

# BIOLOGY COURSES (BIOL)

## BIOL 112 Introduction to the Principles of Heredity (4)

Is a lecture/lab course designed to introduce the non-science major to basic Mendelian and molecular genetics with special emphasis on human characteristics and diseases. Social, ethical and evolutionary issues are discussed.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

**IAI Course Number:** L1 906

## BIOL 113 Anatomy & Physiology (4)

Provides the non-biology major with a basic survey of human anatomy and physiology. Emphasis is placed on the relationship between structure and function, homeostasis and homeostatic regulating mechanisms. This class meets three lecture periods and one two-hour laboratory period each week.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

## BIOL 114 Human Biology (4)

Is intended for the non-science major, and will consider the biological nature of humans and the role that humans play in the biosphere. Topics for discussion will include the nature of biology in society, body systems and homeostasis, genetics, cancer, and human evolution and ecology. Course includes laboratory experiences.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

**IAI Course Number:** L1904L

## BIOL 115 Plants & Civilization (4)

Is a lab and lecture course that introduces the non-science major to the impact of plants on the past, present, and future of human civilization. Topics include the origin of agricultural crops, plants that changed history, the green revolution, medicinal plants, supermarket botany and genetic engineering of plants. Also included is a brief introduction to plant structure, function, and classification.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

**IAI Course Number:** L1901L

## BIOL 116 Introduction to Life Sciences for Education (4)

This course has been designed to provide elementary education majors with the background in biology needed to teach elementary life science. Concepts from the physical sciences will be incorporated to demonstrate the relationship between all fields of science. The course will use laboratory investigations to enhance understanding of biological concepts and to emphasize the discovery nature of science. An in-service learning experience has been added to this course to allow students to apply what they have learned by developing and teaching science lessons to 4th or 5th graders at Farragut Elementary School.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

## BIOL 124 Principles of Biology I (3)

**Prerequisite:** BIOL 125 (may be taken concurrently)

Provides an introduction to basic biological concepts in the areas of biological chemistry, cell biology, and genetics. Student should have taken HS Chemistry.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

**IAI Course Number:** L1 910, BIO 910, CLS 902

## BIOL 125 Principles of Biology I Lab (1)

**Prerequisite:** BIOL 124 (may be taken concurrently)

Provides laboratory experiences to complement the lecture material presented in BIOL 124 and introduces the student to basic lab techniques and scientific method.

**IAI Course Number:** L1 910L, BIO 910, CLS 901

## BIOL 126 Principles of Biology II (3)

**Prerequisite:** BIOL 127 (may be taken concurrently) and BIOL 124 and BIOL 125

Provides an introduction to basic biological concepts in the areas of biological diversity, zoology, botany, and ecology.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

**IAI Course Number:** L1 910, BIO 910, CLS 902

## BIOL 127 Principles of Biology II Lab (1)

**Prerequisite:** BIOL 126 (may be taken concurrently)

Emphasizes the process of biological investigation, with group and individual projects, to study evolution, biodiversity and ecology.

**IAI Course Number:** L1 910L, BIO 910, CLS 901

## BIOL 150 Fundamentals of Ecology/Evolution (3)

Introduces the concepts and themes of ecology and evolution and how these topics relate to organismal diversity. This course is an introduction to the foundations of evolution and ecology and the emphasis is on describing the diversity we see in present day populations and the role of evolution and ecology. We will address the mechanisms that can drive evolution and, using examples from different levels of biological organization, highlight the role of selection on diversification. Taxonomy, phylogenies and cladogenesis will be used to explain historical and extant species assemblages, while ecology will allow us to view habitat, niche fulfillment and current assemblages.

## BIOL 151 Beginning Investigative Experiences in Biology (2)

A lab course which introduces biology and biochemistry majors to the scientific method and how to apply it to simple investigations. Scientific integrity, literacy and communication will be emphasized.

## BIOL 160 Cell Biology (4)

A study of cell structure and function, emphasizing the molecular components, metabolism, organelles, motility, and growth and division. The molecular biology of cells and the regulation of cellular processes are emphasized along with the connection between cell biology and other aspects of the biological sciences. Laboratory exercise will include light microscopy, molecular cellular experiments and other experiments in cell biology.

## BIOL 165 Tropical Biology (4)

Will introduce students to aspects of tropical ecology including: weather patterns, forest structure, biodiversity and its importance, conservation and evolution. To better appreciate topics such as biodiversity and speciation, students will attain literacy in areas of biology such as ecology, mechanisms of speciation and extinction. The emphasis will be rooted in the scientific method and inquiry as to promote literacy in scientific thought and reason. Also to highlight the topics discussed in class, a field component is incorporated where the class will travel to Costa Rica and Panama to explore tropical biology and diversity first hand.

