IB 501. RESEARCH. (1-16 Credits)
Graduate-level research completed under faculty supervision.
This course is repeatable for 16 credits.

IB 503. THESIS. (1-16 Credits)
Master's thesis, completed under faculty supervision.
This course is repeatable for 999 credits.

IB 505. READING AND CONFERENCE. (1-16 Credits)
For graduate students working toward a master's degree. After
arrangements with individual faculty, readings and discussions on topics
of mutual interest.
This course is repeatable for 16 credits.

IB 506. PROJECTS: OUTREACH. (1-16 Credits)
Graded P/N.
This course is repeatable for 16 credits.

IB 507. SEMINAR. (1-16 Credits)
Graded P/N.
This course is repeatable for 16 credits.

IB 510. INTERNSHIP. (1-16 Credits)
This course is repeatable for 16 credits.

IB 511. INTEGRATIVE BIOLOGY GRADUATE STUDENT ORIENTATION. (2
Credits)
Introduction to the graduate program in Integrative Biology and at OSU
in general. Class introduces students to various skills for success in
graduate school and beyond. Exploration of career options for those
holding a degree in IB are explored. Graded P/N.

IB 512. INTEGRATIVE BIOLOGY GTA TRAINING AND DEVELOPMENT. (1
Credit)
Provides instructional support and professional development for first year
graduate teaching assistants (GTAs) in Integrative Biology. Focuses on
developing a foundation for quality instruction, facilitation, and leadership
as GTAs and professionals. Best practices, skills, theory and knowledge
necessary for effective teaching, facilitation, and assessment of student
learning are explored.
This course is repeatable for 3 credits.

IB 513. GRANT WRITING AND ETHICS. (3 Credits)
Participants will write and submit a grant proposal by the end of the
term. We discuss the main components of a typical grant proposal.
Participants read and critique proposal drafts written by participants.
Ethical issues are discussed as they are encountered.
This course is repeatable for 6 credits.

IB 514. SCIENTIFIC WRITING AND ETHICS. (3 Credits)
Participants will write a scientific paper based on their own research and
submit it for publication. Topics to be covered include writing skills (e.g.,
making a good argument, choice of a journal, reviewing the literature) and
ethical issues (e.g., citation, plagiarism, disclosure, data archiving, and
acknowledgment).
This course is repeatable for 6 credits.

IB 515. SCIENCE COMMUNICATION: MAKING YOUR SCIENCE MATTER.
(2 Credits)
A practical, hands-on course designed to help science graduate students
build knowledge and skills for engaging with audiences beyond their
scientific peers. The science of science communication, the cultures of
journalism and public policy, the changing roles of scientists in society,
and science advocacy will be explored through lectures, invited talks, in-
class discussions and exercises.

IB 516. SCIENCE AND POLICY. (2 Credits)
An introduction to the science-policy interface in a ‘post-truth’ society.
The formulation of state and federal public policy is examined, as well
and role of science and scientist in informing policy, management
decisions and public understanding. Current topics are emphasized.

IB 522. COMPARATIVE/FUNCTIONAL VERTEBRATE ANATOMY. (5
Credits)
Phylogenetically-based study of the form and function of vertebrate
organ systems, including integumentary, musculoskeletal, cardiopulmonary, digestive, and sensory. Lab emphasizes comparative
form through dissection, and function through non-invasive
experimentation. Lec/lab.

IB 523. ENVIRONMENTAL PHYSIOLOGY. (3 Credits)
Comparative environmental physiology of animals with emphasis on
adaptations to such aspects of the physical environment as temperature,
water, ions, and gases. Consideration given to interactions between
physiology and environment that influence the local and geographic
distribution of animals.

IB 525. EMBRYOLOGY AND DEVELOPMENT. (5 Credits)
An integrated molecular, cellular and whole organism approach.
Comparative embryonic development from gametogenesis, body axis
specification, pattern formation and organogenesis. Experimental
approaches uncovering cellular interactions, regulation of gene
expression, and cellular differentiation. Lab emphasizes experimental
comparative developmental biology and embryology. Lab fee. Lec/lab.

IB 527. PALEOBIOLOGY. (0-4 Credits)
Fossils provide a direct window into the evolution, extinction, and
ecology of past life on Earth. A process-based study of the marine and
terrestrial fossil record is taken to explore the topics of preservation,
macroevolution, extinction of biotas, biomechanics, paleoecology, and
climatic change. Required laboratory and weekend field trip.

IB 531. VERTEBRATE PHYSIOLOGY I. (4 Credits)
Systems/concepts covered include motor reflexes, autonomic nervous
system, digestion/metabolism, renal and osmoregulatory, endocrine and
reproductive systems. First in IB 531, IB 532 series.

IB 532. VERTEBRATE PHYSIOLOGY II. (3 Credits)
Systems/concepts covered include blood, immune, lymphatic,
cardiovascular, and pulmonary. Second in the IB 531, IB 532 series.

IB 537. VERTEBRATE ENDOCRINOLOGY. (4 Credits)
An exploration of vertebrate endocrinology that examines principles of
hormone action, inter- and intracellular signaling mechanisms within
docrine axes, and comparative endocrine physiology, emphasizing
concepts of homeostasis and methodologies for evaluating normal and
physiological function. Students are provided multiple forums for class
participation, in the form of scientific presentations and "mini-reports."

