**ZOOLOGY 470 – INTRODUCTION TO ANIMAL DEVELOPMENT**
3 credits.

Introduction to the major features and mechanisms of early embryonic development in animals, including (1) the major stages of early development, (2) how form arises in the embryo (morphogenesis), (3) how differences arise between cells in the embryo, and (4) how specific genes control these processes.
**Requisites:** ZOOLOGY/BIOLOGY/BOTANY 151, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY 101, BIOCORE 381, or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Explain and use key concepts in developmental biology.
Audience: Undergraduate

2. Explain how developmental biologists study embryos and devise experiments to study developmental processes.
Audience: Undergraduate

3. Explain the steps by which an animal embryo arises from a fertilized egg.
Audience: Undergraduate

4. Explain the cellular mechanisms underlying morphogenesis.
Audience: Both Grad & Undergrad

5. Explain how gene expression, regulated by cell signaling and localized molecules, controls development.
Audience: Both Grad & Undergrad

6. Relate specific molecular pathways regulating development to specific graduate-level research topics.
Audience: Graduate

**ZOOLOGY/BOTANY/ENTOM 473 – PLANT-INSECT INTERACTIONS**
3 credits.

Multiple ways in which arthropods exploit plants, plant traits that deter or augment insects, environmental mediation of these interactions, effects on population dynamics, community ecology and co-evolution, and implications to natural resource management, environmental quality, and sustainable development.
**Requisites:** F&W ECOL/BOTANY/ZOOLOGY 460, FW ECOL 500, ENTOM/BOTANY/PL PATH 505, or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Identify the fundamental mechanisms mediating interactions of plants and insects.
Audience: Both Grad & Undergrad

2. Describe the implications of plant and insect interactions for population, community, and ecosystem ecology.
Audience: Both Grad & Undergrad

3. Discuss the implications of plant and insect interactions for natural resource management and sustainable ecosystems.
Audience: Both Grad & Undergrad

4. Communicate relevant and current scientific literature to peers.
Audience: Both Grad & Undergrad

5. Synthesize current research findings in plant and insect interactions and apply this knowledge to evaluate implications of plant-insect co-evolution.

Audience: Graduate

**ZOOLOGY 500 – UNDERGRADUATE NEUROBIOLOGY SEMINAR**
1 credit.

A wide range of topics in neurobiology research from molecular neurobiology to integrative systems. Topics discussed by invited UW-Madison faculty researchers might include: ion channels and synaptic plasticity, neural development, sensory and cognitive physiology, biological basis of behavioral disorders and cognitive decline.
**Requisites:** Declared in Neurobiology and ZOOLOGY/PSYCH 523 or concurrent enrollment.
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Identify contemporary approaches to neuroscience research.
Audience: Undergraduate

2. Evaluate the strengths and weaknesses of various experimental approaches.
Audience: Undergraduate

3. Develop analytical and writing communication skills in the context of modern neuroscience research.
Audience: Undergraduate

4. Describe the breadth of neuroscience research on the UW-Madison campus.
Audience: Undergraduate

**ZOOLOGY/ENVIR ST 510 – ECOLOGY OF FISHES**
3 credits.

Interactions of fishes with their physical, chemical, and biotic environment; physiological ecology, community ecology and fisheries sciences. Lake Mendota perch fishery and Shedd Aquarium field trips.
**Requisites:** (ZOOLOGY/BIOLOGY 101 and 102), ZOOLOGY/BIOLOGY/BOTANY 152, or BIOCORE 381
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Use facts to guide conceptual thinking and hypothesis tests about ecological systems.
Audience: Undergraduate

2. Draw upon aspects of fish evolution, ecology, and conservation to produce an integrated perspective.
Audience: Undergraduate

3. Summarize the diversity of fishes on Earth, including phylogenetic and geographic patterns.
Audience: Undergraduate

4. Analyze the relationship between form and function of individual fish.
Audience: Undergraduate

5. Place fish in the context of the broader food web and ecological community.
Audience: Undergraduate

6. Describe the management and use of fish by human society.
Audience: Undergraduate

7. Describe the conservation challenges faced by fish now and in the future.
Audience: Undergraduate

8. Write clear, concise scientific reports both individually and in teams.
Audience: Undergraduate

9. Present effective, informative, and persuasive arguments in writing and orally.
Audience: Undergraduate

**ZOOLOGY/ENVIR ST 511 – ECOLOGY OF FISHES LAB**
2 credits.

Anatomy and taxonomy of Wisconsin fishes and projects in fish ecology.
**Requisites:** ZOOLOGY/ENVIR ST 510 or concurrent enrollment
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Develop, think about, and answer scientific questions like a fish ecologist.
Audience: Undergraduate

