

Interdisciplinary Science and Practice

This section presents the requirements for programs in:

- Interdisciplinary Science and Practice B.Sc. Honours
- Interdisciplinary Science and Practice B.Sc.

Interdisciplinary Science and Practice B.Sc. Honours (20.0 credits)

A. Credits Included in the Major CGPA (10.0 credits)

1. 4.0 credits in: 4.0

ISAP 1001 [0.5] Introduction to Interdisciplinary Science

ISAP 1002 [0.5] Seminar in Interdisciplinary Science

ISAP 2001 [0.5] Foundations in Critical Inquiry

ISAP 2002 [0.5] Research Principles for Interdisciplinary Science

ISAP 3001 [0.5] Principles and Applications in Data Analysis

ISAP 3002 [0.5] Applications in Interdisciplinary Research

ISAP 3003 [0.5] Science Communication

ISAP 3004 [0.5] Science Policy

2. 1.0 credit from: 1.0

ISAP 4906 [1.0] Capstone Course - Group Research Project

ISAP 4907 [1.0] Capstone Course - Research Essay

ISAP 4908 [1.0] Capstone Course - Individual Research Project

3. 1.0 credit in: 1.0

COMP 1005 [0.5] Introduction to Computer Science I

STAT 2507 [0.5] Introduction to Statistical Modeling I

4. 0.5 credit from: 0.5

MATH 1007 [0.5] Elementary Calculus I

MATH 1107 [0.5] Linear Algebra I

5. 0.5 credit from: 0.5

COMP 1006 [0.5] Introduction to Computer Science II

STAT 2509 [0.5] Introduction to Statistical Modeling II

6. 1.0 credit from the Faculty of Science at the 2000 level or higher 1.0

7. 2.0 credits from the Faculty of Science at the 3000 level or higher 2.0

B. Credits Not Included in the Major CGPA (10.0 credits)

8. 1.0 credit in: 1.0

ECON 1001 [0.5] Introduction to Microeconomics

ECON 1002 [0.5] Introduction to Macroeconomics

9. 2.0 credits in Approved Experimental Science Courses as defined in the Regulations for the Bachelor of Science 2.0

10. 2.0 credits from the Faculty of Science at the 2000 level or higher 2.0

11. 2.0 credit in Approved courses outside the Faculties of Science and Engineering and Design, as defined in the Regulations for the Bachelor of Science. Note: students in the ISAP program may not use NSCI 1000 in this category. 2.0

12. 3.0 credits in free electives 3.0

13. Students are required to complete one minor from the Faculty of Science. A second minor (from any faculty, including Science) is encouraged. Students should consult with their academic advisor to ensure compliance with this requirement.

Total Credits 20.0

Interdisciplinary Science and Practice B.Sc. (15.0 credits)

A. Credits Included in the Major CGPA (8.0 credits)

1. 4.0 credits in: 4.0

ISAP 1001 [0.5] Introduction to Interdisciplinary Science

ISAP 1002 [0.5] Seminar in Interdisciplinary Science

ISAP 2001 [0.5] Foundations in Critical Inquiry

ISAP 2002 [0.5] Research Principles for Interdisciplinary Science

ISAP 3001 [0.5] Principles and Applications in Data Analysis

ISAP 3002 [0.5] Applications in Interdisciplinary Research

ISAP 3003 [0.5] Science Communication

ISAP 3004 [0.5] Science Policy

2. 1.0 credit in: 1.0

COMP 1005 [0.5] Introduction to Computer Science I

STAT 2507 [0.5] Introduction to Statistical Modeling I

3. 0.5 credit from: 0.5

MATH 1007 [0.5] Elementary Calculus I

MATH 1107 [0.5] Linear Algebra I

4. 0.5 credit from: 0.5

COMP 1006 [0.5] Introduction to Computer Science II

STAT 2509 [0.5] Introduction to Statistical Modeling II

5. 1.0 credit from the Faculty of Science at the 2000 level or higher 1.0

6. 1.0 credit from the Faculty of Science at the 3000 level or higher 1.0

B. Credits Not Included in the Major CGPA (7.0 credits)

7. 1.0 credit in: 1.0

ECON 1001 [0.5] Introduction to Microeconomics

ECON 1002 [0.5] Introduction to Macroeconomics

8. 2.0 credits in Approved Experimental Science Courses as defined in the Regulations for the Bachelor of Science 2.0

