Biology (BIOL)

BIOL 400G  Plant Physiology  4 Hours
A study of the general principles by which plants function. Three areas discussed are transport and translocation of water and solutes, metabolism with special emphasis on photosynthesis, and plant growth and development.
Prerequisite(s): BIOL 120/BIOL 121, and two semesters of chemistry.
Grade Mode: Non-graded

BIOL 403G  Molecular Basis of Cancer  3 Hours
Biological and molecular features of oncogenesis and clinical cancer, focusing on specific molecular events underlying carcinogenesis, metastasis and angiogenesis. Case study learning will be integrated into the course to engage students in understanding the societal implications of cancer.
Prerequisite(s): BIOL 319/BIOL 322 or equivalent course.

BIOL 404G  Electron Microscopy  4 Hours
A course in the fundamentals of electron microscopy including basic theory, techniques for specimen preparation and photography, and operation of the electron microscope. Lecture, two hours; laboratory, four hours.
Prerequisite(s): BIOL 222/BIOL 223, BIOL 224/BIOL 225 or permission of instructor.
Grade Mode: Non-graded
Course Fee: $20

BIOL 405G  Aquatic Insect Diversity  2 Hours
The taxonomy and biology of the insects commonly encountered in freshwater habitats.
Prerequisite(s): Graduate standing.

BIOL 407G  Virology  3 Hours
Study of bacterial, animal and plant viruses. Emphasis on the molecular aspects of replication, expression, regulation and pathogenesis.
Prerequisite(s): BIOL 319/BIOL 322.

BIOL 411G  Cell Biology  3 Hours
A lecture series emphasizing the morphological and chemical make-up of cells, the physical and chemical properties of the cell, and modern techniques for investigation of cellular functions.
Prerequisite(s): BIOL 319/BIOL 322 or consent of instructor.

BIOL 412G  Lab Cell Biology  1 Hour
A laboratory course correlated with BIOL 411G.
Course Fee: $20

BIOL 415G  Ecological Methods  3 Hours
A course emphasizing the collection, manipulation and analysis of ecological data using a variety of techniques in aquatic and terrestrial habitats.
Prerequisite(s): BIOL 315 or permission of instructor.
Grade Mode: Non-graded

BIOL 416G  Biochemistry I  3 Hours
Biochemical compounds and their role in metabolism.
Prerequisite(s): CHEM 314 or CHEM 340.

BIOL 417G  Lab Biochemistry I  2 Hours
Selected experiments which illustrate biochemical principles. Five hours per week.
Prerequisite(s): BIOL 446/CHEM 446.
Course Fee: $35

BIOL 450G  Recombinant Gene Technology  3 Hours
Discovery-based laboratory emphasizing application of basic techniques to solve student-defined problems. Problems in characterization and expression of genetic material are explored. Laboratory, six hours.
Prerequisite(s): BIOL 350 and BIOL 446.
Course Fee: $20

BIOL 456G  Ichthyology  4 Hours
Fishes of the world, their physiology, structure, behavior, and ecology. Emphasis on the collection and identification of freshwater species of Kentucky. Lecture, two hours; laboratory, four hours.
Prerequisite(s): BIOL 224, BIOL 225, and permission of instructor.
Grade Mode: Non-graded

BIOL 457G  Herpetology  4 Hours
An introduction to the classification and biology of reptiles and amphibians.

BIOL 458G  Fisheries Management  4 Hours
A study of the factors affecting fish populations. Topics covered include life history traits, sampling techniques, management practices, and policies regulating the management of fish populations. Off-campus and overnight weekend field trips are required.
Grade Mode: Non-graded
Course Fee: $25

BIOL 459G  Mammalogy  3 Hours
Taxonomy, life history and ecology of the mammals. Laboratory work includes field studies and collection and study of specimens. Lecture two hours; laboratory two hours.
Prerequisite(s): BIOL 120/BIOL 121.

BIOL 460G  Parasitology  4 Hours
The morphology, physiology, life histories, control and economic significance of representative species. Lecture, two hours; laboratory, four hours.
Prerequisite(s): BIOL 224/BIOL 225.
Grade Mode: Non-graded

BIOL 461G  Immunology  3 Hours
An introduction to the classification and biology of reptiles and amphibians.

BIOL 464G  Endocrinology  3 Hours
Endocrinology is the study of hormones. This course will provide a general survey of endocrinology, with specific emphasis upon the physiology of the endocrine system among different vertebrate groups, including humans.
Prerequisite(s): BIOL 319/BIOL 322; BIOL 446-BIOL 447 strongly recommended.

