INTEGRATIVE BIOLOGY (IB)

IB Class Schedule (https://courses.illinois.edu/schedule/DEFAULT/DEFAULT/IB)

Courses

IB 100  Biology in Today's World  credit: 3 Hours.
Introduction to biology for the non-major. In-depth focus on three contemporary problems-maintaining a livable environment, issues of human health, and evolution.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 103  Introduction to Plant Biology  credit: 4 Hours.
Basic principles of growth and form, physiology, genetics, evolution, and ecology in plant biology. Lecture and laboratory.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 104  Animal Biology  credit: 4 Hours.
Introductory zoological concepts with emphasis on the diversity and comparative anatomy of animals and the fundamentals of physiology, genetics, evolution, and behavior. Lecture and laboratory. The laboratory includes vertebrate dissection.

IB 105  Environmental Biology  credit: 3 Hours.
Introduction to ecological principles in relation to understanding environmental problems; lecture and discussion emphasize impacts upon ecosystems by human activities such as air and water pollution, usage of pesticides and pest control measures, expansion of agriculture in tropics and arid regions, harvesting the oceans, and development of energy sources.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 108  The Biology of Dinosaurs  credit: 3 Hours.
The origin, diversity, and extinction of dinosaurs will serve as a conceptual framework to explore fundamental principles of biology. We will consider dinosaurs as animals, examining evidence for their physiology and behavior, and how evolution and speciation produced the diversity of dinosaurs. We will relate the influence of Earth's changing environments on dinosaurs to environmental change in human timescales. We will emphasize how scientists collect and evaluate fossil data through an understanding of living organisms.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 150  Organismal & Evolutionary Biology  credit: 4 Hours.
Introduction to physiology, genetics, and evolution of organisms, and their ecology and diversity.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 151  Organismal & Evol Biol Lab  credit: 1 Hour.
Topics follow lecture topics in IB 150 and include labs in ecology, plant and animal function, and genetics and evolution. Designed for non-majors needing a year of biology with lab. Credit is not given for IB 151 for Integrative Biology or Molecular and Cellular Biology majors. Prerequisite: Credit or concurrent registration in IB 150.

IB 199  Undergraduate Open Seminar  credit: 0 to 5 Hours.
Approved for both letter and S/U grading. May be repeated to a maximum of 5 hours.

IB 202  Physiology  credit: 3 or 4 Hours.
How animals function in acquiring, processing, and allocating resources in the face of environmental constraints. The inquiry-based laboratory emphasizes testing of hypotheses related to functioning of physiological components of the basic systems of animals. Lecture only, 3 hours; with laboratory, 4 hours. Students must complete the laboratory portion of the course to receive 4 hours of credit. The laboratory includes vertebrate dissection. Prerequisite: IB 150 and MCB 150.

IB 203  Ecology  credit: 4 Hours.
The links between evolution and ecology, population dynamics, community structure and function, and ecosystem function on local and global scales. Basic ecology needed to understand environmental problems and to conserve biodiversity. Investigations in both field and laboratory included. Prerequisite: IB 150 and MCB 150.
This course satisfies the General Education Criteria for: Advanced Composition

IB 204  Genetics  credit: 3 or 4 Hours.
The fundamentals of inheritance, with an emphasis on eukaryotes. Major topics include transmission genetics, quantitative genetics, cytogenetics, genomics, genetics of development and behavior, and population genetics. Laboratory emphasizes an experimental, inquiry-based approach to modern and classical genetics. Lecture only, 3 hours; with laboratory, 4 hours. Students must complete the laboratory portion of the course to receive 4 hours of credit. Prerequisite: IB 150 and MCB 150.

IB 220  Applied Entomology  credit: 3 Hours.
Same as CPSC 270 and NRES 270. See CPSC 270.
This course satisfies the General Education Criteria for: Nat Sci Tech - Life Sciences

IB 270  Evolution of Molecules & Cells  credit: 5 Hours.
The major evolutionary transitions of biomolecules and cells including: energy acquisition and metabolism; information inheritance, system regulation, and genomes; the origin of life and of the prokaryotic cell, eukaryotic cell, and multicellularity. Lecture and laboratory. Credit is not given for both IB 270 and either MCB 250 or MCB 252. Prerequisite: Admission to the IB honors biology option; credit or concurrent registration in organic chemistry.