2. Identify different Wisconsin fishes based on their anatomy.
Audience: Undergraduate

3. Carry out a variety of fish field sampling, laboratory, and data analysis techniques.
Audience: Undergraduate

4. Communicate and write in a proper scientific format.
Audience: Undergraduate

**ZOOLOGY/BOTANY/ENVIR ST/F&W ECOL 516 – CONSERVATION BIOLOGY**
3 credits.

Investigate the science behind the protection of nature and preservation of biodiversity by focusing on both the biological and socioeconomic factors that underlie the challenges to and the impacts of conservation efforts. Explore the theory, research, and application of biological conservation from an interdisciplinary, international, solutions-focused perspective. Learn about the many threats to Earth's biodiversity but also examine in-depth and apply approaches to overcome them.
**Requisites:** Satisfied Quantitative Reasoning (QR) A requirement and ZOOLOGY/BIOLOGY/BOTANY 152, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY 101, BIOCORE 381, or graduate/professional standing
**Course Designation:** Gen Ed - Quantitative Reasoning Part B
Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Distinguish conservation biology from other scientific disciplines and describe its over-arching principles.
Audience: Both Grad & Undergrad

2. Articulate many reasons why the conservation of biological diversity (at many levels) is important.
Audience: Both Grad & Undergrad

3. Quantify biodiversity at the individual, population, and species level by applying various commonly used models and indices.
Audience: Both Grad & Undergrad

4. Explain orally and in writing the principal threats to biodiversity, to both scientific and layperson audiences (habitat loss and fragmentation; industrial agriculture; climate change; overexploitation; invasive species; pollution) and the specific biological effects of these threats.
Audience: Both Grad & Undergrad

5. Outline strategies to implement at the personal, local, and global scales for solving the biodiversity crisis.
Audience: Both Grad & Undergrad

6. Critically analyze, apply, and communicate recommendations for changing personal behaviors to mitigate the biodiversity and climate crises.
Audience: Both Grad & Undergrad

7. Assess the strengths and weaknesses of various conservation strategies or policy approaches.
Audience: Both Grad & Undergrad

8. Synthesize multiple investigations of conservation strategies to assess trade#offs and synergies among them.
Audience: Graduate

9. Make science#based recommendations for the appropriate conservation approach or strategy for a given situation.
Audience: Graduate

10. Manipulate quantitative data using multi-step arguments to evaluate, interpret, and express solutions to problems in biodiversity estimation, population monitoring, and genetics in the context of conservation.
Audience: Both Grad & Undergrad

**ZOOLOGY/AN SCI/F&W ECOL 520 – ORNITHOLOGY**
3 credits.

Introduction to bird biology, ecology, and behavior. Topics include the evolutionary origin of birds and flight, anatomy and physiology, functional morphology, migration, communication, reproductive strategies, ecological adaptations and roles, and biogeographical patterns.
**Requisites:** ZOOLOGY/BIOLOGY 101 and 102, ZOOLOGY/BIOLOGY/BOTANY 152, (BIOCORE 381 and 382), or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Articulate how birds differ from other vertebrate taxa and trace birds' basic evolutionary history.
Audience: Both Grad & Undergrad

2. Characterize the adaptations (morphological, physiological, behavioral) that are associated with birds' great evolutionary success.
Audience: Both Grad & Undergrad

3. Analyze the mechanics of flight, and relate different modes of flight to species' life history strategies.
Audience: Both Grad & Undergrad

4. Compare and contrast the annual cycle of bird groups that have distinct life history strategies.
Audience: Both Grad & Undergrad

5. Explain different modes of learning in birds, and what conditions favor the different modes.
Audience: Both Grad & Undergrad

6. Synthesize modes of communication in birds.
Audience: Both Grad & Undergrad

7. Distinguish between factors shaped by natural versus sexual selection, and discuss the role of sexual selection, habitat selection, and foraging mode in shaping avian behavior and ornamentation.
Audience: Both Grad & Undergrad