BIOL 467G  Biochemistry II  3 Hours
The reactions of living systems and an introduction to the mechanisms and energetics of metabolism. Lecture.
Prerequisite(s): BIOL 446/Chem 446.

BIOL 470G  Pathogenic Microbiology  4 Hours
A study of the organisms causing disease with emphasis on bacteria. Includes pathogenic bacteria, viruses, rickettsiae, fungi and protozoa. Lecture, two hours; laboratory, four hours.
Prerequisite(s): BIOL 226/Biol 227, or permission of instructor.
Grade Mode: Non-graded

BIOL 472G  Applied and Environmental Microbiology  4 Hours
The study of the roles of microorganisms in food preservation, fermentation, spoilage and food intoxication. Production of microbial products of industrial interest; application of modern microbiological techniques to industrial processes; interrelationships between microorganisms and their environment.
Prerequisite(s): BIOL 226/Biol 227, or consent of instructor.
Grade Mode: Non-graded

BIOL 473G  Cave and Karst Environment  3 Hours
Discussion of biological diversity, groundwater and humanity's role in utilizing and conserving the unique features of karst areas and use of these areas in teaching. Course does not count toward the M.S. Options.
Prerequisite(s): BIOL 120/BIOL 121 or equivalent.

BIOL 475G  Independent Topics/Biology  1-3 Hours (repeatable max of 6 hrs)
Significant problems and developments of current interest in biology.
Biology (BIOL)

BIOL 485G  Field Biology  1-4 Hours
An intensive field experience on a biological or ecological topic.

BIOL 490G  Plants as Alternative Therapeutics  3 Hours
An exploration of plants used in traditional systems of medicine with emphasis on their pharmacological implications as evidenced in modern clinical research. The therapeutic actions of phytochemicals, vis-a-vis different human illnesses (cardiovascular, gastrointestinal, respiratory, autoimmune psychosomatic disorders; cancer, AIDS, skin diseases, etc.) will be examined.
Prerequisite(s): Consent of instructor.

BIOL 495G  Molecular Genetics  3 Hours
A study of the molecular basis of genetics and heredity of prokaryotic and eukaryotic organisms.
Prerequisite(s): BIOL 450G.

BIOL 496G  Plant Biotechnology  4 Hours
A course designed to illustrate the current advances in plant biotechnology and their potential application in agriculture, health and environment.

BIOL 497G  Aquatic Field Ecology  4 Hours
An integrated study of aquatic ecosystem structure and function emphasizing the physical and chemical properties of water and application of biological field methods. This course requires off-campus and overnight travel.
Prerequisite(s): BIOL 222/ BIOL 223 or BIOL 224/BIOL 225 or BIOL 226/BIOL 227; CHEM 120/CHEM 121; or equivalent or graduate standing.
Grade Mode: Non-graded
Course Fee: $20

BIOL 500  Introduction to Graduate Studies and Research in Biology  3 Hours
Introduction to research techniques and experimental design, with an emphasis on on-going research at WKU. Also includes an introduction to research-related resources at WKU.

BIOL 501  Biological Perspectives  4 Hours
Designed to acquaint graduate students with advances in the biological sciences and practical applications of biological principles. Lecture, three hours; or lecture, three hours, laboratory, two hours.
Grade Mode: Non-graded

BIOL 503  Contemporary Research/Biology  1 Hour
Participants will present a research article on a topic of their choice to the class. A critical appraisal of the research approach, methods, results and interpretation of results will be stressed. Requires participation in critical discussions of all presentations. The course may be taken as often as wished but only once for credit toward a degree program.
Prerequisite(s): Admission to biology graduate program.

BIOL 505  Aquatic Insect Ecology  2 Hours
Ecological functions, evolutionary adaptations, and indicators of environmental quality of aquatic insects.
Prerequisite(s): Graduate standing or permission of instructor.

BIOL 506  Environmental Seminar  1 Hour (repeatable max of 3 hrs)
Designed for future environmental practitioners, this course will provide real world examples of environmental jobs and research projects. The course will impart a broad understanding of environmental science from a multi-disciplinary perspective. Required for the MS Environmental Science emphasis degrees.

