Biotechnology

This section presents the requirements for programs in:

- Biochemistry and Biotechnology B.Sc. Honours
- Biology and Biotechnology B.Sc. Honours

Program Requirements

Biochemistry and Biotechnology B.Sc. Honours (20.0 credits)

A. Credits Included in the Major CGPA (15.0 credits)

1.	**4.0 credits in:**		4.0
	BIOL 1103 [0.5]	Foundations of Biology I	
	BIOL 1104 [0.5]	Foundations of Biology II	
	BIOL 2104 [0.5]	Introductory Genetics	
	BIOL 2301 [0.5]	Biotechnology I	
	BIOL 2303 [0.5]	Microbiology	
	BIOL 3104 [0.5]	Molecular Genetics	
	BIOL 3301 [0.5]	Biotechnology II	
	BIOL 4301 [0.5]	Current Topics in Biotechnology	
2.	**0.5 credit from:**		0.5
	BIOL 2001 [0.5]	Animals: Form and Function	
	BIOL 2002 [0.5]	Plants: Form and Function	
3.	**0.5 credit from:**		0.5
	BIOL 3201 [0.5]	Cell Biology	
	BIOL 3205 [0.5]	Plant Biochemistry and Physiology	
	BIOL 3303 [0.5]	Experimental Microbiology	
	BIOL 3305 [0.5]	Human and Comparative Physiology	
	BIOL 4109 [0.5]	Laboratory Techniques in Molecular Genetics	
4.	**0.5 credit from:**		0.5
	BIOL 3201 [0.5]	Cell Biology	
	BIOL 3303 [0.5]	Experimental Microbiology	
	BIOL 4106 [0.5]	Advances in Molecular Biology	
	BIOL 4109 [0.5]	Laboratory Techniques in Molecular Genetics	
	BIOL 4201 [0.5]	Advanced Cell Culture and Tissue Engineering	
	BIOL 4300 [0.5]	Applied Microbiology	
	BIOL 4303 [0.5]	Advances in Microbiology	
5.	**3.0 credits in:**		3.0
	BIOC 2200 [0.5]	Cellular Biochemistry	
	BIOC 3101 [0.5]	General Biochemistry I	
	BIOC 3102 [0.5]	General Biochemistry II	
	BIOC 3103 [0.5]	Practical Biochemistry I	
	BIOC 3104 [0.5]	Practical Biochemistry II	
	BIOC 3202 [0.5]	Biophysical Techniques and Applications	
6.	**1.0 credit from:**		1.0
	BIOC 4907 [1.0]	Honours Essay and Research Proposal	
	BIOC 4908 [1.0]	Research Project	
7.	**1.0 credit from:**		1.0
	BIOC 3008 [0.5]	Bioinformatics	
	or BIOC 3203 [0.5]	Biochemical Pharmacology	
	BIOC 4004 [0.5]	Industrial Biochemistry	
	BIOC 4005 [0.5]	Biochemical Regulation	
	BIOC 4007 [0.5]	Membrane Biochemistry	
	BIOC 4008 [0.5]	Computational Systems Biology	
	BIOC 4009 [0.5]	Biochemistry of Disease	
	BIOC 4200 [0.5]	Immunology	
	BIOC 4201 [0.5]	Advanced Cell Culture and Tissue Engineering	
	BIOC 4202 [0.5]	Mutagenesis and DNA Repair	
	BIOC 4203 [0.5]	Advanced Metabolism	
	BIOC 4204 [0.5]	Protein Biotechnology	
	BIOC 4708 [0.5]	Principles of Toxicology	
8.	**4.0 credits in:**		4.0
	CHEM 1001 [0.5]	General Chemistry I	
	CHEM 1002 [0.5]	General Chemistry II	
	CHEM 2103 [0.5]	Physical Chemistry I	
	or BIOC 2300 [0.5]	Physical Biochemistry	
	CHEM 2203 [0.5]	Organic Chemistry I	
	CHEM 2204 [0.5]	Organic Chemistry II	
	CHEM 2303 [0.5]	Analytical Chemistry II	
	CHEM 2501 [0.5]	Introduction to Inorganic and Bioinorganic Chemistry	
	CHEM 3201 [0.5]	Advanced Organic Chemistry I	
9.	**0.5 credit from:**		0.5
	BIOC courses listed in, but not used to fulfil, Item 7 above		
	BIOC 2400 [0.5]	Independent Research I	
	BIOC 3400 [0.5]	Independent Research II	
	BIOC 4001 [0.5]	Methods in Biochemistry	
	BIOC 4901 [0.5]	Selected Topics in Biochemistry	
	BIOL courses listed in, but not used to fulfil, Item 3 or 4		
	BIOL 2001 [0.5]	Animals: Form and Function	
	BIOL 2002 [0.5]	Plants: Form and Function	
	BIOL 3102 [0.5]	Mycology	
	BIOL 3202 [0.5]	Principles of Developmental Biology	
	BIOL 3306 [0.5]	Human Anatomy and Physiology	
	BIOL 3307 [0.5]	Advanced Human Anatomy and Physiology	
	BIOL 3501 [0.5]	Biomechanics	
	BIOL 4104 [0.5]	Evolutionary Genetics	
	BIOL 4206 [0.5]	Human Genetics	
	BIOL 4207 [0.5]	Advanced Embryology & Developmental Biology	
	BIOL 4209 [0.5]	Advanced Plant Physiology	
	BIOL 4304 [0.5]	Forensic Biology	
	BIOL 4309 [0.5]	Studies in Human Performance	
	BIOL 4317 [0.5]	Neuroethology: The Neural Basis of Animal Behaviour	
	BIOL 4319 [0.5]	Studies in Exercise Physiology	
	BIOL courses listed in but not used to fulfil Item 4 above		
	CHEM 3100 [0.5]	Physical Chemistry II	
	CHEM 3107 [0.5]	Experimental Methods in Nanoscience	
	CHEM 3202 [0.5]	Advanced Organic Chemistry II	
	CHEM 3205 [0.5]	Experimental Organic Chemistry	
	CHEM 3600 [0.5]	Introduction to Nanotechnology	
	CHEM 3700 [0.5]	Industrial Applications of Chemistry	

