

NATURAL RESOURCES (NRES)

NRES 92 Plant Biology Portfolio and Assessment

Crosslisted with: AGRO 92, HORT 92

Prerequisites: Junior standing in Plant Biology degree program

Notes: Required for graduation. Offered every Fall during the first 5 weeks. Pass/No Pass only.

Description: Development of an experiential portfolio and completion of an online survey as part of assessment activities.

Credit Hours: 0

Max credits per semester:

Max credits per degree:

Format: LEC

NRES 101 Natural Resources Orientation

Description: Introduction to natural resource disciplines. Fisheries, wildlife, forestry, grasslands, climate, and water science. Participate in field exercises in terrestrial and aquatic ecosystems.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

Offered: FALL

NRES 103 Introduction to Agricultural and Natural Resource Systems

Crosslisted with: AGRI 103

Description: Agricultural and natural resource systems. The interrelationship and the impact of increased human involvement on these systems.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL/SPR

NRES 104 Climate in Crisis

Description: Past, present and future climate change. Climate science basics in the context of global changes (such as global warming, droughts, deforestation) that impact Earth and its inhabitants. Future climate change scenarios and possible impacts.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 9 Global/Diversity

NRES 107 Invasive Plant Species: Impacts on Ecosystems

Crosslisted with: AGRO 107

Notes: Online only

Description: The flora of the earth is constantly being re-distributed by natural and human forces. As plant species change locations, they affect ecosystems, but how? In this course, students will learn how invasive plants establish and spread in ecosystems and develop an understanding of the importance of invasive plants and their impacts on ecosystems from local to global scales.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 9 Global/Diversity

NRES 108 Earth's Natural Resource Systems Laboratory

Description: Introduction to Earth's natural resource systems.

Interactions between the geosphere (solid earth) and the hydrosphere.

The atmosphere and biosphere over many different spatial and temporal scales, and role of humans as part of the system.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LAB

ACE: ACE 4 Science

NRES 109 Water in Society

Crosslisted with: SCIL 109, AECN 109, ENVR 109, GEOG 109

Description: Introduction to the scientific, social, and economic dimensions of historical and contemporary water systems. Students will develop an understanding of hydrologic systems and analyze and engage in decision-making about complex challenges associated with water resource use.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

Prerequisite for: SCIL 300

ACE: ACE 4 Science ACE 8 Civic/Ethics/Stewardship

NRES 111 Natural Resource Conservation in Society

Description: Explore and distinguish the values, civics, and stewardship of natural resource conservation in agricultural and natural ecosystems. Examine the philosophies of ecosystem services and stewardship within a dynamic human dominated world. Students will discuss and critically analyze current issues related to conservation of natural resources.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: SCIL 300

NRES 130 People of Great Plains

Description: The Great Plains region offers considerable ecological and cultural diversity, encompassing more than 600 million acres which have been occupied by humans for over 12,000 years. Introduction to the different populations who have called the Great Plains home, and how they have made a living on this landscape. Investigate Native American life ways in the Great Plains from the time of initial colonization up to European contact and the dramatic changes experienced during the historic era. Select topics centered on contemporary socio-ecological systems on the Plains and how understanding of past Plains experiences can be used to inform on these contemporary issues.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 5 Humanities

NRES 163 Oh My Cod: Exploring Aquatic Ecology Careers

Prerequisites: Limited to Freshman or Sophomore classification only

Description: Introduction to fisheries and aquatic ecology. Familiarize with current research and critical review of literature. Guidance on careers in aquatic ecology. Initial field sampling experience.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LEC

NRES 170 Introduction to Great Plains Studies

Crosslisted with: ANTH 170, GEOG 170, GPSP 170, SOCI 170

Description: Interdisciplinary study of the natural environment, social environment, human heritage, arts and humanities of the Great Plains.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Groups: Regional Geography

NRES 201 Dendrology: Study and Identification of Trees and Shrubs

Crosslisted with: HORT 201

Description: An introduction to the naming, identification, and natural history of woody trees and shrubs in North American with emphasis on trees common to Nebraska. Covers morphology, natural site conditions, wildlife and human uses of woody trees and shrubs.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

NRES 208 Applied Climate Sciences

Description: Role of the atmosphere in the natural resource system. Solar radiation, water, wind and energy, hazards and risk in the plant-soil atmosphere system. Role of weather and climate in crop zones, land use, and wildlife habitat.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 210 Applied Ornithology

Description: To explore interactions between birds and people from economic and scientific perspectives, understand societal conflicts between feral cats and birds, hazards birds present to aircraft, the economics of bird feeding, how commercial bird hunting clubs work, how populations are affected by collisions with vehicles, windows and towers, the taxidermy industry and museum science, and hunting organizations such as Pheasants Forever and Ducks Unlimited.

Credit Hours: 1

Max credits per semester: 1

Max credits per degree: 1

Format: LAB

Offered: SPRING

NRES 211 Introduction to Conservation Biology

Prerequisites: Sophomore standing.

Description: Introduction to problems faced in fulfilling the ever increasing human needs while maintaining ecosystem and biodiversity. The integration of biological fields such as wildlife biology, ecology, evolution, and genetics with non-biological fields such as economics, philosophy, and politics to the dilemma this presents.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 212 Landscape Plants I

Crosslisted with: HORT 212, LARC 212

Prerequisites: HORT 131

Notes: Requires Saturday off-campus field trips.

Description: Identification using botanical and common names for herbaceous annuals, perennials, grasses, ground covers, vines, trees, and shrubs commonly found in Great Plains gardens, parks, and landscapes is stressed through field visits.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: ARCH 467, ARCH 567, ARCH 867, LARC 467, HORT 467; HORT 213, NRES 213, LARC 213

NRES 213 Landscape Plants II

Crosslisted with: HORT 213, LARC 213

Prerequisites: HORT/LARC/NRES 212.

Notes: Continuation of HORT/LARC/NRES 212.

Description: Site requirements, landscape use, natural history, and specific needs of herbaceous ornamentals, grasses, ground covers, vines, trees, and shrubs commonly found in Great Plains gardens, parks, and landscapes. Common cultivars and additional species not covered in HORT/LARC/NRES 212.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 214 Herbaceous Landscape Plants

Crosslisted with: HORT 214

Description: Identification of herbaceous plants with ornamental value in the landscape including native and introduced annuals, perennials, grasses and cultivars. Typical ecological associations, environmental tolerances and/or intolerance, cultural requirements, and design characteristics.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 220 Principles of Ecology

Prerequisites: LIFE 121 or BIOS 101 or HORT 131; 3 hours MATH.

