Ecology and Ecosystem Management

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Our Ecology and Ecosystem Management program offers a comprehensive curriculum that focuses on ecological and organismal sciences, providing students with a deep understanding of ecology, environmental issues, and natural resource management and conservation. With access to over 2,500 acres of diverse ecosystems—including forests, grasslands, wetlands, streams, and rivers—students gain hands-on experience in both research and practical conservation. You'll not only explore fundamental concepts in biology and ecology but also engage in original research on topics such as prairie ecosystems and restoration, wetland and freshwater ecology, forest ecology and management, and studies of local wildlife. Our program is designed to prepare students for successful careers in the ecological sciences and ecosystem management, with a strong emphasis on developing the practical skills necessary for immediate post-graduate success. Our low student-to-faculty ratio and highly accomplished faculty ensure personalized attention, allowing each student to pursue their unique interests and develop professional-level expertise in their chosen field.

There is a growing recognition of the importance that marine environments play in global ecological processes. To provide Principia students with the opportunity to study at a world-class marine laboratory, Principia has joined the Marine Science Education Consortium (MSEC), based at Duke University's Marine Laboratory (DUML). Over 34 schools (mostly four-year liberal arts colleges like Principia) in the consortium send students to DUML to take classes in a wide variety of marine science fields. Principia students wishing to attend a semester at DUML may apply through Principia's Ecology and Ecosystem Management Department to take courses that will then be accepted for credit at Principia College through the normal processes in the Registrar's Office.

B.S. in Ecology

The B.S. in Ecology offers a strong foundation in ecology, ecological research, and organismal biology. The program includes additional coursework in genetics, chemistry, mathematics, and organismal biology, making it an excellent choice for students aiming to pursue graduate studies or careers in biological and ecological research.

B.S. in Ecosystem Management

The B.S. in Ecosystem Management equips students with a strong foundation for careers in land management, ecological restoration, forestry, wildlife conservation, soil and water conservation, and environmental law and policy. Students begin with a comprehensive introduction to environmental sciences and then focus on applying ecological principles to solve real-world management challenges. The flexible structure of the program allows students to tailor their studies to their specific interests and career goals by selecting from a wide range of specialized courses.

Minor in Ecology:

There is also a minor in ecology for those students seeking to enhance their major degree in another discipline. The minor in Ecology provides students with a foundation of theory and practice in the fields of ecology and ecosystem management and experiences in field research and ecological application.

Program Learning Outcomes

Ecology

1. Demonstrate foundational knowledge in Ecology
2. Practice scientific skills such as sampling, measuring, estimating, calculating, and analysis of data
3. Demonstrate the ability to communicate science and scientific findings to society

Ecosystem Management

1. Demonstrate foundational knowledge in Ecosystem Management
2. Practice scientific skills such as sampling, measuring, estimating, calculating, and analysis of data
3. Demonstrate the ability to communicate science and scientific findings to society

Majors

- B.S. in Ecology (http://catalog.principiacollege.edu/majors-minors/ecology-ecosystem-management/bs-ecology/)
- B.S. in Ecosystem Management (http://catalog.principiacollege.edu/majors-minors/ecology-ecosystem-management/bs-ecosystem-management/)

Minor

- Minor in Ecology (http://catalog.principiacollege.edu/majors-minors/ecology-ecosystem-management/minor-ecology/)

EEM 042 Internship - No Credit **0.0 SH** **[ ]**
An opportunity to gain practical experience in ecology, biology, natural resource conservation, environmental policy, consulting, and many other related environmental fields. Internships are selected based on student interest and are designed to extend classroom learning, explore career interests, and put into practice content, theories, and skills in the major. May be taken more than once if topics differ.

EEM 050 EEM Service Learning **0.0 SH** **[ ]**
Students volunteer in positions as naturalists, outdoor teachers, land managers, research technicians, and community recyclers. Projects may serve Principia or other communities or outside agencies such as the Two Rivers National Wildlife Refuge.