CHEM 3800 [0.5]	The Chemistry of Environmental Pollutants	
CHEM 4201 [0.5]	Macromolecular Nanotechnology	
CHEM 4406 [0.5]	Pharmaceutical Drug Design	
B. Credits Not Included in the Major CGPA (5.0 credits)		
10. 1.0 credit from:		1.0
PHYS 1007 [0.5] & PHYS 1008 [0.5]	Elementary University Physics I Elementary University Physics II	
PHYS 1003 [0.5] & PHYS 1004 [0.5]	Introductory Mechanics and Thermodynamics Introductory Electromagnetism and Wave Motion	
11. 1.5 credits in:		1.5
MATH 1007 [0.5]	Elementary Calculus I	
MATH 1107 [0.5]	Linear Algebra I	
STAT 2507 [0.5]	Introduction to Statistical Modeling I	
12. 2.0 credits in Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000)		2.0
13. 0.5 credit in free elective.		0.5
Total Credits		**20.0**

Biology and Biotechnology B.Sc. Honours (20.0 credits)

A. Credits Included in the Major CGPA (13 credits)		
1. 6.5 credits in:		6.5
BIOL 1103 [0.5]	Foundations of Biology I	
BIOL 1104 [0.5]	Foundations of Biology II	
BIOL 1105 [0.5]	Biological Methods, Analysis and Interpretation	
BIOL 2001 [0.5]	Animals: Form and Function	
BIOL 2002 [0.5]	Plants: Form and Function	
BIOL 2104 [0.5]	Introductory Genetics	
BIOL 2200 [0.5]	Cellular Biochemistry	
BIOL 2301 [0.5]	Biotechnology I	
BIOL 2303 [0.5]	Microbiology	
BIOL 3104 [0.5]	Molecular Genetics	
BIOL 3201 [0.5]	Cell Biology	
BIOL 3301 [0.5]	Biotechnology II	
BIOL 4301 [0.5]	Current Topics in Biotechnology	
2. 1.5 credit in:		1.5
BUSI 2800 [0.5]	Entrepreneurship	
BIOC 3101 [0.5]	General Biochemistry I	
BIOC 3102 [0.5]	General Biochemistry II	
3. 4.0 credits from:		4.0
BIOC 2300 [0.5]	Physical Biochemistry	
or CHEM 2103 [0.5]	Physical Chemistry I	
BIOC 3008 [0.5]	Bioinformatics	
BIOC 3103 [0.5]	Practical Biochemistry I	
BIOC 3104 [0.5]	Practical Biochemistry II	
BIOC 3202 [0.5]	Biophysical Techniques and Applications	
BIOL 3004 [0.5]	Insect Diversity	
BIOL 3102 [0.5]	Mycology	
BIOL 3205 [0.5]	Plant Biochemistry and Physiology	
BIOL 3303 [0.5]	Experimental Microbiology	
BIOL 3305 [0.5]	Human and Comparative Physiology	
BIOL 3501 [0.5]	Biomechanics	
BIOL 3901 [0.5]	Research Proposal	
CHEM 3700 [0.5]	Industrial Applications of Chemistry	
CHEM 3800 [0.5]	The Chemistry of Environmental Pollutants	
FOOD 3005 [0.5]	Food Microbiology	
BIOC 4001 [0.5]	Methods in Biochemistry	
BIOC 4004 [0.5]	Industrial Biochemistry	
BIOC 4005 [0.5]	Biochemical Regulation	
BIOC 4007 [0.5]	Membrane Biochemistry	
BIOC 4008 [0.5]	Computational Systems Biology	
BIOC 4009 [0.5]	Biochemistry of Disease	
BIOC 4203 [0.5]	Advanced Metabolism	
BIOC 4204 [0.5]	Protein Biotechnology	
BIOC 4708 [0.5]	Principles of Toxicology	
BIOL 4106 [0.5]	Advances in Molecular Biology	
BIOL 4109 [0.5]	Laboratory Techniques in Molecular Genetics	
BIOL 4200 [0.5]	Immunology	
BIOL 4201 [0.5]	Advanced Cell Culture and Tissue Engineering	
BIOL 4202 [0.5]	Mutagenesis and DNA Repair	
BIOL 4206 [0.5]	Human Genetics	
BIOL 4304 [0.5]	Forensic Biology	
BIOL 4901 [0.5]	Directed Special Studies	
TSES 4001 [0.5]	Technology and Society: Risk	
TSES 4002 [0.5]	Technology and Society: Forecasting	
4. 1.0 credit in:		1.0
BIOL 4905 [1.0]	Honours Workshop	
or BIOL 4907 [1.0]	Honours Essay and Research Proposal	
or BIOL 4908 [1.0]	Honours Research Thesis	
B. Credits Not Included in the Major CGPA (7.0 credits)		
5. 2.0 credits in:		2.0
CHEM 1001 [0.5] & CHEM 1002 [0.5]	General Chemistry I General Chemistry II	
CHEM 2203 [0.5] & CHEM 2204 [0.5]	Organic Chemistry I Organic Chemistry II (See Note, below)	
6. 0.5 credit in:		0.5
MATH 1007 [0.5]	Elementary Calculus I	
7. 1.5 credits from:		1.5
COMP 1005 [0.5]	Introduction to Computer Science I	
COMP 1006 [0.5]	Introduction to Computer Science II	
MATH 1107 [0.5]	Linear Algebra I	
PHYS 1007 [0.5]	Elementary University Physics I	
or PHYS 1003 [0.5]	Introductory Mechanics and Thermodynamics	
PHYS 1008 [0.5]	Elementary University Physics II	
or PHYS 1004 [0.5]	Introductory Electromagnetism and Wave Motion	
STAT 2507 [0.5]	Introduction to Statistical Modeling I	
8. 2.0 credits in Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000)		2.0
9. 1.0 credit in free electives.		1.0
Total Credits		**20.0**