Notes: Not open to students who have completed BIOS 207. Will not count toward a major in BIOS.

Description: Ecology as a quantitative discipline that integrates the life and earth sciences to understand the dynamics of natural and managed ecosystems.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: BIOS 459, BIOS 859, NRES 459, NRES 859, WATS 459; LARC 487, NRES 487; NRES 222; NRES 311; NRES 862, NRES 462

NRES 222 Ecology Laboratory**Prerequisites:** NRES 220 or parallel.**Notes:** May also be offered at Cedar Point Biological Station. Field trips to local ecosystems are required.**Description:** Field and laboratory experiments in terrestrial and aquatic ecology.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**Prerequisite for:** NRES 862, NRES 462; WATS 481, WATS 881, BIOS 481, NRES 481**NRES 233 Wildlife Field Techniques****Prerequisites:** Sophomore status.**Notes:** Offered off-campus during academic breaks at Cedar Point Biological Station. Course fee applies.**Description:** Field and laboratory skills needed for wildlife management emphasizing wildlife and vegetation surveys, mark-recapture of wildlife, radio-telemetry, aging and forensic methods, and habitat assessment.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**NRES 245 Introduction to Grassland Ecology and Management****Crosslisted with:** AGRO 245**Prerequisites:** AGRO 153**Description:** Grassland ecology and management is relevant to students with education and career goals in managing natural resources in Nebraska and the Great Plains. About 50% of the land area in Nebraska is classified as grassland (or rangeland) and is the land type with the most opportunity for enhancing biodiversity and wildlife habitat. Applying ecological principles and social values to managing rangeland resources, students will develop a knowledge and appreciation for the various grassland management uses and techniques available to resource managers.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 249 Individual and Cultural Perspectives on the Environment****Crosslisted with:** ENVR 249**Description:** The influence of culture on individual perspectives related to the concepts of sustainability and the relationship that humans have with the environment. The role of ethics, religion, and historical setting on the individual and cultural perspectives related to environmental challenges at the local to global scales.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 9 Global/Diversity**NRES 270 Biological Invaders****Crosslisted with:** AGRO 270, HORT 270, PLPT 270**Prerequisites:** 3 hrs biological sciences.**Description:** Impact of exotic species and invasive organisms: agricultural and medical emerging disease; predicting biological invasions; biological control; regulatory, monitoring, and control efforts; ecological impact.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 279 Soil Evaluation****Crosslisted with:** AGRO 279, SOIL 279**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 3**Format:** LEC**NRES 281 Introduction to Water Science****Crosslisted with:** GEOG 281, WATS 281**Prerequisites:** High school chemistry or one semester college chemistry; one course in geology or physical geography or soil.**Description:** Survey of the water science from the perspective of both natural and social sciences. Water budget, precipitation, evapotranspiration, runoff and stream flow, groundwater, water quality parameters, economics of water, water policy, water law and water politics.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** NRES 319**Groups:** Physical Geography**NRES 289 People and the Land: Human Environmental Interactions on the Great Plains****Crosslisted with:** GEOG 289**Description:** Explore human environmental interaction on the Great Plains. Samples a variety of Great Plains cultures and time periods to explore past use of the Great Plains environment. Evaluation of attributes and related data critical to the operation of past social-ecological systems with reference to changing climatic/ecological dynamics, human environmental impacts, and the sustainability of various indigenous and western modes of land use on the Great Plains. Investigate knowledge of these processes and how they can be of relevance to contemporary issues of Great Plains land management and resource utilization.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 5 Humanities ACE 6 Social Science**NRES 299 Special Topics****Prerequisites:** Permission.**Description:** Special topics in natural resources.**Credit Hours:** 1-4**Min credits per semester:** 1**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC

NRES 300 Toxins in the Environment

Crosslisted with: BIOS 300, ENTO 300

Prerequisites: One semester BIOS and one semester CHEM

Description: Introduction to the principles of toxicology as they apply to environmental contaminants, agri-chemicals, and industrial and naturally occurring chemicals.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 301 Environmental Communication Skills

Prerequisites: ACE 1 course. Sophomore or higher.

Description: Written and oral communication skills for natural resource management including writing for the media, grant writing, conflict resolution and advocacy.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

ACE: ACE 2 Communication Competence

NRES 302 Tree Biology

Crosslisted with: HORT 302

Prerequisites: BIOS 101, LIFE 120, HORT 131

Description: The study of the structure and function of woody plants, with a focus on trees growing in temperate climates. Covers the basics of wood physiology in terms of the biological, physical, and chemical processes utilized by tree to function. The anatomy and morphology of trees with a focus on the impacts of tree maintenance to the structure and function of landscape trees.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

NRES 308 Biogeography

Crosslisted with: GEOG 308, GEOL 308

Prerequisites: GEOG 155 or BIOS 101 and 101L or GEOL 101.

Notes: Biogeography is a highly interdisciplinary science, relying heavily on ecology, geological science, and climatology. It is global in scope and offers the latest knowledge in understanding organism distributions, and the factors that determine those distributions.

Description: Introduction to the basic concepts of biogeography, the study of distributions of plants and animals, both past and present.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Groups: Physical Geography

NRES 310 Introduction to Forest Management

Prerequisites: BIOS 101, AGRO/HORT 131 or LIFE 120

Description: Discussion of the history, biology, and management of the world's forest resources with emphasis on the Great Plains region. Topics include: forest types and their relationship to site conditions, ecological principles of forest management, basic forest management practices, economic and policy decisions in forest management. The field-oriented lab emphasizes tree identification, forest ecology, forest management and wood products.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Offered: FALL

NRES 311 Wildlife Ecology and Management

Prerequisites: NRES 220 or BIOS 207, or concurrent with NRES 220 or BIOS 207.

Description: Applied ecology, conservation biology, population biology, and enhancement of vertebrate, non-domestic animal populations through management. Emphasis on policy, decision-making, and management options involving people, habitat, and wildlife.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: SPRING

NRES 312 Introduction to Geospatial Information Sciences

Crosslisted with: GEOG 312

Prerequisites: Junior standing; basic computer skills (spreadsheets, word processors, data and file management).

