

BIOLOGY

Biology is a branch of science fundamental to human existence. It is the study of life at various levels ranging from atoms and molecules, to cells, organisms, ecosystems and ultimately, the biosphere. The core theme linking all fields of biological study is evolution; a theme which is also reflected in our primal quest to discover where we came from and to understand our place in the world.

To study biology is to embark upon a lifelong process of learning about the diversity of living organisms and how they interact with each other, their environment, and with humans. All life forms are inextricably connected to each other and no other field of science has greater relevance or impact upon our lives and how we relate to our environment. This has come about from an understanding of organisms and biological processes which have led to advancements in fields as diverse as health and medicine, psychology, agricultural food production, forensics, genetic engineering and biotechnology and sustainable natural resource management.

Career Opportunities

Students who graduate with a degree in Biology will be well equipped for employment in government agencies as well as the private sector and may include entry level career opportunities in the following fields:

- Agriculture
- Animal Science (Dairy/Farming)
- Biotechnology
- Botany
- Environmental Consultant
- Fisheries Biology
- Food Science and Technology
- Forensics
- Informatics
- Medical or Scientific Laboratories
- Marine Biology
- Microbiology
- Molecular Biology
- Natural Resource Conservation and Management
- Pharmaceuticals
- Government Policy
- Toxicology
- Zoo or Aquaria - Animal Care

Programs

- Bachelor of Science, Major in Biology (<https://calendar.kpu.ca/programs-az/science-horticulture/biology/biology-bs/>)
- Minor in Biology (<https://calendar.kpu.ca/programs-az/science-horticulture/biology/biology-minor/>)

Courses

Registration in some course sections is restricted to students in particular programs. See Timetables - [kpu.ca/registration/timetables](http://www.kpu.ca/registration/timetables/) (<http://www.kpu.ca/registration/timetables/>) - for current section information.

Visit the BC Transfer Guide - [bctransferguide.ca](https://www.bctransferguide.ca) (<https://www.bctransferguide.ca/>) - for information about course transfer in B.C.

BIOL 1110 4 credits

Introductory Biology I

Students will study the diversity of life on Earth, the classification of organisms, and the interactions of organisms with their environments. They will examine the structure and function of tissues and body systems in a variety of organisms. Students will use microscopes and perform a range of experimental procedures in the laboratory.

Level: UG

Prerequisite(s): English 12 (B) or equivalent

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 1112 4 credits

Biology Today

In this course, students will study fundamental concepts in biology including cell biology, genetics, evolution and biodiversity. They will apply this knowledge using an evidence-based approach to examine some of the most exciting and controversial topics in current day biology, such as stem cell research, genetically modified organisms (GMO's) and threats to biodiversity. In the laboratory, students will explore biology via hands on activities that will reinforce concepts learned in class. For graduation with a Bachelor of Science Major in BIOLOGY, this course may only fulfill a requirement for a non-BIOL elective. Students with credit for BIOL 1110 may not take this course for further credit towards graduation requirements.

Level: UG

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 1160 4 credits

Anatomy and Physiology I

Students will study the major organ systems of the human body responsible for support, movement, circulation, respiration and digestion. They will also overview nervous and endocrine control, and microbiology. Students will study these topics using a student-centred laboratory format.

Level: UG

Prerequisite(s): Either (a) BIOL 1110 or (b) both (i) Biology 12 (B) or BIOQ 1099 (B), and (ii) Chemistry 11 (B) or CHEQ 1094 (B)

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 1210 4 credits

Introductory Biology II

Students will study concepts of inheritance and biological evolution. They will examine the major classes of biological molecules, the structure and function of cells, and the processes of cellular respiration and photosynthesis. They will study the patterns and mechanisms of embryological development. Students will apply the scientific method in conducting experimental investigations in the laboratory.

Level: UG

Prerequisite(s): Both (a) BIOL 1110, and (b) English 12 (B) or equivalent.

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 1260 4 credits**Anatomy and Physiology II**

Students will continue to study the major organ systems of the human body, focusing on the excretory, nervous, immune and reproductive systems. Examination of these systems will include related basic concepts in microbiology. Students will study these topics using a student-centred laboratory format.

Level: UG

Prerequisite(s): BIOL 1160

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 2320 4 credits**Genetics**

Students will examine the principles of heredity, transmission of traits, exchange of genetic information, mutation, linkage, gene action and recombinant DNA technology, with emphasis on problem solving. They will acquire a variety of laboratory skills including sterile techniques, isolation of DNA, electrophoresis and photo microscopy.

