

BIOLOGY (BY)

BY 402 Medical Microbiology (4)

Prerequisite(s): BY 323 or 283 and approval of instructor.
Study of pathogenic bacteria, viruses, fungi, and parasites of humans and some domestic animals; identification of pathogens, disease processes, and public health emphasized; lecture and laboratory.

BY 403 Immunology (3)

Prerequisite(s): BY 373; BY 323 recommended.
Study of immunity and how the immune system responds to specific infectious and non-infectious agents; comparative immunology of invertebrate and vertebrate animals, immunological disorders, and application of immunological techniques; lecture and laboratory.

BY 406 Ornithology (4)

Prerequisite(s): BY 332.
History, classification, anatomy, physiology, ecology, and distribution of birds; laboratory emphasis on field identification and ecology; lecture, laboratory, and field studies.

BY 409 Introduction to Forensic Botany (3)

Prerequisite(s): BY 101 and BY 102.
An introduction to the role of plants in criminal investigations, law, and legal matters. The course deals with the study of plants and plant materials collected at scenes of criminal activities. Topics include a survey of basic botany science including plant structure and reproductive biology, plant anatomy, plant diversity, pollen studies, and genetics, with an emphasis on plants as evidence. Another aspect of the course includes simulations of cases and reading and understanding of case studies where forensic botany was applied.

BY 412 Plant Reproduction and Development (4)

Prerequisite(s): BY 322, BY 373; CY 105, CY 106, CY 107, CY 108 recommended.
Study of structural and functional aspects of reproductive and developmental phenomena in vascular plants; lecture and laboratory.

BY 413 Animal Reproduction and Development (4)

Prerequisite(s): BY 322, BY 373; CY 105, CY 106, CY 107, CY 108 recommended.
Study of the structural and functional aspects of reproductive and developmental phenomena in animals with emphasis on the cellular and molecular mechanisms involved; lecture and laboratory.

BY 415 Biometrics (3)

Prerequisite(s): BY 322, 332, or 373 and MS 204.
An introduction into statistics for biology majors. This course will introduce students to appropriate statistics for analyzing biological data including how to select random samples, use basic statistical packages, post-hoc statistical testing and the use of linear regression and will use real-world examples of statistics in ecological, toxicological, and physiological research; lecture and laboratory.

BY 417 Medical Parasitology (3)

Prerequisites for Undergraduate: BY 101, BY 102, BY 103, and BY 104.
Prerequisites for Graduate: none. This course is designed to give a broad overview of general medical parasitology. Major groups of parasites are studied with an emphasis on those that afflict both domesticated and wild animals. This course provides an understanding of important parasitic diseases including their life cycles, vectors of transmission, distribution, epidemiology, pathophysiology, clinical manifestations, treatment, prevention, and control.

BY 419 Medical Botany (4)

Prerequisite(s): BY 101, BY 102, BY 103, and BY 104.
An introduction to the role of plants in human health and medicine, with an emphasis on their biologically active compounds. Includes a survey of traditional medicines around the world (e.g., Ayurveda, Chinese Medicine) and contemporary clinical methods at the forefront of medical research. Lecture and laboratory. This course is eligible for Faster Master's.

BY 420 Applied Medical Cannabis (3)

Prerequisite for Undergraduate: 8 hours of biology, CY105, and CY107.
Prerequisite for Graduate: 8 hours of biology, CY105, and CY107;
Graduate Standing. Comprehensive overview of medical cannabis. This upper-level course will explore the applications of phytocannabinoids for pain, seizure, psychiatric disorder, cancer, and many other medical indications. Important precautions, contraindications, and cannabis use disorders will be introduced as well as an overview of career opportunities in cannabis medicine.

BY 422 Biology of Cryptogams (4)

Prerequisite(s): BY 332, BY 373.
The study of blue-green algae, algae, slime molds, bryophytes, and lichens; lecture, laboratory, field, and library study. Extensive field and laboratory identifications.