**Meets general education requirements:** GE-Math/Science/Comp Sci Elec, GE-Scientific Inquiry

## BIOL 194 Topics (4)

A course which covers broad themes, practices, and subject content not currently offered in the curriculum. This course is directed primarily at non-majors and may be used for general education where approved.

**BIOL 211 Microbiology (5)****Prerequisite:** (BIOL 124 and BIOL 125) or BIOL 160

Introduces the student to microbial morphology, physiology, ecology, and the identification of microorganisms through a series of investigations. The fundamentals of immunology and medical microbiology are also introduced. Three lecture periods and two two-hour laboratory periods meet per week.

**BIOL 221 Human Anatomy (4)****Prerequisite:** (BIOL 124 and BIOL 125) or BIOL 160

Provides an introduction to regional gross anatomy for students engaged in pre-professional study as well as those interested in nursing and allied health. Human anatomy will be covered from a functional and clinical perspective. In the laboratory, students use software, models, histological sections, radiographs and prosected cadavers. The class will meet for three hours of lecture and one three-hour laboratory per week.

**BIOL 252 Human Physiology (4)****Prerequisite:** (BIOL 124 and BIOL 125 or BIOL 160) and CHEM 120 or CHEM 121 and CHEM 123 or CHEM 124

Is a detailed study of functions of the human body. Emphasis is placed on homeostasis, fundamental physiological mechanisms and the coordination and integration of major body systems. Case studies are used to apply physiological principles to clinical applications. The class will meet for three hours of lecture and one three-hour laboratory per week.

**BIOL 255 Genetics (4)****Prerequisite:** (BIOL 160 or BIOL 124)

Provides students with a broad background in transmission genetics, molecular genetics,

**BIOL 310 Invertebrate Zoology (4)****Prerequisite:** BIOL 160

Acquaints the student with the general characteristics of each phylum of the animal kingdom. Detailed structure and function of organ systems are studied in specific representatives of each invertebrate phylum. Laboratory investigations include analysis of local invertebrate communities. Two lecture periods and two two-hour laboratory periods meet per week.

**BIOL 311 Pathophysiology (3)****Prerequisite:** BIOL 211 and BIOL 221 and BIOL 252 and CHEM 120

Builds upon the knowledge of normal human structure and function gained in anatomy and physiology courses. The course begins with a discussion of the concept of health versus disease. The focus is on disease or the physiological alterations in body structure and pathological disruptions in function. These deviations are discussed using Orem's universal self-care requisites as an organizing framework. The course is designed to allow the student to integrate principles and concepts of Pathophysiology into concurrent and subsequent clinical nursing courses.

**BIOL 312 Biology of Terrestrial Arthropods (2-4)****Prerequisite:** BIOL 160

Examines the biology of the arthropods; the most successful group of terrestrial invertebrates. Terrestrial crustacea, myriapoda, arachnida, and insects will be covered. The emphasis will be on the taxonomy, ecology, and evolution of the spiders and insects including their impact on humans. Laboratory will be used to 1) collect, identify, and preserve specimens, and 2) to investigate arthropod behavior and physiology.

**BIOL 314 Comparative Vertebrate Anatomy (3)****Prerequisite:** (BIOL 126 and BIOL 127) or BIOL 315 (may be taken concurrently) and BIOL 160

Provides the student with an understanding of the evolution of the major organ systems of the amphioxus, fishes, amphibians, reptiles, birds, and mammals including man. The comparison of organs is addressed with special emphasis on the evolutionary relationships between each class of chordates.

**BIOL 315 Comparative Vertebrate Anatomy Laboratory (2)****Prerequisite:** BIOL 126 and BIOL 127 or BIOL 160 and BIOL 314

Includes the study of the external anatomy of the amphioxus, comparison of the skeletal systems of the dogfish shark, frog, turtle, bird, and cat, as well as dissection of the dogfish shark and cat.

**BIOL 316 Embryology (4)****Prerequisite:** (BIOL 126 and BIOL 127) or BIOL 160

Provides the student with insight into the development of vertebrates, beginning with gametogenesis, fertilization, cleavage, blastulation, gastrulation, and neurulation. Emphasis is placed on the nature of the primary organizer, induction, and organogenesis. Three lecture periods and one two-hour laboratory meet per week.

**BIOL 321 Human Dissection Anatomy (3)****Prerequisite:** BIOL 221

This is an advanced course in human anatomy. It is primarily a course involving the regional dissection of the human cadaver, covering specific regions or anatomical principles as appropriate.

**BIOL 322 Molecular Biology (4)****Prerequisite:** (BIOL 255 and CHEM 224)

Introduces molecular biology through a class molecular biology investigation. Techniques covered will include DNA purification, sequencing and blotting; PCR amplification; gene cloning and engineering techniques; and mRNA isolation and analysis. This class will be investigation driven with an emphasis on developing workable strategies to solving questions at the molecular level.

