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 is 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 (Honours), Major in Biology (https://calendar.kpu.ca/programs-az/science-horticulture/biology/biology-bsh/)
- 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/) - for current section information.

Visit the BC Transfer Guide - 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
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 Anatomy and Physiology 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): BIOL 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 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 an emphasis on problem solving. They will acquire a variety of current molecular-genetic laboratory skills, including sterile technique, isolation of DNA, gel electrophoresis, genetic cloning and PCR.
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 3130 4 credits
Foundations of Human Anatomy & Physiology
Students will acquire essential principles and procedures in anatomy, histology, and physiology for the study of human body systems. Their study will include regional anatomy, organ tissues, organ structure, homeostatic mechanisms, and electrophysiology. The students will apply these essential principles while focusing on the integumentary system, musculoskeletal system, and immune 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 the use of cellular and molecular experimental tools. Students with credit for BIOL 3160 may not take this course for further credit.
Level: UG
Prerequisite(s): Both (a) BIOL 2321 and, (b) BIOL 2421
Co-requisite(s): BIOL 3321
Credit Exclusion: BIOL 3160
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 as well as improve their writing abilities and overall scientific communication skills. 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. They will develop their writing abilities through practice, revision and assessment from peers and the instructor.
Level: UG
Prerequisite(s): BIOL 1210; ENGL 1100
Co-requisite(s): MATH 2335
Attributes: ASTR (https://calendar.kpu.ca/courses-az/#astrtext), SCIH (https://calendar.kpu.ca/courses-az/#courseattributestext), WI (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 4130 4 credits
The Human Cardiovascular, Respiratory and Nervous Systems
Students will apply essential principles and processes of anatomy and physiology to the study of human cardiovascular, respiratory, and nervous systems. Their study will include anatomical and physiological investigations of normal organ activity. Students will investigate organ and tissue structure and function using laboratory techniques such as anatomical and physiological procedures, data acquisition software, and basic cell/molecular experimental design. Students with credit for BIOL 4160 and BIOL 4260 may not take this course for further credit.
Level: UG
Prerequisite(s): BIOL 3130 and BIOL 3321
Credit Exclusion: BIOL 4160,BIOL 4260
Attributes: F2A3 (https://calendar.kpu.ca/courses-az/#courseattributestext), 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 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 4230 3 credits
Human Gastrointestinal, Excretory, and Reproductive Systems
Students will apply essential principles and processes of anatomy, histology, and physiology to the study of the gastrointestinal, lymphatic, and excretory systems as well as reproductive systems and perinatal development. Students will undertake anatomical and physiological investigations of normal organ activity. Note: This course is credit excluded with BIOL 4260, BIOL 4360. Students may enroll in and earn credit for only one of these courses.
Level: UG
Prerequisite(s): BIOL 3130 and BIOL 3321
Credit Exclusion: BIOL 4260,BIOL 4360
Attributes: F2A3 (https://calendar.kpu.ca/courses-az/#courseattributestext), 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 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. 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 or HSCI at the 3000 level or higher including BIOL 3180, or permission of instructor
Attribute: SCIH (https://calendar.kpu.ca/courses-az/#courseattributestext)

BIOL 4990 4 credits
Honours Thesis Project 1
Students registered in the B.Sc. (Honours), Major in Biology program will design and propose a research project that will be conducted in BIOL 4995 under the supervision of a KPU faculty member with expertise relating to the research topic. Students will learn to organize an advisory committee, develop and present a full research proposal for approval, conduct pilot work as needed, obtain ethics approval where relevant, and prepare a knowledge dissemination plan. Students will also review and provide feedback on research proposals of their colleagues. NOTE: This course is available to Honours Program students only.
Level: UG
Prerequisite(s): All of: (a) BIOL 3180, (b) two 4-credit courses in BIOL at the 3000 level or higher, and (c) permission of the instructor
Attribute: SCIH (https://calendar.kpu.ca/courses-az/#courseattributestext)

BIOL 4995 4 credits
Honours Thesis Project 2
Honours candidates will perform a research project designed in BIOL 4990. Under the direct supervision of a KPU faculty member, students will apply scientific principles and methodology in a creative hands-on research experience. Upon completion of the research project, students will construct and present a formal research report and presentation. Opportunity will be given for students to disseminate findings of their research project. NOTE: This course is available to Honours Program students only.
Level: UG
Prerequisite(s): BIOL 4990
Attribute: SCIH (https://calendar.kpu.ca/courses-az/#courseattributestext)