

BIOL - Biology

Global Citizenship Program Knowledge Areas (....)	
ARTS	Arts Appreciation
GLBL	Global Understanding
PNW	Physical & Natural World
QL	Quantitative Literacy
ROC	Roots of Cultures
SSHB	Social Systems & Human Behavior

Global Citizenship Program Skill Areas (....)	
CRI	Critical Thinking
ETH	Ethical Reasoning
INTC	Intercultural Competence
OCOM	Oral Communication
WCOM	Written Communication
** Course fulfills two skill areas	

BIOL 1010 Human Biology (4)

The "biology" of humans is a study of the organization of the human body, how it works, and what the human needs to stay alive and reproduce. Throughout the course, the focus is on various topics of interest to the college student: e.g., fitness, stress, current discoveries, AIDS. Intended for non-majors. Laboratory is included. Offered in the fall semester. **GCP Coding: (PNW) (CRI)**.

BIOL 1020 Biology of Animals (3)

BIOL 1021 Biology of Animals: Lab (1)

Introduces the fascinating world of animals, from the tiny water flea to the elephant. Examines the challenges in their lives and the ways they meet them, including the search for food sources and shelter, reproduction, and internal stability. Laboratory required. Intended for non-majors. Offered in the fall semester. **Co-requisites:** BIOL 1020 and BIOL 1021 must be taken concurrently. **GCP Coding for BIOL 1020: (PNW) (CRI)**.

BIOL 1030 Biology of Plants (3)

BIOL 1031 Biology of Plants: Lab (1)

Examines plant growth and development, from seed to flower. Plant diversity and ancient and modern uses will be studied, along with care of common garden and household plants. Laboratory required. Intended for non-majors. Offered in the spring semester. **Co-requisites:** BIOL 1030 and BIOL 1031 must be taken concurrently. **GCP Coding for BIOL 1030: (PNW) (OCOM)**.

BIOL 1040 Human Genetics (3)

Introduces DNA, along with the structure and function of human chromosomes and how hereditary traits are passed on. Emphasis on new findings and technologies. Intended for non-majors. Laboratory included. Offered in the spring semester. **GCP Coding: (PNW) (ETH)**.

BIOL 1050 Biology of Disease (3)

This course focuses on the physiological changes associated with diseases of the major organ systems of the human body. Each system is presented from the perspective of the function of the organ system and how alterations in that organ system function lead to a lack of integration with other organ systems and untimely disease. **GCP Coding: (PNW) (WCOM)**.

BIOL 1200 Stream Ecology (4)

This course is an in-depth study and experiential exploration of various freshwater aquatic habitats, as well as the interdisciplinary literature that is associated with each habitat and ecosystem. Pond, wetland, stream, river, and basin – each habitat is explored, studied, and experienced. Water chemistry, EPA standardized water testing, sampling and evaluating of aquatic invertebrates; analysis of water, watershed, and ecosystem health; reporting our findings to private and state agencies – these are all vital and important parts of this course. Students will be certified in Missouri Stream Team standards at the end of the course and will be able to start their own Stream Team. There will be multiple field trips, some overnight, to local and regional streams, rivers, and watersheds. Laboratory is included.

BIOL 1318 Issues I Biology (1-3)

Deals with biological issues of general interest. May be repeated for credit if content differs. **Prerequisite:** May vary with section.

BIOL 1350 Phage Discovery (4)

This is the first semester of a year-long research-based course that immerses students in authentic and accessible research. Students will work toward finding new bacterial viruses and characterizing them. Students make significant contributions to the field of genomics as they learn how to think like scientists. Laboratory is included. **GCP Coding: (PNW) (CRI)**.

BIOL 1550 Essentials of Biology I (4)

BIOL 1551 Essentials of Biology I: Lab (1)

An introduction to basic principles of biochemistry, genetics, molecular biology, cellular biology, and evolution. Students will learn how to apply these basic principles to critically think about and communicate current scientific issues. Laboratory is required. Limited to majors in the sciences or by permission of the instructor. **Co-requisites:** BIOL 1550 and BIOL 1551 must be taken concurrently. **GCP Coding for BIOL 1550: (PNW) (CRI)**.

BIOL 1560 Essentials of Biology II (4)

BIOL 1561 Essentials of Biology II: Lab (1)

A survey of living organisms and ecology. Structure, function and biological processes will be covered. Laboratory required. **Prerequisites:** BIOL 1550. Limited to majors in the sciences or by permission of the instructor. **Co-requisites:** BIOL 1560 and BIOL 1561 must be taken concurrently.

