COUNCIL OF THE FACULTY OF SCIENCE

NOTICE OF MEETING

October 8, 2024

3pm – 4:30pm

via Zoom

AGENDA

1. Call to Order and Approval of Agenda
2. Chair's Remarks
3. Approval of September 10 2024 Minutes
4. Business Arising
5. Inquiries and Communications
   > Senate Synopsis September 26 2024
6. Dean's Remarks
7. Associate Dean and Head of Bethune College Remarks
8. Dean Search
   a) Institutional and Faculty-level decanal search procedures – Muhammad Yousaf
   b) Motion to begin the search for a new Dean as soon as practicable - Pat Hall
9. Reports from Science Representatives on Senate Committees
10. Science Student Caucus Items
11. Reports from Standing Committees of Council
    a) Executive Committee:
    > Ratification and Call for Nominations for Senate and Standing Committee of Council
    > Vacancies report on the Standing Committees of FSc Council
    b) Undergraduate Curriculum Committee:
    > Consent agenda items
12. Other Business
    a) Safeguarding research and the new requirements for submitting grant applications starting May 1 2024 - Rebecca Irwin, Associate Director Research Security.

COUNCIL OF THE FACULTY OF SCIENCE

MINUTES

September 10, 2024

3pm – 4:30pm

via Zoom

MINUTES

1. **Call to Order and Approval of Agenda**
   Chair of Council, M. Yousaf, called the meeting to order and a motion was moved, seconded and carried to approve the Agenda.
2. **Chair's Remarks**
   M. Yousaf welcomed council to the 2024-25 academic year.
3. **Approval of May 14, 2024 Minutes**
   A motion was moved, seconded and carried to approve the Minutes.
4. **Business Arising**
   There was none.
5. **Inquiries and Communications**
   > June 27, 2024
   > Cyclical Program Reviews
6. **Dean's Remarks**
   Dean Wang welcomed the council and new faculty members, extending special thanks to the new Chair, M. Yousaf, for his leadership. He highlighted the significant achievement of reaching a new collective agreement between YUFA and York University.

   The Summer Undergraduate Research Conference was recognized as a major success and celebration.

   The Science Engagement Team set a new record for summer camp registrations—thank you to Kim Tran and Cora Reist for their outstanding work.

   Throughout the summer, the Executive Team held planning meetings focused on addressing low enrollment in courses and programs, improving student retention, and refining research strategies and priorities.

   Hovig Kouyoumdjian, Associate Dean of Curriculum & Pedagogy, will be transitioning to the Markham campus as of September 1, 2024. His responsibilities will be distributed between Mike Scheid (Associate Dean, Students) and Vivian Saridakis

(Associate Dean, Research & Partnerships).

7. Associate Dean and Head of Bethune College Remarks

a) Associate Dean, Faculty Affairs

G. Audette:

He shared slides highlighting the following:

New Faculty Members:
The Dean welcomed new faculty members joining the Departments of Chemistry, Mathematics & Statistics, and Physics & Astronomy.

Equity, Diversity, and Inclusion (EDI):
The University has updated its self-identification process, and new faculty are encouraged to complete the survey.

2024-25 Faculty Searches:
Biology is focused on the Connected Minds initiative,
with a specific focus on Collective Action: Animal Social Behaviour.

Faculty Council Memberships:
The Dean noted the vacancy for Vice-Chair of the Faculty Council and encouraged interested members to consider applying.

Tenure & Promotion:
Key upcoming deadlines for tenure and promotion submissions were highlighted.

CUPE 3903 Workload Documents:
Changes to the process following the recent CUPE 3903 Collective Agreement negotiations were discussed, and updated information has been sent to Department Chairs for distribution to faculty members.

Retirement Notice:
In accordance with Article 14.02(a) of the YUFA Collective Agreement, faculty are reminded that a 9-month notice period is required for retirement.

b) Associate Dean, Research & Partnerships

V. Saridakis:

She shared slides with fall rush application deadlines and reminded council of the weekly newsletter to faculty that highlights funding opportunities.

CONGRATULATIONS:
Jennifer Porat, PHD – Governor General Gold Medal
Elizabeth Clare – Royal Society of Canada
Sandra Rehan - York Research Chair
Jeff Schall – Canada Research Chair
Joel Zylberberg – Canada Research Chair

c) Associate Dean, Students

M. Scheid:

He thanked Eva Hughes, Assistant Dean of Strategic Enrolment Management, her team and departments for their collaborative efforts during 2024-25 enrolment and conversion.

The Ontario University Fair is scheduled for October 5 & 6 and Fall Campus Day is scheduled for November 2. Please consider participating!

He thanked Susy Ribeiro and the Science Academic Advising team for their dedication to helping transitioning new students and supporting continuing students.

Ontario High School applicants have reached 95% of the target.
International Student applicants have reached 54% of the target.

He spoke of the considerably growth in the COOP program over the past several years. There are 74 students admitted this year which is a 42% growth over last years.

Please be mindful of the new Academic Honesty policy effective September 1 2024.

d) Head of Bethune College

P. Wilson:

Claire and Taline worked to improve the Bethune College garden by planting more sustainably and helped the SHAD Program.

Academic Orientation was offered in a new format this year and it was a success. Thank you to all Faculty members that helped.

Science Student Caucus nominations are underway.

8. Reports from Science Representatives on Senate Committees

There was none.

9. Report from Student Caucus Representative

10. Reports from Standing Committees of Council

a) Executive Committee:

> Ratification and Call for Nominations for Senate and Standing Committee of Council

A motion was moved, seconded and carried to ratify all nominations to the Standing Committees of Council.

> Vacancies report on the Standing Committees of FSc Council

M.Yousaf noted the vacancies that remain.

b) Appeals Committee:
> Annual Report

c) Committee on Examinations and Academic Standards:
> Annual Report

d) Committee on Teaching & Learning:
> Annual Report

e) Graduate Curriculum Committee:
> Annual Report

f) Petitions Committee:
> Annual Report

g) Research and Awards Committee:
> Annual Report

h) Senate T & P Review Committee:
> Annual Report

i) Undergraduate Curriculum Committee:
> Annual Report
> Consent agenda items

11. **Other Business**

a) Science Recruitment Process - Lisa Philipps, Provost & Vice-President Academic

Lisa Philipps discussed the topic of the future Dean search with Faculty Council.

b) Faculties of the Future Action Plan - Lisa Philipps, Provost & Vice-President Academic

Lisa Philipps lead a discussion surrounding the Faculties of the Future Action Plan and faculty were given the opportunity to ask questions. .