IB 538. BEHAVIORAL NEUROBIOLOGY. (3 Credits)
An introduction to the neurobiological basis of animal behavior. Examines
behavior in the context of sensory physiology, motor control, neural
circuitry, and cellular processes. Lec.
IB 540. INSECT PHYSIOLOGY. (3 Credits)
Fundamentals of insect physiology from the behavioral to the molecular level. Cellular physiology and hormonal control of molting, metamorphosis and reproduction. Overview of body functions: respiration, circulation, digestion, metabolism, and osmoregulation. Physiological basis of behavior: muscles and flight, structure and functions of the nervous system, sensory physiology and chemical communication. The contributions of insect physiology to general physiological principles and bioregulatory methods of insect pest control are discussed.

IB 545. EVOLUTION. (3 Credits)
Formal analysis of genetic and ecological mechanisms producing evolutionary change; special topics include speciation, ecological constraints, adaptive radiations, paleontology, biogeography, the origin of life, molecular evolution, and human evolution.

IB 551. FUNCTIONAL ANATOMY OF THE HUMAN MUSCULAR SYSTEM. (4 Credits)
In-depth dissection of the orientation, innervation, and functional significance of muscles and muscle groups. Topics include muscle identification, joint anatomy and variation of human form. IB 551 student expectations include vascularization and detailed joint anatomy. The laboratory component will consist of the dissection of the muscular anatomy of a human cadaver. Lab fee. Lec/lab. Recommended: ((BI 231 and 241) or (BI 331 and 341)) and ((BI 232 and 242) or (BI 332 and 342)) and ((BI 233 and 243) or (BI 333 and 343))

IB 556. PHYLOGENETICS. (4 Credits)
Explores the theory and practice of modern phylogenetic analysis. Emphasis placed on tree reconstruction algorithms, assessment of statistical support, and contemporary issues in phylogenetics. Lab will focus on the use of phylogenetic software and the analysis of molecular data sets. Lec/lab.

IB 561. MARINE AND ESTUARINE INVERTEBRATE ZOOLOGY. (4 Credits)
Comparative survey of eight major invertebrate phyla and many lesser-known phyla. Areas of emphasis will be 1) invertebrate identification, 2) natural history (diversity, habitat, feeding, behavior), and 3) comparative anatomy (adaptive significance of morphological structures). Laboratories and field trips will strongly supplement lecture material. Lec/lab. Taught at Hatfield Marine Science Center.

IB 573. HERPETOLOGY. (3 Credits)
World families and distribution of amphibians and non-avian sauropods; evolution, population biology, life histories, current literature.

IB 574. SYSTEMATIC HERPETOLOGY. (2 Credits)
A survey of the phylogenetic diversity of amphibians and reptiles of the United States. Identification through the use of keys will be stressed. Field trip fee. Lab fee. Lec/lab.

IB 577. AQUATIC ENTOMOLOGY. (4 Credits)
Biology, ecology, collection, and identification of aquatic insects. Two required Saturday field trips. Lec/lab.

IB 581. BIOGEOGRAPHY. (3 Credits)
Biogeography is the study of the distribution of biodiversity. We focus on abiotic (geological, climatological) and biotic (ecological, evolutionary) factors that govern diversity across space and through time, emphasizing assembly of communities, global change, and conservation in today's rapidly changing world. The course format includes lecture, computer-based activities, and discussion. Offered winter term in odd years.

IB 583. POPULATION BIOLOGY. (3 Credits)
Theoretical and empirical views of the structure and function of populations from across the tree of life, emphasizing the integration of ecological and evolutionary approaches. Lec.

IB 592. THEORETICAL ECOLOGY. (4 Credits)
A treatment of the central concepts of theoretical ecology, with emphasis on the analysis and modeling of single populations and multispecies communities. Topics include discrete- and continuous-time models of population growth, stochastic and deterministic processes, and the response of populations and communities to perturbations.

IB 593. BEHAVIORAL ECOLOGY. (5 Credits)
Behavioral ecology with emphasis on both theoretical and empirical approaches. Offered alternate years.

IB 594. COMMUNITY ECOLOGY. (5 Credits)
Theory and analysis of multispecies associations. Emphasis on extent to which existing ecological theory is supported by natural phenomena. Course considers how biotic and abiotic mechanisms interact to regulate community organization and stability in marine, freshwater, and terrestrial habitats. Offered alternate years.

IB 595. DISEASE ECOLOGY. (3 Credits)
An introduction to disease ecology—the study of disease processes in natural populations and communities. The course focuses on (I) the role parasites play in the ecology and evolution of animal populations, including humans; and (II) the relevance of ecological and evolutionary considerations in managing infectious diseases.}

IB 601. RESEARCH. (1-16 Credits)
Doctoral-level research under faculty supervision. Graded P/N. This course is repeatable for 16 credits.

IB 603. THESIS. (1-16 Credits)
Doctoral thesis completed under faculty supervision. This course is repeatable for 999 credits.

IB 605. READING AND CONFERENCE. (1-16 Credits)
For graduate students working toward doctoral degree. After arrangements with individual faculty, readings and discussions on topics of mutual interest. This course is repeatable for 16 credits.