8. Identify and discuss contemporary issues in bird conservation, and predict how various avian attributes are associated with risk of extinction.
Audience: Both Grad & Undergrad

9. Assess and integrate primary scientific literature to evaluate evolutionary and ecological theories in ornithology and apply these insights to address a contemporary issue in avian biology or conservation.
Audience: Graduate

**ZOOLOGY/AN SCI/F&W ECOL 521 – BIRDS OF SOUTHERN WISCONSIN**
3 credits.

Outdoor and indoor labs/lectures emphasizing identification of southern Wisconsin birds by sight and vocalization. Two required Saturday field trips in Southern Wisconsin.
**Requisites:** ZOOLOGY/BIOLOGY 101 and 102, ZOOLOGY/BIOLOGY/BOTANY 152, (BIOCORE 381 and 382), or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Identify bird species found in Southern Wisconsin by sight and vocalization.
Audience: Both Grad & Undergrad

2. Compare and contrast habitat associations (e.g., wetlands, grasslands, oak woodlands, conifer forest, riparian zones) and some life history strategies (e.g., foraging guild, migratory guild) for the majority of species.

Audience: Both Grad & Undergrad

3. Explain and use bird monitoring techniques.
Audience: Both Grad & Undergrad

4. Assess and integrate primary scientific literature to evaluate a question about speciation or migration pattern changes or a mutually agreed on (with instructor) topic relevant to field observations of birds.
Audience: Graduate

**ZOOLOGY/PSYCH 523 – NEUROBIOLOGY**
3 credits.

Basic mechanisms in cellular neurophysiology: electrophysiology and chemistry of nerve signals, mechanisms in integration, simple nervous pathways and their behavioral correlates.
**Requisites:** (ZOOLOGY/BIOLOGY/BOTANY 151, ZOOLOGY/BIOLOGY 101, or BIOCORE 383) and (CHEM 104, CHEM 109, or CHEM 116)
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Understand the molecular mechanisms of cellular neurophysiology, including the ionic basis of the resting membrane potential and action potential, and mechanisms of synaptic transmission.
Audience: Undergraduate

2. Understand the basis of sensory perception at the receptor level.
Audience: Undergraduate

3. Demonstrate how neuronal signaling is integrated into simple nervous pathways and their behavioral correlates.
Audience: Undergraduate

4. Apply principles of neuronal function to activity-dependent changes in rhythmic neuronal activity, neuronal plasticity, and memory.
Audience: Undergraduate

5. Understand some of the state-of-the-art approaches to neuronal function.
Audience: Undergraduate

6. Understand key steps in the development of the nervous system and explain and apply the experimental approaches underpinning that understanding.
Audience: Undergraduate

7. Elucidate connections between genetics, pharmacology, and the functioning of the nervous system.
Audience: Undergraduate

8. Understand the mechanisms underlying a subset of disorders of the nervous system and the bases of current treatments.
Audience: Undergraduate

**ZOOLOGY/ENTOM 540 – THEORETICAL ECOLOGY**
3 credits.

Introduction to theoretical ecology, including hands-on experience in computer modeling.
**Requisites:** STAT/F&W ECOL 571
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Describe the purpose and the use of analytical statistical models.
Audience: Both Grad & Undergrad

2. Apply appropriate statistical methods to analyze complex ecological data.
Audience: Both Grad & Undergrad

3. Use the statistical tools available in the R programming language to analyze the type of data that derives from their graduate research.
Audience: Graduate

**ZOOLOGY/GEOSCI 542 – INVERTEBRATE PALEONTOLOGY**
3 credits.

The evolutionary history, morphology, and ecology of fossil invertebrates. Labs emphasize fossil identification and recognition of basic morphological features.
**Requisites:** (GEOSCI 110 or 204), (ZOOLOGY/BIOLOGY 101 and 102), ZOOLOGY/BIOLOGY/BOTANY 152, (BIOCORE 381 and 382), or graduate/professional standing.
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2024
**Learning Outcomes:** 1. Identify fossils of marine invertebrate animals in the rock record.
Audience: Both Grad & Undergrad

2. Describe the processes involved in fossilization of marine invertebrate animals.
Audience: Both Grad & Undergrad

3. Recognize the hierarchical taxonomic classification of marine invertebrate animals and how it reflects their evolutionary histories.
Audience: Both Grad & Undergrad

