BIOLOGY

Courses

BIOL 102  Fundamentals of Biology: Molecular and Cell Biology Units: 3.00
The essential biochemistry, genetics, cell biology, and metabolic pathways underlying the survival and success of all living organisms. Themes and case studies could range from the application of genetic engineering in biotechnology to the role of cellular dysregulation in inheritable diseases.
NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.
NOTE Also offered at the Bader International Study Centre, Herstmonceux. Learning Hours may vary.
LEARNING HOURS 111 (24L;6Lb;9G;12O;60P).
Requirements:
Prerequisite None. Recommended 4U Biology and Chemistry, or equivalent high school background.
Offering Faculty: Faculty of Arts and Science

BIOL 103  Fundamentals of Biology: Organisms to Ecosystems Units: 3.00
The origins and diversification of multicellular organisms, their form, function and adaptation to stress and a changing world. Themes and case studies include energy flow from molecules to ecosystems, organismal interactions including parasitism and disease dynamics, and the impacts of human activity.
NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.
NOTE Also offered at the Bader International Study Centre, Herstmonceux. Learning Hours may vary.
LEARNING HOURS 123 (36L;24Lb;24O;39P).
Requirements:
Prerequisite None. Recommended BIOL 102.
Offering Faculty: Faculty of Arts and Science

BIOL 110  Human Genetics and Evolution Units: 3.00
Introductory genetics and evolutionary processes as they relate to the human condition - genetic diseases, medical techniques, inheritance and ethical issues such as cloning and genetically modified foods.
NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.
LEARNING HOURS 118 (26L;10T;10G;36O;36P)
Requirements:
Prerequisite None. One-Way Exclusion May not be taken with or after BIOL 102; BIOL 103.
Offering Faculty: Faculty of Arts and Science

BIOL 111  Ecology and the Environment Units: 3.00
Introduces the basic concepts of ecology and shows how they relate to environmental issues such as population growth, resource management, biodiversity, agriculture, air and water pollution, energy, and climate change, and to solutions leading to a sustainable environment.
NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.
LEARNING HOURS 108 (36L;72P)
Requirements:
Prerequisite None. One-Way Exclusion May not be taken with or after BIOL 300; BIOL 302; BIOL 303.
Offering Faculty: Faculty of Arts and Science

BIOL 200  Diversity Of Life Units: 3.00
This course provides a phylogenetically based overview of biodiversity across the Tree of Life including viruses; archaea, bacteria, algae, fungi, plants, invertebrates and vertebrates. Patterns of organizational complexity and species diversity are explained in the context of evolutionary processes, structure function relationships and ecology.
NOTE Textbook and onQ course site for distributing reading material.
LEARNING HOURS 120 (36L;18T;18O;48P)
Requirements:
Prerequisite A GPA of 1.90 in (BIOL 102 and BIOL 103).
Offering Faculty: Faculty of Arts and Science

BIOL 205  Mendelian and Molecular Genetics Units: 3.00
An introduction to Mendelian and molecular genetics covering the basic mechanisms of genetic transmission, gene structure and function, as well as the application of molecular genetics in medicine and biotechnology.
LEARNING HOURS 120 (36L;18T;18O;48P).
Requirements:
Prerequisite A minimum grade of a C- in (BIOL 102 and BIOL 103).
Offering Faculty: Faculty of Arts and Science

BIOL 206  Evolutionary Genetics Units: 3.00
An introduction to the genetic mechanisms of population differentiation and evolutionary change - from molecules to species. The genetical theory of evolution is also applied to problems involving conservation, biotechnology and the evolution of disease.
NOTE Priority to BIOL concentrators will be given during course selection.
LEARNING HOURS 120 (36L;18T;18O;48P).
Requirements:
Prerequisite A minimum grade of a C- in BIOL 205.
Offering Faculty: Faculty of Arts and Science
BIOL 212  Scientific Methods in Biology  Units: 3.00  
A hands on laboratory course that establishes the fundamentals of scientific investigation and applies them to selected biological questions. Students will learn to develop hypotheses, design and execute experiments, and to analyze and present results. There will be four modules structured as: Cell, Organism, Population and Ecosystem.
NOTE Blended learning, online material and hands on activities in the lab.
NOTE QUEM Field Trip: Estimated cost $40.
LEARNING HOURS 122 (8L;66Lb;24O;24P).
Requirements: Prerequisite A GPA of 1.90 in (BIOL 102 and BIOL 103).
Offering Faculty: Faculty of Arts and Science

BIOL 243  Introduction to Statistics  Units: 3.00  
An introduction to the analysis of data from real life situations. Covers study design, descriptive and inferential statistics. Topics include probability, t-tests, regression, Chi-square tests, analysis of variance. Emphasis is in the foundation of statistical inference and practical application of statistical methods using statistical software.
LEARNING HOURS 120 (36L;12T;72P).
Requirements: Prerequisite None. Exclusion CHEE 209; COMM 162; ECON 250; GPHY 247; KNPE 251; NURS 323; POLS 285; PSYC 202; SOCY 211; STAM 200; STAT 263; STAT 367. One-Way Exclusion May not be taken with or after STAT 269.
Offering Faculty: Faculty of Arts and Science