9. 1.0 credit from the Faculty of Science at the 2000 level or higher 1.0

10. 1.0 credit in Approved courses outside the Faculties of Science and Engineering and Design, as defined in the Regulations for the Bachelor of Science. Note: students in the ISAP program may not use NSCI 1000 in this category. 1.0

11. 2.0 credits in free electives 2.0

12. Students are required to complete one Minor from the Faculty of Science. A second Minor from outside the Faculty of Science may be possible. Students should consult with their academic advisor to ensure compliance with this requirement.

Total Credits 15.0

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:

- 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**
- 2.0 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):

- 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.
- 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 EARTH 2415 which may be used only as a free elective for any B.Sc. program. Students in Earth Sciences programs may use EARTH 2401, EARTH 2402, and EARTH 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. Interdisciplinary Science and Practice: 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]

In addition to the following:

1. Registered as a full-time student (2.0 credits) in the Bachelor of Science Honours in Interdisciplinary Science and Practice;
2. Successfully completed, by the start date of the first work term, the following 2.0 credits: ISAP 3001, ISAP 3002, ISAP 3003, ISAP 3004.
3. Have obtained third-year standing;
4. 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;

B.Sc. Honours Interdisciplinary Science and Practice students must successfully complete three (3) work terms to obtain the co-op designation.

Work Term Course: ISAP 3999

Work/Study Pattern:

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	Fall	S
Winter	S	Winter	S	Winter	S	Winter	W	Winter	S
Summer		Summer		Summer	W	Summer	W/S		

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.

Interdisciplinary Science and Practice (ISAP) Courses

ISAP 1001 [0.5 credit]

Introduction to Interdisciplinary Science

What is interdisciplinarity and what are the challenges and opportunities of collaboration within and across disciplines in science and beyond? Topics include types of biases, public datasets and science communication. Lectures and discussion three hours per week.

ISAP 1002 [0.5 credit]

Seminar in Interdisciplinary Science

Exploring the role of interdisciplinarity in discovery and innovation, and discussion of selected issues facing society and the role of science. Topics include finding information, collaboration and science communication tools.

Prerequisite(s): ISAP 1001.

Seminar three hours per week.

ISAP 2001 [0.5 credit]

Foundations in Critical Inquiry

What is science and the scientific method? Topics include the scientific method, credible sources of information, knowledge gaps, the impact of scientific discoveries, and discussion of their local and global implications.

Prerequisite(s): ISAP 1002 or permission of the Institute.

Lecture three hours per week, workshop two hours per week.

ISAP 2002 [0.5 credit]

Research Principles for Interdisciplinary Science

Exploring how research is conducted. Topics include publicly available databases, the role of communication in research, stakeholders and participants, and the process of identifying knowledge gaps and developing research questions.

Prerequisite(s): ISAP 2001 or permission of the Institute.

Lecture three hours per week.

ISAP 3001 [0.5 credit]

Principles and Applications in Data Analysis

Development of strategies for obtaining and analyzing data. Topics include: survey of publicly available science-data resources; identification of coincidental, correlational and causal relationships; statistical data-analysis techniques; concepts of risk and error propagation in measured and calculated values. Applications in the physical and biological sciences.

Prerequisite(s): ISAP 2002, COMP 1005 and STAT 2507 or permission of the Institute.

Lecture three hours per week, workshop two hours per week.