4. Use fossils to infer past environmental and ecological conditions.
Audience: Both Grad & Undergrad

5. Use fossils to constrain the age of sedimentary rocks (i.e. biostratigraphy).
Audience: Both Grad & Undergrad

6. Summarize how the fossil record is used to reconstruct Earth history.
Audience: Both Grad & Undergrad

7. Evaluate relevant scientific literature related to invertebrate paleontology.
Audience: Graduate

**ZOOLOGY 555 – LABORATORY IN DEVELOPMENTAL BIOLOGY**
3 credits.

Developmental anatomy and laboratory manipulations of representative animal embryos used extensively for analysis of developmental phenomena (sea urchins, amphibia, annelids, molluscs, ascidians, insects, chicks, fish, mice).
**Requisites:** ZOOLOGY 470, 625, ZOOLOGY/PSYCH 523, or BIOCORE 587
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Review and synthesize key concepts in developmental biology.
Audience: Undergraduate

2. Apply cutting edge experimental methods used by modern developmental biologists.
Audience: Undergraduate

3. Able to design and execute experiments.
Audience: Undergraduate

4. Perform data analysis and presentation of study conclusions to an audience of peers.
Audience: Undergraduate

**ZOOLOGY/F&W ECOL/LAND ARC 565 – PRINCIPLES OF LANDSCAPE ECOLOGY**
2 credits.

Emphasizes the importance of spatial patterns at broad scales. Concepts and applications are covered.
**Requisites:** (ZOOLOGY/BOTANY/F&W ECOL 460 or F&W ECOL 550) and (STAT 301, 371, or F&W ECOL/STAT 571), or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2019

**ZOOLOGY 570 – CELL BIOLOGY**
3 credits.

Comprehensive course on modern aspects of cell biology.
**Requisites:** ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, or BIOCORE 383
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Describe the molecular basis of life with a comprehensive understanding of the intricate interactions between biological macromolecules.
Audience: Undergraduate

2. Analyze and explain the relationship between the structure and function of biological macromolecules, including proteins, nucleic acids, lipids, and carbohydrates.
Audience: Undergraduate

3. Explain the process of gene expression and its regulation, including the roles of transcription factors, enhancers, and silencers.
Audience: Undergraduate

4. Interpret the flow of genetic information from the DNA code to the synthesis of functional proteins.
Audience: Undergraduate

5. Describe the purpose and use of laboratory techniques in modern biology, including a wide variety of biochemical preparation and microscopy techniques.
Audience: Undergraduate

6. Integrate the principles of molecular biology with cultural and historical factors shaping the scientific enterprise, demonstrating an understanding of the ethical, social, and economic implications of biomedical research.
Audience: Undergraduate

7. Critically assess primary scientific literature in cell biology, including experimental design, data interpretation, and the formulation of conclusions and utilize effective written communication skills to communicate analysis of the primary literature.
Audience: Undergraduate

8. Explain the centrality of cell biology to human disease.
Audience: Undergraduate

**ZOOLOGY 603 – ENDOCRINOLOGY**
3-4 credits.

An introduction to the role that hormones play in a variety of physiological pocesses and behaviors from a molecular to a systems level. Topics include hormonal involvement in growth, development, homeostasis, reproduction, and behavior, with an emphasis on vertebrate systems.
**Requisites:** ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 383 or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2023

**ZOOLOGY 604 – COMPUTER-BASED GENE AND DISEASE/DISORDER RESEARCH LAB**
2 credits.

Learn to navigate open access biological and biomedical databases that include a wealth of information regarding genes, gene expression, gene pathways, behavioral characteristics, and disorders or diseases. This includes extracting information to develop new ideas, and using multiple databases to develop new ideas on which genes may be playing important, but previously underappreciated or unknown roles.
**Requisites:** ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 381, or graduate/professional standing
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2024
**Learning Outcomes:** 1. Navigate through a range of open access biological databases and extract information to develop new ideas on how genes are linked to diseases, disorders, or traits.
Audience: Both Grad & Undergrad