BIOL 300  Ecology  Units: 3.00  
An exploration of the relationships between living things and their environment in an evolutionary framework. Topics include constraints, organismal ecology, population dynamics, interactions, community structure, energy and elemental flow through ecosystems, and global diversity patterns. We will collect, analyze, and interpret ecological data.
NOTE QUEM Field Trip: estimated cost $50.
LEARNING HOURS 118 (36L;21Lb;12O;16Oc;33P).
Requirements: Prerequisite BIOL 102; Recommended BIOL 206, BIOL 212, and second year statistics (e.g. BIOL 243, PSYC 202, STAT 269).
Offering Faculty: Faculty of Arts and Science

BIOL 307  Field Biology I  Units: 3.00  
Two weeks of field work plus written assignments in one or two areas of study to be done when specialized modules are available in May, July, August or February. Studies may include ecology of birds, fish, insects, small mammals, plants, tundra and taiga, lakes and caves. The schedule of offerings for each year is available in January.
NOTE Field trip: estimated cost of each module and the schedule of offerings for each year is available in January.
Requirements: Prerequisite (BIOL 102 and BIOL 103) and registration in a (BIOL Major, BIOL Science Minor/General or a BIMA, BIPS, BTEC or EBIO Specialization).
Offering Faculty: Faculty of Arts and Science

BIOL 308  Field Studies in Biology I  Units: 1.50  
One week of field work plus written assignments in one or two areas of study to be done when specialized modules are available in May, July, August or February. Studies may include ecology of birds, fish, insects, small mammals, plants, tundra and taiga, lakes and caves. The schedule of offerings for each year is available in January.
NOTE Field trip: estimated cost of each module and the schedule of offerings for each year is available in January.
Requirements: (BIOL 201 AND BIOL 202)
Offering Faculty: Faculty of Arts and Science

BIOL 315  Plants and Human Culture  Units: 3.00  
Human civilization depends on plants. We have changed them and they have changed us. This course investigates the biology and evolution of valuable economic plants, the science of plant domestication and genetic manipulation, and how our interactions with plants have altered the economy, politics, and sociology of human civilization.
LEARNING HOURS 120 (36L;24O;60P).
Requirements: Prerequisite BIOL 102 and BIOL 103. Corequisite (BIOL 200 or BIOL 201).
Offering Faculty: Faculty of Arts and Science

BIOL 316  Fisheries Biology  Units: 3.00  
An introduction to the basic principles of fisheries biology and examination of the biological foundations of current problems affecting the world's fisheries, with an emphasis on developing sound science-based strategies to resolve these problems.
LEARNING HOURS 120 (36L;84P).
Requirements: Prerequisite BIOL 103. Corequisite (BIOL 200 or BIOL 202). Equivalency BIOL 415.
Course Equivalencies: BIOL316, BIOL415
Offering Faculty: Faculty of Arts and Science
BIOL 317  Field Biology II  Units: 3.00
Two weeks of field work plus written assignments in one or
two areas of study to be done when specialized modules are
available in May, July, August or February. Studies may include
ecology of birds, fish, insects, small mammals, plants, tundra
and taiga, lakes and caves. The schedule of offerings for each
year is available in January.
NOTE Field trip: estimated cost of each module and the
schedule of offerings for each year is available in January.
Requirements: Prerequisite BIOL 307 and prior to registering
in this course students must complete the application
process, be placed in a module and complete the field work.
Equivalency BIOL 407.
Course Equivalencies: BIOL317, BIOL407
Offering Faculty: Faculty of Arts and Science

BIOL 319  Introduction to Ethnobotany  Units: 3.00
Ethnobotany is the study of the relationships that exist
between indigenous cultures and local flora. Case studies will
be presented to examine the various categories of plant use,
the importance of traditional knowledge to Western culture,
and the role of plant conservation and cultural sustainability.
NOTE Only offered online. Consult Arts and Science Online.
Requirements: Prerequisite BIOL 102 and BIOL 103.
Recommended BIOL 200 or BIOL 201.
Offering Faculty: Faculty of Arts and Science

BIOL 321  Animal Behaviour  Units: 3.00
An evolutionary approach to the study of animal behaviour.
This course explores processes and patterns in behaviour,
with emphasis on perception, communication, foraging,
spacing, reproduction and social behaviour in a variety of
animals. Methods of studying and analyzing behaviour are
explored through laboratory exercises.
NOTE Also offered online. Consult Arts and Science Online.
Learning Hours may vary.
LEARNING HOURS 132 (36L;12T;12L;12O;24Oc;36P)
RECOMMENDATION BIOL 202/3.0.
Requirements: Prerequisite None. Corequisite 6.0 units
from (BIOL 200; BIOL 201; BIOL 202; BIOL 205; BIOL 206).
Recommended BIOL 200 or BIOL 202.
Offering Faculty: Faculty of Arts and Science