Meeting Adjournment

A motion was moved, seconded and carried to adjourn the meeting.

FACULTY COUNCIL ATTENDANCE

SEPTEMBER 10 2024

Aleksandra Wiscicka
Andrew McEachern
Anna Burtin
Anne Ralph
Bill Kim
Birgit Schwarz
Brad Sheeller (Non-voting Guest)
Carl Wolfe
Christopher Caputo
Cora Reist
Coral Hillel
Delwar Hossain
Delwar Hossain (Staff Rep# FSc) (Delwar Hossain)
Elaina Hyde
Eva Hughes
Gaelle Luabeya
Gerald Audette
Gino Lavoie
Ha Au (Delwar Hossain)
Helen McLellan
Hovig Kouyoumdjian
Hugo Chen
Iain Moyles
Irina Ovis
Israt Mim
jade atallah
James Elwick
Jane Heffernan
Jennifer van Wijngaarden
Jerusha Lederman
Jessica Wyman
Jessica Wyman (she/her) (Jessica Wyman)
Jill Lazenby
Joanne Sequeira
Joe Tran
Kevin Patel
Khansa Cheema
Kimberly Tran
Lesley Milley
Lisa Philipps
Maggie Xu
Mandy Ramnaraine
margaret mroziewicz
Mark Bayfield
Mark Vicari
MARTIN ROMERO
Meghan Christie
Melissa Hughes
Michael Haslam
Mike Scheid
Mostofa
muhammad yousaf
Neal Madras
Pat Hall
Patricia Lakin-Thomas
Patrick Ingram
Paul Szeptycki
Paula Wilson
Robert Tsushima
rui wang
Ryan Hili
Sibonile Siyakatshana
Sihat Salam
Stephen Watson
Sylvie Morin
Tamara Kelly
Taylor Cosby
Thomas Baumgartner
Tianna McFarlane
Tiffany Guan
Tom Kirchner
Trevor VandenBoer
Violeta Gotcheva
Vivian Saridakis
Wendy Booth

The Senate of York University

Meeting Synopsis

The 709th Meeting of Senate held on Thursday, 26 September 2024

Remarks

Chair

The Chair, Lauren Sergio, welcomed Senators to the 709th meeting of Senate. Senator David Peters was welcomed as the incoming Interim Provost and Vice-President Academic, and thanks and appreciation were extended to Senator Lisa Philipps for her contributions to Senate and governance during her term as Provost and Vice-President Academic.

President

The President spoke to various topics, including the upcoming release of the President's Annual Report, updates on the university's financial challenges, advancements in research and the DEDI strategy, the development of a medical school, innovations in 21st-century learning, sustainability initiatives, the opening of the Markham campus, and the impact of provincial and federal policy decisions on tuition, international student caps, and enrollment-related budget issues.

Approvals

Senate approved a recommendation of the Academic Standards, Curriculum and Pedagogy Committee to authorize:

- the granting of degrees at the University's convocations held in Fall 2024 and Spring 2025, and individually to students at any point during the year who have fulfilled the degree program requirements for receipt of the degrees and the granting of diplomas and certificates at the University's Convocations held in Fall 2024 and Spring 2025, and individually to students at any point during the year who have fulfilled the requirements for receipt of diplomas and certificates;
- the forwarding of recommendations for certification by the Faculty of Education, to the Ontario College of Teachers, for those students who have been deemed "recommended for certification" by the Council of the Faculty of Education.

York University Senate

Committee Information Items

Executive Committee

The Executive Committee's information items included the following:

- its approval of Senate Committee members nominated by Faculty Councils and those nominated by student Senators
- the results of the Senator and Senate committee member surveys conducted in June and July, along with actions that will be taken to address key findings
- revisions to the Structure, Rules and Procedures of the Faculty of Graduate Studies Faculty Council to integrate considerations of DEDI principles in a Council Committee's mandate and enhance clarity of committee reporting functions.

- Preliminary discussion of its priorities for Executive for the 2024-2025 academic year.
- Continued discussion of possible options to address the issues and concerns stemming from a motion submitted by senators recommending the creation of a Senate Finance and Budget Advisory Committee.
- Actions taken under summer authority
- Senate meeting dates and planned modes of delivery of them for the 2024-2025 academic year.

Academic Policy, Planning and Research (APPRC)

APPRC's information items included the following:

- continued discussion of its 2024-2025 committee priorities.
- the decision to extend the 2020-2025 University Academic Plan by one-year, to June 2026, with a retrospective progress report towards the current priorities to be prepared this academic year to guide the development of the succeeding UAP.
- Ongoing developments in the planning for the establishment of a school of medicine.
- A preliminary enrolment outlook for 2024-2025.
- Updates on the "Faculties of the Future" initiative to advance financial sustainability and the University's vision.
- recent research and innovation activities and success across the University.

York University Senate

Academic Standards, Curriculum and Pedagogy Committee

APPRC's information items included the following:

- An update on ongoing policy work, which includes making clarifying edits to the Academic Conduct Policy regarding implementation, and the continuation of work on the Attending Physician's Statement Policy, which was referred back to ASCP at the June Senate meeting. It is anticipated that these items would be brought back to Senate later in the term.
- ASCP reported that it had approved minor changes to degree requirements for the following programs:
    - FGS: Changes to Faculty of Graduate Studies Guidelines on Thesis/Dissertation Prizes, effective Fall 2024
    - FGS: Changes to Graduate Regulations on Courses and Grading – Academic Standing, effective Fall 2024
    - Lassonde: Updates to the guidelines, in the graduate academic calendar, on acceptable formats for the thesis and dissertations, effective F2024
    - Science: Change in program name from "Biophysics" to "Biomedical Physics", Bachelor of Science Specialized Honours degree program, effective F2025
- The Committee Chair reported on sub-committee membership for 2024-2025. Work is ongoing to populate its Coordination and Planning Sub-committee, which still has one remaining vacancy. The Committee reported that the Joint Sub-Committee on Quality Assurance was fully constituted with a complement of seven sitting members.