2. Explain the link between genes and disorders/diseases.
Audience: Both Grad & Undergrad

3. Create a novel hypothesis about how genes may be linked to disorder or disease.
Audience: Both Grad & Undergrad

4. Synthesize novel findings in the form of class presentation and a final paper.
Audience: Undergraduate

5. Work cooperatively by contributing to research performed by classmates.
Audience: Both Grad & Undergrad

6. Apply the techniques learned in class to own research.
Audience: Graduate

**ZOOLOGY 611 – COMPARATIVE AND EVOLUTIONARY PHYSIOLOGY**
3 credits.

Examines general physiological principles by comparing taxa from diverse evolutionary histories and ecological adaptations. Examples include adaptation to environments differing in salinity, temperature, altitude, pressure, or pollution, and examines how nervous and endocrine systems evolved to support the adaptations.
**Requisites:** ZOOLOGY/BIOLOGY 101, BOTANY/BIOLOGY 130, ZOOLOGY/BIOLOGY/BOTANY 151, or BIOCORE 381
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Describe evolutionary biology processes, and awareness of major concepts and debates.
Audience: Undergraduate

2. Identify major stages in the origin of metabolic processes.
Audience: Undergraduate

3. Compare and contrast differences in physiological mechanisms between major clades of organisms.
Audience: Undergraduate

4. Connect physiological responses to ecological responses in changing environments.
Audience: Undergraduate

5. Summarize relevant scientific articles.
Audience: Undergraduate

6. Evaluate scientific claims for evidentiary status and potential bias.
Audience: Undergraduate

**ZOOLOGY 612 – COMPARATIVE PHYSIOLOGY LABORATORY**
2 credits.

Investigating physiological adaptations in different animals. Design and execute experiments.
**Requisites:** ZOOLOGY 611 or concurrent enrollment
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Evaluate prior research in a chosen topic and summarize current research trends.
Audience: Undergraduate

2. Provide and accept constructive criticism.
Audience: Undergraduate

3. Practice developing and executing experiments in physiological processes.
Audience: Undergraduate

4. Work collaboratively in groups.
Audience: Undergraduate

5. Design a professional presentation to communicate results.
Audience: Undergraduate

**ZOOLOGY/ANTHRO/PSYCH 619 – BIOLOGY OF MIND**
3 credits.

Origins and structures of mind, brain, and consciousness. Transitions from early mammalian through primate to hominid intelligence. Genetics and plasticity in brain development. Modern studies of human brain mechanisms and consciousness.
**Requisites:** Junior standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Fall 2023

**ZOOLOGY 620 – NEUROETHOLOGY SEMINAR**
2 credits.

A group discussion of primary literature articles relevant to the neural basis of behavior with a purpose to understand the neural basis of behavior in animals, to learn to read papers critically and improve discussion leading skills.
**Requisites:** PSYCH/ZOOLOGY 523 or graduate/professional standing
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Describe neural basis of animal such as navigation, sensory perception and parental behavior in animals.
Audience: Both Grad & Undergrad

2. Summarize and critically evaluate findings of scientific research.
Audience: Both Grad & Undergrad

3. Lead discussions with a purpose and direction.
Audience: Both Grad & Undergrad

4. Provide constructive feedback to generate discussion.
Audience: Both Grad & Undergrad

5. Discuss how the concepts presented in the class relate to own research interests.
Audience: Graduate

**ZOOLOGY/ENTOM/GENETICS 624 – MOLECULAR ECOLOGY**
3 credits.

Basic principles of molecular ecology. Lecture topics include population genetics, molecular phylogenetics, rates and patterns of evolution, genome evolution, and molecular ecology.
**Requisites:** GENETICS 466, 467, BIOCORE 383, or graduate student standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2025
**Learning Outcomes:** 1. Identify and describe common molecular genetic techniques.
Audience: Both Grad & Undergrad

2. Demonstrate knowledge about the significance of genetic diversity in species biology.
Audience: Both Grad & Undergrad

3. Differentiate how ecological and evolutionary processes shape genetic variation.
Audience: Both Grad & Undergrad

4. Analyze genetic data and communicate the results.
Audience: Both Grad & Undergrad

5. Evaluate whether genetic data are appropriate for answering scientific questions.
Audience: Both Grad & Undergrad

6. Summarize and critique the primary literature in the field of Molecular Ecology.
Audience: Graduate

**ZOOLOGY 655 – MODELING NEURODEVELOPMENTAL DISEASE**
3 credits.

Systematically explores current animal models of human diseases that affect the central nervous system. Topics will include birth defects that disrupt normal brain architecture (holoprosencephaly and neural tube closure defects), birth defects affecting the visual system, and postnatal disease, e.g. neurodegeneration and stroke.
**Requisites:** GENETICS 466, ZOOLOGY/PSYCH 523, ZOOLOGY 470ZOOLOGY 470, or 570
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. apply and enhance their understanding of genetics and cell biology
Audience: Undergraduate