Level: UG

Prerequisite(s): BIOL 1110 and BIOL 1210

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 2321 4 credits**Cell Biology**

Students will examine the ultrastructure of the eukaryotic and prokaryotic cell along with molecular activities associated with these structures. They will also identify and understand the experimental techniques and data that support the current view of cell structure and function. Students will develop considerable skill in the preparation of materials for microscopic examination.

Level: UG

Prerequisite(s): BIOL 1110, BIOL 1210 and CHEM 1110.

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 2322 4 credits**Ecology**

Students will learn the basic properties of ecosystem, community and population ecology, including energy transfer, mineral cycling, community structure and dynamics, competition, predation, evolution and population dynamics. They will perform experimental investigations in the lab and use a range of instruments and equipment to record observations in the field.

Level: UG

Prerequisite(s): BIOL 1110 and BIOL 1210

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 2330 4 credits**Microbiology**

Students will survey a variety of microorganisms with an emphasis on bacteria. They will examine several aspects of microorganisms, including diversity, structure and function, metabolism, growth, reproduction and genetics.

Level: UG

Prerequisite(s): BIOL 1210

Co-requisite(s): CHEM 1110 or ENVI 1106

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 2421 3 credits**Cellular Biochemistry**

Students will learn the patterns and reactions of cellular metabolism with particular attention to the structure and function of proteins, the mechanisms of reactions, and the interrelationships and control of catabolism and anabolism.

Level: UG

Prerequisite(s): BIOL 1110, BIOL 1210, BIOL 2321 and CHEM 2320.

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 3110 4 credits**Animal Behaviour**

Students will learn the basic theories, principles and concepts associated with the scientific study of animal behaviour. They will examine the relationships between behaviour and adaptation, evolution, physiology and genetics, focusing on topics such as foraging, territoriality, mating and social behaviour. Students will observe, record and analyse the behaviour of a variety of animals; in the lab component of the course.

Level: UG

Prerequisite(s): BIOL 2322

Co-requisite(s): BIOL 3180

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3160 4 credits**Foundational Concepts in Human Anatomy & Physiology**

The students will acquire essential principles and procedures in anatomy, histology, physiology and general pathology for the study of human body systems. Their study will include an introduction to regional anatomy, organ tissues, organ structure, homeostatic mechanisms, electrophysiology, general and systemic pathology and drug kinetics and drug dynamics. The student will apply these essential principles while focusing on the integumentary system and the musculoskeletal system. They will also acquire laboratory skills in anatomical and histological procedures, the use of data acquisition software for collection of human physiological data, and sample diagnostic testing and its use of cellular and molecular experimental tools.

Level: UG

Prerequisite(s): BIOL 2321 and BIOL 2421

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3165 3 credits**Conservation Biology**

Students will examine the science, economics, politics and non-governmental organization activities relating to topical issues in conservation biology on a local, regional and global scale. Students will focus on invasive species, endangered species, pollutants, habitat fragmentation, climate change, government regulation, wildlife biology and sustainable ecosystems. Students will explore these issues further in the field component of the course.

Level: UG

Prerequisite(s): BIOL 1110, BIOL 1210 and BIOL 2322

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3180 3 credits**Life Science Research Methods**

Students will learn how to conduct research in the life sciences. They will explore concepts of research design and learn methods for collecting data and conducting appropriate statistical analyses. Students will also learn how to critically evaluate research literature, develop a research proposal and present research findings.

Level: UG

Prerequisite(s): BIOL 1210

Co-requisite(s): MATH 2335

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>), QUAN (<https://calendar.kpu.ca/courses-az/#quantext>)

BIOL 3215 4 credits**Zoology**

Students will investigate animal diversity with an emphasis on the evolutionary relationships and unifying characteristics within and among extant animal taxa. Students will survey major invertebrate and vertebrate taxa in the context of ecological niche diversity, functional morphology, and comparative anatomy, by classroom lectures, observation of live specimens, and dissection. Students will further explore animal diversity and unifying characters among animal taxa by learning about fossil evidence from the Cambrian explosion, Cretaceous-Tertiary extinction and other major events in animal evolution.

Level: UG

Prerequisite(s): BIOL 1110, BIOL 1210 and BIOL 2322

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3225 4 credits**Biology of Plants: An Ecological and Evolutionary Perspective**

Students will investigate the structure, function, classification and systematics of plants. They will learn about the evolutionary origins, adaptational trends of plants and ecological roles of plants. They will acquire skills in plant identification. They will learn to design and conduct observational and experimental studies of plant biology.