Additional Information about this Meeting

Please refer to the full Senate agenda of **26 September 2024** for details about the items reported.

Senate's next meeting will be held at **3:00 pm on Thursday, 24 October 2024.**

2024-2025 FSc Report on vacancies for Senate and FSc Standing Committees of Council

RATIFICATION OF NOMINATIONS

Undergraduate Curriculum Committee:
P. Wilson, Department of Biology (term 2024-2027)

2024-2025 FSc Report on vacancies for Senate and FSc Standing Committees

Committee	Rules of Faculty Council - membership	Meeting time / Membership	Term	
			From	To
Senate	According to the York University Secretariat based on the Senate Rules and Procedures governing the size and composition of Senate, the Faculty of Science shall have twelve members, including a minimum of two Chairs. According to The Rules of Council (Science), Faculty representation shall include the Director of Natural Science, three Department Chairs, and terms shall be for three years.	As per Senate website		
	Dean, Ex officio	R. Wang	Designated	
	Member at large	G. Audette	Designated	
	Member at large	E. Hamm	2024	2027
	Member at large	EJ Janse van Rensburg, Mathematics & Statistics	2022	2025
	Member at large	T. Kelly	2024	2027
	Member at large	J. Elwick, Science, Technology & Society	2022	2025
	Member at large	T. Kubiseski, Biology	2023	2026
	Member at large	V. Saridakis	2024	2027
	Department Chair	T. Kirchner, Department of Science, Physics & Astronomy	2024	2027
	Department Chair	J. van Wijngaarden, Department of Chemistry	2024	2027
	Department Chair	M. Haslam, Department of Mathematics & Statistics	2023	2026
	Director of NATS	R. Metcalfe, Dvision of Natural Science	Designated	
	Student representative	Yuna (Aria) Hwang	2023	2025
	Student representative	Shon Lazarev	2023	2025
Faculty Council	Chair of Council	M. Yousaf	2024	2025
Staff Representatives	Vice-Chair of Council	VACANT	2024	2025
		W. Booth	2024	2025
		D. Hossain	2024	2025
		M. Xu	2024	2025
FSc Reps on Senate Committees				
Senate Executive	1 member from FSc	T. Kelly	2024	2027
Academic Policy, Planning and Research Committee (APPRC)	1 member from FSc	G. Monette	2023	2026
ASCP (Academic Standards, Curriculum and Pedagogy Committee)	1 member from FSc	J. Elwick	2024	2027
Senate Tenure & Promotion	1 member from FSc	P. Wilson	2024	2027
Sub-Committee on Honorary Degrees & Ceremonials	1 member from FSc	VACANT	2024	2027
Executive Committee	The Executive Committee shall be chaired by the Chair of Council and include the Vice-Chair of Council, the Secretary of Council, and one member elected from each of Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy, and Science, Technology & Society/Natural Science, the Dean of the Faculty of Science (ex officio), one student member of Council, and one of the staff members elected to Council.	Executive Committee normally meets the first Tuesday of each month (September to May) from 3pm - 430pm		
	Chair of Council	M. Yousaf	2024	2025
	Vice-Chair of Council	VACANT	2024	2025
	Dean, Ex officio	R. Wang	Designated	
	Asst. Dean - SEM & SEP	E. Hughes	Designated	
	Staff representative	W. Booth	2024	2025
	Undergraduate Student Rep	VACANT	2024	2025
	Biology	M. Vicari	2023	2026
	Chemistry	C. Caputo	2024	2027
	Math & Stats	E. J Janse Van Rensburg	2022	2025
	Physics & Astronomy	E. Hyde	2024	2025
	Science, Technology & Society	VACANT	2024	2025
APPC	The Academic Policy and Planning Committee shall include the Dean or designate (*ex officio*), the Master of Norman Bethune College and one member elected from each of Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy, and Science, Technology & Society/Natural Science, one student member of Council, and one of the staff members elected to Council.	APPC will normally meet the last Thursday of each month (September to April) from 9:00 am - 10:30 am		
	Associate Dean, Faculty Affairs, Ex officio	G. Audette	Designated	
	Head of Bethune College	P. Wilson	Designated	
	Undergraduate Student Representative	VACANT	2024	2025
	Elected staff representative	M. Xu	2024	2025
	Biology	R. Schott	2023	2026
	Chemistry	R. Fournier	2023	2026
	Math & Stats	P. Szeptycki	2023	2026
	Physics & Astronomy	W. van Wijngaarden	2024	2025
	Science, Technology & Society	S. Domenikos	2022	2025
Undergraduate Curriculum Committee	The Curriculum Committee shall include the Dean and an Associate Dean (ex officio), the Chair or nominee from each teaching Division or Department, three members elected by Council and two student members of Council.	The Curriculum Committee will normally meet every last Tuesday of each month (September to April) from 9:00 - 10:30 am		
	Member at Large	VACANT	2023	2026
	Member at Large	Paula Wilson	2023	2026
	Dean, Ex officio	R. Wang	Designated	
	Undergraduate Student Rep	VACANT	2024	2025
	Undergraduate Student Rep	VACANT	2024	2025
	Biology	J. Atallah	2022	2025
	Chemistry	D. Jackson	2022	2025
	Math & Stats	M.W. Wong	2023	2026
	Physics & Astronomy	O. Mermut	2024	2025
	Science, Technology & Society	R. Metcalfe	2022	2025
	Member at Large	L. Robertson	2023	2026

