr. 1-5. Repeatable, maximum of 3 times.
Prereq: Permission of instructor
Limited enrollment. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students. Meets International Perspectives Requirement.

NREM 596B: Travel Course: Domestic
(Dual-listed with NREM 496B). Cr. 1-5. Repeatable, maximum of 3 times.
Prereq: Permission of instructor
Limited enrollment. Extended field trips to study ecological and management topics in varied environments. Location and duration of trips will vary. Pre-trip sessions arranged. Trip expenses paid by students.
NREM 598: Natural Resource Ecology and Management Teaching Practicum
Cr. 1. F.S.SS.
*Prereq: Graduate classification as M.S. candidate in a NREM major and permission of instructor.*
Graduate student experience in teaching. Student must plan and present at least one unit of subject matter in a course or extension workshop. Teaching practicum must be documented by the student and approved by the student's POS committee. Offered on a satisfactory-fail basis only.

NREM 599: Creative Component
Cr. arr.

Courses for graduate students:

NREM 600: Seminar
Cr. 1. Repeatable. F.S.
Current topics in natural resources research and management.

NREM 698: Natural Resource Ecology and Management Teaching Practicum
Cr. 1. F.S.
*Prereq: Graduate classification as a Ph.D. candidate in a NREM major and permission of instructor.*
Graduate student experience in teaching. Student must plan and present substantive subject matter for a minimum of three weeks in lecture and/or laboratory formats, or a series of extension seminars/workshops. Teaching practicum must be documented by the student and approved by the student's POS committee. Offered on a satisfactory-fail basis only.

NREM 699: Research
Cr. 1-12. Repeatable, maximum of 12 credits.