IB 271  Organismal Biology  credit: 5 Hours.
Integrated study of the diversity and structure and function of plants and animals in evolutionary and environmental contexts. Conceptual themes and techniques of molecular and cellular levels of biological organization will be integrated as well. Lecture and laboratory. The laboratory includes vertebrate dissection. Credit is not given for both IB 271 and IB 202. Prerequisite: IB 270; good standing in the honors biology option.
This course satisfies the General Education Criteria for: Advanced Composition

IB 299  Undergraduate Special Course  credit: 0 to 5 Hours.
Approved for letter and S/U grading. May be repeated in the same term; may be repeated in separate terms to a maximum of 6 hours.

IB 302  Evolution  credit: 4 Hours.
Broad introduction to evolutionary biology, including natural selection and macroevolution, phylogeny, speciation, molecular evolution, macroevolution and the fossil records. The laboratory emphasizes a survey of biodiversity and processes and patterns of evolution. Prerequisite: IB 204 or consent of instructor.
IB 303  Anatomy  credit: 4 Hours.
An overview of the body structure of vertebrate animals, with a special focus on mammals including humans. Body structure will be investigated from evolutionary, developmental, and human health perspectives through lectures, in-class activities, and required laboratory dissections. Through this course, students will develop a better understanding of anatomy vocabulary, the anatomical design of vertebrates, vertebrate development, and how vertebrate anatomy and development are related to each other, to organismal function, and to human health. Prerequisite: IB 150.

IB 329  Animal Behavior  credit: 3 Hours.
Introductory course emphasizing how patterns of behavior promote survival, change through evolution, and are modified by the environment. Same as ANSC 366 and ANTH 342. Credit is not given for both IB 329 and ANSC 363.

IB 335  Systematics of Plants  credit: 4 Hours.
Introduces the principles and methods of the identification, naming, classification, systematics, and evolution of flowering plants; includes a survey of selected flowering plant families with information on their interrelationships. Prerequisite: One of the following: IB 100, IB 103, IB 150, or consent of instructor.

IB 348  Fish and Wildlife Ecology  credit: 3 Hours.
Same as NRES 348. See NRES 348.

IB 360  Evolution and Human Health  credit: 3 Hours.
Our health is inseparably tied to our evolutionary history. As a result, evolution is an important underpinning discipline for health professionals. This course first provides an overview of evolutionary processes, molecular evolution, human evolution, life history theory, and evolutionary-developmental biology. Second, it illustrates the application of these principles to our understanding of nutrition and metabolism, reproduction, disease and stress, and behavior. Third, it shows in practical terms how the principles of evolutionary medicine can be applied in medical practice and public health. Same as ANTH 360. Prerequisite: IB 302 or MCB 250 or MCB 244, or consent of instructor.

IB 361  Ecology and Human Health  credit: 3 Hours.
Exploration of the emergence of infectious diseases and other human health issues from an ecological perspective, including vector-borne diseases, diseases spread from wildlife in terrestrial and aquatic ecosystems, and the role of pathogens and parasites in community and population ecology, food webs, and ecosystem functioning. Attention will be placed on how current and future global change and biodiversity loss will contribute to the increasing prevalence of human emerging diseases. Same as ANTH 361. Prerequisite: IB 203 or consent of instructor.

IB 362  Marine Biology  credit: 3 Hours.
Study of the major marine environments on earth, the huge diversity of organisms that live in them, and the ecological and functional reasons why these organisms live where they do. Also examines the impacts of human and their activities upon the sustainability of marine resources. Designed for students with some background in biology and evolution and interest in marine biodiversity, ecology, and conservation.

IB 364  Genomics and Human Health  credit: 3 Hours.
Highlights advances in understanding the human genome, by utilizing the latest techniques in bioinformatics, i.e. acquiring, analyzing, storing, and displaying the information from the entire genome and protein sequences. The course describes the theory and practices behind modern sequencing techniques and explores the genome with a particular emphasis on the use of extensive online databases and software. Students will analyze one human disorder using bioinformatics software and databases in order to update older published literature about the genomics underpinning the disorder. Prerequisite: IB 204 or consent of instructor.

IB 368  Vertebrate Natural History  credit: 4 Hours.
Introduction to the classification, life histories, adaptations, and ecology of fishes, amphibians, reptiles, birds, and mammals. Focus is on species of the Midwest region. Laboratory emphasizes identification and distribution of Illinois’ vertebrate fauna. Some Saturday field trips are required. Same as NRES 368. Prerequisite: IB 203 or NRES 219 or consent of instructor.

