

ECOLOGY, EVOLUTION, AND ORGANISMAL BIOLOGY (EEOB)

The department offers graduate work leading to both Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees. Each EEOB faculty member is affiliated with one or more interdepartmental majors, and EEOB students major in one of these programs. These interdepartmental programs include:

- Bioinformatics and Computational Biology (<http://www.bcb.iastate.edu/>)
- Ecology and Evolutionary Biology (<http://www.eeb.iastate.edu/>)
- Environmental Science (<https://ensci.iastate.edu/>)
- Genetics and Genomics (<http://www.genetics.iastate.edu>)
- Interdisciplinary Graduate Studies (<http://www.grad-college.iastate.edu/igs/admission.html>)
- Microbiology (<http://www.micrograd.iastate.edu/>)
- Plant Biology (<http://www.ipb.iastate.edu/>)
- Sustainable Agriculture (<https://susag.iastate.edu/>)

The department offers graduate work leading to both Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees.

Courses primarily for graduate students, open to qualified undergraduates:

EEOB 5070: Advanced Animal Behavior

Credits: 3. Contact Hours: Lecture 3.

Analysis of current research in animal behavior. Topics covered may include behavioral ecology, mechanisms of behavior, evolution of behavior, applications of animal behavior to conservation biology, and applications of animal behavior to wild animals in captivity. (Typically Offered: Spring)

EEOB 5140: Life History and Reproductive Strategies

(Dual-listed with BIOL 4140).

Credits: 3. Contact Hours: Lecture 3.

Evolution of ecological adaptations at the individual, population, and species level. Emphasis is on evolutionary mechanisms and adaptive strategies related to life histories and reproduction; age and size at maturity; lifespan and senescence; offspring size/number trade-offs; sex and mating systems; sex determination and sex ratios. BIOL 3150 or equivalent recommended. (Typically Offered: Fall)

EEOB 5210: Biological Principles of Aging

(Dual-listed with BIOL 4210). (Cross-listed with GERON 5210).

Credits: 3. Contact Hours: Lecture 3.

Basic biological principles of aging. Course modules include an introduction to the aging process, body systems and normal aging, and environment and the biology of aging. In addition, disorders and diseases of aging, prevention and treatment and exercise and aging topics will be covered. (Typically Offered: Summer)

EEOB 5310: Conservation Biology

(Cross-listed with AECL 5310).

Credits: 3. Contact Hours: Lecture 3.

Prereq: BIOL 3120, BIOL 3130; or *graduate standing*

Examination of conservation issues from a population and a community perspective. Population-level analysis will focus on the role of genetics, demography, and environment in determining population viability. Community perspectives will focus on topics such as habitat fragmentation, reserve design, biodiversity assessment, and restoration ecology. Offered even-numbered years. (Typically Offered: Spring)

EEOB 5340: Endocrinology

(Dual-listed with BIOL 4340).

Credits: 3. Contact Hours: Lecture 3.

Chemical integration of vertebrate organisms. The structure, development, and evolution of the endocrine glands and the function and structure of their hormones. (Typically Offered: Spring)

EEOB 5350: Restoration Ecology

(Cross-listed with NREM 5350/ ENSCI 5350).

Credits: 3. Contact Hours: Lecture 2, Laboratory 3.

Theory and practice of restoring animal and plant diversity, structure and function of disturbed ecosystems. Restored freshwater wetlands, forests, prairies and reintroduced species populations will be used as case studies. Offered even-numbered years. (Typically Offered: Fall)

EEOB 5420A: Introduction to Molecular Biology Techniques: DNA Techniques

(Cross-listed with BMS 5420A/ BBMB 5420A/ FSHN 5420A/ GDCB 5420A/ HORT 5420A/ NREM 5420A/ NUTRS 5420A/ VDPAM 5420A/ VMPM 5420A).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

Includes genetic engineering procedures, sequencing, PCR, and genotyping. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

EEOB 5420B: Introduction to Molecular Biology Techniques: Protein

(Cross-listed with BMS 5420B/ BBMB 5420B/ FSHN 5420B/ GDCB 5420B/ HORT 5420B/ NREM 5420B/ NUTRS 5420B/ VDPAM 5420B).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

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

EEOB 5420C: Introduction to Molecular Biology Techniques: Cell Techniques

(Cross-listed with BMS 5420C/ BBMB 5420C/ FSHN 5420C/ GDCB 5420C/ HORT 5420C/ NREM 5420C/ NUTRS 5420C/ VMPM 5420C/ VDPAM 5420C).