B.Sc. Regulations

The regulations presented in this section apply to all Bachelor of Science programs. In addition to the requirements presented here, students must satisfy the University regulations common to all undergraduate students including the process of Academic Performance Evaluation (see the *Academic Regulations of the University* section of this Calendar).

Breadth Requirement for the B.Sc.

Students in a Bachelor of Science program must present the following credits at graduation:

1. 2.0 credits in Science Continuation courses not in the major discipline; **students completing a double major are considered to have completed this requirement providing they have 2.0 credits in science continuation courses in each of the two majors**
2. 2.0 credits in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000)

In most cases, the requirements for individual B.Sc. programs, as stated in this Calendar, contain these requirements, explicitly or implicitly.

Students admitted to B.Sc. programs by transfer from another institution must present at graduation (whether taken at Carleton or elsewhere):

1. 2.0 credits in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000) if, on transfer, the student received credit for fewer than 10.0 credits.
2. 1.0 credit in courses outside of the faculties of Science and Engineering and Design (but may include NSCI 1000) if, on transfer, the student received credit for 10.0 or more credits.

Declared and Undeclared Students

Students who are registered in a program within the degree are called Declared students. Most students designate a program of study when they first apply for admission and so begin their studies as Declared students. Students may also choose to begin their studies within the B.Sc. degree without being registered in a program. These students are referred to as Undeclared students. The recommended course pattern for Undeclared students is provided in the Undeclared entry of the Programs section of this Calendar. Undeclared students normally must apply to enter a program before beginning their second year of study. The Science Student Success Centre (SSSC) provides Undeclared students guidance to the appropriate support services in making this decision.

Change of Program within the B.Sc. Degree

Students may transfer to a program within the B.Sc. degree if upon entry to the new program they would be in good academic standing.

Other applications for change of program will be considered on their merits; students may be accepted in the new program in *Good Standing* or on *Academic Warning*.

Applications to declare or change their program within the B.Sc. Degree must be made online through Carleton Central by completing a Change of Program Elements (COPE) application form within the published deadlines. Acceptance into a program or into a program element or option is subject to any enrolment, and/or specific program, program element or option requirements as published in the relevant Calendar entry.

Minors, Concentrations and Specializations

Students may add a minor, concentration or specialization by completing a Change of Program Elements (COPE) application form online through Carleton Central. Acceptance into a minor, concentration or specialization requires that the student be in *Good Standing* and is subject to any specific requirements of the intended Minor, Concentration or Specialization as published in the relevant Calendar entry.