BIOL 507  Science Concepts for Elementary Teachers  3 Hours
This course provides basic background to the KY Core Contents in science that elementary teachers are required to teach along with discipline-specific strategies and best-practices that can be implemented in the classroom. National Boards “Big Ideas”, inquiry learning and implementation of math and science will be integrated into this course to provide beginning teachers the tools necessary to conduct dynamic science classes.
Course Fee: $20

BIOL 515  Advanced Ecology  3 Hours
Essential dynamic features of plant and animal populations. Covers the theoretical and empirical aspects of single populations, or pairs of interacting populations, and of whole communities.
Prerequisite(s): BIOL 315 or consent of instructor.

BIOL 516  Investigations/Biology  1-3 Hours (repeatable max of 3 hrs)
Research project completed under faculty supervision. Not applicable to MS thesis option.
Prerequisite(s): Permission of research project director.

BIOL 518  Population Ecology  2 Hours
Investigation of the theories and models used to describe and predict populations. Includes applications in population projection and harvesting, as well as two-species interactions.
Prerequisite(s): Permission of instructor.

BIOL 519  International Wildlife Management and Policy  2 Hours
Exploration of the major wildlife management models used in various countries, emphasizing North America, Europe and Africa. Economic ramifications of these models and international treaty obligations relating to the wildlife trade are investigated.
Prerequisite(s): Permission of instructor.

BIOL 522  Systematics and Evolution  4 Hours
Study of systematic theory and practice with a focus on current controversies. Taxonomic methods will be evaluated with an emphasis upon the use of taxonomic tools to reconstruct evolutionary relationships. Lecture, three hours; laboratory, two hours.
Prerequisite(s): Consent of instructor.
Grade Mode: Non-graded

BIOL 523  Biological Symbioses and Host-Parasite Associations  3 Hours
Exploration of biological symbioses, emphasizing patterns and processes of biological coevolution. Host-parasite systems are explored in detail, with a focus on classic and current coevolutionary and cospeciation systems.
Prerequisite(s): Graduate standing.

BIOL 524  Evolution and Ecological Genetics  3 Hours
Advanced treatment of natural selection as a mechanism of evolution. Interaction of ecological, behavioral and genetic systems in driving evolutionary change at various levels of organization is emphasized.
Prerequisite(s): BIOL 327 or consent of instructor.
Grade Mode: Non-graded

BIOL 526  Physiological Ecology  3 Hours
Study of the physiological adaptations of animals that enhance their survival and/or permit them to exploit extreme environments.
Prerequisite(s): BIOL 330 or consent of instructor.

BIOL 530  Animal Behavior  4 Hours
A comparative approach to a study of the current understanding of physiological mechanisms involved at the organismal level in transducing environmental input into adaptive behavioral output.
Grade Mode: Non-graded

BIOL 532  Behavioral Ecology  3 Hours
An investigation of animals in reference to their evolution and interactions with others emphasizing behavior related to their survival and reproduction in a natural context.
Prerequisite(s): Graduate standing.

BIOL 533  Behavioral Ecology Laboratory  2 Hours
A field and laboratory investigation of the methodology to study the actions of animals in reference to their evolution, environment and interactions with other organisms.
Prerequisite(s): Graduate standing.
BIOL 534 Chemical Ecology 3 Hours
The study of chemical ecology emphasizes the concepts and evolution of chemical signals, the methods for identification, the mechanisms by which such signals act, their functions and applications.

BIOL 535 Analytical Biochemistry 3 Hours
An overview of the science of modern analytical and instrumental techniques with emphasis on techniques relevant to measurements in biochemistry and biology.
Equivalent(s): CHEM 555.
Prerequisite(s): BIOL 446/BIOL 446G or CHEM 446/CHEM 446G or consent of instructor.

BIOL 543 Environmental Science Concepts 3 Hours
Explores the inter-relationship among the science and technical disciplines that contribute to our understanding of the environment as a whole. Introduces research methods and core environmental science concepts. Prepares students to examine environmental science questions with an interdisciplinary outlook.

BIOL 550 Introduction to Biological Applications in Homeland Security 3 Hours
An introductory course in biological principals for students in Homeland Security with a limited biology background. Topics include cell structure/ function, cellular information and energy flow, immune function, cellular and population genetics.

BIOL 552 Biological Applications in Homeland Security I 3 Hours
An advanced study of biological phenomena relevant to Homeland Security Concerns. Biol Apps to HLS I will focus on the recognized groups of pathogenic organisms to human and selected crops. Topics to be covered are: Identification of pathogens, pathogenicity and virulence, control and detection, and dispersal mechanisms. Also, the immune response to infectious disease will be covered in depth with special attention toward understanding the functionality of the antibody.
Corequisite(s): BIOL 553.
Prerequisite(s): BIOL 550 or permission of instructor.