Credits: 1. Contact Hours: Laboratory 2.

Repeatable.

Includes: immunophenotyping, ELISA, flow cytometry, microscopic techniques, image analysis, confocal, multiphoton and laser capture microdissection. ular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Fall, Spring)

EEOB 5420D: Introduction to Molecular Biology Techniques: Plant Transformation

(Cross-listed with BMS 5420D/ BBMB 5420D/ FSHN 5420D/ GDCB 5420D/ HORT 5420D/ NREM 5420D/ NUTRS 5420D/ VMPM 5420D/ VDPAM 5420D).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

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

EEOB 5420E: Introduction to Molecular Biology Techniques: Proteomics

(Cross-listed with BMS 5420E/ BBMB 5420E/ FSHN 5420E/ GDCB 5420E/ HORT 5420E/ NREM 5420E/ NUTRS 5420E/ VMPM 5420E/ VDPAM 5420E).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

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

EEOB 5420F: Introduction to Molecular Biology Techniques: Metabolomics

(Cross-listed with BMS 5420F/ BBMB 5420F/ FSHN 5420F/ GDCB 5420F/ HORT 5420F/ NREM 5420F/ NUTRS 5420F/ VMPM 5420F/ VDPAM 5420F).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

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

EEOB 5420G: Introduction to Molecular Biology Techniques: Genomic

(Cross-listed with BMS 5420G/ BBMB 5420G/ FSHN 5420G/ GDCB 5420G/ HORT 5420G/ NREM 5420G/ NUTRS 5420G/ VMPM 5420G/ VDPAM 5420G).

Credits: 1. Contact Hours: Lecture 0.5, Laboratory 1.

Repeatable.

Sessions in basic molecular biology techniques and related procedures. Offered on a satisfactory-fail basis only. (Typically Offered: Spring)

EEOB 5440: Intro Bioinformatics

Credits: 4. Contact Hours: Lecture 4.

Intro Bioinformatics. (Typically Offered: Fall)

EEOB 5460: Computational Skills for Biological Data

(Cross-listed with BCB 5460).

Credits: 3. Contact Hours: Lecture 1, Discussion 2.

Computational skills necessary for biologists working with big data sets. UNIX commands, scripting in R and Python, version control using Git and GitHub, and use of high performance computing clusters. Combination of lectures and computational exercises. (Typically Offered: Fall)

EEOB 5510: Plant Evolution and Phylogeny

(Dual-listed with BIOL 4510).

Credits: 4. Contact Hours: Lecture 3, Laboratory 3.

Survey of land plant evolution; phylogenetic comparison of anatomical, reproductive, and life history specializations. Relationships among bryophytes, lycophytes, pteridophytes, gymnosperms, and angiosperms emphasizing significant evolutionary changes documented by paleobotanical, morphological, and molecular studies. (Typically Offered: Fall)

EEOB 5530: Agrostology

Credits: 3.

Structure, identification, classification, phylogeny, and economic aspects of grasses and related families. Offered even-numbered years. (Typically Offered: Fall)

EEOB 5550: Bryophyte and Lichen Biodiversity

(Dual-listed with BIOL 4550).

Credits: 3. Contact Hours: Lecture 2, Laboratory 1.

Introduction to the biology and ecology of mosses, liverworts, and lichens. Emphasis on identification and diversity of local representatives of these three groups of organisms. Required field trips and service-learning. (Typically Offered: Spring)

EEOB 5610: Evolutionary and Ecological Genomics

Credits: 3. Contact Hours: Lecture 3.