Description: Introduction to the theory and applications of geospatial information technology. Remote sensing, GPS data collection, GIS data types, editing GIS data, and spatial data analysis with emphasis on applications to natural resources using a problem-based learning format.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Groups: Techniques

NRES 315 Human Dimensions of Fish and Wildlife Management

Description: Introduction to the basic concepts and ideas relevant in the human dimension of fisheries and wildlife management. Covers social, cultural and economic values, attitudes and behavior of individuals and groups of various stakeholders in fisheries and wildlife management.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 316 Case Studies in Theoretical Ecology**Crosslisted with:** BIOS 316, MATH 316**Prerequisites:** MATH 106 or higher OR LIFE 121. Parallel registration in BIOS 316L.**Description:** Introduction to biological literature, applied mathematics, computer programming, and/or statistical techniques relevant to field questions in ecology, evolution, and behavior. Typical mathematical topics include discrete dynamics, systems of differential equations, matrix algebra, or statistical inference and probability.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 4 Science**Groups:** Advanced Mathematics Courses**NRES 319 Fundamentals of Environmental Sampling****Prerequisites:** SOIL 153, WATS 281, CHEM 105 or 109. Recommend taking STAT 218.**Description:** Development of sampling plans and quality assurance project plans (QAPP). Stepwise procedures for correct sampling of soil-air-water environments. Data quality assessment.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Format:** LEC**Prerequisite for:** NRES 320**NRES 320 Fundamentals of Environmental Sampling Laboratory****Prerequisites:** NRES 319 or concurrent enrollment**Notes:** Outdoor and analytical laboratory field trips required.**Description:** Demonstrations and hands on participation in sampling of soil-air-water environments.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**NRES 321 Arboriculture: Maintenance & Selection of Landscape Trees****Crosslisted with:** HORT 321**Prerequisites:** Junior standing**Description:** Covers practical application of the science of tree growth, development, and management in human dominated landscapes. Tree selection for varying landscapes and objectives, proper planting and pruning, identification and correction of tree defects, and working with tree pest issues.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Offered:** SPRING**Groups:** Laboratory and Field Training**NRES 322 Environmental Education Curricula****Description:** National curricula are available to formal and non-formal environmental and STEM (science, technology, engineering, and math) educators. Become certified in a series of national environmental education curricula such as Project WILD, Project WET, Project Aquatic WILD and Project Learning Tree. Apply skills and curricula by teaching others through experiential service learning.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** FALL/SPR**NRES 323 Natural Resources Policy****Prerequisites:** Junior standing.**Description:** Conflicts and common ground perpetuated by increasing demands on our natural resources. Policy development and issue analysis stressed. Historical policy actions reviewed and evaluated.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 330 Environmental Health****Crosslisted with:** NUTR 330**Prerequisites:** Class standing of sophomore or above with at least one semester of chemistry and biology.**Description:** Provides a comprehensive understanding of how environmental exposures to physical, chemical and biological hazards influence human health. Offers basic knowledge in the core concepts of toxicology, exposure and risk, vulnerable populations and the interrelationship between human, animal and environmental health.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** FALL/SPR**ACE:** ACE 8 Civic/Ethics/Stewardship**NRES 348 Wildlife Damage Management****Description:** Fundamentals of prevention and control of damage caused by vertebrate pests, principally birds and mammals. Philosophical, ecological, and behavioral basis for controlling population levels or individuals of pest species.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 361 Soils, Environment and Water Quality****Crosslisted with:** AGRO 361, GEOL 361, SOIL 361, WATS 361**Prerequisites:** AGRO/HORT/SOIL 153; MATH 102 or 103; two semesters chemistry (CHEM 105, 106 or CHEM 109,110) and WATS/GEOG/NRES 281**Description:** Chemical and physical processes that influence the fate and transport of contaminants (inorganic, organic, microbial) in soil-water environments. Extent, fate, mitigation and impact of various sources of pollution. Remedial technologies used for environmental restoration of contaminated environments.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGRO 458, AGRO 858, NRES 458, NRES 858, SOIL 458

NRES 370 Basic and Applied Climatology**Crosslisted with:** METR 370**Prerequisites:** METR 100.**Description:** Processes that give rise to spatial and temporal differences in climate. Various interrelationships between humans and climate. Influence of climate on building styles, the economy, water resources, human health, and society. Humans' inadvertent and purposeful modification of the atmosphere.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 380 Geography of Africa****Crosslisted with:** GEOG 380, ETHN 380**Description:** Overview of the major physical and human landscapes in Africa. Prominent past and current events will be placed into a spatial context in an attempt to develop insight into the interrelationships that exist among people, cultures, countries, economies, and the environment, not only within Africa, but between Africa and the rest of the world.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 9 Global/Diversity**Groups:** Regional Geography**NRES 386 Vertebrate Zoology****Crosslisted with:** BIOS 386**Prerequisites:** LIFE 121 & LIFE 121L**Description:** Evolutionary origin and relationships, natural history, and ecological adaptations of vertebrates. Comparative form and function, particularly of bone and muscle systems among and the diversity within vertebrate groups.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**NRES 388 Employment Seminar****Crosslisted with:** AGRI 388**Prerequisites:** Sophomore standing.**Description:** Efficient job-hunting. Resumes, cover letters, mock interviews, and dining etiquette.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LEC**Prerequisite for:** AGRI 395**NRES 393 Digital Imaging and Storytelling in Agriculture and Natural Resources****Crosslisted with:** ALEC 393**Prerequisites:** Consent of instructor(s). One college level course in photography or equivalent, and knowledge of the basics of shooting still photographs or video using digital cameras. Open only to College of Agricultural Sciences and Natural Resources students.**Notes:** Can be repeated for a maximum of 9 credit hours by consent of instructor.**Description:** Concepts and techniques related to use of remote and automated digital camera technology to capture images in agriculture and natural resources contexts to communicate a narrative/story. Completion of individual project using a variety of technologies including camera traps, time-lapse camera systems, remote triggered cameras, as well as traditional audio and video and conventional photography.**Credit Hours:** 1-9**Min credits per semester:** 1**Max credits per semester:** 9**Max credits per degree:** 9**Format:** LAB**NRES 399 Independent Research****Prerequisites:** 8 hrs NRES or closely related areas.**Notes:** To be supervised and evaluated by a NRES faculty member.**Description:** Research, literature review, or extension of course work.**Credit Hours:** 1-5**Min credits per semester:** 1**Max credits per semester:** 5**Max credits per degree:** 6**Format:** IND**NRES 402 Aquatic Insects****Crosslisted with:** BIOS 485, BIOS 885, ENTO 402, ENTO 802, NRES 802**Prerequisites:** 12 hrs biological sciences.**Description:** Biology and ecology of aquatic insects.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Format:** LEC**Prerequisite for:** BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, NRES 402L, NRES 802L**NRES 402L Identification of Aquatic Insects****Crosslisted with:** BIOS 485L, BIOS 885L, ENTO 402L, ENTO 802L, NRES 802L**Prerequisites:** Parallel ENTO 802, NRES 402/802, BIOS 485/885.**Description:** Identification of aquatic insects to the family level.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**NRES 404 Forestry, Fisheries and Wildlife Seminar****Prerequisites:** Junior standing or above in natural resources.**Description:** Seminar involving technical aspects of forestry, fisheries, and wildlife management.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 2**Format:** LEC

NRES 406 Plant Ecophysiology: Theory and Practice**Crosslisted with:** AGRO 806, HORT 406, HORT 806, NRES 806, AGRO 406**Prerequisites:** Junior standing; 4 hrs ecology; and 4 hrs botany or plant physiology.**Description:** Principles of plant physiology which underlie the relationship between plants and their physical, chemical and biotic environments.