IB 372  Ecology and Evolution  credit: 5 Hours.
Integrated study of ecology, population genetics, and evolution. Conceptual themes and techniques from the molecular, cellular, and organismal levels of biology will be integrated as well. Lecture, laboratory, and field work. Credit is not given for both IB 372 and either IB 303 or IB 302. Prerequisite: IB 271; good standing in the IB honors biology option.

IB 390  Introductory Research  credit: 1 to 5 Hours.
Laboratory and/or field research and/or reading supervised by faculty members in the School of Integrative Biology. Approved for S/U grading only. May be repeated. Credit is not given for more than a combined maximum of 10 hours of IB 390 or IB 490 towards graduation for IB majors. Prerequisite: Consent of instructor.

IB 401  Introduction to Entomology  credit: 3 or 4 Hours.
Integrated studies of the principal morphological, physiological, ecological and behavioral relationships among insects. Lecture and laboratory. 3 or 4 undergraduate hours. 3 or 4 graduate hours. An insect collection will be required for 4 hours credit. Prerequisite: IB 150; or consent of instructor.

IB 405  Ecological Genetics  credit: 3 Hours.
Study of the genetics of natural populations, stressing empirical observations and experiments. Emphasis on recent theories of genotype/environmental interactions and their relationship to evolutionary processes. Offered in alternate years. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 204; or consent of instructor.

IB 411  Bioinspiration  credit: 3 Hours.
Focuses on how experts in biology and technological fields find inspiration in nature and use it as a model to make technological innovations and solve societal problems. In the future, our day-to-day living, health, and the environment will benefit from interdisciplinary teams using findings in basic biological research for technological innovation. Topics to be explored include human health, efficient architecture, cooperative control, robotics, swarm logic, and advanced biological materials. 3 undergraduate hours. 3 graduate hours.

IB 416  Population Genetics  credit: 3 or 4 Hours.
Same as ANSC 446. See ANSC 446.
IB 420  Plant Physiology credit: 3 Hours.
General course concerned with plant functions, including water relations, mineral nutrition, metabolism, growth, and reproduction. Same as CPSC 484. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 103 or IB 150 and MCB 150; CHEM 232; or consent of instructor.

IB 421  Photosynthesis credit: 3 Hours.
Comprehensive description of photosynthesis. Topics include: the photosynthetic membranes, light absorption, electron and proton transfer, photophosphorylation, water oxidation, RUBP carboxylase/oxygenase, photorespiration, whole plant photosynthesis, gas exchange and atmospheric interactions, and impacts of global environmental change. Same as BIOP 432 and CPSC 489. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 420, MCB 354, MCB 450, BIOP 401, or equivalent; or consent of instructor.

IB 426  Env and Evol Phys of Animals credit: 3 Hours.
Physiological adaptations of invertebrate and vertebrate animals to diverse aquatic and terrestrial environments and the extreme habitats embodied therein. 3 undergraduate hours. 3 graduate hours. Prerequisite: MCB 150; IB 202; CHEM 232; or consent of instructor.

IB 427  Insect Physiology credit: 4 Hours.
The principal physiological and biochemical functions of insects. Lecture and laboratory. Offered in alternate years. 4 undergraduate hours. 4 graduate hours. Prerequisite: IB 202 and IB 401; or consent of instructor.

IB 430  Animal Behavior Lab credit: 3 Hours.
Inquiry-driven laboratory course in animal behavior. Students work in groups to generate hypotheses, design experiments, collect and analyze data, and write up their results. Experiments will be carried out in both the field and lab. Discussions emphasize the scientific process, including hypothesis testing, and experimental design and statistics. 3 undergraduate hours. No graduate credit. Prerequisite: IB 329. For majors only.

IB 431  Behavioral Ecology credit: 3 Hours.
In-depth examination of areas of current interest at the interface of behavior, ecology, and evolution; focuses on communication, foraging, and social behavior. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: IB 329; or consent of instructor.

IB 432  Genes and Behavior credit: 3 Hours.
Concepts, methods, and problems in the analysis of the relationship between genes and behavior, the complex neurobiological processes that mediate action on behavior, in appropriate ecological and evolutionary contexts. Same as ANTH 432, NEUR 432, and PSYC 432. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 150 and IB 204; or consent of instructor.