Experimental Science Requirement

Students in a B.Sc. degree program must present at graduation at least two full credits of experimental science chosen from two different departments or institutes from the list below:

Approved Experimental Science Courses

Biochemistry	
BIOC 2200 [0.5]	Cellular Biochemistry
BIOC 4001 [0.5]	Methods in Biochemistry
BIOC 4201 [0.5]	Advanced Cell Culture and Tissue Engineering
Biology	
BIOL 1103 [0.5]	Foundations of Biology I
BIOL 1104 [0.5]	Foundations of Biology II
BIOL 2001 [0.5]	Animals: Form and Function
BIOL 2002 [0.5]	Plants: Form and Function
BIOL 2104 [0.5]	Introductory Genetics
BIOL 2200 [0.5]	Cellular Biochemistry
BIOL 2600 [0.5]	Ecology
Chemistry	
CHEM 1001 [0.5]	General Chemistry I
CHEM 1002 [0.5]	General Chemistry II
CHEM 1005 [0.5]	Elementary Chemistry I
CHEM 1006 [0.5]	Elementary Chemistry II
CHEM 2103 [0.5]	Physical Chemistry I
CHEM 2203 [0.5]	Organic Chemistry I
CHEM 2204 [0.5]	Organic Chemistry II
CHEM 2302 [0.5]	Analytical Chemistry I
CHEM 2303 [0.5]	Analytical Chemistry II
CHEM 2800 [0.5]	Foundations for Environmental Chemistry
Earth Sciences	
ERTH 1006 [0.5]	Exploring Planet Earth
ERTH 1009 [0.5]	The Earth System Through Time
ERTH 2102 [0.5]	Mineralogy to Petrology
ERTH 2404 [0.5]	Engineering Geoscience
ERTH 2802 [0.5]	Field Geology I

ERTH 3111 [0.5]	Vertebrate Evolution: Mammals, Reptiles, and Birds
ERTH 3112 [0.5]	Vertebrate Evolution: Fish and Amphibians
ERTH 3204 [0.5]	Mineral Deposits
ERTH 3205 [0.5]	Physical Hydrogeology
ERTH 3806 [0.5]	Structural Geology
Food Sciences	
FOOD 3001 [0.5]	Food Chemistry
FOOD 3002 [0.5]	Food Analysis
FOOD 3005 [0.5]	Food Microbiology
Geography	
GEOG 1010 [0.5]	Global Environmental Systems
GEOG 3108 [0.5]	Soil Properties
Neuroscience	
NEUR 3206 [0.5]	Sensory and Motor Neuroscience
NEUR 3207 [0.5]	Systems Neuroscience
NEUR 4600 [0.5]	Advanced Lab in Neuroanatomy
Physics	
PHYS 1001 [0.5]	Foundations of Physics I
PHYS 1002 [0.5]	Foundations of Physics II
PHYS 1003 [0.5]	Introductory Mechanics and Thermodynamics
PHYS 1004 [0.5]	Introductory Electromagnetism and Wave Motion
PHYS 1007 [0.5]	Elementary University Physics I
PHYS 1008 [0.5]	Elementary University Physics II
PHYS 2202 [0.5]	Wave Motion and Optics
PHYS 2604 [0.5]	Modern Physics I
PHYS 3007 [0.5]	Third Year Physics Laboratory: Selected Experiments and Seminars
PHYS 3606 [0.5]	Modern Physics II
PHYS 3608 [0.5]	Modern Applied Physics

Course Categories for B.Sc. Programs

Science Geography Courses

GEOG 1010 [0.5]	Global Environmental Systems
GEOG 2006 [0.5]	Introduction to Quantitative Research
GEOG 2013 [0.5]	Weather and Water
GEOG 2014 [0.5]	The Earth's Surface
GEOG 3003 [0.5]	Quantitative Geography
GEOG 3010 [0.5]	Field Methods in Physical Geography
GEOG 3102 [0.5]	Geomorphology
GEOG 3103 [0.5]	Watershed Hydrology
GEOG 3104 [0.5]	Principles of Biogeography
GEOG 3105 [0.5]	Climate and Atmospheric Change
GEOG 3106 [0.5]	Aquatic Science and Management
GEOG 3108 [0.5]	Soil Properties
GEOG 4000 [0.5]	Field Studies
GEOG 4005 [0.5]	Directed Studies in Geography
GEOG 4013 [0.5]	Cold Region Hydrology
GEOG 4017 [0.5]	Global Biogeochemical Cycles
GEOG 4101 [0.5]	Two Million Years of Environmental Change
GEOG 4103 [0.5]	Water Resources Engineering
GEOG 4104 [0.5]	Microclimatology
GEOG 4108 [0.5]	Permafrost

Science Psychology Courses

PSYC 2001 [0.5]	Introduction to Research Methods in Psychology
PSYC 2002 [0.5]	Introduction to Statistics in Psychology
PSYC 2700 [0.5]	Introduction to Cognitive Psychology
PSYC 3000 [1.0]	Design and Analysis in Psychological Research
PSYC 3506 [0.5]	Cognitive Development
PSYC 3700 [1.0]	Cognition (Honours Seminar)
PSYC 3702 [0.5]	Perception
PSYC 2307 [0.5]	Human Neuropsychology I
PSYC 3307 [0.5]	Human Neuropsychology II