2. understand the concepts and methods used to model human disease
Audience: Undergraduate

3. read and critically evaluate current scientific literature
Audience: Undergraduate

4. develop and present short lectures on selected topics
Audience: Undergraduate

5. prepare review-style articles based on primary literature research
Audience: Undergraduate

**ZOOLOGY/F&W ECOL 660 – CLIMATE CHANGE ECOLOGY**
3 credits.

The evidence that the Earth's climate is changing at unprecedented rates is now overwhelming. Environmental tipping points are being crossed and many species are adapting or failing to adapt. Climate change poses a significant problem for conserving and managing wildlife and their habitats. Climate change, its ecological impacts, and the principle of climate change adaptation in natural resources conservation will be discussed.
**Requisites:** BOTANY/BIOLOGY/ZOOLOGY 152, (BIOLOGY/ZOOLOGY 101 and 102), BIOCORE 381, or BIOLOGY/BOTANY 130, or graduate/professional standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. explain historic and future trends in climate change within an ecological context.
Audience: Both Grad & Undergrad

2. identify the eco-evolutionary impacts of climate change on biological communities (including changes in phenology and ranges, community dynamics, and altered trophic interactions).
Audience: Both Grad & Undergrad

3. develop a climate change vulnerability assessment for a given species or community.
Audience: Both Grad & Undergrad

4. analyze and incorporate climate and biological data in vulnerability assessments.
Audience: Graduate

**ZOOLOGY/BOTANY/F&W ECOL 672 – HISTORICAL ECOLOGY**
2 credits.

Study the importance of past events for current ecosystems. Emphasizes concepts and applications.
**Requisites:** Senior standing
**Course Designation:** Breadth - Biological Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2024

**ZOOLOGY/NEURODPT/PSYCH 674 – BEHAVIORAL NEUROENDOCRINOLOGY SEMINAR**
2 credits.

Behavior results from a complex interplay among hormones, the brain, and environmental factors. Behaviors and their underlying neural substrates have evolved in response to specific environmental conditions, resulting in vast species diversity in behavioral and neuroendocrine solutions to environmental problems. Designed to explore the primary literature on the neuroendocrine underpinnings of behavior spanning from feeding to sex differences in complex social behaviors. A range of taxonomic groups will be discussed, including (but not limited to) mammals, birds, and fish.
**Requisites:** ZOOLOGY/BIOLOGY 101, ZOOLOGY/BIOLOGY/BOTANY 151, BIOCORE 383 or graduate/professional standing
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Identify how behaviors and their underlying neural substrates have evolved in response to specific environmental conditions
Audience: Both Grad & Undergrad

2. Discuss and explore the primary literature on the neuroendocrine underpinnings of behavior spanning from feeding to sex differences in complex social behaviors
Audience: Both Grad & Undergrad

3. Identify and discuss hormones, the brain, and environmental factors as they relate to behavioral evolution and biological diversity
Audience: Both Grad & Undergrad

4. Develop and apply critical thinking to evaluate neuroendocrinological research
Audience: Graduate

5. Communicate effectively about concepts, theories and approaches of neuroendocrinology and behavioral research
Audience: Graduate

**ZOOLOGY 677 – INTERNSHIP IN ECOLOGY**
2 credits.

Provides support and structure for those interested in gaining hands-on experience working as a volunteer with local environmental, ecological or conservation groups.
**Requisites:** Junior standing
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2023
**Learning Outcomes:** 1. Articulate specific ways in which ecology and conservation benefit human society.
Audience: Undergraduate

2. Apply ecological principles and research techniques to write a small-grant proposal.
Audience: Undergraduate

3. Network with professionals in conservation and ecology.
Audience: Undergraduate

4. Confidently apply for an internship or job in conservation or ecology.
Audience: Undergraduate

**ZOOLOGY 681 – SENIOR HONORS THESIS**
1-6 credits.

Mentored individual research and study for students completing a thesis in an Honors program.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025