2024-2025 FSc Report on vacancies for Senate and FSc Standing Committees

Committee	Rules of Faculty Council - membership	Meeting time / Membership	Term	
			From	To
CEAS	The Committee on Examinations and Academic Standards shall consist of an Associate Dean (*ex officio*), five members elected by Council from each of Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy and Science, Technology & Society/Natural Science, and one student member of Council.	CEAS will normally meet every alternate Wed / Thurs from 1:00 - 3:00 pm year round.		
	In addition to the above membership of the committee, Council shall elect an alternate member from each of the Departments specified above. The alternate member shall be the person polling the next highest number of votes to those elected to the committee from each Department. The alternate for the student member will be selected by the Science Student Caucus from one of its Members at Large. An alternate can only vote in the event that first elected members are not in attendance.			
	Associate Dean - Students, Ex officio	M. Scheid	Designated	
	Undergraduate Student Rep	VACANT	2024	2025
	Undergraduate Student Rep	VACANT	2024	2025
	Biology	A. Hilliker / ALT. VACANT	2023/2024	2026/2027
	Chemistry	P. Johnson & D. Jackson / ALT T. Mirkovic	2023/2023	2026/2026
	Math & Stats	VACANT, N.Purzitsky / ALT. Y. Gao	2021/2022	2025/2025
	Physics & Astronomy	C. Storry & E. Hyde / ALT. VACANT	2023/2023	2025/2025
	Science, Technology & Society	J. Webb / ALT. S. Domenikos	2023/2023	2026/2026
Petitions	The Petitions Committee for the purpose of hearing student petitions shall consist of an Associate Dean (*ex officio*), six members of Council, and two student members of Council. The Committee may divide the workload by splitting the Committee membership into two panels of four people each. A quorum shall consist of either (a) two faculty voting faculty members and one student member or (b) three voting faculty members.	Each panel meets once a month on Wednesday or Thursday from 2:30 pm - 4:00 pm		
	Associate Dean, Ex officio	M. Scheid	Designated	
	Undergraduate Student Rep	VACANT	2024	2025
	Undergraduate Student Rep	VACANT	2024	2025
	Member at Large	S. Morin	2023	2026
	Biology	C. Jang	2022	2025
	Chemistry	R. Fournier	2022	2025
	Physics & Astronomy	S. Jerzak	2023	2025
	Math & Stats	D. Liang	2022	2025
	Science, Technology & Society	J. Rogerson	2022	2025
	Member at Large	A. Mills	2023	2026
SRC T & P Committee	The Committee on Tenure and Promotions shall consist of one currently tenured member from each of Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy and Science, Technology & Society/Natural Science elected by Council, and one student member of Council. No member of the Committee shall be a member of another Tenure and Promotions Committee at any time during their tenure on this committee.	SRC T & P Committee will normally meet the last Friday of each month (September to May) from 9:00 am - 11:00 am in LUM 305B		
	In addition to the above membership of the committee, Council shall elect an alternate member from each of the Units mandated above. The alternate member shall be the person polling the next highest number of votes to those elected to the committee from each Department. The alternate for the student member shall be selected by the Science Student Caucus from one of its Members-at-Large on an annual basis. An alternate can only vote in the event that existing members are not in attendance.			
	Associate Dean - Faculty, Ex officio	G. Audette	Designated	
	Undergraduate Student	VACANT	2023	2024
	Biology	M. Bayfield/ ALT. VACANT	2023/2023	2026/2026
	Chemistry	A. Orellana/ ALT. S. Krylov	2023/2024	2026/2027
	Physics & Astronomy	C. Bergevin / ALT. M. George	2024/2024	2025/2025
	Math & Stats	Y.Gao / ALT Jianhong Wu	2024/2022	2027/2025
	Science, Technology & Society	E. Hamm / ALT. D. Lungu	2023	2026
CoTL	Currently, the Committee on Teaching and Learning shall consist of a minimum of two Faculty members from each department, the Associate Dean – Students, one Librarian, one staff member, one undergraduate student, and two graduate students, in addition to other members invited as provided for by the Rules. Graduate students and staff nominees will indicate their interest in serving on the committee in writing to the committee, who will then approve by majority vote.	CoTL normally meets every third Thursday of each month (September to May) from 10:00 am - 11:30 am		
	Associate Dean - Students, Ex officio	M. Scheid	Designated	
	Graduate Student Representative	Taylor Cosby	2024	2025
	Graduate Student Representative	Sihat Salam	2024	2025
	Undergraduate Student Representative	VACANT	2024	2025
	Stacie Science Library, Designated	Minglu Wang	Designated	
	IT Representative	V. Gotcheva	Designated	
	Teaching Commons Rep	Y. Su	Designated	
	Staff representative, Elected	D. Hossain	2024	2025
	Biology	L. Adriana Puentes Jacome	2023	2026
	Biology	J. Atallah	2023	2026
	Chemistry	T. Mirkovic	2023	2026
	Chemistry	D. Wilson	2024	2025
	Physics & Astronomy	N. Blinov	2023	2025
	Physics & Astronomy	C. Boukaré	2023	2025
	Math & Stats	J. Cao	2022	2025
	Math & Stats	VACANT	2023	2026
	Science, Technology & Society	C. Rozins	2024	2027
Committee on Research & Awards	The Committee on Research and Awards shall consist of one member elected by Council from each of Biology, Chemistry, Mathematics and Statistics, Science, Technology & Society/Natural Science, and Physics and Astronomy, one student member of Council and an Associate Dean (*ex officio*).	The Research & Awards Committee will meet when grants and awards need to be adjudicated.		
	Associate Dean - Research & Partnerships, ex officio	V. Saridakis	Designated	
	Undergraduate Student Representative	VACANT	2024	2025
	Graduate Student	Aysa Tajeri	2024	2025
	Biology	D. Golemi-Kotra	2023	2026
	Chemistry	S. Morin	2022	2025
	Physics & Astronomy	R. Kannan	2023	2025
	Math & Stats	H. Zhu	2023	2026
	Science, Technology & Society	H. Mialet	2023	2026
Appeals Committee	The Appeal Committee for the purpose of hearing student appeals shall consist of four elected faculty members from Science units, an Associate Dean (ex officio) and two student members of Council. A quorum shall consist of either (a) two faculty members and one student member or (b) three faculty members.	Meeting is held once a month and times are polled by the Committee Secretary.		
	Associate Dean - Faculty, ex officio	G. Audette	Designated	
	Undergraduate Student Representative	VACANT	2024	2025
	Undergraduate Student Representative	VACANT	2024	2025
	Member at Large	VACANT	2023	2026
	Biology	L. Donaldson	2023	2026
	Chemistry	L. Hébert	2023	2026
	Physics & Astronomy	S. Tulin	2023	2025
	Math & Stats	M.W. Wong	2023	2026
	Science, Technology & Society	D. Monaldi	2023	2026