IB 434  Physical Principles in Biology credit: 3 Hours.
Examines the interaction between biological processes and the fundamental laws of mechanics. Covers general topics, such as structural analyses of anatomy, kinematics of movement, the behavior of organisms in fluids, and the importance of scaling, as well as specific topics, such as bird flight, fluid flow in cardio-vascular systems, and high speed predation. Lab culminates in student-designed, group projects to collect novel biomechanical data to answer questions about the organism of the students' choice. 3 undergraduate hours. No graduate credit. Prerequisite: IB 202 or consent of instructor; Physics 101 is recommended.

IB 435  Critical Evaluation of Herbal Remedies credit: 3 Hours.
One-third of Americans use health care products derived from natural sources, particularly plants, but also animals, and fungi. This course examines the biological activity of natural products with respect to their ecological functions and their therapeutic uses. Principles of evidence-based medicine will be reviewed and students will evaluate natural remedies through lectures, in-class activities, discussions, and analyses of scientific papers. Overall, students develop skills useful for evaluating alternative remedies and for communicating their conclusions to the general public. 3 undergraduate hours. No graduate credit. Prerequisite: IB 202 or IB 203 or consent of instructor.

IB 439  Biogeography credit: 3 Hours.
Spatial and temporal patterns of biological diversity and the factors that govern the distribution and abundance of taxa. This course addresses two of its subfields: historical biogeography - the origin, dispersal, and extinction of taxa and biotas; and ecological biogeography - the role of physical and biotic environments have played in determining taxonomic distributions. Also explores the ecological, evolutionary, climatological, and paleontological foundations for the distribution of species and biological communities. Includes a review of many of the field's classical papers, the current synthesis of biogeographic theory, and the relevance of biogeography to modern conservation goals. Offered in alternate years. Same as ANTH 436, ESE 439, GEOG 436, and NRES 451. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 103 or consent of instructor.

IB 440  Plants and Global Change credit: 3 Hours.
Same as CPSC 431 and NRES 451. See CPSC 431.

IB 442  Evolution of Infectious Disease credit: 3 Hours.
Same as MCB 435. See MCB 435.

IB 443  Evolutionary Ecology credit: 3 Hours.
Emphasizes the evolution of life-history strategies in plants and animals (reproductive rates, life cycles, sex ratios, breeding and mating systems) and the coevolution of animals and plants (pollination, dispersal, and herbivory). 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: IB 203 or equivalent; IB 302; or consent of instructor.

IB 444  Insect Ecology credit: 3 or 4 Hours.
Discussion of the practical and theoretical aspects of ecology in relation to insects as individuals, populations, and communities; emphasis on the role of insects in the environment. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Offered in alternate years. Lecture only, 3 hours; with laboratory, 4 hours. Prerequisite: IB 150 and MCB 150 or consent of instructor.

IB 447  Field Ecology credit: 1 Hour.
Study of habitats in various sections of North America during spring vacation or intersession. Outdoor cooking and camping; transportation in University cars. Additional fees may apply. See Class Schedule. 1 undergraduate hour. 1 graduate hour. May be repeated to a maximum of 3 hours. Prerequisite: IB 203; or consent of instructor.

IB 449  Limnology credit: 3 or 4 Hours.
Fresh water biology, study of the lake, pond, and river with emphasis on the physical environment as well as on the plants and animals which live in fresh water. Lectures, discussions, laboratory, and field work. Students must complete the laboratory portion of the course to receive 4 hours of credit. Offered in alternate years. 3 or 4 undergraduate hours. 3 or 4 graduate hours. Prerequisite: IB 203 or consent of instructor.

IB 450  Stream Ecology credit: 3 or 4 Hours.
Same as CEE 432. See CEE 432.
IB 451 Conservation Biology credit: 4 Hours.
Synthesis of conservation biology with an emphasis on the preservation of biological diversity and its evolutionary potential. Laboratory includes an introduction to the use of modern molecular techniques in conservation biology, computer simulation modeling, and field conservation problem solving. Same as CPSC 436 and ENVS 420. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 203 or consent of instructor.

IB 452 Ecosystem Ecology credit: 3 Hours.
Distribution and structure of ecosystems on earth; integration of multiple disciplines to gain a holistic view of ecosystem function; ecosystem concepts as they apply to understand natural and anthropogenic environmental change. Offered in alternate years. Same as ESE 452 and NRES 462. 3 undergraduate hours. 3 graduate hours. Prerequisite: CHEM 102 and CHEM 104; or consent of instructor.

