

Division of Natural Sciences and Mathematics

Overview

The Division of Natural Sciences and Mathematics offers a diverse range of courses, programs and degrees (B.Sc., B.A., M.Sc.) in Biochemistry, Biological Sciences, Chemistry, Computer Science, Environmental Science, Mathematics, and Physics and Astronomy.

Students enrolled in the experimental science classes receive extensive laboratory experience. Laboratories are well equipped and laboratory courses are instructed by the regular faculty. Each department has its own computer facilities and dedicated study rooms. Laboratories and classes tend to be small (often fewer than 20 students) and students are able to obtain essential feedback from Professors. The Division also offers students free help in learning mathematics/statistics, physics and computer science through Help Centres staffed with upper year students and/or professional tutors, under the supervision of Faculty members. The Bishop's University Astronomical Observatory is also available for graduate and undergraduate research as well as for public viewing.

Graduates from the Division pursue careers in many diverse fields. In recent years these careers have included, but are not limited to: medicine, veterinary medicine, dentistry, biomedical research, engineering, actuarial science, statistics, software engineering, pharmacology, physiotherapy, secondary and primary school science teaching and the chemical industry.

Degrees and Programs

Detailed descriptions of the degrees and programs offered are found under the respective Departmental sections of this calendar. The Division of Natural Sciences and Mathematics offers selected Masters of Science (M.Sc.) degrees and a wide range of programs leading to the Bachelor of Science (B.Sc.) or Bachelor of Arts (B.A) degrees with Honours or Majors specialization. In addition, several departments offer Minor programs that can be added to one's Honours/Major program, and Computer Science offers a certificate program. Please see the complete list of programs in Table I below.

Divisional Major

The Division offers an entry level program for a limited number of students, allowing them to register as Divisional Majors (rather than into a specific program) for a maximum of two semesters. After two semesters of full-time study are completed, students must enrol into a specific program (Major). Students who are not accepted into one of the regular programs must consult with the Dean of Arts and Science to determine an academic plan.

Length of Degrees and Collegial Equivalent Science Courses

All students admitted into their first Bachelor's degree come into a 4-year, 120-credit program. Students having a Québec collegial diploma (DEC), as well as Mature students (please consult the Admission section of the calendar for the definition of Mature status), will be granted up to one year of advanced credits (30 credits) if they have completed all the collegial courses that are equivalent to the introductory science courses which must be taken as part of the various science programs. CEGEP/Bishop's course equivalencies are listed below; Bishop's collegial-equivalent science courses that must be completed in each of our science programs are listed in Table II. Note that the labs that are associated with many of these courses (e.g. the course BIO 196 has an associated lab named BIL 196), must be taken concurrently.

Cellular/Molecular Biology	BIO 196
General Biology	BIO 197
General Chemistry	CHM 191
Solutions Chemistry	CHM 192
Differential Calculus	MAT 191 or MAT 198
Integral Calculus	MAT 192 or MAT 199
Mechanics	PHY 191 or PHY 193
Electricity and Magnetism	PHY 192 or PHY 194

Arts and Science Requirement

In addition to the courses listed in Table II, in order to encourage students enrolled in the Division of Natural Sciences & Mathematics to broaden the scope of their education, all majors and honours are required to complete at least three credits in either the Division of Humanities or the Division of Social Sciences. While this requirement will not in itself ensure against excessive specialization, it is hoped that it will lead students to find and pursue various areas of interest. Students with program combinations which require more than 72 credits are exempt from this requirement.

Advanced Placement

The Division of Natural Sciences and Mathematics grants credit for successful completion of AP examinations in the Sciences as follows. Note that a minimum score of 4 is required. When applicable, credit will also be granted for the lab that is associated with the course (e.g. the course BIO 196 and associated lab BIL 196).

Biology	BIO 196 and BIO 197
Chemistry	CHM 191 and CHM 192
Computer Science AB	CS 311
Mathematics BC	MAT 191 and MAT 192
Physics C-Mechanics	PHY 191 (or PHY 193)
Physics C-Electricity	PHY 192 (or PHY 194)

Table I: Programs Offered

Department/Program	Concentration	Degree type	Specialization Level
Biochemistry		B.Sc.	Honours, Major, Minor
Biological Sciences	Health Science	B.Sc., B.A	Honours, Major
	Life Science	B.Sc., B.A	Honours, Major
	Biology		Minor
Chemistry		B.Sc.	Honours, Major, Minor
Computer Science		M.Sc.	
		B.Sc.	Honours, Major, Minor
		Certificate	
	Information Technology	B.A.	Major
Environmental Science (part of Environment and Geography)	Physics	B.Sc.	Major
	Chemistry	B.Sc.	Major
	Environmental Science		Minor
Mathematics		B.Sc., B.A	Honours, Major, Minor
	Mathematics Education	B.Sc., B.A	Double Major*
	Matemáticas en Español	B.Sc., B.A	Honours, Major
	Mathematical Contexts		Minor
Physics		M.Sc.	
		B.Sc.	Honours, Major, Minor
Science Teaching	Biology	B.Sc.	Double Major*
	Chemistry	B.Sc.	Double Major*
	Physics	B.Sc.	Double Major*

*The Division of Natural Sciences and Mathematics, in cooperation with the School of Education, offers students in these programs the opportunity to prepare for professional careers as Secondary School science and mathematics educators. Students must also be registered Education majors in the **School of Education**. The specific required course lists and program regulations for these double Major programs are found in the School of Education section of this Calendar. All questions concerning application to the School and course requirements should be referred to the Dean of the School of Education.