2024-2025 FSc Report on vacancies for Senate and FSc Standing Committees

Committee	Rules of Faculty Council - membership	Meeting time / Membership	Term	
			From	To
Graduate Curriculum Committee	To provide broad review and commendation to Council via the Academic Policy and Planning Committee of all proposals received from Graduate Programs with respect to: New Course Proposals , Course Change Proposals, Minor Changes to Program/Graduate Diploma Academic Requirements, Major Modifications to Program/Graduate Diploma Academic Requirements, New Graduate Fields, New Graduate Diplomas, New Graduate Degree Programs The Graduate Education Committee shall consist of: - Associate Dean – Research & Graduate Education (ex officio) - Graduate Program Director (or designate who must be a member of the graduate program) of each Graduate Program in the Faculty of Science -one graduate student member from any Graduate Program within the Faculty of Science -one full-time faculty member from the Faculty of Health or Lassonde School of Engineering who is appointed to teach in any FSc graduate program - A member at large with knowledge of graduate programming, and experience with curriculum approvals at the Faculty-level. The Chair of the Committee is selected by the voting members of the Committee for a one-year term.	Meeting is held based on availability.		
	Associate Dean – Associate Dean Students (ex officio)	M. Scheid	Designated	
	Biology	J. Paluzzi	2023	2026
	Chemistry	R. Hili	2023	2026
	Physics & Astronomy	A. Muzzin	2023	2026
	Math & Stats	P. Ingram	2023	2026
	Science, Technology & Society	VACANT	2023	2026
	Member from Faculty of Health OR Lassonde	VACANT	2023	2026
	Member at Large	D. Golemi-Kotra	2023	2026
	Graduate student	Joe Tran	2024	2025
Committee on Equity, Diversity & Inclusion	The purpose of the Committee on Equity, Diversity & Inclusivity is to provide broad review and leadership to Council on matters of Equity, Diversity and Inclusivity issues with respect to: • Tenure and Promotions • Hiring and Retention of members form EDI groups • Approaches to addressing gender bias in the workplace • Research engaging equity recognized groups • Workload and service contributions of EDI members • EDI experiences in Teaching and Learning The Equity, Diversity and Inclusivity committee shall consist of: • Associate Dean, Faculty Affairs (ex officio) • Associate Dean,Research and Partnerships (ex officio) • One primary and one alternate member from each of Biology, Chemistry, Mathematics & Statistics, Physics & Astronomy and Science, Technology & Society. • Two graduate students or postdoctoral fellow/visitors (one primary and one alternate) from any graduate program within the Faculty of Science • One undergraduate student	Meeting is held the last Wednesday of every month.		
	Associate Dean - Faculty, ex officio	G. Audette	Designated	
	Associate Dean, Research & Partnerships (ex officio)	V. Saridakis	Designated	
	Undergraduate Student Representative	VACANT	2024	2025
	Graduate Student	Coral Hillel	2024	2025
	Graduate Student	Gaelle Nsamba Luabeya	2024	2025
	Biology	B. Schwarz	2024	2027
	Chemistry	C. Young	2023	2026
	Physics & Astronomy	P. Scholz	2023	2026
	Math & Stats	A. Woldegerima ALT A. Lumley	2022	2025
	Science, Technology & Society	VACANT	2024	2027

CURRICULUM COMMITTEE REPORT

JUNE 2024

The Faculty of Science Curriculum Committee has reviewed proposals for changes to course information and degree requirements and recommends to the Executive Committee that the following changes be submitted to Council for approval.

Details regarding these proposals (and other minor changes to Calendar/Repository course descriptions and prerequisites which were approved by the Committee but are not reported here) are included in the working papers of June 25, 2024 meeting of the Curriculum Committee, which are on file for your inspection in the Office of the Dean, with all members of the Curriculum Committee or by contacting the Secretary of the Committee at scicurri@yorku.ca

1.2 NATURAL SCIENCE: Proponent: Prof. Robin Metcalfe

1.2.1 New Course Proposal: NATS 1545 3.0 – Rocks and Resources

Passed with majority votes.

1.3 MATH FOR EDUCATION – Department of Mathematics and Statistics: Proponent: Prof. Andrew Skelton

1.3.1 Non-Major Modification: Changes to degree requirements for BSc. Programs, Honours, Specialized Honours, Major/Minor, Double Major, and Minor (increasing to the number of Major credits, change to list of required courses and housekeeping change).

Passed unanimously.

1.3.2 Non-Major Modification: Changes to degree requirements for BA Programs, Honours, Specialized Honours, Major/Minor, Double Major, and Minor (increasing to the number of Major credits, change to list of required courses and housekeeping change).

Passed unanimously.

1.3.3 Change to Existing Course: SC/MATH 3052 6.0 – Exploring Geometries – changes in pre-requisite, course number, credit value, and title.

1.3.4 New Course Proposal: SC/MATH 3700 3.0 – Mathematics Pedagogy Practicum

1.3.5 Change to Existing Course: SC/MATH 4400 6.0 – History of Mathematics – changes in course number and credit value.

Passed unanimously 1.3.3 – 1.3.5.

1.4 DATA SCIENCE – Department of Mathematics and Statistics: Proponent: Prof. Andrew Skelton

1.4.1 Non-Major Modification: Changes to degree course requirements for BSc. Honours.

Passed unanimously.

1.4.2 Non-Major Modification: Changes to degree course requirements for BA Honours.

Passed unanimously.

1.5 BIOLOGY: Proponent: Prof. Nicole Nivillac

1.5.1 Minor Modification: Changes to Academic Calendar: Replace BIOL 3071 3.0 and/or CHEM 3071 3.0 to BIOL 3075 3.0 and/or CHEM 3075 3.0 for the following programs:

- Biology (Biomedical Science) – Bachelor of Science – Honours
- Biology (Biomedical Science) – Bachelor of Science – Honours Major/Minor
- Biology (Biomedical Science) – Bachelor of Science – Specialized Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours Major/Minor
- Biology (Biotechnology) - Bachelor of Science – Specialized Honours

Passed unanimously.

