Biological Sciences

Faculty

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Program Overview

The Biology programs educate students about diverse aspects of living organisms, ranging from microbes to human populations to complex ecosystems. Many of our graduates go on to graduate and professional studies in medicine, dentistry, veterinary medicine, the allied health sciences, forestry, wildlife biology, microbiology or biotechnology. A degree in biology also prepares students for direct employment in the biotechnology sector, environmental biology, or some allied health fields.

The Biology program's best attribute is its teachers. Our faculty members are dedicated to undergraduate teaching and enjoy helping students develop their knowledge and skills both in and out of the classroom.

The Department of Biological Sciences is well equipped for study and student research in zoology, botany, physiology, molecular biology and ecology. Students receive extensive instruction and hands-on experience in our modern laboratory facilities, and are encouraged in every way to develop their capacities for independent work. Bishop's University is located near a variety of habitats including bogs, lakes, rivers, mountains, marshes, hardwood forests and meadows. This variety means students can be hiking during one lab and canoeing the next. The rural setting of Bishop's combines the features of a biological field station with those of a well-equipped biology department, providing exceptional opportunities for field study and research in ecology and environmental biology. Those students interested in molecular biology and health sciences will benefit from the proximity of the Université de Sherbrooke. This French-language university provides an active nucleus of researchers in physiology, immunology, nuclear medicine, and microbiology. An ongoing collaboration between the Université de Sherbrooke and Bishop's provides our students (including unilingual Anglophones) with access to these researchers and their laboratories.

The Biology department offers both Bachelors of Science (B.Sc.) and Bachelors of Arts (B.A.) degrees. Students in either degree program choose between two concentrations: Health Science or Biodiversity and Ecology. Health Science is the best concentration for students interested in medical research, clinical medicine, or the allied health sciences (such as nursing or physiotherapy). Students interested in wildlife biology, plant science, and environmental biology choose the Biodiversity and Ecology concentration. Please note that the courses to be taken within each program are outlined in the nearby tables.

Please refer to the Natural Sciences Division page for information on ***Divisional Requirements***.

Programs

All Biology programs include core Biology courses, courses related to the chosen concentration, and, in the case of B.Sc. programs, basic science courses. All Bachelor degrees require 120 credits; thus, each student takes elective courses in addition to those required for their specific program.

B.Sc. Biology Major (90 credits) MAJBIO

The B.Sc. programs are the best choice for students with a strong grounding in the core sciences (math, physics, and chemistry). Students graduating with a B.Sc. will be ready to enter graduate studies (M.Sc. or Ph.D) or professional schools (e.g. medicine, dentistry, physiotherapy, or veterinary medicine). See the nearby tables for the complete list of courses.

B.Sc. Biology Honours (102 credits) HONBIO

Highly motivated students may choose to pursue an honours degree, which requires additional Biology courses and thus fewer electives (see nearby tables). To qualify, students must: (1) maintain a cumulative average of at least 75%; (2) receive a mark lower than 75% in no more than four credits (1 lecture and 1 laboratory course) in any 300 or 400-level Biology or Biochemistry course; and (3) obtain a mark of 75% or higher in each BIO 492 and BIO 493.

B.A. Biology Major (54 credits) MAJBIO

The B.A. Biology program is designed for students lacking a strong science background. This program has fewer required courses than the B.Sc. programs, so students may be able to complete the requirements of a second major within their 120-credit degree. It is thus ideal for students interested in pursuing a double major (such as Biology and Psychology, or Biology and Political Science), and provides a solid grounding in the biological sciences. The B.A. Biology degree provides adequate preparation for some, but not all, professional and graduate programs. Students are advised to consult officials of the specific post-graduate institution of interest.

Please see the nearby Tables for the complete list of courses required to complete this major.

Pre-Medicine Double Major MAJMED

Many of our students enrolled in the biology program are interested in going to medical school, and the BSc Biology (Health Sciences) program includes common prerequisites for application to medical schools in both Canada and the US. However, students should be aware that the entrance requirements can vary greatly between medical schools, and often change from year to year, therefore we recommend that students decide on which schools they are hoping to go to and then research what are the particular requirements of that school (the faculty can help you with this search). For those students unsure of where they would like to go and wishing to cover as wide a set of potential requirements as possible, BU also offers an inter-disciplinary Pre-Medicine double major, which specifically addresses these concerns. See the ***Pre-Medicine Double Major*** section for more details on how this program can be combined with a B.Sc. or B.A. Biology.

Biology Minor (24 credits) MINBIO

The biology minor consists of eight introductory courses in different areas of Biology. As illustrated in Table 2, seven of these courses are required and one is optional. This minor allows students majoring in a different field to obtain a perspective on modern biology.