An introduction to the ecological niche, limiting factors and adaptation.

An overview of the seed germination and ecology, plant and soil water relations, nutrients, plant energy budgets, photosynthesis, carbon balance and plant-animal interactions. An introduction to various field equipment used in ecophysiological studies.

Credit Hours: 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**NRES 408 Microclimate: The Biological Environment****Crosslisted with:** AGRO 408, GEOG 408, HORT 408, METR 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808, NRES 808**Prerequisites:** Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering.**Description:** Physical factors that create the biological environment.

Radiation and energy balances of earth's surfaces, terrestrial and marine.

Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection,

manipulation of light, and radiation. Applications to air pollution research.

Instruments for measuring environmental conditions and remote sensing of the environment.

Credit Hours: 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGRO 907, HORT 907, METR 907, NRES 907; BSEN 954, NRES 954**Groups:** Physical Geography**NRES 409 Human Dimensions of Natural Resources****Crosslisted with:** GEOG 409**Prerequisites:** Junior standing; 12 credit hours in natural resources, environmental studies, or closely related fields**Description:** Overview of the human dimensions of natural resources issues.

Exploration of the socioeconomic, cultural, and political aspects of human behavior and how these interact with, might influence, or are influenced by the environment.

Credit Hours: 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 412 Introduction to Geographic Information Systems****Crosslisted with:** GEOG 412, GEOG 812, NRES 812**Description:** Introduction to conceptual foundations and applications of computer-based geographic information systems (GIS). GIS database development, spatial data analysis, spatial modeling, GIS implementation and administration.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** GEOG 422, GEOG 822; GEOG 432, GEOG 832; GEOG 922, NRES 922**Groups:** Techniques**NRES 413 Environmental Leadership****Crosslisted with:** ALEC 410, ALEC 810, NRES 813**Prerequisites:** Junior standing.**Notes:** Offered on the World Wide Web (WWW) fall semester of odd-numbered years and in the classroom fall semester of even numbered-years.**Description:** Major leaders in conservation and ecology that emphasizes agricultural and cultural issues and relationships with the environment.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 417 Agroforestry Systems in Sustainable Agriculture****Crosslisted with:** HORT 418, HORT 818, NRES 817**Prerequisites:** 12 hours biological or agricultural sciences.**Description:** The roles of woody plants in sustainable agricultural systems of temperate regions. Emphasis on the ecological and economic benefits of trees and shrubs in the agricultural landscape. Topics include: habitat diversity and biological control; shelterbelts structure, function, benefits and design; intercropping systems; silvopastoral systems; riparian systems; and production of timber and specialty crops. Comparison of temperate agroforestry systems to those of tropical areas.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 418 Introduction to Remote Sensing****Crosslisted with:** GEOG 418, GEOG 818, NRES 818**Prerequisites:** 9 hours of GEOL, NRES or GEOG.**Notes:** Advanced standing in geography, natural resources, environmental sciences, engineering or agronomy recommended.**Description:** Introduction to remote sensing of the earth from aerial and satellite platforms. Aerial photography, multispectral scanning, thermal imaging and microwave remote sensing techniques. Physical foundations of remote sensing using electromagnetic energy, energy-matter interactions, techniques employed in data acquisition and methods of image analysis. Weekly laboratory provides practical experience in visual and digital interpretation of aerial photography, satellite imagery, thermal and radar imagery. Applications in geographic, agricultural, environmental and natural resources analyses.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** GEOG 420, GEOG 820; GEOG 421, GEOG 821, NRES 421, NRES 821**Groups:** Techniques

NRES 419 Chemistry of Natural Waters**Crosslisted with:** GEOL 418, GEOL 818, NRES 819, WATS 418**Prerequisites:** CHEM 109 and 110, 113 and 114, or CHEM 111.**Description:** Principles of water chemistry and their use in precipitation, surface water, and groundwater studies. Groundwater applications used to determine the time and source of groundwater recharge, estimate groundwater residence time, identify aquifer mineralogy, examine the degree of mixing between waters of various sources and evaluate what types of biological and chemical processes have occurred during the water's journey through the aquifer system.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** GEOL 418L, GEOL 818L, NRES 419L, NRES 819L, WATS 418L; GEOL 917, NRES 917**NRES 419L Chemistry of Natural Waters Laboratory****Crosslisted with:** GEOL 418L, GEOL 818L, NRES 819L, WATS 418L**Prerequisites:** CHEM 109 and 110 or CHEM 113 and 114; GEOL 418 or parallel.**Description:** Basic laboratory techniques used to perform water analysis including various wet chemical techniques, instrument use (AA, IC, UV-Visible) and computer modeling. Techniques for sample collection and preservation, parameter estimation and chemical analysis.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**NRES 420 Applications of Remote Sensing in Agriculture and Natural Resources****Crosslisted with:** AGRO 419, GEOG 419, GEOL 419, AGRO 819, GEOG 819, GEOL 819, NRES 820**Notes:** GEOG 418/NRES 418 recommended**Description:** Introduction to the practical uses of remote electromagnetic sensing in dealing with agricultural and water-resources issues.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Groups:** Techniques**NRES 421 Field Techniques in Remote Sensing****Crosslisted with:** GEOG 421, GEOG 821, NRES 821**Prerequisites:** NRES 418/818**Description:** Field techniques as they relate to remote-sensing campaigns. Research methods, systematic approaches to data collection, field spectroscopy, collecting ancillary information linked with spectroscopic data sets as well as aircraft or satellite missions and subsequent analyses of acquired data.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Groups:** Techniques**NRES 422 Laboratory Earth: Earth's Changing Systems****Crosslisted with:** NRES 822**Description:** Fundamental concepts related to understanding Earth's changing natural systems in the past, present, and the future. The cycling of matter and energy; the relationship between human activity and environmental change; and the consequence of these relationships.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 423 Integrated Resources Management****Crosslisted with:** NRES 823**Prerequisites:** Senior standing, natural resources or related major.**Description:** Integrated and multiple-use management. Economic, political, social, and physical impacts on natural resources management priorities.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 424 Forest Ecology****Crosslisted with:** NRES 824**Prerequisites:** NRES 220 or BIOS 207**Description:** The structure and function of forest ecosystems including their response to global change; emphasis on forest succession and disturbance regimes in order to understand the dynamics of forested landscapes.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**NRES 426 Invasive Plants****Crosslisted with:** AGRO 426, AGRO 826, HORT 426, HORT 826, NRES 826**Prerequisites:** AGRO/HORT/SOIL 153; AGRO/HORT 131**Description:** Identification, biology and ecology of weedy and invasive plants. Principles of invasive plant management by preventative, cultural, biological, mechanical and chemical means using an adaptive management framework. Herbicide terminology and classification, plant-herbicide and soil-herbicide interactions, equipment calibration and dosage calculations.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**NRES 427 Introduction to the Global Positioning System (GPS)****Crosslisted with:** GEOG 427, GEOG 827, NRES 827**Prerequisites:** Junior standing.**Notes:** Familiarity with mapping and GIS recommended.**Description:** Integrated lectures, lab exercises and field experience provide an understanding of GPS technology and applications. Students will learn to collect, correct and use GPS data in a geographic information system (GIS) environment.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Format:** LEC