IB 453 Community Ecology credit: 3 Hours.
The direct and indirect interactions among species that determine the structure and composition of plant and animal communities. Emphasis will be on the maintenance of species diversity and its consequences at both local and regional scales. Offered in alternate years. Same as NRES 452. 3 undergraduate hours. 3 graduate hours. Prerequisite: IB 203 or consent of instructor.

IB 461 Ornithology credit: 4 Hours.
Structure, function, ecology, behavior, and evolution of the birds of the world; laboratory devoted to anatomy and identification; and field studies devoted to identification and behavior of birds. Independent research project and two optional weekend field trips. Same as NRES 461. 4 undergraduate hours. 4 graduate hours. Prerequisite: IB 203 or consent of instructor.

IB 462 Mammalogy credit: 4 Hours.
Classification, distribution, structure, function, life history, evolution and identification of mammals. Lecture/discussions, laboratory and field work. The laboratory includes vertebrate dissection. Same as NRES 442. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 202 and IB 203; or consent of instructor.

IB 463 Ichthyology credit: 4 Hours.
Classification, anatomy, ecology, behavior, distribution, and evolution of fishes of the world. Emphasis is on morphological, ecological, and behavioral diversification of fishes in a phylogenetic context. Laboratory devoted to anatomy and identification. Same as NRES 463. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 302; or consent of instructor.

IB 464 Herpetology credit: 4 Hours.
Classification, diversity, structure, function, ecology, behavior and evolution of amphibians and reptiles. Laboratory devoted to anatomy and identification. Offered in alternate years. Same as NRES 464. 4 undergraduate hours. 4 graduate hours. Prerequisite: IB 302; or consent of instructor.

IB 465 Principles of Systematics credit: 4 Hours.
Comprehensive survey of the theory and methodology of systematics as they are applied today to all groups of organisms, with a practical experience in the acquisition and analysis of systematic data. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 302 and IB 335 or IB 468; or consent of instructor.

IB 466 Insect Classification and Evolution credit: 4 Hours.
Analytical survey of the classification and evolution of the orders and principal families of insects, with practical experience in the identification of insects at these taxonomic levels; field trips required. Lecture and laboratory. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 401 or consent of instructor.

IB 471 General Mycology credit: 4 Hours.
Structure, classification, and identification of fungi, including those of economic importance. Offered in alternate years. 4 undergraduate hours. 4 graduate hours. Prerequisite: IB 150 and MCB 150; IB 302 recommended; or consent of instructor.

IB 472 Plant Molecular Biology credit: 1 Hour.
The basic concepts and methodologies of measuring plant gene expression and gene product activity and constructing transgenic plants are presented and discussed. Same as CPSC 462. 1 undergraduate hour. 1 graduate hour. Prerequisite: MCB 150 and IB 204; or consent of instructor.

IB 473 Plant Genomics credit: 1 Hour.
Provides broad overview of structural and functional genomics, including genetic and physical mapping, whole genome sequencing, comparative genomic analysis, evolution of gene families and repetitive sequences, genome-wide expression analysis. Emphasis on structural and comparative genomics with brief introduction to functional genomics and bioinformatics. Same as CPSC 467. 1 undergraduate hour. 1 graduate hour. Prerequisite: MCB 250; IB 472; or consent of instructor.

IB 474 Genomics for Plant Improvement credit: 2 Hours.
Same as CPSC 466. See CPSC 466.

IB 478 Advanced Plant Genetics credit: 3 Hours.
Same as CPSC 452. See CPSC 452.

IB 481 Vector-borne Diseases credit: 4 Hours.
Study of the major groups of arthropods and associated pathogens that affect the health and well-being of humans and other animals. Training will include ecology, evolutionary biology, and epidemiology of vector-borne diseases; taxonomy and identification of vector arthropods; practical skills in molecular and mathematical biology, spatial analysis and field research. Lecture will make use of technology-enhanced classroom for group-based active learning exercises to address critical challenges in vector-borne disease control. 4 undergraduate hours. 4 graduate hours. Offered in alternate years. Prerequisite: IB 361 or IB 401 or consent of instructor.