EEM 105 Introduction to Forestry **4.0 SH** **[GESL]**
An introduction to humanity's connection to trees and how we care for them. This course is designed to impart technical skills in forest inventory, data analysis, writing forest management plans and harvest prescriptions, tree planting, timber marking and grading, milling, firewood, and operating equipment. Topics on global forest issues, wildlife, recreation, and forest products are covered.
Class Level Restriction: Freshman and Sophomore only.

EEM 111 Introductory Botany 4.0 SH [ ]
Introduction to basic plant structure and function, with emphasis on the processes of photosynthesis, growth, respiration, and reproduction. Includes a survey of the plant kingdom, from algae to flowering plants, focusing on life cycles and ecology of representative plants. Designed primarily for students intending to major in ecology or ecosystem management.
Corequisite: EEM 112, EEM 201, EEM 215.
Class Level Restriction: Freshman and Sophomore only.

EEM 112 Introductory Zoology 4.0 SH [ ]
Survey of animal kingdom and the animal-like protists, including basic structure, life history, ecology, and classification of major groups. Emphasis is given to invertebrates, although vertebrate groups are covered near the end of the course. Introduction to laboratory techniques and scientific writing are stressed.
Corequisite: EEM 111, EEM 201, EEM 215.
Class Level Restriction: Freshman and Sophomore only.

EEM 115 Intro to Restoration Ecology 4.0 SH [GESL]
This course presents students with an introduction to the field of restoration ecology. Students will learn how to apply basic ecological principles to the restoration of various ecosystems as well as the social, economic, and political forces that impact restoration success. Students will become familiar with field techniques, scientific writing skills, and participate in a local ecosystem restoration project.

EEM 120 Plants and Society 4.0 SH [GESL]
Explores basic plant biology, plant culture, from house plant care to home gardening to large-scale agriculture. Topics include introductory plant physiology, the impacts of light, temperature, soil, and fertilizer on plant growth, and pest control. Special emphasis is placed on the development and environmental impacts of large-scale agriculture (including the development and use of genetically modified organisms in agriculture).
Class Level Restriction: Freshman and Sophomore only.
Fee=$25.00.

EEM 161 Field & Natural History 4.0 SH [GESL]
Studies of local plants and animals in their natural environment and in their relation to humankind. Emphasis on conservation, nature interpretation, and observation and field research skills.
Class Level Restriction: Freshman and Sophomore only.
Fee=$50.00.

EEM 190 Global Environmental Issues 3.0 SH [GESN]
Exploration of environmental issues that are global in scale. By examining topics such as deforestation, agriculture, climate change, and the decline of biodiversity, students will learn to think critically about environmental issues, and to identify and evaluate the many conflicting perspectives that surround these issues. Special emphasis placed on the role of science in identifying and solving global environmental problems.
Class Level Restriction: Freshman and Sophomore only.

EEM 191 Introduction to Ecology 4.0 SH [GESL]
Exploration of fundamental concepts relating to ecosystem structure and function, including the interactions of plant and animal populations within biological communities, and the role of abiotic factors in shaping those populations and communities. Emphasizes basic methods of field research, data analysis, and scientific writing. Designed primarily for students intending to major in ecology, ecosystem management, chemistry or sustainability.
Class Level Restriction: Freshman and Sophomore only.

EEM 201 Methods in Research & Writing 4.0 SH [ ]
Course emphasizes a broad range of skills essential to successful work in ecology and ecosystem management. Skills include reading and analyzing scientific literature, designing and conducting lab and field research projects, data management and analysis, scientific writing, and presentation techniques. Designed primarily for students intending to major in ecology or ecosystem management.
Corequisite: EEM 111, EEM 112, EEM 215.
Class Level Restriction: Freshman and Sophomore only.

EEM 215 Biometry **3.0 SH** **[ ]**
This course provides an introduction to statistics emphasizing applications to biology and natural resource management. Topics include descriptive statistics, distributions, confidence intervals, T-tests, correlation, linear regression, analysis of variance (ANOVA), multiple and nonlinear regression, multiple ANOVA, and nonparametric statistics. The course emphasizes application of statistical methodology. Will be offered without corequisites Fall 2025 during the transition from biology to ecology.
Corequisite: EEM 111, EEM 112, EEM 201.
Class Level Restriction: Freshman and Sophomore only.