Table II: Collegial-equivalent courses

Department/Program	Life Science	Chemistry	Mathematics	Physics	Humanities*
Biochemistry	BIO 196	CHM 191	MAT 198	PHY 191 or PHY 193	ELA 116 + 1**
		CHM 192	MAT 199	PHY 192 or PHY 194	
Biological Sciences B.Sc.	BIO 196	CHM 191	MAT 198	PHY 191 or BIO 197	ELA 116 + 1**
	BIO 197	CHM 192	MAT 199	PHY 192 or PHY 194	
				PHY 193	
Biological Sciences B.A.	BIO 196				ELA 116 + 1**
	BIO 197				
Chemistry		CHM 191	MAT 198	PHY 191	ELA 116 + 1**
		CHM 192	MAT 199	PHY 192	
Computer Science B.Sc.			MAT 191	PHY 191	ELA 116 + 1**
			MAT 192	PHY 192	
Information Technology B.A.			MAT 196		ELA 116 + 1**
			MAT 197		
Environmental Science	BIO 196	CHM 191	MAT 191	PHY 191	ELA 116 + 1**
	BIO 197	CHM 192	MAT 192	PHY 192	
Mathematics B.Sc.			MAT 191	PHY 191	ELA 116 + 1**
			MAT 192	PHY 192	
Mathematics B.A.			MAT 191		ELA 116 + 1**
			MAT 192		
Physics		CHM 191	MAT 191	PHY 191	ELA 116 + 1**
		CHM 192	MAT 192	PHY 192	
Science Teaching	BIO 196	CHM 191	MAT 191 or MAT 198	PHY 191 or PHY 193	ELA 116 + 1**
	BIO 197	CHM 192	MAT 192 or MAT 199	PHY 192 or PHY 194	
				PHY 193	

* Any CEGEP DEC fulfils the Humanities requirement

** ELA 116 (Effective Writing) can be replaced by another English course (coded 'ENG'). The second humanities course can be selected from the 100- or 200-level courses in the following disciplines: Classical Studies (CLA), English (ENG), History (HIS), Liberal Arts (LIB), Philosophy (PHI) and Religion (REL)

Transfers from other Universities and Colleges

Students entering a program in the Division of Natural Sciences and Mathematics from another Canadian University or College, or from accredited international post-secondary institutions, will have their transcripts of grades examined individually for possible transfer credit against a Bishop's program's requirements. Please consult the Admission section of this Calendar or the Admissions Office, admissions@ubishops.ca for details.

Transfers from other programs at Bishop's University

Bishop's students wishing to transfer into a program offered by the Division of Natural Sciences and Mathematics normally require a cumulative average of 65% on all courses attempted at Bishop's. Students whose average is below 65% may still register in courses offered in the Division, subject to the normal regulations regarding course registration in the University. Program transfers are not normally permitted in a student's first semester of studies at Bishop's University.

Biochemistry

Faculty

Elizabeth Prusak,

M.Sc. Eng. (Tech. Univ., Poland);
Ph.D. (Polish Academy of Science);
Professor
Chair of the Department

Virginia L. Stroher,

B.Sc. (Montana State), Ph.D.
(University of Washington); Professor

Program Overview

The Biochemistry program at Bishop's is coordinated through an interdisciplinary committee of chemists, biochemists and biologists, providing students with a strong background in chemistry, biochemistry and biology. Students enrolling in the Biochemistry program will be able to follow a course of study that best meets their interests, strengths and future needs. This is accomplished through the offering of three program specializations – General, Molecular Biology, or Chemistry – any one of which the student will select to complete their Biochemistry program requirements. The goal of the General specialization is to provide a broad background in several relevant fields of biology, biochemistry and chemistry. The Molecular Biology specialization places greater emphasis on the molecular and cellular fields of study. The Chemistry specialization is more focused in chemistry and, by selecting the appropriate courses, can provide the student with the necessary academic requirements for membership in the Chemical Institute of Canada and accreditation by *l'Ordre des chimistes du Québec*.

The Biochemistry program offers both an Honours degree, which rigorously prepares students for graduate studies or professional schools, and a Major degree, which provides students more flexibility in their program. The program places strong emphasis on mastering the fundamentals of experimental biochemistry, and provides students with well-equipped laboratory facilities, first-hand experience with modern laboratory equipment, and close instructional contact with professors. As well, the Agriculture Canada Research Station in Lennoxville and the Université de Sherbrooke, with its associated medical research hospital, are easily accessible to students and provide additional opportunities and exposure for interested Honours students.

Programs

Biochemistry Honours (99 credits)

HONBCH

Students are not admitted to the Honours Biochemistry program until the end of their Y3 year.

To be eligible to enter the Honours Biochemistry program, a student must normally achieve:

- i) a minimum cumulative average of 75% by the end of the Y3 year, and
- ii) at least 75% in each 300-level and 400-level course required in the program.

To complete the Honours Biochemistry program, a student must:

- i) maintain a minimum cumulative average of 75% and
- ii) achieve at least 75% in each 300-level and 400-level course required in the program with a maximum permitted exemption of four credits and
- iii) achieve at least 75% in each of BCH 491 and BCH 492.

The Honours Biochemistry program includes a three credit scientific writing course and a six-credit honours research project that will be evaluated by at least three faculty from, or recognized by, the Biochemistry Program Committee. The scientific results of the honours research project must be presented in public, either through an oral seminar or poster presentation, and the scientific results submitted in a written thesis.

The Biochemistry Honours program is a four-year program that requires 40 three-credit courses, or their equivalent, for a total of 120 course credits, plus associated laboratory courses, the number of lab courses required depending on the specialization selected. The 120 course credits are divided as follows: 75 core required course credits, 24 specialization course credits, 18 free elective credits and 3 humanities or social sciences elective credits.