IB 482 Insect Pest Management credit: 3 Hours.
The principles underlying the control of important insect pests of agriculture and of human and animal health; emphasis on integrated pest management involving a systems approach which combines biological, cultural, and chemical suppressive factors into ecologically sound and socially and economically acceptable technology. Lecture and laboratory. Same as CPSC 479. 3 undergraduate hours. 3 graduate hours. Offered in alternate years. Prerequisite: IB 150 or equivalent; or consent of department.

IB 483 Insect Pathology credit: 3 Hours.
The general principles of pathology as they apply to insects; includes non-infectious and infectious diseases caused by viruses, bacteria, fungi, protozoa, and nematodes. Studies the epizootiology of naturally occurring insect disease and the use of insect pathogens as microbial control agents. Same as CPSC 475. 3 undergraduate hours. 3 graduate hours. Lecture in alternate years. Prerequisite: IB 150 and MCB 150 or consent of instructor.
IB 484  Paleoclimatology  credit: 4 Hours.  
Same as GEOL 484. See GEOL 484.

IB 485  Environ Toxicology & Health  credit: 3 Hours.  
Explores toxicological, environmental, public health, occupational and 
ecological aspects of the use and release of toxic substances in 
the environment; features case histories of environmental contamination 
that illustrate ecological, health, and social aspects of pollution; 
emphasizes biochemical mechanisms and ecosystem consequences.  
Same as CHLH 461 and ENV 431. 3 undergraduate hours. 3 graduate 
hours. Prerequisite: A college chemistry course and a college biology 
course; or consent of instructor.

IB 486  Pesticide Toxicology  credit: 3 or 4 Hours.  
Examines the biological effects of major classes of insecticides and 
herbicides, and of selected individual fungicides, including: toxicity 
to nontarget organisms, persistence and fate in the environment, 
biotransformation, and ecological consequences. Current regulations 
on pesticide testing will also be presented. The mechanism of action on 
target species will be discussed only in relation to effects on nontarget 
or ganisms. Same as CB 434 and ENV 433. 3 undergraduate hours. 
4 graduate hours. Offered in alternate years. Prerequisite: One year 
of college chemistry and one year of college biology; or consent 
of instructor.

IB 487  Math Modeling in Life Sciences  credit: 3 or 4 Hours.  
Same as ANSC 448 and STAT 458. See ANSC 448.

IB 488  Environmental Stable Isotopes  credit: 3 Hours.  
Stable isotopes are powerful tools for studying environmental processes, 
acting as tracers of resource origin, fate, and flux and integrators of 
system processes. The goal of this course is to provide a fundamental 
knowledge base and hands-on training for students to become 
practitioners of natural abundance and enriched stable isotope 
techniques. The course will focus on stable isotopes of biologically-
relevant light elements (C, H, N, O, S). We will also review case studies 
demonstrating application of these techniques to disciplines including 
anthropology, animal, insect, and plant biology, biogeochemistry, 
biometeorology, ecosystem ecology, forensics, microbial ecology, 
paleoclimatology, and paleoecology. Offered in alternate years. Same as 
ATMS 422, GEOL 488, and NRES 478. 3 undergraduate hours. 3 graduate 
hours. Offered in alternate years. Prerequisite: CHEM 104 or equivalent; 
or consent of instructor.

IB 489  Undergraduate Research Abroad  credit: 1 to 4 Hours.  
Students assist in research under University of Illinois faculty supervision 
at a location outside of the United States. Topics and type of assistance 
very. 1 to 4 undergraduate hours. No graduate credit. May be repeated 
in separate terms up to 6 hours. Prerequisite: Evidence of adequate 
preparation for such study; consent of UI faculty member supervising the 
work (who will have examined the proposed research plan); and approval 
of the school. Not available to freshman.

IB 490  Independent Study  credit: 1 to 5 Hours.  
Laboratory and/or field research supervised by faculty members in 
the School of Integrative Biology. A written report is required. 1 to 5 
undergraduate hours. No graduate credit. May be repeated. Credit is not 
given for more than a combined maximum of 10 hours of IB 390 or IB 490 
towards graduation for IB majors. Prerequisite: Consent of instructor.

IB 491  Biological Modeling  credit: 3 or 4 Hours.  
Same as ANSC 449, CPSC 448, and GEOG 468. See GEOG 468.