EEM 220 Marine Biology **3.0 SH** **[ ]**
This survey course covers a broad range of subject areas in marine biology including basic oceanography, biology of life in the seas, and management/conservation of oceanic biological resources. Also focuses on learning about marine ecosystems (types, locations, and biological structure).
Prerequisite: EEM 112.

EEM 225 Indigenous Ecol Knowledge **3.0 SH** **[ ]**
The course provides an introduction to the ways in which indigenous people understand the world and the land. Special attention will be paid to interactions between indigenous knowledge and Western science. Students will explore aspects of indigenous ecological knowledge and the role it plays in contemporary ecology. The relevance of indigenous knowledge to contemporary resource management will also be explored.

EEM 230 Ornithology **4.0 SH** **[GESL]**
Study of birds: their structure, identification, classification, habits, life history, distribution, migration, methods of attraction, economic importance. Field identification and behavioral study of local species.
Fee=$25.00.

EEM 231 Herpetology **4.0 SH** **[GESL]**
A survey of the biology of reptiles and amphibians. Topics covered include evolutionary origins, morphology, life history, ecology, and identification, emphasizing Principia College campus species. Field work, collecting, and identifying the Principia herpetofauna constitute a significant portion of the course. Students undertake a research project on the amphibian or reptile of their choice.
Fee=$25.00.

EEM 232 Wildlife Conservation **3.0 SH** **[ ]**
This course explores major local and global wildlife issues focusing on the impacts of population growth, land use, tourism, development, and other human activities. This course also examines a range of conservation and planning strategies to protect wildlife species.

EEM 236 Sea Turtle Biology **3.0 SH** **[ ]**
This course teaches the biology of sea turtles (evolution, anatomy, physiology, behavior, life history, and population dynamics) and their conservation needs. Basic ecological concepts are integrated with related topics of conservation and management of endangered species, the contributions of technology to the management of migratory marine species, and the role of research in national and international law and policy.

EEM 245 Natural History **2.0-4.0 SH** **[GESL]**
This course focuses on the study of the natural history of flora and fauna in a specific country or region. Ecosystems studied may include: marine, alpine, forest, grasslands, riverine. Offered on Principia abroads only, with a star (*) grade until following midterm. The title is extended to describe the current region. May be taken more than once if regions differ.

EEM 255 Natural Resources Management **4.0 SH** **[GESL]**
This course focuses on the biological and physical science aspects of natural resource management at local, national, and global scales. Topics covered include management of soil, water, forest, coastal, and wildlife resources. In the laboratory exercises, students learn field measurement techniques and computer skills commonly used in managing natural resources as well as learn how to write scientific lab reports.

EEM 256 Genetics **4.0 SH** **[ ]**
Classical and modern genetic theory and technique, with an emphasis on the role of genetic variability in the development of species, and in the conservation of biodiversity.
Prerequisite: EEM 111 or 112.

EEM 264 Sugarbush Management **4.0 SH** **[GESL]**
Course exposes students to historical, scientific, business, and conservation aspects of managing a maple-dominated woodland for syrup production. Central to this course is the planning and implementation of a small-scale "sugarbush" on the college campus, complete with tapping, evaporating, and marketing the final product.
Fee=$50.00.

EEM 280 Plant Taxonomy **4.0 SH** **[ ]**
Study of plant families illustrated by their morphology and reproductive structures. Emphasis is on the development of skills used to identify and classify plants in the field.
Prerequisite: EEM 111.

EEM 290 Environmental Policy **3.0 SH** **[ ]**
This course includes the formulation and implementation of environmental policy, with special reference to the impact of political and economic factors. Specific consideration will be given to major environmental regulations.