**ZOOLOGY 682 – SENIOR HONORS THESIS**
1-4 credits.

Mentored individual research and study for students completing a thesis in an Honors program.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Honors - Honors Only Courses (H)
**Repeatable for Credit:** No
**Last Taught:** Spring 2026

**ZOOLOGY 691 – SENIOR THESIS**
1-6 credits.

Mentored individual research and study for students completing a senior thesis.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025

**ZOOLOGY 692 – SENIOR THESIS**
1-4 credits.

Mentored individual research and study for students completing a senior thesis.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** No
**Last Taught:** Spring 2025

**ZOOLOGY 698 – DIRECTED STUDY**
1-6 credits.

Selected research projects for juniors and seniors.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025

**ZOOLOGY 699 – DIRECTED STUDIES IN ZOOLOGY**
1-6 credits.

Selected research projects for juniors and seniors.
**Requisites:** Consent of instructor
**Course Designation:** Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026

**ZOOLOGY/BOTANY 725 – ECOSYSTEM CONCEPTS**
3 credits.

Scope and objectives of ecosystem ecology; roles of theory, long-term studies, comparative studies, and large-scale experiments; scaling problems; ecosystem services and ecological economics; adaptive ecosystem assessment and management.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2025

**ZOOLOGY/ATM OCN/ENVIR ST/GEOSCI 750 – PROBLEMS IN OCEANOGRAPHY**
3 credits.

Introduction to techniques used in the study of the biology, chemistry, geology, and physics of the marine environment.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2024
**Learning Outcomes:** 1. use satellite imagery and measurements in meteorological research and operations.
Audience: Both Grad & Undergrad

2. describe orbital characteristics, navigation, instrumentation and remote sensing techniques.
Audience: Both Grad & Undergrad

3. perform quantitative retrievals of atmospheric properties from active and passive measurement systems and rigorously assess accuracy.
Audience: Both Grad & Undergrad

4. share skills and techniques in analysis and interpretation with classmates.
Audience: Graduate

**ZOOLOGY/NEURODPT 765 – DEVELOPMENTAL NEUROSCIENCE**
3 credits.

Analysis of neural development with emphasis on experimental approaches. Combination of lectures and discussions of primary literature. Topics include neural induction, patterning, mechanisms of axon guidance, neural crest cell migration and differentiation, cortical development, and synapse formation and elimination.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Gain an extensive understanding of mechanisms of neural development
Audience: Graduate

2. Acquire the ability to critically analyze current studies in neural development
Audience: Graduate

**ZOOLOGY 799 – INDEPENDENT STUDY**
1-6 credits.

Advanced topics in zoology explored through individual research projects.
**Requisites:** Consent of instructor
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025

**ZOOLOGY 800 – ADVANCED TOPICS IN THE BIOLOGICAL SCIENCES**
1-3 credits.

Various advanced topics in the Biological Sciences
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Apply, analyze, evaluate advanced theories, concepts and methods in the biological Sciences.
Audience: Graduate

2. Identify and describe key theories, concepts and methods in the biological sciences.
Audience: Graduate

3. Explore new approaches in the biological science research, and apply the knowledge gained to own research.
Audience: Graduate

**ZOOLOGY/BOTANY/ENTOM/GENETICS 820 – FOUNDATIONS OF EVOLUTION**
2 credits.

Explore some of the most important themes and debates that have permeated evolutionary biology over the last 50 years. Read key papers related to each controversial topic, debate the pros and cons of competing viewpoints, and reflect on the relevance of the issue to contemporary evolutionary biology.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Explain important evolutionary concepts, including basic population and quantitative genetics.
Audience: Graduate

2. Identify key ideas and controversies in evolutionary biology.
Audience: Graduate

3. Develop an ability to think about evolution in the manner of a professional in the field.
Audience: Graduate

4. Interpret and critique conceptual theories using rigorous logic and references to established biological phenomena.
Audience: Graduate

5. Summarize, interpret, and synthesize scientific concepts orally and in writing.
Audience: Graduate

6. Communicate and debate in a respectful and constructive manner with fellow evolutionary biologists, including as a peer reviewer.
Audience: Graduate

**ZOOLOGY/BOTANY/ENTOM/F&W ECOL 821 – FOUNDATIONS OF ECOLOGY**
2 credits.

Foundational ideas in the field of ecology. Discussion topics trace the development of ecology as a discipline, and the roots of modern ecological thought, as well as the research approaches in ecology.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Identify and describe key debates in the history of ecology and ongoing controversies in the field.
Audience: Graduate