NRES 428 Leadership in Public Organizations**Crosslisted with:** ALEC 428, ALEC 828, NRES 828**Prerequisites:** Junior standing**Description:** Leadership in theories, research, and practices in public organizations and natural resource agencies.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 429A Food Security: A Global Perspective****Crosslisted with:** ANTH 429A, ANTH 829A, AGRO 429A, AGRO 829A, HORT 429A, HORT 829A, NRES 829A, NUTR 429A, NUTR 829A**Prerequisites:** Junior standing**Description:** Overview of the technical and sociocultural dimensions of global food insecurity.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 431 Waterfowl Ecology and Management****Crosslisted with:** NRES 831**Prerequisites:** NRES 311**Description:** Ecology and identification of North American waterfowl, management of habitats and populations, and current management issues.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 433 Wildlife Management Techniques****Crosslisted with:** NRES 833**Prerequisites:** NRES 311**Description:** Survey of methods used to obtain data and make decisions for wildlife management. Scientific methods for wildlife science; monitoring and surveys; construction of management plans; habitat use, classification, and management; harvest management.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**NRES 434 Environmental Education and Interpretation****Crosslisted with:** NRES 834, ENVR 434**Notes:** Requires 20 hours of service.**Description:** Examination of formal and informal environmental education and interpretation. Knowledge, application and practice relevant to science teachers and park, extension, museums, and zoo educators.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 435 Agroecology****Crosslisted with:** AGRO 435, AGRO 835, HORT 435, NRES 835**Prerequisites:** For AGRO/HORT/NRES 435: Senior standing. For AGRO/NRES 835: 12 hrs biological or agricultural sciences.**Description:** Integration of principles of ecology, plant and animal sciences, crop protection, and rural landscape planning and management for sustainable agriculture. Includes natural and cultivated ecosystems, population and community ecology, nutrient cycling, pest management, hydrologic cycles, cropping and grazing systems, landscape ecology, biodiversity, and socioeconomic evaluation of systems.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**NRES 436 Evolution of Cenozoic Mammals****Crosslisted with:** GEOL 436, GEOL 836, NRES 836**Prerequisites:** GEOL 103**Description:** Survey of mammalian evolution with emphasis on the origin, radiation, and phylogenetic relationships of Cenozoic fossil mammals.**Overview of climatic and ecological changes affecting mammalian adaptations and hands on experience with specimens.****Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 438 Grassland Conservation: Planning and Management****Crosslisted with:** NRES 838**Prerequisites:** Introductory soils and introductory ecology**Description:** Apply fundamental grassland ecology principles to grassland conservation and identify grassland establishment and management practices appropriate for different environmental and cultural situations. Based on field study, critically analyze management options and outcomes for several grasslands and develop a management plan for a grassland resource.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**NRES 440 Great Plains Ecosystem****Crosslisted with:** AGRO 440, AGRO 840, NRES 840, RNGE 440, GRAS 440**Prerequisites:** Junior standing.**Notes:** BIOS 101 and 101L, or equivalent, recommended.**Description:** Characteristics of Great Plains ecosystems, interrelationships of ecological factors and processes, and their application in the management of grasslands. Interactions of fire, vegetation, grazing animals and wildlife.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING

NRES 441 Zoo Keeping and Management

Description: Examine and build on the knowledge, skills and abilities needed to work in a zoo in various capacities including animal keeping, guest services and curation. Acquire knowledge in all aspects needed to manage zoos including individual species care, collections, guest services, species conservation, and AZA accreditation. Become familiar with the concepts and challenges associated with the biological, educational, ethical, and administrative aspects of zoo science through partnerships and interactions with local zoos.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL/SPR

ACE: ACE 10 Integrated Product

NRES 442 Wildland Plants

Crosslisted with: AGRO 442, AGRO 842, NRES 842, RNGE 442, GRAS 442

Prerequisites: Junior standing.

Notes: BIOS 101 and 101L, or equivalent, recommended.

Description: Wildland plants that are important to grassland and shrubland ecosystem management and production. Distribution, utilization, classification, identification (including identification by vegetative parts), uses by Native Americans, and recognition of grasses, forbs, shrubs, exotic and wetland plants.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

NRES 444 Ecosystem Monitoring and Assessment

Crosslisted with: AGRO 444, AGRO 844, NRES 844, RNGE 444, GRAS 444

Prerequisites: Junior standing.

Notes: NRES 220 or equivalent, recommended.

Description: Measurement and monitoring of the important vegetation and environmental factors used to develop management guidelines in grasslands, savannas, woodlands, and wetlands. Emphasis on using ecosystem monitoring protocols for assessment of wildlife habitat, fuels management for wild-land fire, livestock production, and watershed function. Requires field sampling and travel to local field sites.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

NRES 445 Human Remains in Forensic Science

Crosslisted with: FORS 445, FORS 845, NRES 845

Prerequisites: LIFE 120/L and LIFE 121/L, CHEM 109, CHEM 110, and FORS 120/L.

Description: Forensic anthropology within the broader context of forensic sciences and physical anthropology. Decomposition and bone modification through artificial means. Determination of individual identity, diet, chronic pathology and cause of death from human remains.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Offered: FALL

NRES 446 Pollen Analysis for Behavioral, Biological and Forensic Science

Crosslisted with: FORS 446, FORS 846, NRES 846

Prerequisites: BIOS 109 and FORS 120.