EEM 293 Soil and Water Conservation **3.0 SH** **[ ]**
Past and present issues in soil and water conservation will be examined. Principles of erosion, conservation tillage, irrigation, and drainage will be discussed. Agencies and programs responsible for soil and water conservation will be studied. Current issues such as integrated watershed management, water conflicts and cooperation, organic agriculture, urban agriculture, and green roofs will also be investigated.
Prerequisite: EEM 191.
Class Level Restriction: Sophomore and Junior and Senior only.

EEM 301 Environmental Mapping & GIS **4.0 SH** **[ ]**
Introduction to the concepts, techniques, and applications of mapping and monitoring the environment. Students become familiar with the uses of topographic maps, aerial photography, satellite imagery, Global Positioning Systems (GPS), and Geographic Information Systems (GIS). Students design and implement an ecosystem mapping project.
Class Level Restriction: Junior and Senior only.

EEM 312 Grassland Ecology **4.0 SH** **[ ]**
Exploration of the structure and function of grassland ecosystems. Topics include the evolutionary history of the grassland biome, interactions between plants and animals in grasslands, and the effects of fire, grazing, and climate on grasslands. Introduces students to key papers on grassland ecology, as well as current field research methods.
Prerequisite: EEM 111 and EEM 191.
Class Level Restriction: Junior and Senior only.

EEM 313 Forest Ecology **4.0 SH** **[ ]**
An exploration of the structure and function of forested ecosystems, with an emphasis on field research and scientific writing. Topics include succession, disturbance, landscape variation, nutrient cycling, tree identification, and ecosystem stability. This course builds on the fundamentals learned in Introduction to Ecology and introduces students to contemporary ecological thinking.
Prerequisite: EEM 111 and EEM 191.
Class Level Restriction: Junior and Senior only.

EEM 315 Freshwater Ecology **4.0 SH** **[ ]**
A survey course in the ecological functioning of lakes, rivers, streams, and wetlands. The course has a special focus on the great rivers of the Midwest, including their ecological and environmental problems. Students learn field skills needed to conduct ecological research and write scientific lab reports and a final research paper on freshwater ecosystem topics.
Prerequisite: EEM 111 and EEM 191.
Class Level Restriction: Junior and Senior only.

EEM 317 Wetland Ecology 4.0 SH [ ]
The study of bogs, fens, swamps, bottomland hardwood forests, salt marshes and mangroves with an emphasis on the formation, hydrology, biogeochemistry, and community dynamics of these systems. Management, policy, and restoration strategies will also be discussed. Students will learn field skills needed to conduct wetland research and write lab reports and a final research paper on wetland ecosystem topics.
Prerequisite: EEM 111 and EEM 191.
Class Level Restriction: Junior and Senior only.

EEM 325 Wildlife Management 4.0 SH [ ]
This course is designed to give students an understanding of wildlife and conservation management methods. Covers techniques in population estimation, radio and satellite telemetry and other electronic data gathering methods as well as studying when and how to apply such methods. The course combines lecture and field work, with a heavy emphasis on the field work.
Prerequisite: EEM 112.
Class Level Restriction: Junior and Senior only.

EEM 340 Adv Natural History 2.0-4.0 SH [ ]
An advanced course focusing on natural history of flora and fauna in a specific country or region, as well as the ecological dynamics of populations, communities, and ecosystems. Case studies are drawn from multiple ecosystems including marine, freshwater, forest, grassland, and alpine. The title is extended to describe the current region. May be taken more than once if regions differ.

EEM 360 Vertebrate Zoology 4.0 SH [ ]
Studies include the evolutionary development of vertebrates, from their origins to the divergence of groups. It focuses on comparative anatomy to understand common ancestral linkages. Students study the broad diversity of modern vertebrates, including life histories, physiology, and ecological adaptations. Laboratory work focuses on anatomy as well as key features of the major vertebrate groups.
Prerequisite: EEM 112.
Class Level Restriction: Junior and Senior only.

EEM 362 Conservation 2.0-4.0 SH [GESN]
This course focuses on how natural resources of a given country are managed. Students study conservation management strategies of representative ecosystems as well as species management and the interface of native culture and resource conservation. Offered on Principia abroads only, with a star (*) grade until following midterm. The title will be extended to describe the current country.
Class Level Restriction: Junior and Senior only.