2. Differentiate ecological processes and how they sustain ecological systems.
Audience: Graduate

3. Moderate and participate in discussions about the significance of important ecological concepts.
Audience: Graduate

4. Summarize, interpret, and synthesize conceptual theories of ecology orally and in writing.
Audience: Graduate

5. Evaluate peer work and provide constructive, professional feedback.
Audience: Graduate

**ZOOLOGY/BOTANY 879 – ADVANCED LANDSCAPE ECOLOGY**
3 credits.

Emphasizes spatial patterning (its development and importance for ecological processes) and often focuses on large regions. Learn concepts, methods, and applications of landscape ecology.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Spring 2024

**ZOOLOGY/ATM OCN/BOTANY/CIV ENGR/ENVIR ST/GEOSCI 911 – LIMNOLOGY AND MARINE SCIENCE SEMINAR**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Explain important research in current limnology.
Audience: Graduate

2. Utilize different research presentation methods.
Audience: Graduate

3. Assess scientific information and ask thoughtful questions.
Audience: Graduate

**ZOOLOGY/AGROECOL/ATM OCN/BOTANY/ENTOM/ENVIR ST/GEOG 953 – INTRODUCTION TO ECOLOGY RESEARCH AT UW-MADISON**
1-2 credits.

Introduction to diverse ecological research across the UW-Madison Campus. Discussions on adapting to graduate school and graduate-level ecological research, key topics in professional development, and research presentations by faculty members.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** No
**Last Taught:** Fall 2025
**Learning Outcomes:** 1. Develop an appreciation for the foundations and legacy of ecology research and conservation science at UW-Madison
Audience: Graduate

2. Recognize the diversity and strength of current research in ecology at UW-Madison
Audience: Graduate

3. Differentiate expectations between undergraduate education and those of independent research for graduate degrees in ecology
Audience: Graduate

4. Develop appropriate expectations for advisors and advisees
Audience: Graduate

5. Reason through hypothetical ethical challenges and identify potential solutions based on professional codes of ethics
Audience: Graduate

6. Develop an understanding of the suite of skills associated with success in graduate school and in science
Audience: Graduate

**ZOOLOGY/AN SCI/OBS&GYN 954 – SEMINAR IN ENDOCRINOLOGY-REPRODUCTIVE PHYSIOLOGY**
0-1 credits.

Promotes scientific and professional development. Presenters develop and deliver research presentations to a scientific audience, field questions, and receive critiques about their presentation style and scientific approach. Additional presentations include professional development, career advancement opportunities, and topics of interest to the endocrinology and reproduction community at large.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026
**Learning Outcomes:** 1. Demonstrate knowledge of cutting-edge research in and related to one's research area through the development and delivery of research presentations
Audience: Graduate

2. Communicate complex ideas in research presentations and questions in a clear and understandable manner
Audience: Graduate

3. Evaluate presentations and providing effective feedback
Audience: Graduate

**ZOOLOGY 955 – SEMINAR-LIMNOLOGY**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026

**ZOOLOGY 956 – SEMINAR-ECOLOGY**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026

**ZOOLOGY 957 – SEMINAR-EVOLUTION**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Fall 2025

**ZOOLOGY 960 – SEMINAR IN CELLULAR BIOLOGY**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2025

**ZOOLOGY 962 – SEMINAR-ETHOLOGY**
1 credit.

Sections in various fields of zoological research.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2025

**ZOOLOGY/ATM OCN/BOTANY/ENVIR ST/GEOG/GEOSCI 980 – EARTH SYSTEM SCIENCE SEMINAR**
1 credit.

Topics in earth system science. Emphasis on the coupling between atmospheric, oceanic and land surface systems, involving physical geochemical and biological processes, and including interactions with human systems.
**Requisites:** Graduate/professional standing
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2024

**ZOOLOGY 990 – RESEARCH**
1-9 credits.

Advanced research in biology as part of graduate program requirements arranged with mentoring faculty.
**Requisites:** Consent of instructor
**Course Designation:** Grad 50% - Counts toward 50% graduate coursework requirement
**Repeatable for Credit:** Yes, unlimited number of completions
**Last Taught:** Spring 2026