Description: Collection, processing, identification of common North American pollen types. Pollination ecology relating to scene reconstruction. Fundamental statistics and presentation requirements for a legal and scientific audience.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Offered: FALL

NRES 447 Archaeoparasitology: The Archaeology of Disease

Crosslisted with: NRES 847

Description: Study of parasites, their hosts, and the relationship between them. Human parasitology is especially interesting due to the adaptation of human populations to a great variety of parasites over long periods of time in the global diversity of environments. Fundamental understanding of human-parasite relations and methods of recovery of parasites from a variety of archaeological remains.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

NRES 448 Advanced Topics in Wildlife Damage Management

Crosslisted with: NRES 848

Prerequisites: NRES 348.

Description: Economic, global, and public policy issues relative to situations in which wildlife damage personal property or natural resources, threaten human health and safety, or are a nuisance. Demonstration and discussion of technological advances in fertility control, damage resistance, toxicology, behavioral modification, and biological management.

Credit Hours: 2

Max credits per semester: 2

Max credits per degree: 2

Format: LEC

NRES 450 Biology of Wildlife Populations

Crosslisted with: BIOS 450, BIOS 850, NRES 850

Prerequisites: NRES 311; MATH 104 or above; STAT 218 or equivalent

Description: Principles of population dynamics. Management strategies (for consumptive and nonconsumptive fish and wildlife species) presented utilizing principles developed.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Offered: SPRING

NRES 451 Soils, Water, and Environmental Chemistry**Crosslisted with:** ENVE 851, NRES 851**Prerequisites:** NRES/WATS/SOIL/AGRO/GEOL 361 or graduate standing**Description:** Environmental chemistry related to the fate and transport of organic contaminants in soil-water environments. Application of computer simulation models (i.e., MODFLOW) for predicting contaminant fate in aquifers. Basic chemical and biological principles of remediating contaminated soil and water.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Offered:** SPRING**ACE:** ACE 10 Integrated Product**NRES 452 Climate and Society****Crosslisted with:** AGRO 450, GEOG 450, METR 450, AGRO 850, GEOG 850, METR 850, NRES 852**Prerequisites:** Junior standing or above.**Notes:** Offered spring semester of even-numbered calendar years.**Description:** Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**Groups:** Physical Geography**NRES 453 Hydrology****Crosslisted with:** NRES 853**Prerequisites:** MATH 106**Notes:** Not available for credit for engineering students and not a substitute for CIVE 456.**Description:** Introduction to the principles of hydrology, with emphasis on the components of the hydrologic cycle: precipitation, evaporation, groundwater flow, surface runoff, infiltration, precipitation runoff relationships.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGEN 957, BSEN 957, CIVE 957, GEOL 957**NRES 454 Ecological Interactions****Crosslisted with:** BIOS 454, BIOS 854, NRES 854**Prerequisites:** LIFE 121; LIFE 121L; BIOS 207 or NRES 220; Senior Standing**Description:** Nature and characteristics of populations and communities. Interactions within and between populations in community structure and dynamics. Direct and indirect interactions and ecological processes, competition, predation, parasitism, herbivory, and pollination. Structure, functioning and persistence of natural communities, foodweb dynamics, succession, and biodiversity.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**NRES 455 Soil Chemistry and Mineralogy****Crosslisted with:** AGRO 455, AGRO 855, NRES 855, SOIL 455**Prerequisites:** AGRO/HORT/SOIL 153 or GEOL 101; CHEM 109 and 110; CHEM 221 or 251; or equivalent.**Description:** Chemical and mineralogical properties of soil components. Inorganic colloidal fraction. Structures of soil minerals as a means of understanding properties, such as ion exchange and equilibria; release and supply of nutrient and toxic materials; and soil acidity and alkalinity.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 456 Mathematical Models in Biology****Crosslisted with:** BIOS 456, BIOS 856, NRES 856**Prerequisites:** LIFE 120; LIFE 120L; LIFE 121; LIFE 121L; MATH 107**Description:** Biological systems, from molecules to ecosystems, are analyzed using mathematical techniques. Strengths and weaknesses of mathematical approaches to biological questions. Brief review of college level math; introduction to modeling; oscillating systems in biology; randomness in biology; review of historically important and currently popular models in biology.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 457 Green Space and Urban Forestry Management****Crosslisted with:** NRES 857, HORT 457**Prerequisites:** Junior or senior standing, Graduate student or permission**Description:** A focus on the management of trees, parks, and green infrastructure in rural and urban communities. Perspectives from community planning, landscape architecture, urban forestry, natural resources, horticulture, and environmental policy. Development and implementation of green space and forest management plans encompassing societal needs and biological limitations in rural and urban communities.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**ACE:** ACE 10 Integrated Product**NRES 458 Soil Physical Determinations****Crosslisted with:** AGRO 458, AGRO 858, NRES 858, SOIL 458**Prerequisites:** SOIL/AGRO/GEOL/WATS 361; PHYS 141 or equivalent; MATH 102 or 103.**Description:** Survey of measurement techniques and principles used in characterizing the physical properties of soils. Includes analysis of experimental design and sources of experimental error. Techniques include: particle size analysis, soil water content, pore size analysis, field sampling techniques, soil strength, and saturated hydraulic conductivity.**Credit Hours:** 2**Max credits per semester:** 2**Max credits per degree:** 2**Format:** LAB