Use of genomic and other 'omic' data in evolution and ecology. Review of data-generation platforms, computational methods, and examples of how phylogenomics, metagenomics, epigenomics, and population genomics are transforming the disciplines of evolution and ecology. Offered even-numbered years. (Typically Offered: Spring)

EEOB 5620: Evolutionary Genetics

Credits: 3. Contact Hours: Lecture 3.

Seminar/discussion course covering the genetic basis of evolutionary processes in multicellular organisms. Offered even-numbered years. (Typically Offered: Spring)

EEOB 5630: Molecular Phylogenetics

Credits: 3.

An overview of the theory underlying phylogenetic analysis and the application of phylogenetic methods to molecular datasets. The course emphasizes a hands-on approach to molecular phylogenetics and combines lecture presentations with computer exercises and discussion of original scientific literature. (Typically Offered: Spring)

EEOB 5640: Wetland Ecology

(Dual-listed with BIOL 4640/ ENSCI 4640). (Cross-listed with ENSCI 5640).

Credits: 3. Contact Hours: Lecture 3.

Ecology, classification, creation and restoration, and management of wetlands. Emphasis on North American temperate wetlands. (Typically Offered: Spring)

EEOB 5650: Macroevolution

(Dual-listed with BIOL 4650).

Credits: 3. Contact Hours: Lecture 2, Discussion 1.

The history and diversity of life on earth; evolutionary patterns and processes above the species level. Diversity from a phylogenetic perspective. Empirical exercises include: phylogeny estimation, ancestral states, estimating diversification rates, evaluating the tempo and mode of evolution, biogeographic patterns, and trait associations across the tree of life. Offered even-numbered years. (Typically Offered: Spring)

EEOB 5660: Molecular Evolution

Credits: 3. Contact Hours: Lecture 3.

Seminar/discussion course covering the fundamentals of molecular evolution. Emphasis is placed on original scientific literature and current topics, including rates and patterns of genetic divergence; nucleotide and allelic diversity; molecular clocks; gene duplications; genome structure; organellar genomes; polyploidy; transposable elements; and modes and mechanisms of gene and genome evolution. Offered even-numbered years. (Typically Offered: Fall)

EEOB 5670: Empirical Population Genetics

Credits: 3. Contact Hours: Lecture 3.

An overview of fundamental population genetic theory and the ecological and evolutionary factors underlying the distribution of genetic variation within and among natural populations. Emphasis on the analysis of inbreeding, breeding systems, parentage, relatedness, spatial autocorrelation, effective population size, hierarchical population models, and phylogeography. (Typically Offered: Fall)

EEOB 5680: Advanced Systematics

(Cross-listed with ENT 5680).

Credits: 3. Contact Hours: Lecture 2, Laboratory 3.

Principles and practice of systematic biology; taxonomy, nomenclature and classification of plants and animals; sources and interpretation of systematic data; speciation; fundamentals of phylogenetic systematics. (Typically Offered: Spring)

EEOB 5690: Biogeography

Credits: 3. Contact Hours: Lecture 3.

Principles underlying the geographic distribution of organisms throughout the world; biological influences of geological history and tectonic movements; role of climate, migration, dispersal, habitat, and phylogeny on past and present organismal distribution patterns; biogeographic methods. (Typically Offered: Spring)

EEOB 5760: Functional Ecology

(Dual-listed with BIOL 4760).

Credits: 3. Contact Hours: Lecture 3.

The nature of adaptations to physical and biotic environments. Biophysical, biomechanical, and physiological bases of the structure, form, growth, distribution, and abundance of organisms. (Typically Offered: Spring)

EEOB 5770: Concepts in Theoretical Ecology and Evolution

Credits: 1. Contact Hours: Lecture 1.

Readings and discussion of influential ideas in ecological and evolutionary theory, with an emphasis on how models are used as conceptual tools for building synthetic paradigms. Topics are chosen according to student interests; may include spatial ecology, behavioral theory, chaos, community assembly and biodiversity, and others. Offered even-numbered years. (Typically Offered: Fall)

EEOB 5840: Ecosystem Science

(Cross-listed with ENSCI 5840).