BY 427 Independent Studies in Biology (1)

Laboratory or field research investigation dealing with an aspect of biological sciences; biology sponsor required for topic approval and supervision. Grade: Pass/Fail

BY 434 Animal Systems Physiology (4)

Prerequisite(s): BY 373; CY 105, CY 106, CY 107, CY 108; CY 231, CY 232 and one semester of physics recommended.
Systematic survey of organ system physiology in vertebrates; systems analysis, biophysics, and bioengineering emphasized; lecture and laboratory. This course is eligible for Faster Master's.

BY 435 Landscape Ecology (4)

Prerequisites for Undergraduate: BY 322. Prerequisites for Graduate: BY 322, MS 204. Lecture, laboratory, and field study. Emphasis will be on the role of spatial heterogeneity in terrestrial systems; its detection and description, analysis of pattern formation, landscape dynamics and models, human interactions with heterogeneity, and the implications of heterogeneity of populations, communities, and ecosystems. Landscape ecology provides approaches to fundamental research questions in ecology, as well as new approaches to forest and resource management that consider ecosystem processes at larger spatial and temporal scales.

BY 438 Freshwater Biology (4)

Prerequisite(s): BY 332.
Analysis of the unique ecology and biology of the freshwater environment; extensive field work; research project; lecture, laboratory, and field studies.

BY 442 General Entomology (4)

Prerequisite(s): BY 332.
Lecture, laboratory, and field study of insects and other arthropods, with an emphasis on the taxonomy, morphology, physiology, and ecology of the insects. This course is eligible for Faster Master's.

BY 443 Medical Entomology (3)

Prerequisite(s): BY 332.
Arthropods of medical and veterinary importance, how they affect their hosts and transmit disease.

BY 445 Ecotoxicology (4)

Prerequisite(s): BY 332, BY 373.

Recommended: BY 322. This course is a survey of ecotoxicology. The study of the integration of the major processes involved with transport, exposure and response of biological systems to xenobiotics, how toxicants mediate interactions between organisms and their biotic and abiotic environments and, the impact and toxic effects of pollutants on diversity, growth and metabolism of living organisms, populations, communities, and the ecosystem; lecture, laboratory and field study.

BY 450 Molecular Biology (4)

Prerequisite(s): BY 322 or approval of instructor.

Study of the processes involved in the expression of biological information at the molecular level; lecture and laboratory. This course is eligible for Faster Master's.

BY 451 Plant Anatomy (4)

Prerequisite(s): BY 373.

Study of the comparative structural organization of the vegetative and reproductive parts of seed plants, from cells to tissues to systems; lecture and laboratory.

BY 452 Plant Taxonomy (4)

Prerequisite(s): BY 322 or BY 332.

Survey of plant nomenclature, identification systems, description, evolution, and classification; vascular plants emphasized; lecture, library, laboratory, and field studies.

BY 453 Dendrology (4)

Prerequisite(s): BY 332.

Lecture, laboratory, and field study. The identification, taxonomy, ecological characteristics, distribution, and economic importance of trees native to North America and ornamentals.

BY 458 Herpetology (4)

Prerequisite(s): BY 332.

Recommended: BY 320. Taxonomy, ecology, physiology, and external anatomy of amphibians and reptiles; conservation and field methodology emphasized; lecture, laboratory and field studies. This course is eligible for Faster Master's.

BY 460 Ichthyology (4)

Prerequisite(s): BY 332.

An overview of the evolution, ecology, behavior, physiology, and conservations of fishes. Preparation and presentation of an original library or lab/field research project required. Lecture, laboratory, and field study.

BY 472 Virology (3)

Prerequisite(s): BY 373.

This course focuses on the principles of viral infection and pathogenicity. Topics include the classification of viruses, virus entry, genome replication and assembly, emphasis placed on virus-host cell interactions and common features between viral families.

BY 473 Advanced Cell Biology (4)

Prerequisite(s): BY 373.

Recommended: BY 322, CY 231, CY 232, CY 362, CY 363. A study of molecular aspects of cell structures and their functions using both descriptive and biochemical approaches. Lecture and laboratory.

BY 476 Invertebrate Zoology (4)

Prerequisite(s): BY 332.

Systematics, ecology, physiology, and phylogenetic relationships of invertebrate animals; lecture, laboratory, and field studies.