Table 1: The Health Science Concentration

B.Sc. Biology (Health Sciences)*

1. Y1 Year
(All non-Quebec students; 30 cr)
BIO 196 Introduction to Cell & Molecular Biology
CHM 191 General Chemistry I
CHM 192 General Chemistry II
PHY 193 Physics for the Life Sciences I
PHY 194 Physics for the Life Sciences II
MAT 198 Calculus I for Life Sciences
MAT 199 Calculus II for Life Sciences
ENG 116 Effective Writing (or other ENG)
Humanities option (CLA, ENG, HIS, REL, PHI or Lib. Arts)
Free elective: students may take any free elective or they may want to consider taking either *BIO 207 Introduction to Evolution and Ecology or BIO233 Human Anatomy*. Students who did not do well in BIO 196 should not take the above courses until their second year when they are better prepared.

2. Required Core Courses (21 cr)
BIO 201 Cellular and Molecular Biology
BIO 205 Diversity of Life 1
BIO 206 Diversity of Life 2
BIO 208 Genetics
BIO 336 Animal Physiology 1
CHM 111 Organic Chemistry
PHY 101 Statistical Methods

3. Required Concentration Courses (15 cr)
BCH 313 Metabolism
BIO 337 Animal Physiology 2
BIO 352 Microbiology
OR BCH 383 Molecular Biology
BCH 210 General Biochemistry
PSY 101 Introductory Psychology

4. Concentration Options (21 cr)
Select any 7 courses from the far right column. At least 5 of these courses must be from Biology and at least one of these 7 courses must be either BIO 394 Biology and Cancer, BIO 411 Health Science Seminar, or BIO 428 Advanced Physiology.

5. Science Options (6 cr)
Select any 2 courses from the Division of Natural Sciences and Mathematics (including Biology). All courses must be eligible for science credit by science students (see individual course descriptions). For students interested in medicine, *PHY 206 Waves and Optics* and *CHM 211 Organic Chemistry II* may be good choices as they are pre-requisites for some medical schools.

6. Free Options (27 cr)
Choose 9 courses from any division to complete your 120-credit degree. These electives can be used to fulfill the requirements for a minor from a different department.

B.Sc. Biology Honours (Health Sciences)
In addition to requirements 1-5 above, students in the honours program must add the following 4 courses and reduce the free options by 12 credits (4 courses).
BIO 492 Honours Thesis I
BIO 493 Honours Thesis II
BIO 386 Scientific Writing
BIO 311 Quantitative Methods in Biology

B.A. Biology (Health Sciences)*

1. Y1 Year
(All non-Quebec students; 30 cr)
BIO 196 Introduction to Cell & Molecular Biology
ENG 116 Effective Writing (or other ENG)
Humanities option (CLA, ENG, HIS, REL, PHI or Lib. Arts)
7 free options

2. Required Core Courses (15 cr)
BIO 201 Cellular & Molecular Biology
BIO 205 Diversity of Life 1
BIO 206 Diversity of Life 2
BIO 208 Genetics
PHY 101 Statistical Methods

3. Required Concentration Courses (12 cr)
BIO 233 Human Anatomy
PSY 101 Introductory Psychology
BIO336 Animal Physiology 1
BIO 337 Animal Physiology 2

4. Concentration Options (18 cr)
Select any 6 courses from the far right column, a minimum of 5 must be from Biology

5. Free Options (45 cr)
Choose 15 courses from any division to complete your 120-credit degree. Consider using these free options (along with the Y1 options, if applicable) to fulfill requirements for a second major.

Health Sciences Concentration Options*

BIO 207 Introduction to Evolution and Ecology
BIO 311 Quantitative Methods in Biology
BIO 315 Frontiers of Biology, From Past to Present
BIO 320 Programmed Cell Death
BIO 340 Comparative Anatomy
BIO 341 Population Genetics and Evolution
BIO 349 Medical and Forensic Entomology
BIO 359 Human Genetics
BIO 365 Developmental Biology
BIO 391 Experiential Learning in Health Sciences and Biochemistry
BIO 394 Biology of Cancer
BIO 411 Seminar in Health Sciences
BIO 428 Advanced Physiology
BIO 433 Advanced Exercise Phys
BCH 210 General Biochemistry
BCH 311 Proteins
BCH 312 Lipids and Membranes
BCH 381 Immunology
BCH 382 Environmental Biochemistry and Toxicology
BCH 383 Molecular Biology
BCH 422 Biotechnology
CHM 141 Analytical Chemistry
CHM 211 Organic Chemistry II
EXS 231 Nutrition for Sports and Exercise
EXS 317 Biomechanics of Human Movement
PBI 275 Health Psychology 1
PBI 288 Brain and Behavior 1
PBI 379 Neuropsychology
PBI 380 Psychopharmacology
PSY 213 Research Methods
PMA 360 Advanced Psychological Statistics

**Please note that many courses have associated labs, featuring the same course number and the BIL code, as indicated in the individual course descriptions. Lab credits do not count towards the total credit requirements of the program. The associated (co-requisite) lab must be completed to receive credit for the course.*

Table 2: The Biodiversity and Ecology Concentration

B.Sc. Biology
(Biodiversity and Ecology)*

1. Y1 Year
(All non-Quebec students; 30 cr)
BIO196 Intro. to Cell & Molecular Biology
CHM 191 General Chemistry I
CHM 192 General Chemistry II
PHY 193 Physics for the Life Sciences I
PHY 194 Physics for the Life Sciences II
MAT 198 Calculus I for Life Sciences
MAT 199 Calculus II for Life Sciences
ENG 116 Effective Writing (or other ENG)
Humanities option (CLA, ENG, HIS,REL, PHI or Lib. Arts)
Free elective: students may take any free elective or, they may want to consider taking *BIO 207 Introduction to Evolution and Ecology*. Students who did not do well in BIO 196 should not take the above course until their second year when they are better prepared.

