COMPUTER SCIENCE IN HEALTH AND LIFE SCIENCES

Section 71.75

Faculty

Undergraduate Program Director
NEMATOLLAAH SHIRI-VARNAAMKHAASTI, PhD *Concordia University*; *Associate Professor*

Location

Sir George Williams Campus
Engineering, Computer Science and Visual Arts Complex, Room: EV 003.139
514-848-2424, ext. 3000

Objectives

The Bachelor of/Baccalaureate in Computer Science in Health and Life Sciences is offered in collaboration with the Department of Biology and shares a number of courses with the BSc Honours and Specialization programs in Systems and Information Biology. The detailed description of the BCompSc program can be found in this section and the detailed description of the Biology programs can be found in §31.030.
BCompSc in Health and Life Sciences provides students with the unique mix of interdisciplinary knowledge and skills needed to work at the boundary of computing and health and life sciences. Research and development in this field often spans biochemistry and biology as well as computing and engineering. It is essential that students gain sufficient knowledge of the theory, application and language of all the relevant fields to be able to work in interdisciplinary teams to investigate scientific and technical questions, solve problems, use and develop tools and techniques, and communicate effectively. Drawing from students with different backgrounds but with aptitudes for both biology and computing, this interdisciplinary program focuses on scholarship that extends beyond traditional boundaries and prepares the graduates to work in the diverse fields of health and life sciences.

71.75.1 Curriculum for the Degree of BCompSc in Health and Life Sciences

The BCompSc in Health and Life Sciences prepares students to explore and decipher the complexity and interdependency within biological systems; provides students with an understanding of techniques from computer science, mathematics, statistics and modelling; and develops students' skills in efficiently generating information and knowledge by optimal use of data analytics, while maintaining a rigorous training in empirical and experimental approaches.

71.75.2 Degree Requirements

The BCompSc in Health and Life Sciences constitutes a 90-credit program that consists of courses in the following groups: Computer Science Core, Complementary Core, Health and Life Sciences Core, Health and Life Sciences Electives, Mathematics Electives and General Electives.

BCompSc in Health and Life Sciences	*Credits*
Computer Science Core*	33.00
Complementary Core	6.00
Health and Life Sciences Core	24.00
Health and Life Sciences Electives	12.00
Mathematics Electives*	6.00
General Electives*	9.00
	90.00

*The list of corresponding courses can be found in §71.70.2.

Complementary Core		*Credits*
ENCS 282	Technical Writing and Communication	3.00
ENCS 333	Research Methods, Ethics, Law and Regulation for Computational Biology	3.00
		6.00

Health and Life Sciences Core		Credits
BIOL 261	Molecular and General Genetics	3.00
BIOL 266	Cell Biology	3.00
BIOL 367	Molecular Biology	3.00
BIOL 479	Computational Biology	3.00
BIOL 481	Genome Structure	3.00
CHEM 212	Analytical Chemistry for Biologists	3.00
CHEM 221	Introductory Organic Chemistry I	3.00
CHEM 271	Biochemistry I	3.00
		24.00

Health and Life Sciences Electives		Credits
BIOL 226	Biodiversity and Ecology	3.00
BIOL 364	Cell Physiology	3.00
BIOL 368	Genetics and Cell Biology Laboratory	3.00
BIOL 422	Advanced Statistics for Biological Sciences	3.00
BIOL 461	Advanced Genetics	3.00
BIOL 466	Advanced Techniques in Molecular Biology	3.00
BIOL 475	Biological Computing and Synthetic Biology	3.00
BIOL 480	Bioinformatics	3.00
BIOL 482	Functional Genomics	3.00
BIOL 484	Industrial and Environmental Biotechnology	3.00
BIOL 485	Agriculture and Agri-Food Biotechnology	3.00
BIOL 486	High-throughput Instrumentation	3.00
COEN 432	Applied Evolutionary and Learning Algorithms	3.00
COEN 433	Biological Computing and Synthetic Biology	3.00
COEN 434	Microfluidic Devices for Synthetic Biology	3.00
COMP 339	Combinatorics	3.00
COMP 353	Databases	4.00
COMP 361	Elementary Numerical Methods	3.00
COMP 465	Design and Analysis of Algorithms	3.00
COMP 472	Artificial Intelligence	4.00
COMP 478	Image Processing	4.00
COMP 479	Information Retrieval and Web Search	4.00
COMP 493	Computational Biology Team Project	6.00
ENGR 213	Applied Ordinary Differential Equations	3.00
ENGR 411*	Special Technical Report	1.00
SOEN 287	Web Programming	3.00
SOEN 387	Web-Based Enterprise Application Design	3.00

Electives may also be taken from amongst 300-level and 400-level courses in BIOL, COEN, COMP, SOEN with permission of the Department.
*Students missing one credit of the 90 credits to graduate may take ENGR 411 Special Technical Report (1 credit).

71.75.3 Extended Credit Program

Students admitted to an Extended Credit Program (ECP) under the provisions of Sections 13.3.2 or 13.8.1 must successfully complete a minimum of 120 credits including:

90 Program requirements as set out in Section 71.75.2
9 MATH 203[3], 204[3], 205[3]
6 PHYS 204[3], 206[3]
6 CHEM 205[3], 206[3]
3 BIOL 201[3]
6 Elective credits chosen from outside the Gina Cody School of Engineering and Computer Science (see Note).

Note: ECP elective credits may be chosen as follows:

- General Education Electives found in §71.110.
- Basic and Natural Science Courses found in §71.70.9.
- Courses not included in the above lists may be taken with prior approval of the undergraduate program director.

71.75.4 Honours Program

Students should refer to §16.2.4 of the Calendar for academic regulations for the honours program. The following regulations are additional requirements for the Honours BCompSc in Health and Life Sciences.

1. Applications to enter an honours program must be submitted to the Office of the Associate Dean (Student Academic Services) at least three months before the start of the term in which the student wishes to enter an honours program.
2. Students must complete at least 30 credits towards their degree before entering an honours program.
3. Students must have a GPA of at least 3.30.
4. Students who are required to withdraw from an honours program may continue in the regular program provided they are in acceptable or conditional standing according to the academic regulations in §71.10.3.

Course Requirements for Honours Programs

Honours students must fulfill the requirements of the program. In addition, to receive an honours degree, students must:

1. have a final graduation GPA of at least 3.30;
2. successfully complete the course BIOL 368 and one of the Computer Science (COMP) courses listed below as part of their Health and Life Sciences Electives;
3. successfully complete one course from those listed under "Project Courses" below as part of their General Electives.

Computer Science Courses		*Credits*
COMP 339	Combinatorics	3.00
COMP 353	Databases	4.00
COMP 465	Design and Analysis of Algorithms	3.00
COMP 479	Information Retrieval and Web Search	4.00

Project Courses		*Credits*
BIOL 490	Independent Study	6.00
COMP 490	Computer Science Project I	3.00
COMP 492	Computer Science Project II	3.00
COMP 493	Computational Biology Team Project	6.00

71.75.5 The Co-operative and C.Edge (Career Edge) Option

For a full description of the Co-operative and C.Edge Option, please refer to §24 and §71.70.7 of this Calendar.