1.5.3 Minor Modification: Changes to Academic Calendar: Replace SC/BIOL 3001 3.0, SC/ENVB 3001 3.0, SC/BIOL 3002 3.0 and SC/ENVB 3002 3.0 in the current academic calendar with SC/BIOL 4001 3.0, SC/ENVB 4001 3.0, SC/BIOL 4002 3.0 and SC/ENVB 4002 3.0 for the following programs:

- Environmental Biology - Bachelor of Science – 90 Credits
- Environmental Biology - Bachelor of Science – Honours
- Environmental Biology - Bachelor of Science – Honours Double Major
- Environmental Biology - Bachelor of Science – Honours Major/Minor
- Environmental Biology - Bachelor of Science – Honours Minor
- Environmental Science (Biodiversity and Conservation Stream) – Bachelor of Science 90 credits
- Environmental Science (Biodiversity and Conservation Stream) – Bachelor of Science Honours
- Environmental Science (Environmental Dynamics Stream) – Bachelor of Science 90 Credits
- Environmental Science (Environmental Dynamics Stream) – Bachelor of Science – Honours

Passed unanimously.

1.5.4 Minor Modification: Changes to Academic Calendar: Increase the minimum number of credits for Biology (SC/BIOL) courses at the 3000 level or above with an associated laboratory component from seven (7) to eight (8) for the following:

- Biology (Biomedical Science) – Bachelor of Science – Honours
- Biology (Biomedical Science) – Bachelor of Science – Honours Major/Minor
- Biology (Biomedical Science) – Bachelor of Science – Specialized Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours Major/Minor

Passed unanimously.

1.5.5 <u>Minor Modification</u>: Changes to Academic Calendar: Addition of SC/BIOL 3095 3.0 as an approved course for the following:

- Biology (Biomedical Science) – Bachelor of Science – Honours
- Biology (Biomedical Science) – Bachelor of Science – Honours Major/Minor
- Biology (Biomedical Science) – Bachelor of Science – Specialized Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours
- Biology (Biomedical Science) – International Bachelor of Science – Honours Major/Minor

Passed unanimously.

1.5.6 <u>Change to Existing Course</u>: SC/BIOL 4275 3.0 – Fungi: Threads of Life – changes in credit value.

Passed unanimously.

COMMITTEE ON ACADEMIC STANDARDS, CURRICULUM AND PEDAGOGY TEMPLATE

NEW COURSE PROPOSAL FORM

Faculty: Indicate all relevant Faculty(ies)	Science

Department: Indicate department and course prefix (e.g. Languages, GER)	Natural Science	**Date of Submission:**	Jan 29, 2024

Course Number: Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is "C")	NATS 1545	**Var:**	**Academic Credit Weight:** Indicate both the fee, and MTCU weight if different from academic weight (e.g. AC=6, FEE=8, MET=6	3	

Course Title: The official name of the course as it will appear in the Undergraduate Calendar and on the Repository	Rocks and Resources
Short Title: Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 characters**	Rocks and Resources

With every new course proposal it is the Department's responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.

Brief Course Description:

Maximum 2000 characters
(approximately 300 words including spaces and punctuation).

The course description should be carefully written to convey what the course is about. It should be followed by a statement of prerequisites and co-requisites, if applicable. This description appears in the calendar.

For editorial consistency, and in consideration of the various uses of the Calendars, verbs should be in the present tense (i.e., "This course analyzes the nature and extent of...," rather than "This course will analyze...")

This course introduces students to the physical processes involved in the creation and evolution of the rocks and minerals that we find on Earth. The course also examines the practical uses of these resources, the methods by which we discover and extract them, and the environmental and sociological impacts of their extraction. The course covers a wide and diverse range of resources, from flint to precious metals to building materials like stone and gypsum.

CCEs: None
NCRs: No credit received for students who are taking or have completed ESSE 1012.3 The Earth Environment.

Generic Course Description:

This is the description of the "Parent / Generic course" for Special Topics courses under which variances of the "Generic" course can be offered in different years (Max. 40 words). Generic course descriptions are published in the calendar.

List all degree credit exclusions, prerequisites, integrated courses, and notes below the course description.

This course introduces students to the physical processes involved in the creation and evolution of the rocks and minerals that we find on Earth. The course also examines the practical uses of these resources, the methods by which we discover and extract them, and the environmental and sociological impacts of their extraction.

Expanded Course Description:

Please provide a detailed course description, including topics / theories and learning objectives, as it will appear in supplemental calendars.

This course introduces students to the physical processes involved in the creation and evolution of the rocks and minerals that we find on Earth. The course also examines the practical uses of these resources, the methods by which we discover and extract them, and the environmental and sociological impacts of their extraction. The course covers a wide and diverse range of resources, from flint to precious metals to building materials like stone and gypsum.

Course level learning objectives- these main objectives are broken down in detail in the unit level objects.

1. Explain what a rock and/or mineral are, how they form and how they are part of the Earth system.
2. Describe how we study the rocks and minerals on Earth.
3. Describe how we find specific rocks/minerals that we use.
4. Evaluate the importance of rocks and minerals in our everyday life

Unit 1- Rocks and Minerals

- What is a mineral?
- What is their basic chemistry?
- When and how have they been formed?
- What are the different types of rock?
- How do the different types of rock form?

In this first unit students look at the definition of a mineral and learn some basic chemistry as to what makes them up. Students learn how the different types of minerals found on Earth have changed over time and the relationship this has to Earth's evolution from both a geological and biological stand point. We then look at rocks as aggregates of minerals, the 3 main types of rock (igneous, sedimentary and metamorphic) and how they form.

Unit Learning Objectives:

1. Explain what is and isn't a mineral.
2. Explain the basic chemistry and way in which minerals are classified and identified.
3. Comprehend how the nature of minerals tells us about the environment is formed in.
4. Explain the relationship between rocks and minerals.
5. Differentiate between the different types of rock and explain the processes and conditions under which each form.

Unit 2 – Finding resources.

- Boreholes
- Geophysics
- Field sampling

This unit examines the different techniques that geologists and geophysicists use to find and evaluate the different possible locations for resource extraction.

Unit Learning Outcomes:

1. Explain what a borehole is and can be learned from it.
2. Explain the different types of geophysical techniques that are used to find resources.
3. Utilize geophysical data (eg, seismic, magnetic, etc.) to identify the presence of resources.