BIOL 322  Environmental Physiology of Animals  Units: 3.00
A comparative examination of interaction between
animals and their environment including: physiological
adaptations to extreme environments (e.g., arctic, desert);
responses to acute and chronic environmental stress (e.g.,
hypoxia, temperature); environmental regulation of normal
physiological processes; uses of comparative models in other
fields.
LEARNING HOURS 120 (36L;24O;60P)
Requirements: Prerequisite BIOL 339.
Offering Faculty: Faculty of Arts and Science

BIOL 323  Vertebrate Diversity and Evolution  Units: 3.00
Vertebrate biodiversity including characteristics and
adaptations of the major classes of the living vertebrates;
major environmental and geological changes associated with
vertebrate evolution.
NOTE Field trip: estimated cost $35.
LEARNING HOURS 120 (36L;12Lb;72P)
Requirements: Prerequisite BIOL 206 and (BIOL 200 or BIOL
201 or BIOL 202).
Offering Faculty: Faculty of Arts and Science

BIOL 327  Field Biology III  Units: 3.00
Two weeks of field work plus written assignments in one or
two areas of study to be done when specialized modules are
available in May, July, August or February. Studies may include
ecology of birds, fish, insects, small mammals, plants, tundra
and taiga, lakes and caves. The schedule of offerings for each
year is available in January.
NOTE Field trip: estimated cost of each module and the
schedule of offerings for each year is available in January.
Requirements: (BIOL 307 and BIOL 317) and
prior to registering in this course, students must complete
the application process, be placed in a module and complete
the field work.
Offering Faculty: Faculty of Arts and Science

BIOL 330  Cell Biology  Units: 3.00
An introduction to the cellular basis of biological variation.
The course explores the control of cell function exerted by the
nucleus, the pathways for building and fuelling cells, and the
control of integrative cellular events.
NOTE Also offered online. Consult Arts and Science Online.
Learning Hours may vary.
LEARNING HOURS 120 (36L;12T;24O;48P)
Requirements: Prerequisite BIOL 205 or BCHM 218.
Offering Faculty: Faculty of Arts and Science

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BIOL 331 Analytical Genomics  Units: 3.00
This course will explore the structure of genomes and the nature and origin of gene families as well as large scale functional genomics methods for analysis of novel gene function.
LEARNING HOURS 124 (36L;12T;40O;36P)
Requirements: Prerequisite BIOL 205 or BCHM 218.
Offering Faculty: Faculty of Arts and Science

BIOL 333 Applied Biology  Units: 3.00
The course explores biological contributions to society in the fields of environmental assessment and management, materials and food production, and biotechnology. Emphasis is placed on understanding of applied processes in relevant service and production industries.
Requirements: Prerequisite BIOL 205 and (BIOL 200 or BIOL 201).
Offering Faculty: Faculty of Arts and Science

BIOL 334 Comparative Biochemistry  Units: 3.00
A survey of selected topics including: general principles of enzymology; bioenergetics; metabolism and its control; the importance of proteomic and enzyme research in functional genomics and biotechnology; mechanisms whereby animals and plants acclimate at the biochemical level to environmental stress.
LEARNING HOURS 110.4 (36L;24O;50.4P).
Requirements: Prerequisite BIOL 103 and CHEM 112 and (BIOL 205 or BCHM 218). Note Priority enrolment will be given to students registered in a BIOL Plan or who require this course for their program.
Course Equivalencies: BIOL234, BIOL334
Offering Faculty: Faculty of Arts and Science

BIOL 335 Limnology and Aquatic Ecology  Units: 3.00
Physics, chemistry and biology of freshwater lakes. Emphasis on: morphometry; light and temperature; water chemistry in relation to nutrients; physiological requirements; composition and interaction of algal and invertebrate populations; eutrophication; pollution; environmental change.
NOTE QUBS Field trip: estimated cost $45.
LEARNING HOURS 113 (36L;18Lb;8Oc;51P).
Requirements: Prerequisite CHEM 112. Recommended BIOL 200 or BIOL 201 or BIOL 202.
Offering Faculty: Faculty of Arts and Science

BIOL 338 Marine Biology  Units: 3.00
Introduction to life in the World's oceans and seas from a global, ecological, and evolutionary perspective. Study of marine habitats, food webs, biodiversity, ecological processes, functional biology, adaptations of marine organisms, and human impacts on marine life (fisheries and environmental impacts).
NOTE Only offered at the Bader International Study Centre, Herstmonceux. Learning hours include four days of fieldwork.
LEARNING HOURS 116 (18L;24Lb;12T;12O;32Oc;18P).
Requirements: Prerequisite BIOL 103. Exclusion ENSC 307; GEOL 200.
Offering Faculty: Faculty of Arts and Science