**BIOL 331 Botany (4)****Prerequisite:** BIOL 160 or (BIOL 126 and BIOL 127)

Introduces students to the basic structural, reproductive and evolutionary patterns seen in the plant kingdom. The class will meet for three hours of lecture and one three-hour laboratory per week.

**BIOL 335 Conservation Biology (3)****Prerequisite:** (BIOL 150 and BIOL 151) or (BIOL 126 and BIOL 127) or ENVS 105

Introduces students to conservation biology, which is an interdisciplinary science that focuses on biodiversity at the genetic, population, species, ecosystem, and global levels. The course emphasizes the ecological and evolutionary processes that form the basis for the protection, maintenance and restoration of biological diversity, but the economic and political effects are also investigated. The impacts of humans on biodiversity and the effects of biodiversity on humans are both addressed.

**BIOL 342 Medical Microbiology (3)****Prerequisite:** BIOL 211

An investigation of pathogenic viruses, bacteria, fungi, and protozoans with an emphasis on life cycles, virulence, diagnostic testing, and host responses. Content in this class is taught with a combination of case studies, primary literature, and guided lectures.

**BIOL 343 Immunology (3)****Prerequisite:** BIOL 211

Considers adaptive and innate responses to infection and disease, including mechanisms of T and B lymphocyte-mediated immunity and contribution to allergies and autoimmune disease. Transplantation and tumor immunology will also be considered. Current literature will be examined to introduce modern theories on immunoregulation. Two or three lecture periods per week.

**BIOL 345 Perspectives in Evolution (3)****Prerequisite:** BIOL 255

Examines Darwin's theory of evolution and natural selection and recent biology research that supports the role evolution has had in shaping organisms.

**BIOL 347 Biomechanics (3)****Prerequisite:** PSCI 111 and BIOL 221

The study of the mechanical function and design of biologic tissues or organisms. Principles from the fields of physics, engineering, and anatomy will be used to analyze the kinematics and kinetics of the healthy and pathologic human musculoskeletal system.

**BIOL 351 Plant Physiology (4)****Prerequisite:** (BIOL 331 and CHEM 322 and CHEM 323)

Will experimentally investigate the effects of water, nutrients, and light on plant growth and development. The topics will be studied at the molecular, cellular and environmental levels. Three lecture periods and one three-hour laboratory meet per week.

**BIOL 353 Endocrinology (3)****Prerequisite:** (BIOL 252 and CHEM 224)

Examines the physiological and metabolic actions of selected endocrine glands and their hormones. Strong emphasis is placed on mammalian physiology and the mechanism of hormone action, as well as diseases caused by inappropriate hormone function. The first part of the course will cover the general principles of endocrinology, followed by system-based approach to endocrinology. CHEM 322/3 is recommended.

**BIOL 355 Exercise Physiology (3)****Prerequisite:** BIOL 252

Teaches the student how humans attempt to maintain homeostasis during physical activity. Topics will include diverse areas such as metabolism, ventilation, cardiovascular dynamics, and skeletal muscle properties and function. In addition, the student will spend time in the laboratory to collect physiological data on exercising subject using research grade laboratory equipment. The student will also assess and critically evaluate the current scientific literature regarding exercise physiology.

**BIOL 360 Animal Behavior (4)****Prerequisite:** BIOL 124 and BIOL 125 and BIOL 126 and BIOL 127 or BIOL 160

Introduces student to the study of animal behavior (Ethology) and how behaviors are developed. The emphasis will be placed on naturally occurring behavior but reference training, conditioning and relevant behavioral modification will be introduced. Student will become proficient in topics such as the history of ethology, modeling behavior, sensory system reliance, signaling and communication. Evolution will be explored to demonstrate the importance of ecology in the development of behavior and species specific interactions.

**BIOL 361 Ecology (4)****Prerequisite:** (BIOL 126 and BIOL 127) or BIOL 160

Acquaints the student with the dynamics of ecological relationships between man, animals, plants, and the environment. The laboratory will include field experiments in representative ecosystems. The class will meet for 3 hours of lecture and one 3-hour lab per week. Additionally, some weekend fieldwork will be required.

**BIOL 375 Advanced Investigative Experience in Biology I (3)****Prerequisite:** BIOL 255 and BIOL 151

Exposes students to scientific investigation in greater depth than is achieved in standard laboratory courses and introduces them to independent scientific research. Students will be presented with a specific, multi-faceted scientific question that they will explore in small groups. Each group will investigate one component of the overall question using critical thinking and the scientific methods via traditional bench testing, fieldwork, and/or numerical analytical methods. The groups will then work together as a class to assimilate their results into a coherent explanation/solution of the overarching question.