EEM 380 Advanced Ecology Seminar 1.0-3.0 SH [ ]
Offered when regular or visiting faculty are available to work with students on selected topics in ecology. Recent topics have included ecological modeling and soils ecology. The title will be extended to describe the current topic. May be offered for variable credit from one to three semester hours. May be taken more than once provided the topics differ.
Class Level Restriction: Junior and Senior only.

EEM 381 Adv Natural Resources Seminar 1.0-3.0 SH [ ]
Offered when regular or visiting faculty are available to work with students on selected topics in natural resources conservation. The title will be extended to describe the current topic. May be offered for variable credit from one to three semester hours. May be taken more than once provided the topics differ.
Class Level Restriction: Junior and Senior only.

EEM 390 Forest Resource Management 4.0 SH [ ]
A course in the ways we manage forest lands to provide an array of goods and services to mankind. This course teaches the concepts of sustainable forestry and the field techniques that allow the manager to evaluate, plan, and implement forest management activities. Students learn specific skills in forest measurements, applied silviculture, and the use of management decision support tools.
Prerequisite: EEM 191.
Class Level Restriction: Junior and Senior only.

EEM 400 Senior Thesis Seminar 1.0 SH [ ]
This course assists Ecology and Ecosystem Management (EEM) majors design, plan, and conduct, research for a senior thesis project. Class activities may include meetings with research librarians, discussions with EEM faculty about project design and methodology, preparation of an annotated bibliography and coaching on presentation skills. Students develop a formal research proposal and a plan for the project.
Class Level Restriction: Junior and Senior only.
Field of Study Restrictions: Ecosystem Management, Ecology Majors only.

EEM 401 Senior Thesis 1.0-6.0 SH [ ]
Project selected in accordance with student's qualifications, interests, and needs. May be taken for variable credit from one to six semester hours. May be taken more than once with EEM department chair approval. May be repeated up to a total of 12 semester hours.
Prerequisite: five or more EEM courses numbered above 150 including EEM 400.
Class Level Restriction: Senior only.

EEM 402 Internship 1.0-6.0 SH [ ]
An opportunity to gain practical experience in biology, ecology, natural resource conservation, environmental policy, and other related environmental fields. Past student internships include waterfowl research for the U.S. Fish and Wildlife Service, amphibian research in Puerto Rico, and aquarium management at the New England Aquarium. May be taken more than once if topics differ. Offered on an independent contract basis.
Class Level Restriction: Junior and Senior only.

EEM 403 Research Experience 1.0-6.0 SH [ ]
This course is designed to give students the opportunity to conduct guided research as research assistants in ecology, biology, natural resource conservation, or other environmental fields. Students will undertake original research while gaining practical experience as research ecologists. Depending on the project, students may spend some of, or the whole semester, off campus.
Prerequisite: EEM 111, EEM 191, and EEM 201, and at least one of the following: EEM 312, EEM 313, EEM 315.
Class Level Restriction: Junior and Senior only.
Field of Study Restrictions: Ecosystem Management, Ecology Majors only.

EEM 405 Integrated Eco Mgmt Capstone 4.0 SH [ ]
This course provides students with the opportunity to synthesize their knowledge and skills in ecosystem management for a real-world project. Students will collaborate in teams to identify ecological issues within a social and economic context and create objectives to address these challenges.
Prerequisite: EEM 215, EEM 255, EEM 301, and at least one of the following: EEM 312, EEM 313, EEM 315, EEM 317.
Class Level Restriction: Senior only.
Field of Study Restrictions: Ecosystem Management Majors only.

EEM 410 Senior Readings 3.0 SH [ ]
This course introduces students to seminal pieces of environmental literature and to cutting edge thinking on environmental problems. Students are responsible for reading assigned materials and participating in seminar discussions. The course challenges students to define and defend their personal values regarding environment and to become active citizens in the environmental issues facing society.
Prerequisite: five EEM courses.
Class Level Restriction: Junior and Senior only.