2. Required Core Courses (21 cr)
BIO 201 Cellular and Molecular Biology
BIO 205 Diversity of Life 1
BIO 206 Diversity of Life 2
BIO 208 Genetics
BIO 336 Animal Physiology 1
CHM 111 Organic Chemistry
PHY 101 Statistical Methods

3. Required Concentration Courses (15 cr)
BIO 207 Intro. to Evolution and Ecology
BIO 327 Advanced Ecology
BIO 338 Vertebrate Life 1 or BIO 339: Vertebrate Life 2
BIO 329 Invertebrate Biology
ESG127 Introduction to Physical Geography

4. Concentration Options (21 cr)
Select any 7 courses from the far right column, including a maximum of 2 non-BIO courses.

5. Science Options (6 cr)
Select any 2 courses from the Division of Natural Sciences and Mathematics (including Biology). All courses must be eligible for Science credit by science students (see individual course descriptions). Students wishing to continue to graduate school may want to consider taking MAT 209 Linear Algebra, or MAT 310 Ordinary Differential Equations, as these will better prepare them for more advanced statistical courses later in their careers.

6. Free Options (27 cr)
Choose 9 courses from any division to complete your 120-credit degree. These electives can be used to fulfill the requirements for a minor from a different department.

B.Sc. Biology Honours (Biodiversity and Ecology)
In addition to requirements 1-5 above, add the following courses and reduce the free options by 12 cr (4 courses).
BIO 492 Honours Thesis I
BIO 493 Honours Thesis 2
BIO 386 Scientific Writing
BIO 311 Quantitative Methods in Biology

B.A. Biology
(Biodiversity and Ecology)*

1. Y1 Year
(All non-Quebec students; 30 cr)
BIO 196 Introduction to Cell & Molecular Biology
ENG 116 Effective Writing (or other ENG)
Humanities option (CLA, ENG, HIS, REL, PHI or Lib. Arts)
7 free options

2. Required Core Courses (15 cr)
BIO 201 Cellular & molecular Biology
BIO 205 Diversity of Life 1
BIO 206 Diversity of Life 2
BIO 208 Genetics
PHY 101 Statistical Methods

3. Required Concentration Courses (12 cr)
BIO 207 Intro. to Evolution and Ecology
BIO 338 Vertebrate Life 1 or BIO 339 Vertebrate Life 2
BIO 329 Invertebrate Biology
ESG 127 Introduction to Physical Geography

4. Concentration Options (18 cr)
Select any 6 courses from the far right column, a minimum of 5 must be from Biology.

5. Free Options (45 cr)
Choose 15 courses from any division to complete your 120-credit degree. Consider using these free options (along with the Y1 options, if applicable) to fulfill requirements for a second major.

Biodiversity and Ecology Concentration Options
BIO 311 Quantitative Methods in Biology
BIO 315 Frontiers of Biology, From Past to Present
BIO 327 Advanced Ecology
BIO 329 Invertebrate Biology
BIO 331 Freshwater Biology
BIO 332 Vertebrate Zoology
BIO 337 Animal Physiology 2
BIO 341 Population Genetics and Evolution
BIO 334 Epidemiology
BIO 338 Vertebrate Life 1
BIO 339 Vertebrate Life 2
BIO 340 Comparative Anatomy
BIO 349 Medical and Forensic Entomology
BIO 352 Microbiology
BIO 354 Insect Biodiversity
BIO 358 Animal Behaviour
BIO 386 Science Writing
BIO 392 Experiential Learning in Biodiversity & Ecology
BIO 412 Seminars in Biodiversity & Ecology
BCH 313 Metabolism
ESG 262 Introduction to GIS
ESG 250 Geomorphology
ENV 241 Environmental Chemistry I
ENV 242 Environmental Chemistry II
ENV 337 Economics of the Environment
ENV 375 Environmental Physics
ENV 475 Ecological Economics

Minor in Biology (24 credits)
BIO196 Intro. to Cell & Molecular Biology
BIO 201 Cellular & Molecular Biology
BIO 205 Diversity of Life 1
BIO 206 Diversity of Life 2
BIO 207 Intro. to Evolution and Ecology
BIO 208 Genetics
Any 2 additional Biology courses
**Please note that many courses have associated labs, featuring the same course number and the BIL code, as indicated in the individual course descriptions. Lab credits do not count towards the total credit requirements of the program. The associated (co-requisite) lab must be completed to receive credit for the course.*

Note: A course can only count under one category. For instance, if you took BIO 338 as a required concentration course, it cannot be counted as one of your concentration options.