IB 492  Science Communication Skills  credit: 2 Hours.  
A successful career in scientific research, teaching and service requires 
tools and skills for communicating research. Students interested in 
going into science careers need to know how to write a competitive 
graduate school or job application, a thesis proposal for graduate 
research, a fellowship or grant proposal, and how to give a good scientific 
presentation. This course is designed to teach students these skills 
with targeted in and out of class exercises. 2 undergraduate hours. No 
graduate credit. Prerequisite: IB 203 or IB 271; AND one of the following: 
IB 299, IB 390, IB 490, or consent of instructor. Junior and Senior IB 
majors only.

IB 494  Theoretical Biology + Models  credit: 4 Hours.  
Biologists are increasingly using mathematical and computer-based 
models to complement fieldwork and experimental data. These models 
provide a context in which to understand and answer existing questions, 
and also lead us to new questions and new insights. Students will encode 
biological mechanisms into mathematical models, develop the skills to 
find solutions to these models and relate them to biological data, and 
analyze and discuss relevant primary literature. Examples will be drawn 
largely from ecology and evolutionary biology. 4 undergraduate hours. 
4 graduate hours. Prerequisite: MATH 220 or MATH 221; Introductory 
courses in Ecology and Evolution.

IB 496  Special Courses  credit: 1 to 5 Hours.  
Experimental and temporary courses. Additional fees may apply. See 
Class Schedule. 1 to 5 undergraduate hours. 1 to 4 graduate hours. 
Approved for letter and S/U grading. May be repeated as topics vary. 
Prerequisite: Consent of instructor.

IB 501  Programming for Genomics  credit: 4 Hours.  
Students will learn to think algorithmically by constructing a biological 
hypothesis, and implementing code or deploying an existing code 
implementation, to test that hypothesis. Students will learn to use 
UNIX and to program in Python, using biological data sets from 
high-throughput sequencing projects. We will cover major genomics 
approaches and the algorithms that underlie them, including K-mer 
analysis, genome and transcriptome assembly, databases and SQL, 
and visualization techniques. Same as CPSC 501. 4 graduate hours. 
No professional credit. Prerequisite: Courses in Ecology, Evolution, 
and Molecular Biology, or consent of instructor.

IB 502  Biological Networks  credit: 3 Hours.  
This taxon-neutral course prepares students to organize, integrate and 
analyze complex, multi-scale data that describe biological systems. 
It provides training, collecting, and processing "omic"-scale data 
genomics, transcriptomics, proteomics, metabolomics) into network 
models, and analyzing these models using current in silico tools to 
determine biological significance and function of the resulting network 
interactions. Students will be introduced to Gene Ontology and open 
source tools for data integration and visualization, including: Cytoscape, 
Multiple Experiment Viewer, Mapman, and KEGG 3 graduate hours. No 
professional credit. Prerequisite: Graduate student status or consent 
of instructor. At least one upper level undergraduate course in molecular 
biology or its equivalent.

IB 504  Genomic Analysis of Insects  credit: 3 Hours.  
Comprehensive and integrated presentation of insect genomic analysis 
from the molecular level to that of the population; concepts are applied to 
certain aspects of insect population regulation. Offered in alternate years. 
Prerequisite: IB 204 or consent of instructor.

IB 505  Bioinformatics & Systems Biol  credit: 4 Hours.  
Same as CPSC 567. See CPSC 567.
IB 506  Applied Bioinformatics  credit: 4 Hours.
Same as ANSC 542 and CPSC 569. See ANSC 542.

IB 507  Statistical Genomics  credit: 3 or 4 Hours.
Same as ANSC 545 and CPSC 545. See ANSC 545.

IB 508  Multivariate Biostatistics  credit: 4 Hours.
Same as PATH 528. See PATH 528.

IB 510  Discussions in Plant Biology  credit: 0 to 2 Hours.
All graduate students in plant biology, except those with conflicting teaching assignments, are required to register in and attend the seminar. Approved for both letter and S/U grading. No credit given except to those students presenting the results of their Ph.D. thesis research or industry research projects in the PSM program.

IB 513  Disc in Plant Physiology  credit: 1 Hour.
Approved for letter and S/U grading. May be repeated.

IB 516  Ecosystem Biogeochemistry  credit: 4 Hours.
Same as NRES 516. See NRES 516.

IB 524  Plant Biochemistry  credit: 4 Hours.
Same as CPSC 588 and HORT 588. See CPSC 588.

IB 526  Seminar in Entomology  credit: 0 to 1 Hours.
Discussions, reviews, and appraisals of special topics in the field of entomology. Approved for both letter and S/U grading. May be repeated to a maximum of 4 hours.