<u>Unit 3 - Use of rocks and minerals as resources</u>

- Economic value of minerals and rocks
- How specific rocks and minerals form
- Extracting economically value ores, what are the effects on the environment and what are the uses of these ores.

This unit examines a few specific examples of minerals/ores and addresses the above points for each resource. This includes Canadian examples such diamonds from Northern Canada, potash in Saskatchewan, the Sudbury mining complex, and ancient volcanic structures in Ontario's "Ring of Fire". This unit also assesses the value of such resources, why they are needed, and what the environmental effects of extraction are. Unit is focused on the real world applications and how rocks and resources are something which affect us on a daily basis both in how we obtain them, how they are used, and what effects this has on us both in terms of environment and economic benefits.

Learning Outcomes:

1. Explain how a specific resource forms.
2. Describe what exactly is found when a resource is extracted and what makes it a useful resource.
3. Explain the methods by which different resources are extracted.
4. Assess the implications of resource extraction.

Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

This course can be delivered in either the in-person format (LECT) or the fully online, asynchronous format with online assessments (ONLN). The range of delivery formats provides students with flexibility when scheduling their courses, thereby increasing the likelihood that they can find a course in their area of interest.

Although the content of the courses will be equivalent in either format, the delivery and organization will differ, as follows:

LECT: The course lectures, in-class activities, and tests are held in-person. In-class activities will consist of active learning exercises such as clicker surveys and peer-to-peer/group discussions. Assignments will be submitted electronically. Kritik will be used for the submission and grading of assignments, but instruction and discussion of the Kritik assignments will be done in lecture.

ONLN: All lectures will be delivered asynchronously online, with lecture material divided into digestible lessons that address specific topics. Clicker activities will be replaced with online quizzes to be taken after viewing lecture videos or from H5P videos with embedded questions or review. In-class discussion exercises will be replaced with online forum discussions. Kritik will be used for assignment submission and grading, with instructions delivered through text and video.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained **OR** in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. At least once per year either as a lecture based or fully asynchronous online course.

2. M.H. Armour and I. Lumb

3. M.H. Armour

4. LECT: 3 hours per week lecture/class time

   ONLN (Summer only): fully asynchronous online course with the units broken down into smaller videos and short interactive quizzes with a total time for this content similar to what would be expected in a lecture-based course.

For each course it is estimated that there will be approx. 2 hours of lecture or video a week, with an additional 1 hour of active learning activities and assessments, either in-person or online.

Students will be expected to have an additional ~ 4-5 hours of work on homework assignments, review for quizzes or work on a final capstone assignment.

Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

LECT:

- In class participation – using Personal response systems – 5% (automatic grading). This would give instant feedback on how well students are absorbing material discussed in class

- Online short exercises (weekly) – 25 %: This will include a range of activities including readings for current events, activities using H5P, and other interactive activities that will reinforce the material covered that week). H5P is software that allows instructors to create interactive videos with embedded assessments, such as quiz questions (automatic grading). These are meant to assess student learning for the various topics.

- Assignments (peer graded with Kritik) – 25%: As there are multiple small assignments this allows students to learn from the feedback of previous work. Having to engage with the material through the 3-step process in Kritik also has them look at the material from different perspectives. Kritik also reduces the marking burden on TA's as they need only to provide oversight as opposed to a complete assessment of all the work. Each unit will have at least 2 Kritik assignments in which students address a specific question by applying the material they have learned. This may include things like virtual field trips (there are a variety available through e-campus and other groups like INTEGRATE) These are meant to have students research specific examples or applications of material covered in the course.

- Capstone activity - 20%: An activity in which students address a specific topic and research/write about it by drawing on the material of 2 or more major themes from the course. This is meant to pull together multiple topics from the course into a single submission to show how topics are interconnected.

- In class tests (25%): 3 major in class tests, approximately 1 per month. Assess student learning in an environment where academic honesty can easily be maintained.

Overall, TAs or instructors only directly grade the capstone activity and short answer elements of the tests. They are also involved in the Kritik activity by oversight of the process of grading.

ONLN: As an instructor who has worked for over a decade on the development of asynchronous online courses, I make use of a variety of tools to ensure that students receive an equivalent learning experience to the in-person format and that academic honesty is upheld. The ONLN format will have the same basic structure as the in-person format, with the following modifications:

- Embedded quiz questions in videos/lessons to replace the use of Personal response systems.
- As this course would be asynchronous, peer to peer communication is done through forums and discussion that are not in real time. Kritik also plays a role here as it allows them to interact with peers through their work, though anonymously. As many students are not necessarily comfortable with required peer interaction, this course takes the approach of doing some of this anonymously in forums etc as well.
- In lieu of in class tests, there will be a series of short quizzes at biweekly intervals with strict time limits. The response to the questions MUST be framed in the terminology and level of detail used in the course. The combination of the time limit and the requirement of using the course-based detail and language limits the opportunities for academic misconduct. This approach is one I have been using successfully in my current asynchronous online courses as it makes cut and paste and use of things like Chegg unlikely to produce the answer in the correct language and format needed for a correct answer. In addition, the strict time limit reduces the student's ability to search for an answer. The questions are framed such that without an understanding of the course material and specific applications and examples discussed in the course, a correct answer is unlikely given the time limits.

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/ undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be

This is a topic with abundant online resources. Websites such as the United States Geological Survey (USGS.com), British Geological survey (https://www.bgs.ac.uk/) and even NASA have extensive resources for studying rocks and minerals. Specific pages/images will be incorporated into the course notes, and used as further readings.

There are many books available that cover this topic for a range of audiences. The York library already has access to many of these such as:

Vaughan, David, 'The mineral world', Minerals: A Very Short Introduction, Very Short Introductions (Oxford, 2014; online edn, Oxford Academic, 23 Oct. 2014), https://doi-org.ezproxy.library.yorku.ca/10.1093/actrade/9780199682843.003.0001

Meyer, Jürg. Rocks and Rock Formations: A Key to Identification, Princeton: Princeton University Press, 2021. https://doi-org.ezproxy.library.yorku.ca/10.1515/9780691217550

Zhdanov, M. S., & Zhdanov, M. S. (2021). Geophysics for Mineral Exploration. MDPI - Multidisciplinary Digital Publishing Institute. https://directory.doabooks.org/handle/20.500.12854/76658

required, a rationale should be supplied. **LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.**	Material from the above sources will be used to develop course content.