BIOL 339 Animal Physiology  Units: 3.00
Focus is placed on adaptive physiology and integrative function (nervous and hormonal, movement, excretion, circulation and digestion) with examples selected from various phylogenetic levels as appropriate.
LEARNING HOURS 120 (36L;18O;66P)
Requirements: Prerequisite BIOL 205 or BCHM 218.
Offering Faculty: Faculty of Arts and Science

BIOL 341 Plant Physiology  Units: 3.00
The course examines various aspects of plant cell biology, physiology, and biochemistry including carbon and nitrogen metabolism (photosynthesis, respiration, etc.), water relations, mineral nutrition, response to environmental stress, roles of plant hormones, plant biotechnology.
LEARNING HOURS 115 (36L;10G;15O;54P)
Requirements: Prerequisite BIOL 205 or BCHM 218.
Offering Faculty: Faculty of Arts and Science

BIOL 343 Data Analysis for Biologists  Units: 3.00
Advanced topics in using R for data management, exploratory data analysis, data visualization, and statistical analysis using the general linear model, with particular focus on statistical literacy and biological examples from both laboratory and field research.
LEARNING HOURS 120 (36L;12T;12O;60P)
Requirements: Prerequisite BIOL 243 or PSYC 202 or STAT 269.
Offering Faculty: Faculty of Arts and Science

BIOL 350 Evolution and Human Affairs  Units: 3.00
An exploration of how evolutionary thinking can affect our understanding of our lives, our species, and our ability to share the planet with other species.
NOTE Also offered online. Consult Arts and Science Online. Learning Hours may vary.
LEARNING HOURS 120 (36L;24O;60P)
Requirements: Prerequisite Level 3 or above.
Offering Faculty: Faculty of Arts and Science
BIOL 360 Biotechnology and Society Units: 3.00
The contributions and effects of biotechnology on humanity will be explored from the perspective of their impacts on society including moral and ethical issues. Biotechnological contributions to society to be explored will include those in medicine, industry, and agriculture.
LEARNING HOURS 120 (36L;12T;72P)
Requirements: Prerequisite BIOL 205 or BCHM 218.
Offering Faculty: Faculty of Arts and Science

BIOL 369 Sex and Evolution Units: 3.00
Why sex? The evolutionary origins and consequences of sex and sexual reproduction. Topics include costs and benefits of sexual reproduction, the evolution and coevolution of sexes, gametes and genitalia, mating systems, gender differences and sex determination throughout the biotic world.
LEARNING HOURS 122 (36L;8T;18O;60P)
Recommendation BIOL 206.
Requirements: Prerequisite (BIOL 102 and BIOL 103) and 3.0 units from (BCHM 218; BIOL 200; BIOL 201; BIOL 202; BIOL 205 or BIOL 206). Recommended BIOL 206.
Course Equivalencies: BIOL210; BIOL369
Offering Faculty: Faculty of Arts and Science

BIOL 401 Experimental Approaches to Animal Physiology Units: 3.00
Laboratory-based course emphasizing experimental approaches to understanding the principles of animal physiology covered in BIOL 339.
LEARNING HOURS 108 (36L;12T;60P).
Requirements: Prerequisite BIOL 339 and a minimum GPA of 2.0 in the Biological Foundations List.
Course Equivalencies: BIOL340; BIOL401
Offering Faculty: Faculty of Arts and Science

BIOL 402 Experiments in Plant Physiology Units: 3.00
Laboratory-based course emphasizing experimental approaches to understanding the principles of plant physiology covered in BIOL 341/3.0.
LEARNING HOURS 114 (36Lb;24T;60;48P)
Requirements: Prerequisite A minimum GPA of 2.0 in the Biological Foundations List. Corequisite BIOL 341.
Course Equivalencies: BIOL342; BIOL402
Offering Faculty: Faculty of Arts and Science

BIOL 403 Experimental Techniques in Biology Units: 3.00
Self-directed and self-selected hands-on experimental techniques used in fundamental biology research, biotechnologies, and medical sciences.
LEARNING HOURS 120 (36L;12T;72Oc)
Requirements: Prerequisite BIOL 205 and a minimum GPA of 2.0 in the Biological Foundations List.
Course Equivalencies: BIOL325;BIOL403
Offering Faculty: Faculty of Arts and Science

BIOL 404 Techniques in Molecular Biology Units: 3.00
Intensive laboratory work (8h/day) to be carried out over two and a half weeks in May. Practical work includes DNA isolations, DNA cloning, PCR, production of proteins, biochemical and immunological analysis of proteins.
NOTE Priority to students registered in BIOL Major and Specialization degree Plans. See course website for details.
LEARNING HOURS 112.5 (100Lb;12.5P)
Requirements: Prerequisite (BCHM 218 or BIOL 330) and a minimum GPA of 2.0 in the Biological Foundations List.
Course Equivalencies: BIOL304, BIOL404
Offering Faculty: Faculty of Arts and Science