BY 477 Cell and Tissue Culture (4)

Prerequisite(s): BY 101, BY 102, BY 103, BY 104, BY 373, CY 105-CY 108.

Recommended: BY 322, 412, 431 and CY 231. Cell and Tissue Culture is an advanced biology course dealing with in vitro manipulation of cells, organs, and tissues; both solid and suspension culture and their application to biotechnology. Lecture and laboratory. This course is eligible for Faster Master's.

BY 478 Endocrinology (3)

Prerequisite(s): BY 373 and CY 231.

General introduction to vertebrate endocrine systems and the variety of chemical messengers involved in the regulation of physiological processes. Topics will include discussions of the history and methodologies of endocrinology, hormone synthesis, physiological effects of hormones, and the mechanisms of actions for various hormones.

BY 479 Plant Physiology (4)

Prerequisite(s): BY 373; BY 451 recommended.

Mineral nutrition, water relations, photosynthesis, metabolism and transport in vascular plants; lecture and laboratory.

BY 480 Advanced Topics in Biology I (1)

Prerequisite(s): BY 322 or 332 or 373.

Lecture and discussion; topics to be posted in the Biology Department.

BY 481 Advanced Topics in Biology II (1)

Prerequisite(s): BY 322 or 332 or 373.

Lecture and discussion; topics to be posted in the Biology Department.

BY 501 Graduate Student Success (1)

All Master's students in their first semester as graduate students in the department must take BY 501: Graduate Student Success. Students will achieve course objectives related to their overall adjustment to being a successful graduate student in Biology at JSU. Grades: Pass/Fail.

BY 502 Scientific Literacy and Communication (3)

This course is designed to give students experience in accurately and effectively interpreting scientific literature, rigorously assessing popular media reporting on scientific topics, and factually and constructively communicating scientific topics to varying audiences, both in an academic/learning environment and to the broader public.

BY 503 Special Problems in Biology (2)

Special topics approved by instructor after consideration of students background. Grades: Pass/Fail.

BY 504 Problems in Biology (1)

Special topics approved by instructor after consideration of students background. Grades: Pass/Fail.

BY 510 Introduction to Spatial Analysis (3)

An overview of geographic information systems and a foundation in map coordinate systems, map projections, and map scale. (BY 510 is cross-listed with GIS 510, and only one course may be counted for credit.)

BY 525 Physiological Adaptations (3)

Prerequisite(s): BY 434 or its equivalent.

An in depth survey of selected topics in comparative physiology. Interactions between organisms and their environments will be examined with an emphasis on molecular and cellular adaptations. Phenotypic differences in adaptations will serve as a central theme for this course. The course is designed to expose students to the various topics through lecture, primary literature, and lab presentations/activities.

BY 533 Advanced Plant Biology (3)

Study of plant biology consisting of lectures, discussions, investigative laboratory exercises on the topics of Plant Classification, Plant Anatomy and Reproduction, Plant Growth, and Development, the Physiology and Biochemistry of Plants, Plants Genetics and Molecular Biology, Plants Interactions with their Environments, and the Impacts of Plants to our Society.

BY 535 Functional Vertebrate Anatomy (3)

Prerequisite(s): BY 320 or equivalent or permission of the instructor. Lecture and demonstration. This course will emphasize the adaptations of vertebrate animals as revealed by morphology and will study the anatomy of vertebrates, as it relates to topics such as locomotion, reproduction, digestion, and physiology. In addition, molecular and morphological phylogeny of vertebrate groups using datasets will be studied.

BY 538 Population and Community Ecology (3)

This course addresses theoretical and applied issues at both the population and community levels. Topics include population and community structure/stability, trophic relations, population interactions, population and community dynamics, landscape ecology, and others. Discussion of primary literature will be a large part of this course. Lecture and lab.

BY 540 Invertebrate Relationships (3)

Prerequisite(s): Permission of the instructor. An analysis of recently published research in the anatomy, morphology, phylogeny, and physiology of invertebrate animals. The major invertebrate phyla (including parasitic forms) will be emphasized; lecture, discussion, presentation, and lab exercises.

