

DEPARTMENT OF INTEGRATIVE BIOLOGY

SPRING 2021 COURSE OFFERINGS

In addition to the introductory courses, Zoology/Biology 101, Zoology/Biology 102, Zoology/Biology/Botany 151, Zoology/Biology/Botany 152 and Zoology 153, Department of Integrative Biology is offering following courses during spring 2021:

INTRODUCTORY ECOLOGY (ZOOLOGY 260) 3 credits, Remote, flipped design, synchronous lectures/discussions

For non-bioscience majors: the relationships of organisms and the environment. Population dynamics and community organization, human-environment relationships, action programs. *Pre-Reqs: Open to freshmen. Does not count toward Botany or Zoology major*

INVERTEBRATE ZOOLOGY (Zoology 300) 3 credits, Remote, asynchronous

Provides an introduction to invertebrate diversity and biology, with emphasis on anatomy, development, and systematic relationships of the main animal phyla. Phyla are discussed in the context of major themes in animal evolution, such as the origin of tissue layers, the diversity of feeding mechanisms, the evolution of terrestrialization, patterns of diversification through time, and the conservation of transcriptional circuitry. The aim of this course is to understand animal diversity from a phylogenetic and developmental perspective. *Pre-reqs: Zoology/Biology 101 and 102 or Zoology/Biology/Botany 151 and 152 or Biocore 381.*

MOLECULAR BIOLOGY (ZOOLOGY 400-1), 3 credits topics course, Remote, asynchronous, optional synchronous session with the instructor once per week

This lecture-based course will provide students with a broad understanding of the mechanisms of life at the molecular level. It is intended for intermediate and advanced undergraduates majoring in the biological sciences. The course will cover the structure, chemistry and functions of biological macromolecules, focusing primarily on the ways by which nucleic acids carry out their central roles in cells. Other topics will include the governing principles by which life evolved, functions and is organized; the experimental methods used to study these processes, and the historical context for our understanding of them. *Pre-reqs: Biology/Botany/Zoology 151; or Biology/Botany 130; or Biology/Zoology 101; or Biology/Biocore 381.*

MUSIC and the BRAIN (ZOOLOGY 400-2), 3 credits topics course, In person

This course addresses principles in systems, cellular, and cognitive neuroscience in the context of music. Topics include auditory sensation and perception, movement control and patterning, learning and memory, mood, social interaction, neural development and specialization, and the evolution of musicality. Course will include an examination of experimental approaches and clinical applications. *Pre-reqs: Biology, Molecular Biology, Neurobiology and Zoology majors plus one semester of biology (Zoo/bio 101 or zoo/bio/bot 151).*

COEVOLUTION (ZOOLOGY 400-3)

Coevolution emphasizes the study of biotic interactions, ranging from mutualism to antagonism. The course will examine the history of the field, theoretical models for how interacting organisms might evolve over time (including computational simulations of these models), and empirical data from a variety of systems. Focus will be placed on host-microbe, host-parasite, plant-pollinator, and predator-prey interactions. *Pre-reqs: Open*

to students with any complete intro bio sequence (Z/B/B 151&152) OR (Z/B 101 and 102) OR Biocore 381.

INTRODUCTION TO ANIMAL DEVELOPMENT (ZOOLOGY 470) 3 credits, Remote, asynchronous

This course introduces students 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. *Pre-reqs: Biology/Botany/Zoology 151; or Biology/Zoology 101; or Biology/Biocore 381.*

ECOLOGY OF FISHES (ZOOLOGY 510) 3 credits, Remote, asynchronous lectures, synchronous discussion

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. *Pre-Req: Zoology/Biology 101 and 102 or Zoology/Biology/Botany 151 and 152 or Biocore 381 and 382.*

ECOLOGY OF FISHES LAB (ZOOLOGY 511) 2 credits, Satisfies CALS Capstone Requirement, Remote, asynchronous

Multiple aspects of fish biology, with a primary focus on the ecology of the fishes of Wisconsin. Instruction will encourage a thorough understanding of the elements that affect fish and fish populations including physical attributes, interactions among fishes, and interactions between fishes and their environment. We will encourage critical thinking with reading and summarizing primary literature, identifying species, field trips, and scientific writing. Lab activities will include dissections, direct observation, computer simulations and more. *Pre-Req: Previous or concurrent enrollment in Zoology 510*

ORNITHOLOGY (ZOOLOGY 520) 3 credits, Remote, synchronous

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. *Pre-Req: Biology/Zoology 101 and 102, Biology/Botany/Zoology 151 and 152 or Biocore 381 and 382*

BIRDS OF SOUTHERN WISCONSIN (ZOOLOGY 521) 3 credits, In person

Outdoor and indoor labs/lectures emphasizing identification of southern Wisconsin birds by sight and vocalization. Two required Saturday field trips in Southern Wisconsin. *Pre-Req: Biology/Zoology 101 and 102 or Biology/Botany/Zoology 151 and 152 or Biocore 381*

COMPUTER-BASED GENE AND DISEASE/DISORDER RESEARCH LAB (ZOOLOGY 604) 2 credits, Remote, synchronous

In recent years, a large number of open access biological and biomedical databases have become available for on-line, computer based research. Among these databases are the National Center for Biotechnology Information, Allen Brain Atlas, NIH DAVID, Genemania, ToppClusterPhenopedia, GeneNetwork, GWAS Central, and Broad Institute's MSIGDB. Within these and other sites is a wealth of information regarding genes, gene expression, gene pathways, behavioral characteristics, and disorders or diseases, such as autism, arthritis, bipolar disorder, and schizophrenia. Learning to navigate the various sites to take advantage of the information and push scientific discovery forward is a valuable skill to develop for any student interested in a career in science or medicine. In the early part of this laboratory course, students will be guided through a range of databases and shown how to extract information to develop new ideas. A key

part of the course is that each student will pick a disease or disorder of interest (e.g., autism, arthritis, epilepsy, schizophrenia) and use multiple databases to develop new ideas on which genes may be playing important, but previously underappreciated or unknown roles. Pre-reqs: *Biology/Zoology 101 OR Biology/Botany/Zoology 151 or Biocore 381*

COMPARATIVE AND EVOLUTIONARY PHYSIOLOGY (ZOOLOGY 611) 3 credits, In Person

Course 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. Pre-reqs: *Zoology/Biology 101; or Zoology/Biology/Botany 151 or 152; or Biocore 381*

COMPARATIVE PHYSIOLOGY LAB (ZOOLOGY 612) 2 credits, satisfies CALS Capstone requirement, In Person

Investigating physiological adaptations in different animals. Students design and execute experiments. Only invertebrate animals are used. Pre-reqs: *Previous or concurrent enrollment in zoology 611.*

MODELING NEURODEVELOPMENTAL DISEASE (ZOOLOGY 655) 3 credits, Remote, synchronous

This course will systematically explore 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. This course is designed for graduate and advanced undergraduate students. Pre-Req: *Graduate standing or Genetics 466, Zoology 470, Zoology/Psychology 523, or Zoology 570*

INTERNSHIP IN ECOLOGY (ZOOLOGY 677) 2 credits, Remote, synchronous

A seminar course to provide support and structure for undergraduates interested in gaining hands-on experience working as a volunteer with local environmental, ecological or conservation groups. *No Requisites.*