NRES 459 Limnology**Crosslisted with:** BIOS 459, BIOS 859, NRES 859, WATS 459**Prerequisites:** 12 hrs BIOS, including BIOS/NRES 220/BIOS220x; two semesters CHEM.**Description:** Physical, chemical, and biological processes that occur in fresh water. Organisms occurring in fresh water and their ecology; biological productivity of water and its causative factors; eutrophication and its effects.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** BIOS 866, NRES 866**ACE:** ACE 10 Integrated Product**NRES 460 Soil Microbiology****Crosslisted with:** AGRO 460, BIOS 460, SOIL 460, AGRO 860, BIOS 860, NRES 860**Prerequisites:** One semester microbiology; one semester biochemistry or organic chemistry.**Description:** Soil from a microbe's perspective-growth, activity and survival strategies; principles governing methods to study microorganisms and biochemical processes in soil; mechanisms controlling organic matter cycling and stabilization with reference to C, N, S, and P; microbial interactions with plants and animals; and agronomic and environmental applications of soil microorganisms.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**NRES 461 Soil Physics****Crosslisted with:** AGRO 461, GEOL 461, SOIL 461, WATS 461, AGRO 861, GEOL 861, NRES 861**Prerequisites:** AGRO/SOIL 153; PHYS 141 or equivalent, one semester of calculus.**Description:** Principles of soil physics. Movement of water, air, heat, and solutes in soils. Water retention and movement, including infiltration and field water regime. Movement of chemicals in soils.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGEN 955, AGRO 955, CIVE 955, GEOL 985**NRES 462 Conservation Biology****Crosslisted with:** NRES 862**Prerequisites:** 12 hours of biological sciences, including NRES 220 and NRES 222 or equivalent.**Description:** Current issues in conservation biology. Theoretical principles from the areas of ecology and genetics to effectively preserve and manage biological diversity and small populations.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 463 Fisheries Science****Crosslisted with:** NRES 863**Description:** Fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Basis of specific management techniques. May also be offered at Cedar Point Biological Station.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** NRES 871**ACE:** ACE 10 Integrated Product**NRES 463L Fisheries Science Lab****Crosslisted with:** NRES 863L**Description:** Field and laboratory skills needed for fisheries biology emphasizing the determination and evaluation of vital statistics for the management of fish populations. Applied data collection and fish sampling techniques will be used. May also be offered at Cedar Point Biological Station.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LAB**NRES 464 Fisheries Biology****Crosslisted with:** BIOS 464, BIOS 864, NRES 864**Prerequisites:** BIOS/NRES 489/889 or equivalent.**Description:** Biology of fishes. Factors that affect fishes in the natural environment. Techniques used in the analysis and management of fish populations.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 465 Soil Geomorphology and Paleopedology****Crosslisted with:** GEOL 465, GEOL 865, NRES 865**Prerequisites:** GEOL 450/850 and NRES 477/877.**Description:** Soils and paleosols as evidence in reconstruction landscape evolution and paleoenvironments. Role of paleosols in stratigraphy.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 467 Global Climate Change****Crosslisted with:** METR 483, METR 883, NRES 867**Prerequisites:** Junior standing; and METR 475/875.**Notes:** Offered fall semester of even-numbered calendar years.**Description:** Elements of climate systems, El Nino/LaNina cycle and monsoons, natural variability of climate on interannual and interdecadal scales. Paleoclimate, and future climate, developed climate change scenarios and climate change impacts on natural resources and the environment.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC

NRES 468 Wetlands

Crosslisted with: BIOS 458, NRES 868, WATS 468, BSEN 468, BSEN 868
Prerequisites: CHEM 109 and CHEM 110, or CHEM 105 and CHEM 106; Junior or Senior Standing.

Notes: Offered even-numbered calendar years.

Description: Physical, chemical and biological processes that occur in wetlands; the hydrology and soils of wetland systems; organisms occurring in wetlands and their ecology wetland creation, delineation, management and ecotoxicology.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

NRES 469 Bio-Atmospheric Instrumentation

Crosslisted with: AGRO 469, GEOG 469, HORT 407, METR 469, MSYM 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 869, NRES 869

Prerequisites: Junior standing; MATH 106; 4 hrs physics; physical or biological science major.

Description: Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Groups: Physical Geography

NRES 470 Lake and Reservoir Restoration

Prerequisites: 12 hrs NRES or related fields.

Description: Theory, processes, and mechanisms underlying lake and reservoir water quality degradation and/or pollution and remediation of eutrophications and its effects. Current techniques used to restore and protect degraded lakes.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 472 Applied Soil Physics

Crosslisted with: AGRO 472, AGRO 872, NRES 872, SOIL 472, WATS 472

Prerequisites: AGRO/HORT/SOIL 153 or equivalent; MATH 104 or MATH 106 or equivalent.

Description: Emphasis on applied soil physics. Discussion of theoretical principles followed by field and laboratory exercises and applications. Fluxes of water, solutes, air, and heat through the soil. Emphasis on water infiltration, water retention, other soil hydraulic properties. Components of soil water balance. Management of soil water.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

NRES 474 Herpetology

Crosslisted with: BIOS 474, BIOS 874, NRES 874

Prerequisites: BIOS/NRES 386 and permission.

Notes: BIOS 388 recommended.

Description: Fossil and living amphibians and reptiles. Anatomy, classification, ecology and evolution.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

NRES 475 Water Quality Strategy

Crosslisted with: NRES 875, SOCI 475, SOCI 875, SOIL 475, WATS 475, AGRO 475, AGRO 875, CIVE 475, CIVE 875, CRPL 475, CRPL 875, GEOL 475, GEOL 875, MSYM 475, MSYM 875, POLS 475, POLS 875

Prerequisites: Senior standing.

Notes: Capstone course.

Description: Holistic approach to the selection and analysis of planning strategies for protecting water quality from nonpoint sources of contamination. Introduction to the use of methods of analyzing the impact of strategies on whole systems and subsystems; for selecting strategies; and for evaluating present strategies.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 10 Integrated Product

Groups: American Government&Public Pol

NRES 476 Mammalogy

Crosslisted with: BIOS 476, BIOS 876, NRES 876

Prerequisites: 8 hrs BIOS; BIOS/NRES 386 or NRES 311.

Notes: May also be offered at Cedar Point Biological Station. Field trips are required and may occur outside of scheduled class time. Lab and field time emphasize diversity of mammalian families and species identification of Nebraska mammals.

Description: Evolution, natural history, ecology, and functional morphology of planetary mammals and mammals of the Northern Great Plains.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

NRES 477 Great Plains Field Pedology

Crosslisted with: AGRO 477, GEOG 467, SOIL 477, GEOG 867, NRES 877

Prerequisites: AGRO/SOIL 153.