BIOL 1610 Anatomy and Physiology I (3)

BIOL 1611 Anatomy and Physiology I: Lab (1)

Introduces the structure and function of the human body to gain a fundamental knowledge of human anatomy and physiology. Topics will include cellular chemistry, cell biology, histology as well as an overview of the integumentary, skeletal, muscular, and nervous systems. Laboratory sessions will focus on basic organization of the body and hands-on exploration of the integumentary, skeletal, muscular, and nervous systems with a microscopic examination and dissection. Laboratory is required.

BIOL - Biology

Offered in the fall semester. **Co-requisites:** BIOL 1610 and BIOL 1611 must be taken concurrently.

BIOL 1620 Anatomy and Physiology II (3)

BIOL 1621 Anatomy and Physiology II: Lab (1)

A continuation of BIOL 1610/11. Topics will include endocrine, cardiovascular, respiratory, renal, digestive, and reproductive systems. Laboratory sessions will focus on basic organization of the body and hands-on exploration of the endocrine, cardiovascular, respiratory, renal, digestive, and reproductive systems with dissection and physiology experimentation. Laboratory is required. Offered in the fall semester. **Co-requisites:** BIOL 1620 and BIOL 1621 must be taken concurrently.

BIOL 1800 Medical Terminology (3)

This course provides the student with the building blocks of basic medical terminology. Such information will facilitate learning of scientific and medical principles as they relate to the physiological processes in the human body. The relationship of word parts to their anatomical counterparts will be studied. Rules for combining word parts into complete medical terms will be stressed. Accurate pronunciation and spelling of word parts and complete terms will be emphasized throughout the course. Offered in online format.

BIOL 2000 Bioinformatics (3)

This course demonstrates the rationale and uses for large biological datasets and engages students in DNA sequence analysis using several types of biological databases. Students learn the strengths and weaknesses of the various types of data that provide insight into biology and work with computational methods to analyze novel genomes. Students will use DNA analysis software programs and/or programming language at an introductory level. **Prerequisite:** BIOL 1560.

BIOL 2010 Evolution (3)

This course covers the development of evolutionary theory, examines the genetic basis of evolution, explores mechanisms of speciation and the construction of phylogeny, and studies various data that contribute to the current understanding of biological evolution that yields the present day diversity of life. Students perform an investigation on an evolutionary topic of choice, and present a critical analysis of the findings. **Prerequisites:** BIOL 1550 and BIOL 1560, or permission of the instructor.

BIOL 2011 Evolution: Lab (2)

This course provides a general assessment of the different disciplines in the evolutionary field and helps students develop an understanding of the principles used by evolutionary biologist to create new knowledge. Students will examine mechanisms of evolution and speciation, the development of evolutionary theory and study various data that contribute to our current understanding of biological evolution. Students will learn first-hand how evolution drives patterns of biodiversity through a required short-term study abroad trip to the Galápagos Islands, Ecuador. They will develop skills in hypothesis-driven science and perform an investigation on an evolutionary topic of choice. They will use basic experimental design and statistical tests used in evolutionary biology and present a critical analysis of the findings. Study Abroad fee will vary. **Prerequisites:** BIOL 1550 and BIOL 1560, or permission of the instructor.

BIOL 2120 Microbiology (3)

BIOL 2121 Microbiology Lab (1)

A study of bacteria, viruses, fungi, and protists with respect to microbial structure and function, growth, metabolism, pathogenesis, and methods of disinfection and sterilization.

Prerequisites: BIOL 1550 and BIOL 1551 or BIOL 1610 and BIOL 1611. **Co-requisites:** BIOL 2120 and BIOL 2121 must be taken concurrently.

BIOL 2200 Biological Basis of Animal Behavior (3)

Presents the key processes that affect animal behavior (internal mechanisms, development, social interactions, ecology, and evolution) and their significance.

BIOL 2350 Nutrition (3)

Examines the physiologic importance of all major nutrients on an individual's health. Effects of both deficiencies and excesses of the nutrients will be studied. The relationship between energy balance (calories) and weight control is emphasized.

Prerequisites: BIOL 1550 or BIOL 1610 or instructor permission.

BIOL 2400 Zoology (3)

This course will delve into the evolutionary and ecological perspectives of the group of organisms we call "animals." Structure function relationships, physiological processes, and the role animals play in our ecosystem will be explored.

Prerequisites: BIOL 1550, BIOL 1551, BIOL 1560 and BIOL 1561.

BIOL 2500 Botany: The Good, The Bad, and The Deadly (3)

The path of human history is intimately related to the plants that surround us. The plants in our environment have shaped us, and we in turn have shaped them. During this course, students will learn botanical concepts and scientific skills, through exploration of our relationships with plants. Topics covered include plant morphology, physiology, diversity, and ecology. Intended for early-career majors and non-majors. **GCP Coding: (PNW)** (OCOM).