Science Continuation Courses

A course at the 2000 level or above may be used as a Science Continuation credit in a B.Sc. program if it is not in the student's major discipline, and is chosen from the following:

- BIOC (Biochemistry)
- BIOL (Biology)
- CHEM (Chemistry)
- COMP (Computer Science) A maximum of two half-credits at the 1000-level in COMP, excluding COMP 1001 may be used as Science Continuation credits.
- ERTH (Earth Sciences), except ERTH 2415 which may be used only as a free elective for any B.Sc. program. Students in Earth Sciences programs may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.
- Engineering. Students wishing to register in Engineering courses must obtain the permission of the Faculty of Engineering and Design.
- ENSC (Environmental Science)
- FOOD (Food Science and Nutrition)
- GEOM (Geomatics)
- HLTH (Health Sciences)
- ISAP (Interdisciplinary Science Practice)
- MATH (Mathematics)
- NEUR (Neuroscience)
- PHYS (Physics), except PHYS 2903
- Science Geography Courses (see list above)
- Science Psychology Courses (see list above)
- STAT (Statistics)
- TSES (Technology, Society, Environment) except TSES 2305. Biology students may use these courses only as free electives. Integrated Science and Environmental Science students may include these courses in their programs but may not count them as part of the Science Sequence.

Science Faculty Electives

Science Faculty Electives are courses at the 1000-4000 level chosen from:

- BIOC (Biochemistry)
- BIOL (Biology) Biology & Biochemistry students may use BIOL 1010 and BIOL 2005 only as free electives

CHEM (Chemistry) except CHEM 1003, CHEM 1004 and CHEM 1007	
COMP (Computer Science) except COMP 1001	
ERTH (Earth Sciences) except ERTH 1010, ERTH 1011 and ERTH 2415. Earth Sciences students may use ERTH 2401, ERTH 2402, and ERTH 2403 only as free electives.	
Engineering	
ENSC 2001	
FOOD (Food Science and Nutrition)	
GEOM (Geomatics)	
HLTH (Health Science)	
ISAP (Interdisciplinary Science Practice)	
MATH (Mathematics)	
NEUR (Neuroscience)	
PHYS (Physics) except PHYS 1901, PHYS 1902, PHYS 1905, PHYS 2903	
Science Geography (see list above)	
Science Psychology (see list above)	
STAT (Statistics)	
TSES (Technology, Society, Environment) Biology students may use these courses only as free electives.	

Advanced Science Faculty Electives

Advanced Science Faculty Electives are courses at the 2000-4000 level chosen from the Science Faculty Electives list above.

Approved Courses Outside the Faculties of Science and Engineering and Design (may include NSCI 1000**)**

All courses offered by the Faculty of Arts and Social Sciences, the Faculty of Public Affairs, and the Sprott School of Business are approved as Arts or Social Sciences courses EXCEPT FOR: All Science Geography courses (see list above), all Geomatics (GEOM) courses, all Science Psychology courses (see list above). NSCI 1000 may be used as an Approved Course Outside the Faculties of Science and Engineering and Design.

Free Electives

Any course is allowable as a Free Elective providing it is not prohibited (see below). Students are expected to comply with prerequisite requirements and enrolment restrictions for all courses as published in this Calendar.

Courses Allowable Only as Free Electives in any B.Sc. Program

BIOL 4810 [0.5]	Education Research in Biology
CHEM 1003 [0.5]	The Chemistry of Food, Health and Drugs
CHEM 1004 [0.5]	Drugs and the Human Body
CHEM 1007 [0.5]	Chemistry of Art and Artifacts
ERTH 1010 [0.5]	Our Dynamic Planet Earth
ERTH 1011 [0.5]	Evolution of the Earth
ERTH 2415 [0.5]	Natural Disasters
ISCI 1001 [0.5]	Introduction to the Environment
ISCI 2000 [0.5]	Natural Laws
ISCI 2002 [0.5]	Human Impacts on the Environment
MATH 0107 [0.5]	Algebra and Geometry
PHYS 1901 [0.5]	Planetary Astronomy
PHYS 1902 [0.5]	From our Star to the Cosmos
PHYS 1905 [0.5]	Physics Behind Everyday Life
PHYS 2903 [0.5]	Physics Towards the Future

Prohibited Courses

The following courses are not acceptable for credit in any B.Sc. program:

COMP 1001 [0.5]	Introduction to Computational Thinking for Arts and Social Science Students
MATH 0005 [0.5]	Precalculus: Functions and Graphs
MATH 0006 [0.5]	Precalculus: Trigonometric Functions and Complex Numbers
MATH 1009 [0.5]	Mathematics for Business
MATH 1119 [0.5]	Linear Algebra: with Applications to Business
MATH 1401 [0.5]	Elementary Mathematics for Economics I
MATH 1402 [0.5]	Elementary Mathematics for Economics II

Co-operative Education

For more information about how to apply for the Co-op program and how the Co-op program works please visit the Co-op website.