Credits: 3. Contact Hours: Lecture 3.

Advanced studies of ecosystems and the biological and physical factors that influence their properties and dynamics. Conceptual foundations and modern approaches to ecosystem studies. Interactions among organisms, biological diversity, and ecosystem attributes. Quantitative analyses of accumulations, transformations, and fluxes of nutrients, water, and energy within and among ecosystems. Global change issues. Offered even-numbered years. (Typically Offered: Spring)

EEOB 5850: Community Ecology

(Dual-listed with BIOL 4850).

Credits: 3. Contact Hours: Lecture 3.

The effect of interspecific interactions on the structure and dynamics of natural and managed communities; including concepts of guild structure and trophic web dynamics and their importance to the productivity, diversity, stability, and sustainability of communities. The implications of interspecific interactions in the management of wild species will be emphasized with illustrative case histories of interactions between plants, invertebrates, and vertebrates. (Typically Offered: Spring)

EEOB 5860: Aquatic Ecology

(Dual-listed with AECL 4860/ BIOL 4860/ ENSCI 4860). (Cross-listed with AECL 5860/ ENSCI 5860).

Credits: 3. Contact Hours: Lecture 3.

Prereq: BIOL 3120 or ENSCI 3810 or ENSCI 4020 or NREM 3010 or graduate classification

Structure and function of aquatic ecosystems with application to fishery and pollution problems. Emphasis on lacustrine, riverine, and wetland ecology. (Typically Offered: Fall)

EEOB 5860L: Aquatic Ecology Laboratory

(Dual-listed with AECL 4860L/ BIOL 4860L/ ENSCI 4860L). (Cross-listed with AECL 5860L/ ENSCI 5860L).

Credits: 1. Contact Hours: Laboratory 3.

Prereq: Concurrent enrollment in BIOL 4860

Field trips and laboratory exercises to accompany 4860. Hands-on experience with aquatic research and monitoring techniques and concepts. (Typically Offered: Fall)

EEOB 5870: Microbial Ecology

(Dual-listed with BIOL 4870/ ENSCI 4870/ GEOL 4870/ MICRO 4870).

(Cross-listed with ENSCI 5870/ GEOL 5870/ MICRO 5870).

Credits: 3. Contact Hours: Lecture 3.

Introduction to major functional groups of autotrophic and heterotrophic microorganisms and their roles in natural and environmental systems. Consequences of microbial activity on water chemistry, weathering, and precipitation/dissolution reactions will be emphasized. (Typically Offered: Fall)

EEOB 5890: Population Ecology

(Dual-listed with EEOB 4890/ AECL 4890). (Cross-listed with AECL 5890).

Credits: 3. Contact Hours: Lecture 3.

Prereq: (BIOL 3120, STAT 1010 OR STAT 1040, MATH 1510 OR 1600 OR 1650) or graduate classification

Concepts and theories of population dynamics with emphasis on models of growth, predation, competition, and regulation. Offered even-numbered years. (Typically Offered: Fall)

EEOB 5900A: Special Topics: Current Topics in Ecology

Credits: 1-3. Repeatable.

Prereq: Instructor Permission for Course

EEOB 5900B: Special Topics: Current Topics in Evolutionary Biology

Credits: 1-3. Repeatable.

Prereq: Instructor Permission for Course

EEOB 5900C: Special Topics: Current Topics in Organismal Biology

Credits: 1-3. Repeatable.

Prereq: Instructor Permission for Course

EEOB 5990: Creative Component

Credits: 1-30. Repeatable.

Research toward nonthesis master's degree.

Courses for graduate students:

EEOB 6980: Seminar

Credits: 1. Contact Hours: Lecture 1.

Repeatable.

Prereq: Instructor Permission for Course

Meetings of graduate students and faculty to discuss recent literature and problems under investigation.

EEOB 6990: Research

Credits: 1-30. Repeatable.

Prereq: Instructor Permission for Course

Research for thesis or dissertation. Offered on a satisfactory-fail basis only.