Description: Spatial relationship of soil properties on various parts of landscape typical of the Plains, causal factors, and predictions of such relationships on other landscapes. Grouping these properties into classes, naming the classes, and the taxonomy that results from this grouping. Application of a taxonomy to a real situation through making a field soil survey in a region representative of the Plains border, predicting land use response of various mapped units as it affects the ecosystem, and evaluating the effectiveness of the taxonomic system used in the region surveyed.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Groups: Physical Geography

NRES 478 Regional Climatology**Crosslisted with:** METR 478, METR 878, NRES 878**Prerequisites:** NRES/METR 370.**Description:** Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. The chief systems of climatic classification.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 479 Hydroclimatology****Crosslisted with:** METR 479, WATS 479, BSEN 479, NRES 879, METR 879, BSEN 879**Prerequisites:** NRES 208 or METR 100 or METR/NRES 370.**Notes:** Offered spring semester of even-numbered calendar years.**Description:** Interaction between earth's climate and the hydrologic cycle. Energy and water fluxes at the land-atmosphere interface. Atmospheric moisture transport, precipitation, evaporation, snowmelt, and runoff. Impacts of climate variability and change on the hydrologic cycle.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 481 Stream and River Ecology****Crosslisted with:** WATS 481, WATS 881, BIOS 481**Prerequisites:** NRES 222 or equivalent**Description:** Fundamental physical drivers operating in stream and river ecosystems and how those vary in space and time. Major classes of organisms associated with stream ecosystems and their functional roles. Fundamental controls on biotic diversity in stream and river ecosystems and its variance. Major aspects of stream ecosystem function including energy flow and nutrient cycling. Ecosystem services provided by stream and river ecosystems and causes and consequences of human impacts on streams and rivers. Underlying principles of bioassessment and current methods of stream restoration.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**NRES 482 Ecophysiology of Wildlife****Crosslisted with:** NRES 882**Prerequisites:** NRES 220 or BIOS 207; AGRO 215/BIOS 206; BIOS 386**Description:** Evaluation of the conserved physiological principles that are broadly used across animal groups, as well as the many unique adaptations used by specific taxa. Focuses on all major vertebrate groups, including fish, birds, mammals, reptiles and amphibians, and links the physiological mechanisms that allow them to survive to the environments in which they live. Highlights methods scientists use to gather physiological information, and the ways in this information can be used by scientists in a variety of different fields.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** FALL**NRES 484 Water Resources Seminar****Crosslisted with:** AGRO 484, GEOG 484, GEOL 484, WATS 484, NRES 884, AGRO 884, GEOG 884, GEOL 884, WATS 884**Prerequisites:** Junior or above standing**Description:** Seminar on current water resources research and issues in Nebraska and the region.**Credit Hours:** 1**Max credits per semester:** 1**Max credits per degree:** 1**Format:** LEC**NRES 487 Introduction to Landscape Ecology****Crosslisted with:** LARC 487**Prerequisites:** AGRO/HORT/SOIL 153 and BIOS/NRES 220.**Notes:** HORT/LARC/GEOG 200, CIVE 353/853/NRES 853, and CRPL 470 recommended.**Description:** The history, principles, and concepts of landscape ecology. Use and application of landscape structure, function in the planning, the design, and management of human and natural landscapes.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**NRES 488 Groundwater Geology****Crosslisted with:** GEOL 488, GEOL 888, NRES 888**Prerequisites:** GEOL 100-level course; MATH 106 or equivalent.**Description:** Occurrence, movement, and development of water in the geologic environment.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** AGEN 955, AGRO 955, CIVE 955, GEOL 985; GEOL 889, NRES 887; NRES 918**NRES 489 Ichthyology****Crosslisted with:** BIOS 489, BIOS 889, NRES 889**Prerequisites:** LIFE 120 and LIFE 121**Notes:** May also be offered at Cedar Point Biological Station.**Description:** Fishes, their taxonomy, physiology, behavior, and ecology. Dynamics of fish stocks and factors regulating their production.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** BIOS 464, BIOS 864, NRES 464, NRES 864; NRES 871**NRES 491 Geography Field Tour****Crosslisted with:** GEOG 491, GEOG 891**Description:** Group educational tours to specific sites that illustrate aspects of physical and cultural geography. Off-campus travel required.**Credit Hours:** 2-3**Min credits per semester:** 2**Max credits per semester:** 3**Max credits per degree:** 6**Format:** FLD**Groups:** Physical Geography

NRES 492 International Study Tours in Natural Resource Management**Crosslisted with:** NRES 492H, NRES 892**Prerequisites:** Permission.**Notes:** Off-campus travel may be required. Choice of subject matter and coordination of on- and off-campus study is at the discretion of the instructor.**Description:** Group educational tours to sites that illustrate the diversity of approaches to natural resources management found around the world.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 6**Format:** FLD**ACE:** ACE 9 Global/Diversity**NRES 492H International Study Tours in Natural Resource Management****Crosslisted with:** NRES 492, NRES 892**Prerequisites:** Permission.**Notes:** Off-campus travel may be required. Choice of subject matter and coordination of on- and off-campus study is at the discretion of the instructor.**Description:** Group educational tours to sites that illustrate the diversity of approaches to natural resources management found around the world.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 6**Format:** FLD**ACE:** ACE 9 Global/Diversity**NRES 495 Grasslands Seminar****Crosslisted with:** AGRO 495, ENTO 495, GRAS 495, HORT 495, RNGE 495, SOIL 495**Prerequisites:** Junior standing.**Description:** Topic varies and deals with different aspects of forage and/or range and/or livestock, turf and/or landscape grasses, natural habitats, and wetlands.**Credit Hours:** 1-2**Min credits per semester:** 1**Max credits per semester:** 2**Max credits per degree:** 4**Format:** LEC**NRES 496 Independent Study****Prerequisites:** 12 hrs natural resource sciences or closely-related fields, and permission.**Description:** Individual or group projects in research, literature review, or extension of course work.**Credit Hours:** 1-5**Min credits per semester:** 1**Max credits per semester:** 5**Max credits per degree:** 12**Format:** IND**NRES 497 Career Experiences in Natural Resource Sciences****Prerequisites:** Sophomore standing; School of Natural Resources (SNR) majors; permission and advanced approval of a plan of work.**Description:** Off-campus work experiences sponsored by natural resource agencies, companies, and organizations. Students collaborate in the development of a plan of work that will identify student responsibilities, including a final written report.**Credit Hours:** 1-6**Min credits per semester:** 1**Max credits per semester:** 6**Max credits per degree:** 6**Format:** FLD**NRES 498 Special Topics in Natural Resources****Crosslisted with:** NRES 898**Prerequisites:** 6 hrs NRES or equivalent.**Description:** Current issues in natural resource sciences.**Credit Hours:** 1-6**Min credits per semester:** 1**Max credits per semester:** 6**Max credits per degree:** 12**Format:** LEC**NRES 499 Thesis Research****Prerequisites:** Permission of thesis adviser.**Notes:** Requires conducting a scholarly research project and writing an undergraduate thesis.**Credit Hours:** 3-6**Min credits per semester:** 3**Max credits per semester:** 6**Max credits per degree:** 6**Format:** IND**NRES 499H Honors Thesis****Prerequisites:** Admission to the University Honors Program and permission.**Notes:** AGRI 299H recommended.**Description:** Conduct a scholarly research project and write a University Honors Program or undergraduate thesis.**Credit Hours:** 3-6**Min credits per semester:** 3**Max credits per semester:** 6**Max credits per degree:** 6**Format:** IND