All students participating in the Co-op program are governed by the Undergraduate Co-operative Education Policy.

Undergraduate Co-operative Education Policy

Admission Requirements

Students can apply to co-op in one of two ways; directly from high school or after beginning a degree program at Carleton.

If a student is admitted to co-op from high school, their grades will be reviewed two terms to one year prior to their first work term to ensure they continue to meet the academic requirements after their 1st or 2nd year of study. The time at which evaluation takes place depends on the program of study. Students will automatically be notified via their Carleton email account if they are permitted to continue.

Students not admitted to Carleton University with the co-op option on their degree can apply for admission via the co-operative education program website. To view application deadlines, visit carleton.ca/co-op.

Admission to the co-op option is based on the completion of 5.0 or more credits at Carleton University, the CGPA requirement for the students' academic program as well as any course prerequisites. The articulated CGPA for each program is the normal standard for assessment. Please see the specific degree program sections for the unique admission and continuation requirements for each academic program.

Participation Requirements

COOP 1000

Once a student has been given admission or continuation confirmation to the co-op option s/he must complete and pass COOP 1000 (a mandatory online 0.0 credit course). Students will have access to this course a minimum of two

terms prior to their first work term and will be notified when to register.

Communication with the Co-op Office

Students must maintain contact with the co-op office during their job search and while on a work term. All email communication will be conducted via the students' Carleton email account.

Employment

Although every effort is made to ensure a sufficient number of job postings for all students enrolled in the co-op option of their degree program, no guarantee of employment can be made. Carleton's co-op program operates a competitive job search process and is dependent upon current market conditions. Academic performance, skills, motivation, maturity, attitude and potential will determine whether a student is offered a job. It is the student's responsibility to actively conduct a job search in addition to participation in the job search process operated by the co-op office. Once a student accepts a co-op job offer (verbally or written), his/her job search will end and access to co-op jobs will be removed for that term. Students that do not successfully obtain a co-op work term are expected to continue with their academic studies. The summer term is the exception to this rule. Students should also note that hiring priority is given to Canadian citizens for co-op positions in the Federal Government of Canada.

Registering in Co-op Courses

Students will be registered in a Co-op Work Term course while at work. The number of Co-op Work Term courses that a student is registered in is dependent upon the number of four-month work terms that a student accepts.

While on a co-op work term students may take a maximum of 0.5 credit throughout each four-month co-op work term. Courses must be scheduled outside of regular working hours.

Students must be registered as full-time before they begin their co-op job search (2.0 credits). All co-op work terms must be completed before the beginning of the final academic term. Students may not finish their degree on a co-op work term.

Work Term Assessment and Evaluation

To obtain a Satisfactory grade for the co-op work term students must have:

1. A satisfactory work term evaluation by the co-op employer;
2. A satisfactory grade on the work term report.

Students must submit a work term report at the completion of each four-month work term. Reports are due on the 16th of April, August, and December and students are notified of due dates through their Carleton email account.

Workplace performance will be assessed by the workplace supervisor. Should a student receive an unsatisfactory rating from their co-op employer, an investigation by the co-op program manager will be undertaken. An unsatisfactory employer evaluation does not preclude a student from achieving an overall satisfactory rating for the work term.

Graduation with the Co-op Designation

In order to graduate with the co-op designation, students must satisfy all requirements for their degree program in addition to the requirements according to each co-op program (i.e. successful completion of three or four work terms).

Note: Participation in the co-op option will add up to one additional year for a student to complete their degree program.

Voluntary Withdrawal from the Co-op Option

Students may withdraw from the co-op option of their degree program during a study term ONLY. Students at work may not withdraw from the work term or the co-op option until s/he has completed the requirements of the work term.

Students are eligible to continue in their regular academic program provided that they meet the academic standards required for continuation.

Involuntary or Required Withdrawal from the Co-op Option

Students may be required to withdraw from the co-op option of their degree program for one or any of the following reasons:

1. Failure to achieve a grade of SAT in COOP 1000
2. Failure to pay all co-op related fees
3. Failure to actively participate in the job search process
4. Failure to attend all interviews for positions to which the student has applied
5. Declining more than one job offer during the job search process
6. Continuing a job search after accepting a co-op position
7. Dismissal from a work term by the co-op employer
8. Leaving a work term without approval by the Co-op manager
9. Receipt of an unsatisfactory work term evaluation
10. Submission of an unsatisfactory work term report

Standing and Appeals

The Co-op and Career Services office administers the regulations and procedures that are applicable to all co-op program options. All instances of a student's failure during a work term or other issues directly related to their participation in the co-op option will be reported to the academic department.

Any decision made by the Co-op and Career Services office can be appealed via the normal appeal process within the University.