ISAP 3002 [0.5 credit]

Applications in Interdisciplinary Research

Application of skills from Interdisciplinary Science and Practice (ISAP) courses to develop a research proposal. Topics include: research ethics; identification of stakeholders; inclusive consultation, collaboration and dissemination strategies.

Prerequisite(s): ISAP 2002 or permission of the Institute.

Lecture three hours per week, workshop two hours per week.

ISAP 3003 [0.5 credit]**Science Communication**

How is science perceived and how has science been communicated? Students will use case studies to assess examples of science communication with varying outcomes. Topics include the principles of effective science communication, the range of tools available, and knowing the audience.

Includes: Experiential Learning Activity

Prerequisite(s): ISAP 2002 or permission of the Institute.

Lecture and seminar three hours per week.

ISAP 3004 [0.5 credit]**Science Policy**

Exploration of how science-related policy is developed and the impact of policy on science. Topics include policy frameworks, stakeholder roles, power relationships, commercialization and the funding of science.

Prerequisite(s): ISAP 3003 or permission of the Institute.

Lecture and seminar three hours per week.

ISAP 3700 [0.5 credit]**Topics in Interdisciplinary Science**

Specific topics of current interest. Topics may vary from year to year.

Includes: Experiential Learning Activity

Prerequisite(s): Second year standing in the

Interdisciplinary Science and Practice program or permission of the Institute.

Seminar/workshop three hours per week.

ISAP 3999 [0.0 credit]**Co-operative Work Term**

Includes: Experiential Learning Activity

ISAP 4700 [0.5 credit]**Topics in Interdisciplinary Science**

Specific topics of current interest. Topics may vary from year to year.

Includes: Experiential Learning Activity

Prerequisite(s): Third year standing in the Interdisciplinary Science and Practice program or permission of the Institute.

Seminar three hours per week.

ISAP 4901 [0.5 credit]**Directed Studies**

Independent or group study, open to third- and fourth-year students to explore a particular topic, in consultation with a Faculty supervisor. May include directed reading, written assignments, tutorials, laboratory or field work.

Includes: Experiential Learning Activity

Prerequisite(s): third-year standing in the Interdisciplinary Science and Practice (ISAP) program and permission of the instructor.

ISAP 4906 [1.0 credit]**Capstone Course - Group Research Project**

Students will collaborate on a project that addresses a real-world issue in a team environment. Focus includes: design and completion of a research project; development of communication, critical inquiry, data analysis and research skills; and the opportunity to develop initiative, creativity and self-reliance.

Includes: Experiential Learning Activity

Precludes additional credit for ISAP 4907, ISAP 4908.

Prerequisite(s): fourth-year standing in the Interdisciplinary Science and Practice (ISAP) Honours program and permission of the Institute.

Lecture, seminar and workshop four hours per week, as scheduled by the instructor.

ISAP 4907 [1.0 credit]**Capstone Course - Research Essay**

A substantial, independent essay or research proposal-based critical review and research proposal, using library, database and/or bioinformatic resources, under the direct supervision of the instructor. Topics include identification and critical review of resources, development of writing skills and formulation of research question and strategy.

Includes: Experiential Learning Activity

Precludes additional credit for ISAP 4906, ISAP 4908.

Prerequisite(s): fourth-year standing in the Interdisciplinary Science and Practice (ISAP) Honours program.

Lecture, seminar and workshop four hours per week, as scheduled by the instructor.

ISAP 4908 [1.0 credit]**Capstone Course - Individual Research Project**

An independent research project under the direct supervision of a faculty adviser. Evaluation is based on a written thesis and a poster presentation.

Includes: Experiential Learning Activity

Precludes additional credit for ISAP 4906, ISAP 4907.

Prerequisite(s): fourth-year standing in the Interdisciplinary Science and Practice (ISAP) Honours program, a major CGPA of 9.0 or higher, and permission of the Institute.

Lectures and discussion as scheduled by the course coordinator; other hours as arranged with the faculty advisor.