BIOL 409 Bioremediation Units: 3.00
The use of living organisms to address environmental problems. Topics include mechanisms of contaminant extraction, absorption, concentration, and degradation using bacteria and plants to detoxify organic compounds, sequester heavy metals or clean up excess nutrients.
NOTE Field trip: estimated cost $40.
Recommendation BIOL 330 and a minimum GPA of 2.0 in the Biological Foundations List. Recommended BIOL 322 or BIOL 341 or BIOL 339.
Offering Faculty: Faculty of Arts and Science

BIOL 410 Ecology of Lakes and Streams Units: 3.00
An in-depth look at the ecology and evolution of freshwater aquatic ecosystems, considering the role of populations, interspecific interactions, and the flow of energy and matter. There will be an emphasis on linking ecological theory with empirical evidence from aquatic systems. Topics will include dispersal and colonization, ecological genetics, resource competition, predator-prey interaction, evolution of life-history strategies, habitat coupling, and biogeochemical cycling.
LEARNING HOURS 120 (24L;12S;84P)
Recommendation BIOL 335.
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL 303) and a minimum GPA of 2.0 in the Biological Foundations List. Recommended BIOL 335.
Offering Faculty: Faculty of Arts and Science
BIOL 411  Global Change Biology  Units: 3.00
This course focuses on the fundamental biology underlying
the major global change issues that humanity currently
faces. Strong emphasis will be placed on the critical
interconnections among issues across hierarchical levels
from molecule to biosphere that explain the patterns and
mechanisms which have led to our current environmental
dilemma.
LEARNING HOURS 117 (24L; 18T; 12G; 30c; 36P)
Requirements: Prerequisite BIOL 300 and a minimum GPA of
2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 416  Terrestrial Ecosystems  Units: 3.00
Principles of terrestrial ecosystem ecology: soils; plant-soil
interactions; energy and water balance; carbon and nutrient
cycling; species effects; landscape-level and whole earth
biogeochemistry; global change.
NOTE  Overnight field trip: cost $75.
LEARNING HOURS 124 (12L; 24S; 18Lb; 12G; 12O; 16Oc; 18P)
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL
303 or GPHY 317) and a minimum GPA of 2.0 in the Biological
Foundations List. One-Way Exclusion May not be taken with
or after BIOL 510.
Offering Faculty: Faculty of Arts and Science

BIOL 418  Fisheries Techniques  Units: 3.00
This course will introduce students to many "hands-on"
techniques currently used in fisheries. This will include fish
identification, different capture techniques for fisheries
assessment, bioacoustics, environmental monitoring,
techniques for ageing fish, diet analysis, fish tracking
(biotelemetry approaches), and data management.
LEARNING HOURS 120 (30Lb; 10T; 40G; 40P)
Requirements: Prerequisite BIOL 316/3.0 and a minimum GPA of
2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 422  Conservation Biology  Units: 3.00
The application of biological research to the conservation of
biodiversity and natural resources, as well as the interaction
of biology with philosophy, politics and economics in
influencing conservation policy.
NOTE  A course fee to cover guest speakers and field trips of
not more than $40.
LEARNING HOURS 108 (36L; 36T; 36P)
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL
303) and a minimum GPA of 2.0 in the Biological Foundations
List. Exclusion ENSC 320.
Offering Faculty: Faculty of Arts and Science

BIOL 423  Modern Insect Science  Units: 3.00
An exploration into the world of insects, one of the most
abundantly successful group of organisms on the earth.
NOTE  An overnight field trip is estimated to cost $65; a
limited number of bursaries may be available for exceptional
circumstances; contact the instructor early in the previous
term.
RECOMMENDATION BIOL 330/3.0 or MBIO 218/3.0
Requirements: Prerequisite BIOL 205 and a minimum GPA of
2.0 in the Biological Foundations List. One-Way Exclusion May
not be taken with or after BIOL 507. Recommended BIOL 330
or BCHM 218.
Offering Faculty: Faculty of Arts and Science