BIOL 3010 Human Anatomy & Physiology I (3)

BIOL 3011 Human Anatomy & Physiology I Lab (1)

An upper division course designed for biology majors familiar with the general principles of biological and chemical sciences. Initial discussions involve the relationships between macromolecules, metabolism, cytology, and histology. This is followed by examinations of the integumentary system, skeletal system, muscular system, and nervous system. Homeostatic regulation is presented as a function of the nervous system. Laboratory sessions involve microscopic examinations of cells and tissue and bones. Laboratory required. Offered in the fall semester.

Prerequisites: BIOL 1550, BIOL 1551 and CHEM 1100, CHEM 1101 or permission of the instructor. **Co-requisites:** BIOL 3010 and BIOL 3011 must be taken concurrently.

BIOL 3020 Human Anatomy & Physiology II (3)

BIOL 3021 Human Anatomy & Physiology II: Lab (1)

This course is a continuation of BIOL 3010/3011 for biology and biological science majors. Endocrine, cardiovascular, respiratory, immune, renal, digestive, and reproductive organ systems will be studied in-depth. Particular attention will be on the interaction between organ systems for homeostasis and in the context of disease. Laboratory sessions will be devoted to the hands-on exploration of the endocrine, cardiovascular, respiratory, renal, digestive, and reproductive systems with dissection and

BIOL - Biology

physiological experimentation. Laboratory required. Offered in the spring semester. **Prerequisites:** BIOL 3010 and BIOL 3011 or permission of the instructor. **Co-requisites:** BIOL 3020 and BIOL 3021 must be taken concurrently.

BIOL 3050 Genetics (3) **BIOL 3051 Genetics: Lab (1)**

This course establishes an understanding of genetic analysis in prokaryotic cells, eukaryotic systems and model organisms, with an emphasis on Mendelian genetics. Topics include transmission genetics, molecular genetics, and population genetics, with a focus on problem solving. Laboratory required. Offered in the spring semester. **Prerequisites:** BIOL 1550, BIOL 1551 and BIOL 1560, BIOL 1561, or permission of the instructor. **Co-requisites:** BIOL 3050 and BIOL 3051 must be taken concurrently.

BIOL 3060 Genetics II Lecture (3)

This course centers around molecular genetics and genomics, with an emphasis on genotypes, gene editing/modification, comparative genomics, population genetics and bioinformatics. This is a hybrid lecture-based course with an experimental component; sessions may include lectures, journal club-like literature studies, activities or lab experiments. **Prerequisites:** BIOL 3050 and BIOL 3051.

BIOL 3061 Genetics II Lab (1)

When offered, this course should be taken concurrently with BIOL 3060, and centers around molecular genetics and genomics, with an emphasis on genotypes, gene editing/modification, comparative genomics, population genetics and bioinformatics. **Prerequisites:** BIOL 3050 and BIOL 3051.

BIOL 3080 Cell Biology (3) **BIOL 3081 Cell Biology: Lab (1)**

Examines cellular structure and function in both eukaryotic and prokaryotic cells. This course provides the foundation for understanding modes of cellular communication, such as channels, receptors, messenger systems, and cell cycle processes. Energy production, storage, and utilization are also discussed. Offered in the spring semester. **Prerequisites:** BIOL 3050 and BIOL 3051 or instructor permission. **Co-requisites:** BIOL 3080 and BIOL 3081 taken concurrently.

BIOL 3200 Ecology (3) **BIOL 3201 Ecology: Lab (1)**

Defines ecosystems, examines how they function, and how human intervention changes that function. Emphasizes world ecosystems. Laboratory required. Offered in the fall semester. **Prerequisites:** BIOL 1550 and BIOL 1560, or permission of the instructor. **Co-requisites:** BIOL 3200 and BIOL 3201 must be taken concurrently.

BIOL 3600 Topics in Biology (1-4)

Provides for in-depth analysis of issues and topics of specialized interest to advanced students in the life sciences. May be repeated for credit if content differs. **Prerequisite:** Junior standing or permission of the instructor.

BIOL 3700 Plant Physiology (3) **BIOL 3701 Plant Physiology: Lab (1)**

Plant physiology is the study of how plants function and grow. This course aims to broaden students' understanding of how physical, chemical, and biotic factors affect the life of a plant.

Emphasis will be placed on water relations, metabolism, and regulation of plant growth and development. Students will be expected to read, present, and discuss research from current scientific articles about plant physiology. Laboratory required. **Prerequisites:** BIOL 1560 and CHEM 1110, or permission of the instructor. **Co-requisites:** BIOL 3700 and BIOL 3701 must be taken concurrently.