Level: UG

Prerequisite(s): BIOL 2322

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3320 4 credits**Molecular Genetics**

Students will learn mechanisms of gene regulation, both inherited and epigenetic, primarily in eukaryotic organisms. They will study the fundamentals of genomics. They will learn the concepts underlying the most commonly used molecular biology laboratory techniques. In the laboratory, students will conduct experiments using molecular biology techniques including bacterial plasmid transformation, gel electrophoresis and polymerase chain reaction. They will learn how to work with model organisms for investigating inheritance and gene expression.

Level: UG

Prerequisite(s): BIOL 1110, BIOL 1210 and BIOL 2320

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3321 4 credits**Advanced Cell and Molecular Biology**

Students will build on concepts covered in Cell and Molecular Biology (BIOL 2321) and explore advanced concepts associated with cell and molecular signalling. They will learn about topics including regulation of gene expression, cell to cell signalling, signalling between cells and the extracellular matrix, immunology, cell cycle regulation, apoptosis, and cancer. Students will be required to read and interpret current publications in these subject areas. Students will participate in labs focusing on cell culture and involve the use of advanced cell and molecular techniques such as Western Blot analysis, fluorescent labeling and microscopy, and cell transfection with Green Fluorescent Protein (GFP).

Level: UG

Prerequisite(s): BIOL 2321 and BIOL 2421

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3330 4 credits**Microbiology II**

Students will learn the principles and laboratory techniques associated with the various fields of microbiology including environmental, medical, food and industrial microbiology. Students will explore the diversity of soilborne Streptomycetes and the role of antibiotic production by these organisms in the laboratory. Students will perform 16srRNA sequencing to identify an unknown microorganism.

Level: UG

Prerequisite(s): BIOL 2330

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 3421 3 credits**Molecular Biochemistry**

Students will examine the structural and functional characteristics of complex organic molecules, such as lipids, amino acids and nucleotides. They will build on their understanding of metabolism and anabolic/catabolic pathways to study the synthesis and breakdown of lipids, amino acids, and nucleotides. Students will investigate the molecular mechanisms and biochemical reactions associated with DNA transcription, DNA repair, and protein synthesis.

Level: UG

Prerequisite(s): BIOL 2421 and CHEM 2420

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4140 4 credits**Animal Physiology**

Students will examine the diversity and function of animal physiological systems, including the nervous, endocrine, circulatory, respiratory, excretory, digestive and reproductive systems. They will compare and contrast these systems among animals groups from different evolutionary and ecological backgrounds, including domesticated animals. Students will examine the consequences of perturbation to physiological systems. They will investigate the role of different physiological systems in organism function through classroom activities, laboratory experiments, and literature surveys of current topics in animal physiology.

Level: UG

Prerequisite(s): BIOL 2321 and 3215

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4150 3 credits**Evolutionary Biology**

Students will examine key concepts and processes in evolutionary biology including micro- and macroevolution, phylogenetics, population genetics, genome evolution, natural selection, sexual selection, adaptation, speciation, extinction, biodiversity and evolution of development. They will further investigate evolutionary themes by critically analyzing written and graphical material from scientific literature. Students will learn about the relevance of evolutionary biology to modern society by examining research into a range of contemporary topics such as the evolution of disease, and the application of evolutionary theory to conservation.

Level: UG

Prerequisite(s): BIOL 2320 and BIOL 2322

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4160 4 credits**Human Cardiovascular and Respiratory Systems**

The students will apply essential principles and processes of anatomy, histology, physiology and general pathology to the study of human cardiovascular and respiratory systems. Their study will include anatomical and physiological investigations of normal organ activity, pathophysiological descriptions of organ and tissue dysfunctions and analysis of drug categories used for treatment. The students will investigate organ and tissue structure and function using laboratory techniques such as anatomical and histological procedures, data acquisition software, diagnostic tools and basic cell/molecular experimental design.

Level: UG

Prerequisite(s): BIOL 3160

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4199 3 credits**Research Project 1**

Students will use the knowledge and skills gained in BIOL 3180 to develop a research proposal that can be conducted in the field or laboratory setting. Students will prepare a budget for the proposed research.

Level: UG

Prerequisite(s): All of: (a) BIOL 3180, (b) two 4-credit courses in BIOL at the 3100 level or higher, and (c) permission of the instructor.