International Students

All International Students are required to possess a Co-op Work Permit issued by Immigration, Refugees and Citizenship Canada before they can begin working. It is illegal to work in Canada without the proper authorization. Students will be provided with a letter of support to

accompany their application. Students must submit their application for their permit before being permitted to view and apply for jobs on the Co-op Services database. Confirmation of a position will not be approved until a student can confirm they have received their permit. Students are advised to discuss the application process and requirements with the International Student Services Office.

B.Sc. Honours Biotechnology: Co-op Admission and Continuation Requirements

- Maintain full-time status in each study term (2.0 credits);
- Be eligible to work in Canada (for off-campus work)
- Have successfully completed COOP 1000 [0.0]

Co-operative Education - Bachelor of Science

The following programs in the Bachelor of Science Honours offer a co-operative education option:

Applied Physics, Biochemistry (including computational), Bioinformatics, Biology (including computational), Biotechnology, Chemistry (including computational), Earth Sciences, Environmental Science, Food Science and Nutrition, Geomatics, Neuroscience, Neuroscience and Mental Health, Physical Geography and Physics.

Students in all streams of the Bachelor of Science must successfully complete three (3) work terms to obtain the co-op designation.

Co-op Admission and Continuation Requirements for Students in the Bachelor of Science

For admission to and continuation in the co-op option, all students must:

- Maintain full-time status in each study term (2.0 credits);
- Be eligible to work in Canada (for off-campus work)
- Have successfully completed COOP 1000

Program-Specific Admission and Continuation Requirements:

Applied Physics, Biochemistry (including computational), Bioinformatics, Biology (including computational), Biotechnology, Chemistry (including computational), Earth Sciences, Environmental Science, Neuroscience, Neuroscience and Mental Health and Physics:

1. Completion of 5.0 or more credits at Carleton University;
2. Registered as a full-time student in the Bachelor of Science Honours degree program;
3. Obtained and maintained a major CGPA of 8.0 or higher and an overall CGPA of 6.50 or higher

Food Science and Nutrition

1. Registered as a full-time student in the Bachelor of Science Honours in Food Science and Nutrition;
2. Obtained and maintained a major CGPA of 9.0 or higher and an overall CGPA of 7.5 or higher in the first three years of academic study
3. Have obtained third-year standing;
4. Successfully completed, by the start date of the first work term, at least 2.0 credits from the following list of courses: FOOD 3001, FOOD 3002, FOOD 3003, FOOD 3004, and FOOD 3005

Geomatics and Physical Geography:

1. Registered in the Bachelor of Science (Honours) Programs in Physical Geography or Geomatics;
2. Obtained and maintained an overall minimum CGPA of 9.5 and a major CGPA of 9.5;
3. Have obtained third-year standing;
4. Successfully completed, by the start-date of the first work term:
   a. the required second-year methods courses in their program (GEOG/ENST 2005, GEOG/ENST 2006)
   b. the required field course in their program (ENST 3900/GEOG 3000/GEOG 3010/GEOG 3030)
5. Be registered as a full-time student.

Co-op Work Term Courses

Physics, Applied Physics, Biology and Physics, Chemistry and Physics, Mathematics and Physics	
PHYS 3999 [0.0]	Co-operative Work Term Report
Biochemistry and Computational Biochemistry	
BIOC 3999 [0.0]	Co-operative Work Term
Biochemistry and Biotechnology, Bioinformatics, Biology, Biotechnology, Computational Biology, Biology and Physics	
BIOL 3999 [0.0]	Co-operative Work Term Report
Chemistry, Chemistry and Physics, Computational Chemistry	
CHEM 3999 [0.0]	Co-operative Work Term
Earth Sciences	
ERTH 3999 [0.0]	Co-operative Work Term
Food Science	
FOOD 3999 [0.0]	Co-operative Work Term
Environmental Science	
ENSC 3999 [0.0]	Co-operative Work Term
Geomatics	
GEOM 3999 [0.0]	Co-operative Work Term
Neuroscience and Neuroscience Mental Health	
NEUR 3999 [0.0]	Co-operative Work Term
Physical Geography	
GEOG 3999 [0.0]	Co-operative Work Term

Work-Study Patterns

Applied Physics, Biochemistry, Bioinformatics, Biology, Biotechnology, Chemistry, Computational Biochemistry, Computational Biology, Computational Chemistry, Earth Sciences, Environmental Science, Neuroscience, Neuroscience and Mental Health, Physics

Year 1		Year 2		Year 3		Year 4		Year 5	
Term	Pattern	Term	Pattern	Term	Pattern	Term	Pattern	Term	Pattern
Fall	S	Fall	S	Fall	S	Fall	*W/S	Fall	S
Winter	S	Winter	S	Winter	S	Winter	*W/S	Winter	S
Summer	**O/W	Summer	*W	Summer	O/W	Summer	O/W		

Food Science and Nutrition

Year 1		Year 2		Year 3		Year 4		Year 5	
Term	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**
Fall		Fall	S	Fall	S	Fall	W/S	Fall	S
Winter		Winter	S	Winter	S	Winter	W/S	Winter	S
Summer		Summer		Summer	O/W	Summer	O/W		

Physical Geography, Geomatics

Year 1		Year 2		Year 3		Year 4		Year 5	
Term	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**	**Term**	**Pattern**
Fall	S	Fall	S	Fall	S	Fall	S/W	Fall	O
Winter	S	Winter	S	Winter	S	Winter	S/W	Winter	S
Summer		Summer		Summer	W	Summer	S/W		

Legend
S: Study
W: Work
O: Optional
***** indicates recommended work study pattern
****** student finds own employer for this work-term.