BIOL 430  Molecular Genetics of Development  Units: 3.00
The use of genetic analysis to understand developmental
processes such as cell fate determination, pattern formation
and morphogenesis. Emphasis will be on the molecular
pathways used during embryonic development, highlighting
applications and techniques using model organisms.
LEARNING HOURS 126 (36L; 18S; 24G; 12O; 12I; 24P)
Requirements: Prerequisite (BCHM 218 or BIOL 330) and a
minimum GPA of 2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 431  Cellular Basis of Adaptation  Units: 3.00
The cellular origins of diversity in physiological processes,
with consideration of the role of evolutionary, developmental
and molecular mechanisms.
LEARNING HOURS 108 (6L; 30S; 8T; 4G; 60P)
Requirements: Prerequisite (BCHM 218 or BIOL 330) and
(BIOL 334 or BIOL 339 or BIOL 341) and a minimum GPA of
2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 432  Computation and Big Data in Biology  Units: 3.00
Application of basic coding and analytical methods to obtain,
organize, analyze, visualize, and interpret information from
large, complex datasets (i.e. 'Big Data') in biology. Datasets
may include climate/weather records, 'omics' data, specimen
collections, long-term observational studies, journal articles,
and other historical and online sources.
LEARNING HOURS 120 (36L; 12T; 72P)
Requirements: Prerequisite BIOL 343 and a minimum GPA of
2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

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BIOL 433  History and Philosophy of Biology  Units: 3.00
An examination of the foundations of evolution, classification and other selected topics from historical, philosophical and scientific perspectives.
LEARNING HOURS 120 (36L;24T;60P)
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL 303) and a minimum GPA of 2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 439  Natural Selection and Microevolution  Units: 3.00
The mechanisms of evolutionary change - from genes to societies. How natural selection interacts with genetic and population processes to make organisms adapted to their environment and to create biological diversity.
LEARNING HOURS 120 (36L;6S;18Lb;60P)
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL 303) and a minimum GPA of 2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 440  Speciation and Macroevolution  Units: 3.00
An exploration of higher-level processes in evolution spanning considerations of mechanisms of speciation, extinction, adaptive radiation, and phylogenetics.
LEARNING HOURS 120 (24L;24T;60G;12O)
Requirements: Prerequisite (BIOL 300 or BIOL 302 or BIOL 303) and a minimum GPA of 2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 441  Molecular Genetics  Units: 3.00
Research in eukaryotic molecular genetics with an emphasis on epigenetics. Epigenetic phenomena will be examined in a range of models from single-celled organisms to metazoans, with student discussions on topics as diverse as bioethics, disease controls, and eugenics.
LEARNING HOURS 125 (30L;8S;12Lb;10G;65P)
Requirements: Prerequisite (BIOL 330 or BCHM 218) and a minimum GPA of 2.0 in the Biological Foundations List. Exclusion PATH 425.
Offering Faculty: Faculty of Arts and Science

BIOL 442  Evolutionary Medicine  Units: 3.00
An exploration of human disease, illness, and injury, and the symptoms and treatments of medical conditions, with an evolutionary framework.
LEARNING HOURS 120 (24L;20T;10O;66P)
Requirements: Prerequisite BIOL 206 and a minimum GPA of 2.0 in the Biological Foundations List. Equivalency BIOL 522.
Course Equivalencies: BIOL442; BIOL522
Offering Faculty: Faculty of Arts and Science

BIOL 444  Neuroethology  Units: 3.00
The current status of research in the study of the neural control of the natural behaviour of animals. Topics include the detection and coding of information in the environment, the integration of this information in the process of decision-making, the generation of the motor patterns that underlie behaviour, and general constraints on form and function of neural circuits.
LEARNING HOURS 126 (36L;18T;24O;48P).
Requirements: Prerequisite (BIOL 339 or [PHGY 215 and PHGY 216] or PHGY 214) and a minimum GPA of 2.0 in the Biological Foundations List.
Offering Faculty: Faculty of Arts and Science

BIOL 501  Recent Research in Molecular  Units: 3.00
This course will focus on how molecular biology is used in basic and medical research to dissect the mechanisms involved in a large variety of biological problems. Students in the course will explore molecular literature and techniques that are relevant to their interest through seminar presentations, writing critiques, scientific reviews.
LEARNING HOURS 120 (36S;84P)
RECOMMENDATION BIOL 430/3.0.
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department. Recommended BIOL 430.
Offering Faculty: Faculty of Arts and Science

BIOL 502  Plant Cell Responses to Environmental Stress  Units: 3.00
This course will dissect signal transduction pathways and molecular responses in plants exposed to environmental stresses such as pathogen infection, drought, or temperature fluctuations. Emphasis is on understanding techniques used to investigate changes in gene expression, protein-protein interactions, sub-cellular localization, as well as the analysis of mutant and transgenic plant lines.
LEARNING HOURS 120 (36S;84P)
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and (BIOL 330 or BIOL 334 or BIOL 341 or BIOL 430) or permission of the Department.
Offering Faculty: Faculty of Arts and Science
BIOL 503 Plant Biotechnology Units: 3.00
This is an experiential course on the business of science and the steps leading to the commercialization of an agrobiotech product. Students will go through a series of workshops to develop their own ideas into a commercially valuable product, plus an assessment of all related social and economic issues using business-oriented exercises.
LEARNING HOURS 120 (15L;9S;24G;72P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and (BIOL 205 or BCHM 218] and BIOL 341) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