IB 531  Emerging Infectious Diseases  credit: 4 Hours.
Examines new human infectious diseases, such as Asian flu, West Nile virus, AIDS, and Lyme disease, that are a major threat to human health. Explores the historic links among human health, disease pathogens, and ecology, as well as the origin of each new disease and how it is regulated by specific environmental conditions. Also explores how global change and biodiversity loss will increase the possibility of future ecological epidemic and the steps needed to reduce their effects on human health. In this course, students also produce teaching materials for their classrooms.

IB 532  Sustainability & Global Change  credit: 4 Hours.
Examines how on-going global change affects sustainability. Explores climate change, global warming, alternative biofuels, future food security, and conservation of biodiversity, and their effects on society. Examines how to make better use of the Earth's natural resources with little to no damage to the ecosystem, while taking into account ever mounting demands for energy resources and climate change. In this course, students also produce teaching materials for their classrooms.

IB 533  Human Genome & Bioinformatics  credit: 4 Hours.
Highlights advances in understanding the human genome, utilizing the latest techniques in bioinformatics, i.e. acquiring, analyzing, storing, and displaying the information from the entire genome and protein sequences. Explores the latest laboratory techniques, as well as the use of extensive online databases and software. Students explore the significance of sequencing the human genome, applying bioinformatics to the genome, and realizing its potential to understand human health, disease, and the place of humans in the large ecosystem. In this course, students also produce teaching materials for their classrooms.

IB 534  Evolution and Medicine  credit: 4 Hours.
Explores how human health is inseparably tied to our evolutionary history. Principles that apply to human health include evolutionary processes, e.g. natural selections, as well as molecular evolution, human evolution, and evolutionary-developmental biology. Explores these principles can be applied to understand human nutrition and metabolism, reproduction, disease and stress, and behavior. These principles assist physicians, researchers, and the general public in understanding how natural selection has acted on humans over time and left us vulnerable to disease and injury. In this course, students also produce teaching materials for their classrooms.

IB 535  Biology & Tech Innovation  credit: 4 Hours.
Focuses on how experts in biology and technological fields use bio-inspiration to create technology innovations to solve human problems. Classic examples, such as how the observation that seeds with barbs stick to animal fur led to Velcro, are explored. Students use and expand upon the current biological knowledge to explore new ways to create environmentally friendly innovations. Topics to be explored include nest building as inspiration for energy-efficient architecture, plant chemistry as inspiration for green manufacturing, animal locomotion and sensing as inspiration for robots, and the advances in understanding of biological nanostructures and nanomaterials as inspiration for nanotechnology. In this course, students also produce teaching materials for their classrooms.

IB 536  Evolutionary Biology  credit: 4 Hours.
Examines fundamental topics for understanding evolution, the unifying principle for all of biology. Evidence for evolution is all around us, and learning how to view life through 'evolutionary tinted' glasses greatly changes our perspective. Emphasizes the creative ways that scientists are gaining insights into how and why life evolved as it is. Provides avenues to use in the classroom to provide scholarly evidence for the basis of evolution to refute non-academic arguments. Students will produce teaching materials for their classrooms. 4 graduate hours. No professional credit. Prerequisite: For graduate students in the Online Masters of Science Teaching Biology program (OMST).

IB 542  Environmental Plant Physiology  credit: 4 Hours.
The interaction of plants and environment at the level of the whole organism, extending to the cell and the community; emphasis on heat and mass transfer, plant and soil potentials, and effects of light on growth. Same as CPSC 538. Offered in alternate years. Prerequisite: IB 420; consent of instructor.

IB 545  Fish and Wildlife Ecol Seminar  credit: 2 Hours.
Modern ecological principles and concepts to specific problems in fisheries and wildlife. Approved for letter and S/U grading. Offered in alternate years.

IB 546  Topics in Ecology & Evolution  credit: 1 Hour.
Speaker seminar series featuring discussion, review and critical analysis of general concepts and specific problems in ecology and evolution. Approved for both letter and S/U grading. May be repeated.

IB 590  Individual Topics  credit: 2 to 12 Hours.
Individual topics in research conducted under the supervision of faculty members in the School of Integrative Biology. Designed for graduate students who would like to become more familiar with specialized fields of study prior to committing themselves to a specific area for their doctorate degree. Approved for S/U grading only. May be repeated to a maximum of 16 hours. Prerequisite: Consent of instructor.