BY 542 Biodiversity: Kingdoms of Living Things (3)

Prerequisite(s): BY 332 or its equivalent. Lectures and demonstrations. Biodiversity emphasizing systematic, phylogeny, structure, function, life cycles, ecology, and economics.

BY 546 Molecular Genetics (3)

Prerequisite(s): BY 322 or its equivalent or permission of the instructor. A survey of molecular genetics focusing on the analysis of genomes, genes, and chromosomes. Discussion of modern genetic analysis techniques will be integrated into these topics. Biotechnology topics will include nucleic acid isolation methods, PCR, gene expression analysis, gene cloning, expression systems, proteomics, DNA sequencing, and molecular phylogenetic analysis.

BY 562 Symbiotic Associations (3)

Prerequisite(s): BY 322, 332, 373 or equivalent and one 400 level organismal courses. Analysis of the nature and mechanism of symbiotic associations, including commensalism, mutualism, parasitism, that involve interactions between organisms.

BY 563 General Toxicology (4)

Prerequisite(s): BY 373 and CY 106. The study of basic toxicology and ecotoxicology, including how toxic substances are taken up in the organisms, distributed, biotransformed and excreted, how toxic substances react with biomolecules and downstream consequences for the organism, as well as knowledge about toxic substances, e.g. pharmaceuticals, metals, organic contaminants, and pesticides. The course aims to provide a holistic view of the topic by bridging human toxicology and ecotoxicology; lecture, laboratory and field study.

BY 570 Seminar in Developmental Biology (2)

Prerequisite(s): Approval of the instructor. Presentation, discussion, and analysis of recently published research in developmental biology of cells, tissues, and organ systems in plants, animals, or microbes; independent library research required.

BY 571 Seminar in Organismal Biology (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research focusing on specific groups of organisms; independent library research required.

BY 572 Seminar in Ecology (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in plant, animal, or microbial ecology; independent library research required.

BY 573 Seminar in Cell Biology (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in cellular biology; independent library research required.

BY 574 Seminar in Evolutionary Biology (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in evolutionary biology; independent library research required.

BY 575 Seminar in Genetics (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in plant, animal, or microbial genetics; independent library research required.

BY 576 Seminar in Physiology (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in plant, animal, or microbial physiology; independent library research required.

BY 577 Seminar in Systematics (2)

Prerequisite(s): Approval of instructor. Presentation, discussion, and analysis of recently published research in systematic biology; independent library research required.

BY 594 Biology Research Methods (1)

Prerequisite(s): Approval of instructor. Introduction to diverse research methods and literature in the biological sciences. Includes topics such as, but not limited to, techniques in environmental analysis, microscopy, protein and nucleic acid analysis, biometry and population dynamics, and physiology.

BY 595 Research Project (3)

Prerequisite(s): BY 594, completion of at least 20 hours of graduate study in biology, and approval of instructor.

(3) (3). Completion of an acceptable original research paper; non-thesis option only. May be duplicated for credit for a total of 6 semester hours. (Grade: Pass/Fail).

BY 596 Research I (1)

Prerequisite(s): Approval of Application for Thesis Option and approval of instructor.

(1) (1). Original field and/or laboratory research in the biological sciences; thesis option only. May be duplicated for credit for a total of 2 semester hours. (Grade: Pass/Fail).

BY 597 Research II (2)

Prerequisite(s): Approval of Application for Thesis Option and approval of instructor.

(2) (2). Original field and/or laboratory research in the biological sciences; thesis option only. May be duplicated for credit for a total of 4 semester hours. (Grade: Pass/Fail).

BY 598 Research (3)

Prerequisite(s): Approval of Application for Thesis Option, BY 594 and approval of instructor.

(3) (3). Master's thesis research. May be duplicated for credit for a total of 6 semester hours. (Grade: Pass/Fail).

BY 599 Thesis (3)

Prerequisite(s): Dean's Approval and Approval of Application for Thesis Option.

See "Thesis Option and Procedures." May be duplicated for credit for a total of 6 semester hours. Grade: Pass/Fail.