BIOL 3900 Journal Club (3)

Keeping up with current scientific knowledge requires reading the latest scientific publications. This journal club course will focus on a specific area of research and delve into recent progress made in this field. Students will gain an in-depth understanding of the principles, techniques, and context of the subject while developing their skills in oral communication. This course can be repeated for credit, as the topics and research papers will differ each time. However, the course can only count one time toward the major. **Prerequisites:** BIOL 1550 and BIOL 1560, or permission of the instructor.

BIOL 4050 Gene Expression (3)

Reviews the structure and function of chromosomes, the regulation of gene expression, and the molecular basis of gene mutation. Special topics will include gene regulation during development, the genetic basis of cancer, and the use of transgenic model systems. **Prerequisites:** BIOL 3050, BIOL 3051 and BIOL 3080, or permission of the instructor.

BIOL 4300 Immunology (3)

Provides the student with a detailed understanding of the mechanisms involved in protecting the body from infections and other potential sources of tissue damage. It examines the workings of the immune system and the interrelationships among its cell types. **Prerequisite:** BIOL 3080, or permission of the instructor.

BIOL 4400 Research Methods (3)

Lecture and discussion of the research process from question formulation to planning, design, methodology analysis, and preparation of a research proposal. **Prerequisites:** BIOL 1550, BIOL 1551, BIOL 1560, BIOL 1561, BIOL 2010, BIOL 3050, BIOL 3051, CHEM 1100, CHEM 1101, CHEM 1110, CHEM 1111, CHEM 2100 and CHEM 2101. Senior status in BA biology or BS biological sciences, or permission of the instructor.

BIOL 4420 Senior Thesis for BA in Biology (4)

Students working toward a BA in biology will enroll in this course to complete their senior research project in the laboratory or field. Completion of the project will culminate with a scientific write-up and oral presentation of research results at a formal meeting of faculty and peers. Student must complete all required coursework for the major, including BIOL 4400 Research Methods, or receive permission of the instructor.

BIOL 4430 Senior Thesis for BS in Biological Sciences (4)

Students working toward a BS in biological sciences will enroll in this courses to complete their senior research project in the laboratory or field. Completion of the project will culminate with a scientific write-up in publishable format. Research results will be presented at a formal meeting with faculty and peers. Student must complete all required coursework for the major, including BIOL 4400 Research Methods, or receive permission of the instructor.

BIOL - Biology

BIOL 4500 Virology (3)

Investigates the fundamental processes of viral evolution, classification, infection of host, pathogenesis, and viral replication. The use of viruses in biomedical research will be presented in order to understand the methodologies for the isolation, identification, and detection of viruses. **Prerequisites:** BIOL 3050, BIOL 3051, BIOL 3080, BIOL 3081 and CHEM 3100, or permission of the instructor.

BIOL 4610 Reading Course (1-4)

May be repeated for credit if content differs. **Prerequisites:** Permission of the department chair and filing of the official form.

BIOL 4700 Independent Research in Biology I (1-4)

A specialized course for students working on an independent, research-oriented project in a topic of current interest. Students should select among the equivalent courses BIOL 4700/CHEM 4700/PHYS 4700 for the one that is most consistent with their chosen project. For BIOL 4700, the topic should have a primary basis in biology. Also offered during the summer term. May be repeated once for credit if content differs. **Prerequisite:** Permission of the instructor.

BIOL 4710 Independent Research in Biology II (1-4)

A specialized course for students working on an independent, research-oriented project in a topic of current interest. Students should select among the equivalent courses BIOL 4710/CHEM 4710/PHYS 4710 for the one that is most consistent with their chosen project. For BIOL 4710, the topic should have a primary basis in biology. Also offered during the summer term. May be repeated once for credit if content differs. **Prerequisite:** Permission of the instructor.

BIOL 4750 Laboratory Teaching Assistant (1-3)

Teaching assistantships benefit students by providing a basic understanding of both the science and logistics of running different types of biology and chemistry labs. The students gain experience in experimental techniques, some pedagogy and overall classroom organization. These skills are useful for those who plan to pursue science teaching professional and are translatable to other types of jobs. Second, teaching assistants are part of a team effort within the biological sciences department to offer meaningful hands on laboratory components of critical courses and develop relationships with faculty members. These faculty-student interactions can lead to letters of recommendation or more long-term mentoring relationships. **Prerequisites:** Students will have taken the laboratory course they will be assisting in with a grade of B or better. Submit laboratory teaching assistant application for department approval.

BIOL 4900 Internship in Biological Sciences (1-3)

This course awards credit for approved research experiences with a business or not-for-profit organization that affords students an opportunity to apply and integrate the knowledge and skills they have gained in the classroom to the real world. **Prerequisite:** Students will submit an application for internship credit to the department chair for approval and determination of credit hours awarded.