Admissions Information

Admission Requirements are for the 2021-22 year only, and are based on the Ontario High School System. Holding the minimum admission requirements only establishes eligibility for consideration. The cut-off averages for admission may be considerably higher than the minimum. See also the **General Admission and Procedures** section of this Calendar. An overall average of at least 70% is normally required to be considered for admission. Some programs may also require specific course prerequisites and prerequisite averages and/or supplementary admission portfolios. Higher averages are required for admission to programs for which the demand for places by qualified applicants exceeds the number of places available. The overall average required for admission is determined each year on a program by program basis. Consult admissions.carleton.ca for further details.

Note: Courses listed as *recommended* are not mandatory for admission. Students who do not follow the recommendations will not be disadvantaged in the admission process.

Degrees

- B.Sc. (Honours)
- B.Sc. (Major)
- B.Sc.

Admission Requirements

B. Sc. Honours Program

First Year

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. For most programs including Biochemistry, Bioinformatics, Biotechnology, Chemistry, Combined Honours in Biology and Physics, Chemistry and Physics, Computational Biochemistry, Food Science, Nanoscience, Neuroscience, Neuroscience and Mental Health, and Psychology, the six 4U or M courses must include Advanced Functions and two of Biology, Chemistry, Earth and Space Sciences or Physics. (Calculus and Vectors is strongly recommended).

Specific Honours Admission Requirements

For the Honours programs in Earth Sciences, Environmental Science, Geomatics, Interdisciplinary Science and Practice, and Physical Geography, Calculus and Vectors may be substituted for Advanced Functions.

For the Honours programs in Physics and Applied Physics and for double Honours in Mathematics and Physics, Calculus and Vectors is required in addition to Advanced Functions and one of 4U Physics Chemistry, Biology, or Earth and Space Sciences. For all programs in Physics, 4U Physics is strongly recommended.

For the Combined Honours program in Chemistry and Computer Science, 4U Chemistry and Calculus and Vectors are strongly recommended.

For Honours in Psychology, a 4U course in English is recommended.

For Honours in Environmental Science, a 4U course in Biology and Chemistry is recommended.

Advanced Standing

For entry to an Honours program after the completion of 5.0 included credits, a student must have a major CGPA of 5.50 or higher, an overall CGPA of 4.50 or higher and the recommendation of the Honours department or committee. A student beginning the final 10.0 credits towards an Honours degree must present a major CGPA of 6.00 or higher, an overall CGPA of 5.00 or higher and the recommendation of the Honours department or committee. A student beginning the final 5.0 credits towards an Honours degree must present a major CGPA of 6.50 or higher and an overall CGPA of 5.00 or higher, as calculated for graduation. Advanced standing will be granted for studies undertaken elsewhere when these are recognized as the equivalent of subjects offered at Carleton University.

B.Sc. Major Program

B.Sc. Program

First Year

The Ontario Secondary School Diploma (OSSD) or equivalent including a minimum of six 4U or M courses. The six 4U or M courses must include Advanced Functions and two of Calculus and Vectors, Biology, Chemistry, Earth and Space Science or Physics (Calculus and Vectors is strongly recommended). For the B.Sc. Major in Physics. 4U Physics is strongly recommended. Equivalent courses may be substituted between the old and new Ontario mathematics curriculum.

Advanced Standing

For entry to a B.Sc. or B.Sc. Major program after the completion of 5.0 included credits, a student must have a major and core CGPA of 3.50 or higher and an overall CGPA of 3.50 or higher. A student beginning the final 5.0 credits towards a B.Sc. or B.Sc. Major degree must present a major and core CGPA of 4.00 or higher and an overall CGPA of 4.00 or higher, as calculated for graduation. Advanced standing will be granted for studies

undertaken elsewhere when these are recognized as the equivalent of subjects offered at Carleton University.

Co-op Option

Direct Admission to the First Year of the Co-op Option

Applicants must:

1. meet the required overall admission cut-off average and prerequisite course average. These averages may be higher than the stated minimum requirements;
2. be registered as a full-time student in the Bachelor of Science Honours program;
3. be eligible to work in Canada (for off-campus work placements).

Note that meeting the above requirements only establishes eligibility for admission to the program. The prevailing job market may limit enrolment in the co-op option.

Note: continuation requirements for students previously admitted to the co-op option and admission requirements for the co-op option after beginning the program are described in the Co-operative Education Regulations section of this Calendar.