**INTEGRATIVE BIOLOGY (IB)**

**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 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)**

**IB 527. PALEOBIOLOGY. (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 climate 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 endocrine 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)**

**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 biorational 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.

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 575. INSECT BIODIVERSITY SURVEY. (4 Credits)
Through lectures, laboratories and an intensive field survey, students learn about insect diversity, natural history and evolution as well as the important role of biological collections in modern biodiversity research. The survey takes place in the two weeks prior to fall term at a remote Pacific Northwest field station. 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 pulse and press 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 599. SPECIAL TOPICS. (1-16 Credits)
Topics and credits vary. Grading mode TBA. Taught at Hatfield Marine Science Center and Corvallis campus. This course is repeatable for 16 credits.

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.