BIOL 553 Laboratory: Biological Applications in Homeland Security I 1 Hour (repeatable max of 3 hrs)
The laboratory will provide students with knowledge in laboratory safety and manipulation, identification, and enumeration of microbial and viral cultures.
Corequisite(s): BIOL 552.
Prerequisite(s): BIOL 550 or equivalent.

BIOL 555 Laboratory: Biological Applications in Homeland Security II 1 Hour (repeatable max of 3 hrs)
The laboratory will provide students with knowledge in laboratory immunological methodologies and analytical methods in DNA forensics.
Corequisite(s): EHS 572.
Prerequisite(s): BIOL 552/BIOL 553 or permission of instructor.

BIOL 560 Advanced Cell Biology 3 Hours
Lecture-discussion course designed to understand structure and function of differentiated cells of multicellular organisms. Textbook readings, review articles and current research papers will be incorporated into lectures and discussions.
Prerequisite(s): BIOL 411 or equivalent.

BIOL 562 Advanced Biochemistry 3 Hours
Survey of biochemical research areas where significant advances have been made in recent years. Textbook readings, review articles and current research papers will be incorporated into lectures and discussions.
Equivalent(s): CHEM 562.
Prerequisite(s): BIOL 446/CHEM 446.
Grade Mode: Non-graded

BIOL 566 Advanced Molecular Genetics 3 Hours
Consideration of the molecular mechanisms for replication, gene expression and regulation of development.
Prerequisite(s): BIOL 495 or consent of instructor.

BIOL 568 Advanced Microbiology 3 Hours
Study of microbial metabolic and genetic diversity, phylogeny and evolution, and ecology, including a consideration of research methodologies applicable to microorganisms. Lecture, three hours; laboratory, two hours.
Grade Mode: Non-graded

BIOL 569 Professional Work/Career Experience in Biology 1-3 Hours (repeatable max of 3 hrs)
Practical experience in a supervised work situation with a cooperative business, industry, non-governmental, or governmental agency, emphasizing application of advanced knowledge and skills in specified areas of biology.

BIOL 570 Advanced Immunology 3 Hours
Cellular, biochemical, and molecular mechanisms of the immune response of multicellular organisms. Emphasis is on current scientific literature in the field.
Prerequisite(s): BIOL 328 or consent of instructor.

BIOL 577 Advanced Marine Biology 3 Hours
Marine organisms are examined within a framework of basic biological principles and processes that are fundamental to all forms of life in the sea, including evolution, ecology, biodiversity, biogeography, behavior, and physiology.
Prerequisite(s): Graduate standing.

BIOL 579 Mechanistic Toxicology 3 Hours
A course that examines how toxic substances interact with living organisms, while integrating aspects of biochemistry, anatomy and physiology, ecology, and health. Emphasis is placed on the effects of xenobiotics on human systems, particularly the mechanisms of action, detoxification and adverse effects on target organs.
Prerequisite(s): Graduate standing.

BIOL 582 Biometry 3 Hours
Application of statistical and techniques to problems in biological sciences. Emphasis is placed on hypothesis testing, use of linear models, randomization techniques, and non-parametric methods.
Prerequisite(s): Graduate standing.

BIOL 583 Advanced Biostatistics 3 Hours
Advanced analysis of biological data, including multivariate methods, multiple model inference, and Monte Carlo methods.
Prerequisite(s): BIOL 582.

BIOL 587 Environmental Law, Regulations, and Policy 3 Hours
An introduction to major environmental legislation for air, water, toxic and hazardous pollutants, and related legislative, administrative, and judicial developments. A broad overview of legal practices focused on specific regulatory programs.

BIOL 598 Graduate Seminar 2 Hours
Oral presentation on selected topics in biology.

BIOL 599 Thesis Research/Writing 1-6 Hours (repeatable max of 9 hrs)
Thesis research and writing directed by faculty committee.
Grade Mode: Pass/Fail

BIOL 600 Maintaining Matriculation 1-6 Hours (repeatable max of 6 hrs)
Continued enrollment for thesis completion.
Grade Mode: Non-graded

BIOL 601 Internship in College Instruction 1 Hour (repeatable max of 2 hrs)
Designed for prospective teachers of biology. Staff direction in preparing and giving lectures. Includes analyses of presentation and techniques.

BIOL 675 Independent Advanced Topics/Biology 1-3 Hours (repeatable max of 6 hrs)
Selected topics in Biology.