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4235 3 credits**Marine Biology**

Students will examine a variety of marine habitats and the diversity of algal and animal life forms that reside there. Students will study ecological principles that affect the distribution and abundance of marine life in intertidal, subtidal and pelagic communities. They will learn to identify local marine organisms (rocky and soft sediment intertidal organisms, plankton and nekton) on field trips. Students will also investigate human impact on marine environments and conservation of marine biodiversity.

Level: UG

Prerequisite(s): BIOL 3215 and BIOL 3180

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4245 4 credits**Developmental Biology**

Students will examine organismal development from fertilization to adulthood with a particular emphasis on the underlying cellular and molecular mechanisms. Students will survey development in a number of animal and plant model systems, and develop an understanding of mammalian development. Students will examine current topics in developmental biology through analysis and discussion of current research papers. In the laboratory, students will conduct a research project examining a facet of development in an invertebrate model organism, and will gain experience in both written and oral reporting of research results.

Level: UG

Prerequisite(s): BIOL 2320, BIOL 2421, and BIOL 3180

Attributes: ASTR (<https://calendar.kpu.ca/courses-az/#astrtext>), SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4255 3 credits**Bioinformatics**

Students will learn the fundamental concepts of Bioinformatics, an encompassing field that connects Molecular Biology, Evolutionary Biology, Genomics and Health Science through the use of advanced computer algorithms and software. Students will learn to access DNA, RNA and protein databases and genomic maps and how to utilize Bioinformatic algorithms and software to understand and predict structure and function of these important biological molecules, and their involvement in human disease. Students will explore and discuss emerging topics in the rapidly advancing field of Bioinformatics. Students will participate in weekly computer labs to obtain hands-on experience accessing and utilizing online bioinformatic tools and resources for Biologists and Health Science professionals.

Level: UG

Prerequisite(s): BIOL 2320, BIOL 2421 and BIOL 3180

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4260 4 credits**Human Neural, Excretory and Endocrine Systems**

The students will apply essential principles and processes of anatomy, histology, physiology and general pathology to the study of human gastrointestinal, urinary and nervous systems. Their study will include anatomical and physiological investigations of normal organ activity, pathophysiological descriptions of organ and tissue dysfunctions and analysis of drug categories used for treatment. The students will investigate organ and tissue structure and function using laboratory techniques such as anatomical and histological procedures, data acquisition software, diagnostic tools and basic cell/molecular experimental design.

Level: UG

Prerequisite(s): BIOL 3160

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4299 3 credits**Research Project 2**

Students will carry out the research project identified in BIOL 4199 (Research Project 1). Students will reflect upon their experimental outcomes and make suggestions for future direction.

Level: UG

Prerequisite(s): BIOL 4199

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4320 3 credits**Human Genetics**

Students will study several human genetic diseases, including examples of single gene mutations, chromosome mutations, and multifactorial traits. Students will investigate the nature of inherited diseases at the biochemical, cellular and phenotypic level. Students will learn how epigenetics, such as imprinting, can affect disease inheritance. They will study emerging fields of human genetics including genome editing and pharmacogenomics. Students will analyze ethical, legal and social issues relevant to human genetics.

Level: UG

Prerequisite(s): BIOL 3320

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4360 4 credits**Human Immune and Reproductive Systems**

The students will apply essential principles and processes of anatomy, histology, physiology and general pathology to the study of the human immune system, reproductive systems and prenatal development. Their study will include anatomical and physiological investigations of normal organ activity, pathophysiological descriptions of organ and tissue dysfunctions and analysis of drug categories used for treatment. The students will investigate organ and tissue structure and function using laboratory techniques such as anatomical and histological procedures, data acquisition software, diagnostic tools and basic cell/molecular experimental design.

Level: UG

Prerequisite(s): BIOL 3160 and BIOL 3321

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)

BIOL 4900 3 credits**Special Topics**

Students will undertake an in-depth exploration of current biological research within the field of expertise of a particular faculty member. They will critique and discuss primary research papers in a seminar-style class. Students with credit for HSCI 4950 may not take BIOL 4900 for further credit. NOTE: Students may take this course a maximum of two times for further credit on different topics. The topic in a given semester will be determined in advance. Please check with the department for the current topic.

Level: UG

Prerequisite(s): 4 courses in BIOL at the 3000 level or higher, including BIOL 3180

Credit Exclusion: HSCI 4950

Attribute: SCIH (<https://calendar.kpu.ca/courses-az/#courseattributestext>)