**BIOL 376 Advanced Investigative Experience Biology II (3)****Prerequisite:** BIOL 151 and BIOL 255

Exposes students to scientific investigation in greater depth than is achieved in standard laboratory courses and introduces them to independent scientific research. Students will be presented with a specific, multi-faceted scientific question that they will explore in small groups. Each group will investigate one component of the overall question using critical thinking and the scientific methods via traditional bench testing, fieldwork, and/or numerical analytical methods. The groups will then work together as a class to assimilate their results into a coherent explanation/solution of the overarching question.

**BIOL 390 Methods of Teaching Adolescents Science (3)**

Examines methods and techniques for teaching science to middle grades and high school students. Focus will be upon laboratory experiences, teaching in the field, applications of the scientific inquiry method, use of technology, questioning and listening skills, delivery methods, differentiation, instructional planning, and assessment procedures. Classroom organization and management, relevant content and instructional standards, and professional development are also addressed.

**BIOL 410 Senior Seminar (3)**

Further develops the undergraduate research projects from previous semesters. Students will demonstrate critical thinking, an ability to synthesize scientific literature, an understanding of the scientific process and the ability to communicate biological concepts in writing and oral presentations.

**Restrictions:** Enrollment limited to students with a semester level of Senior. Enrollment is limited to students with a major in Biology.

**BIOL 411 Senior Thesis I (1)**

Acquaints the student with research and reference facilities and offers the opportunity for independent research. Successful completion of thesis proposal, outline and bibliography are required before advancing to BIOL 412.

**Restrictions:** Enrollment limited to students with a semester level of Senior. Enrollment is limited to students with a major in Biology.

**BIOL 412 Senior Thesis II (2)****Prerequisite:** BIOL 411

Is a continuation of BIOL 411. Students prepare and complete their thesis under the supervision of a faculty advisor. Students also prepare for the oral presentation of their research at the end of the semester.

**BIOL 413 Senior Teaching Portfolio (1)**

In this capstone course, senior biology/secondary education majors will create a portfolio that includes an innovative unit of scientific inquiry based upon a research project that they have completed in BIOL151, BIOL375, or BIOL495. The portfolio should include a developed primary research manuscript of the scientific project completed, a reflective narrative on the process of developing it for high school-level inquiry, and a unit of how they would teach the project to a high school classroom. The unit should include lesson plans clearly linked to Next Generation Science Standards, with formative and summative assessments, and suggestions for modifications and extensions. The portfolio will be presented to a committee of biology and education faculty for review.

**BIOL 480 Topics in Biology (1-4)**

**Prerequisite:** BIOL 211

Are specialized courses offered depending on student and faculty interests.

May be repeated for up to 4 hours

**BIOL 481 Topics in Botany (3-4)**

Offers advanced or specialized botany courses through the ACCA Cooperative College Botany Program at the Morton Arboretum.

May be repeated for up to 4 hours

**BIOL 482 Topics in Zoology (2-4)**

**Prerequisite:** BIOL 160

This course will be taught at the Shedd Aquarium and include a week-long field experience aboard the Shedd Aquarium's research vessel, the R/V Coral Reef II on the Bahamas.

May be repeated for up to 4 hours

**BIOL 483 Topics in Aquatic and Marine Biology (3-4)**

**Prerequisite:** BIOL 160

This course will be taught at the Shedd Aquarium and include a week-long field experience aboard the Shedd Aquarium's research vessel, the R/V Coral Reef II on the Bahamas.

May be repeated for up to 4 hours

**BIOL 494 Special Problems in Biology (1-4)**

Affords the student the opportunity of investigating a biological problem by laboratory or field experience. The study should be defined prior to registration through consultation with the supervising instructor.

May be repeated for up to 4 hours

**Restrictions:** Enrollment limited to students with a semester level of Junior.

**BIOL 495 Directed Study (1-4)**

An academic learning experience designed by the instructor. Student must have a 3.0 GPA or higher.

**BIOL 496 Independent Study (1-4)**

Allows students to select their own topic of investigation and determine their own way of pursuing and reporting work. A faculty advisor serves as a resource person. Students provide goals, materials, and criteria for evaluation. Requires approval of dean.

**BIOL 497 Undergraduate Research Program (1-12)**

Selects students to engage in research activities with scientists at local research institutions such as Argonne National Laboratory, Morton Arboretum, Shedd Aquarium and with the Will County Forest Preserve District.

**BIOL 498 Internship (0-6)**

Allows for credit to be earned through internships and cooperative programs such as those available through Argonne National Laboratory, Morton Arboretum, Shedd Aquarium, and Will County Forest Preserve District.