BIOL 504 Extremophiles Units: 3.00
The course explores biology of extraordinary organisms that flourish under conditions of stress and how more ordinary organisms deal with periodically unfavourable circumstances. Emphasis is placed on understanding of the relevant adaptations and processes involved.
NOTE No textbook is required. The course website will be used to provide lecture notes and assigned readings from scientific books, journals and selected websites.
LEARNING HOURS 116 (30L;2S;12G;12O;60P)
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and (BIOL 339 or BCHM 315 and BCHM 316) or BCHM 310) or permission of the Department.
Offering Faculty: Faculty of Arts and Science

BIOL 505 Cell Signaling in Development and Disease Units: 3.00
Organisms arise from a single cell into functional tissues, patterns, and structures by orchestrating cell behaviors, such as cell divisions, cell differentiation, pattern formations, cell shape changes and cell movements. This course will focus on the genetic and molecular analyses of how these cell behaviors occur.
NOTE No textbook is required. The course website will be used to provide lecture notes and assigned readings from scientific books, journals and selected websites.
LEARNING HOURS 120 (24L;12S;12I;24O;48P)
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and BIOL 330 or permission of Department. Exclusion BIOL 535.
Offering Faculty: Faculty of Arts and Science

BIOL 506 Biochemical Adaptations to Life Under Extreme Conditions Units: 3.00
Biochemical adaptation is a fundamental aspect of biological diversity because it integrates molecular structure, with metabolic function and control. The course evaluates the mechanisms whereby animals, plants, and microbes acclimate at the biochemical level to 'extreme' environmental conditions such as temperature stress, high pressure, hypoxia, salt stress, oxidative stress, and desiccation.
LEARNING HOURS 120 (36S;84P)
RECOMMENDATION (BIOL 301/3.0 or BIOL 341/3.0) and BIOL 322/3.0.
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and [BIOL 334 or (BCHM 315 and BCHM 316) or BCHM 310] or permission of the Department.
Offering Faculty: Faculty of Arts and Science

BIOL 507 Biotechnology Units: 3.00
This course covers the ethical, societal and environmental impacts of biotechnology. There will be critical analysis of public policy and the value of biotechnologies to science and the public. Topics will likely include synthetic biology, human cloning, xenotransplants, stem cells, nanomaterials, marine biotechnology, eugenics, patenting, GMOs and the release of biotech products to the environment.
LEARNING HOURS 120 (36S;84P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department. One-Way Exclusion May not be taken with or after BIOL 441.
Offering Faculty: Faculty of Arts and Science

BIOL 508 Biology of the Cell Cycle Units: 3.00
Cell proliferation underlies development and tissue renewal and is implicated in many diseases. Our universal model of eukaryotic cell cycle control is based on studies in a number of model systems. The course will focus on control mechanisms, deriving information from systems as diverse as yeast and human cells.
LEARNING HOURS 120 (36S;84P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and (BIOL 330 or BCHM 218) or permission of the Department.
Offering Faculty: Faculty of Arts and Science
BIOL 509  Limnological Environmental Studies  Units: 3.00
This course will explore ecological and evolutionary aspects of species invasions, with an emphasis on aquatic invaders. Course discussions will include such topics as invasive species and factors that influence their arrival, establishment, and spread, as well as management strategies that can be employed to reduce the arrival, establishment, and spread of invasive species.
LEARNING HOURS 120 (9L;9S;18G;84P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department. Recommended BIOL 335.
Offering Faculty: Faculty of Arts and Science

BIOL 510  The Biology of Sustainability  Units: 3.00
This ecology course will identify and critique potential mechanisms by which our civilization could most effectively move toward more sustainable living. The topic incorporates many fundamental aspects of biology, and each course iteration may include biogeochemical, ecological, economic, social, genetic, philosophical, and behavioural components.
LEARNING HOURS 120 (36S;12T;12G;36I;12O;12P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department. Recommended BIOL 300 or (BIOL 302 and 303).
Offering Faculty: Faculty of Arts and Science

BIOL 515  Aquaculture  Units: 3.00
This course will examine the influence of biotic and/or abiotic factors in aquaculture industries around the globe. We will explore the application of different biotechnologies in fishery industries and assess the potential impacts of various types of aquaculture practices on the environment and our fundamental socio-economic values.
LEARNING HOURS 120 (9L;9S;18G;84P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department.
Offering Faculty: Faculty of Arts and Science

BIOL 527  Paleolimnology and Global Environmental Change  Units: 3.00
This course is mainly to provide students with a background in studies of long-term environmental change, with a focus on research that is especially relevant to today's environmental problems. Key topics include: climatic change, lake pollution, atmospheric deposition of contaminants and related topics.
LEARNING HOURS 132 (21L;15S;96P)  RECOMMENDATION BIOL 335/3.0.
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department. Recommended BIOL 335.
Offering Faculty: Faculty of Arts and Science

BIOL 530  Origins of Biodiversity  Units: 3.00
This course uses the latitudinal increase in diversity towards the equator as a launching point to explore how diversity forms, is maintained, and disappears, and why we find such dramatic variation in diversity around the world. Discussions will focus on both evolutionary and ecological perspectives of diversity, and we will review various hypotheses to explain latitudinal diversity gradients.
LEARNING HOURS 120 (9L;9S;18G;84P)  RECOMMENDATION BIOL 201/3.0 and BIOL 202/3.0 and (BIOL 302/3.0 or BIOL 303/3.0).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List or permission of the Department.
Offering Faculty: Faculty of Arts and Science

BIOL 535  Selected Topics in Biology  Units: 3.00
Topics vary from year to year. Please consult the Department of Biology website for more information.
LEARNING HOURS 120 (9L;9S;18G;84P).
Requirements: Prerequisite Level 4 or above and registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, BTEC-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and permission of the Department.
Offering Faculty: Faculty of Arts and Science
BIOL 537 Research in Biology Units: 12.00
Individual research projects under the supervision of a staff member; reported in the form of a thesis, poster and seminar.
NOTE In the spring preceding fourth year, students must select projects in consultation with potential supervisors. Registration is subject to availability of a supervisor. Work on the project during summer is advantageous if field studies are required. See also the statement on BIOL 501/3.0-BIOL 536/3.0 in the BIOL Department Information, preliminary information section.
LEARNING HOURS 444 (8L;36S;300Pc;100O)
Requirements: Prerequisite Admission to the final year of a BSCH program in Biology and a minimum GPA of 2.0 in the Biological Foundations List and permission of the project supervisor and course coordinator. Exclusion BIOL 541.
Offering Faculty: Faculty of Arts and Science

BIOL 538 Research Mentorship in Biology I Units: 3.00
Research practicum under the supervision of a Biology faculty member. The course will involve a combination of research in the host laboratory, attendance of BIOL 537 or other seminars in the Department, and literature research to present as a major paper and seminar.
NOTE Students will normally be enrolled in the fourth year of their Program, having completed the third year core requirements of their Plan.
Requirements: Prerequisite Registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and permission of the Department. One-Way Exclusion Not to be taken concurrently with BIOL 537.
Course Equivalencies: BIOL540; BIOL540B
Offering Faculty: Faculty of Arts and Science

BIOL 539 Research Mentorship in Biology II Units: 3.00
Research practicum under the supervision of a Biology faculty member. The course will involve a combination of research in the host laboratory, attendance of BIOL 537 or other seminars in the Department, and literature research to present as a major paper and seminar.
NOTE Students will normally be enrolled in the fourth year of their Program, having completed the third year core requirements of their Plan.
Requirements: Prerequisite Registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and permission of the Department. Corequisite BIOL 538. One-Way Exclusion Not to be taken concurrently with BIOL 537.
Offering Faculty: Faculty of Arts and Science

BIOL 540 Research Mentorship in Biology Units: 6.00
Research practicum under the supervision of a Biology faculty member. The course will involve a combination of research in the host laboratory, attendance of BIOL 537 or other seminars in the Department, and literature research to present as a major paper and seminar.
NOTE Students will normally be enrolled in the fourth year of their Program, having completed the third year core requirements of their Plan.
Requirements: Prerequisite Registration in a Biology Honours Plan (BIOL-M-BSH, BIOL-P-BSH, BIMA-P-BSH, BIPS-P-BSH, EBIO-P-BSH) and a minimum GPA of 2.0 in the Biological Foundations List and permission of the Department. One-Way Exclusion Not to be taken concurrently with BIOL 537.
Offering Faculty: Faculty of Arts and Science

BIOL 541 Research in Biotechnology Units: 12.00
Individual research projects under the supervision of a staff member; reported in the form of a thesis, poster, and seminar.
NOTE Students must select projects in consultation with potential supervisors a minimum of one full term in advance of starting the course.
LEARNING HOURS 446 (8L;18S;360Pc;60P)
Requirements: Prerequisite Admission to the final year of a BSCH program in Biology and a minimum GPA of 2.0 in the Biological Foundations List and permission of the project supervisor and course coordinator. Exclusion BIOL 537.
Offering Faculty: Faculty of Arts and Science

BIOL 594 Independent Study Units: 3.00
Offering Faculty: Faculty of Arts and Science

BIOL 595 Independent Study Units: 6.00
Offering Faculty: Faculty of Arts and Science

BIOL 596 Independent Study Units: 12.00
Offering Faculty: Faculty of Arts and Science

BIOL 597 Independent Study Units: 18.00
Offering Faculty: Faculty of Arts and Science

BIOL 598 Independent Study Units: 9.00
Offering Faculty: Faculty of Arts and Science