Other Resources: A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain **COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.**	This course does not have any special needs. Being taught online or in class would require only the normally available Eclass and for the lecture elements a classroom. The course requires marker/grader TAs commensurate with enrolment.

Course Rationale: *The following points should be addressed in the rationale:* *How the course contributes to the learning objectives of the program / degree.* *The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.* *The expected enrolment in the course.*	The primary purpose of courses offered by the Division of Natural Science is to: • broaden student horizons ("breadth") • expose students to some of the fundamental ideas of the course's major discipline ("scientific knowledge") • Promote multi-or interdisciplinarity ("multi/interdisciplinarity") • Develop skills, problem-solving tools and assessment strategies, some of which are specific to the courses discipline ("critical skills" and "critical thinking") NATS1545 addresses the **breadth** requirement of general education by providing non-science students with an introduction to geology. Geology is a **multi-disciplinary** field including chemical, physical and biological processes. Students will therefore gain **scientific knowledge** in fundamental concepts in multiple branches of science. In addition, students gain **critical skills** by learning how geological data is acquired and how to interpret and use this data. Students will also employ **critical thinking** in assessing the environmental implications of resource extraction. Geology has become a highly topical subject given the interest in resources that are needed to transition away from fossil fuels and the important role Canada is playing in this transition. NATS does not currently offer any course dedicated solely to geology. Courses like NATS1750 6.0 Earth and its Atmosphere and NATS1540 Dinosaur Extinction each contain a unit on rocks and minerals, but not in nearly the same depth as NATS1545. For students who take those courses and went to delve deeper into geological topics, NATS1545 is an ideal 'part 2'. ESSE1012.3 The Earth Environment has been identified as an NCR for NATS1545 as roughly a third of the material in ESSE1012 pertains to geology, including topics pertaining to geological data and technology, though taught at more advanced level for engineering majors. Since ESSE1012 is a 1st-year pre-requisite for the Geomatics Science program, the NCR prohibits students in this stream from taking NATS1545 after having completed ESSE1012, as NATS1545 would not be appropriately challenging for such students. Other programs at York have been investigated but none appear to offer courses that should be identified as either CCEs or NCRs. The one other course that covers similar topics is GEOG1402 Physical Geography, but this course does not focus on geology nor resource extraction at the same depth as NATS1545. Expected course enrollment is 150-200 students.

Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women's Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date

Accessible format can be provided upon request.

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Science Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   - communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple

forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
General Education Foundational Science □ Complete all of the following • Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 ~~Cr=3.00 EN~~ - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • ~~SC/PHYS1410 - Physical Science (6.00)~~ • ~~SC/PHYS1010 - Physics (6.00)~~ ~~Excluding:~~ • ~~Not taken any of the following:~~ • ~~SC/BIOL1500 - Introduction to Biology (3.00)~~ • ~~SC/CHEM1500 - Introduction to Chemistry (4.00)~~ • ~~SC/PHYS1510 - Introduction to Physics (4.00)~~ ~~Note:~~ • ~~If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.~~	General Education Foundational Science □ Complete all of the following • Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • **SC/PHYS1411 – Physics Fundamentals 1 (3.00)** • **SC/PHYS1412 – Physics Fundamentals 2 (3.00)** • **Note: Students wishing to pursue higher level studies in Physics should instead complete SC/PHYS1011 – Physics 1 (3.00) and SC/PHYS1012 – Physics 2 (3.00).**
Major Requirements ~~45 Total Credits~~ • Complete all the following The Mathematics/Statistics Core (24 credits) ○ Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00)	Major Requirements **51 Total Credits** • Complete all the following The Mathematics/Statistics Core (24 credits) ○ Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with

▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~o Complete 1 of the following~~ ~~▪ Passed the following: SC/MATH3050 - Introduction to Geometries (6.00)~~ ~~▪ Passed the following: SC/MATH3052 - Exploring Geometries (6.00)~~ ~~o Earned at least 3 credits from the following:~~ ~~▪ SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~o Completed at least 12 credits from the following types of courses: additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. SC/MATH 4400 6.00, and one of SC/MATH 3090 3.00 or SC/MATH 4090 3.00 recommended.~~ ~~o A total of 45 credits in mathematics is required, including at least 12 credits at the 4000 level~~	Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ▪ **SC/MATH3054 – Geometries and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ▪ **SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** ▪ **SC/MATH4401 – History of Mathematics (3.00)** o **3 additional MATH credits at the 3000 level or higher.** o **6 additional MATH credits at the 4000 level.**

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Science Honours Double Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   - communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple

forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
General Education Foundational Science □ Complete all of the following • Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 ~~Cr=3.00 EN~~ - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • ~~SC/PHYS1410 - Physical Science (6.00)~~ • ~~SC/PHYS1010 - Physics (6.00)~~ ~~Excluding:~~ • ~~Not taken any of the following:~~ • ~~SC/BIOL1500 - Introduction to Biology (3.00)~~ • ~~SC/CHEM1500 - Introduction to Chemistry (4.00)~~ • ~~SC/PHYS1510 - Introduction to Physics (4.00)~~ ~~Note:~~ • ~~If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.~~	General Education Foundational Science □ Complete all of the following • Earned at least 6 credits from the following: ○ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ○ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ○ SC/CHEM1000 - Chemical Structure (3.00) ○ SC/CHEM1001 - Chemical Dynamics (3.00) ○ **SC/PHYS1411 – Physics Fundamentals 1 (3.00)** ○ **SC/PHYS1412 – Physics Fundamentals 2 (3.00)** ○ **Note: Students wishing to pursue higher level studies in Physics should instead complete SC/PHYS1011 – Physics 1 (3.00) and SC/PHYS1012 – Physics 2 (3.00).**
Major Requirements ~~45 Total Credits~~ • Complete all the following The Mathematics/Statistics Core (24 credits) ○ Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to	Major Requirements **51 Total Credits** • Complete all the following The Mathematics/Statistics Core (24 credits) ○ Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 -

Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~o Complete 1 of the following~~ ~~▪ Passed the following: SC/MATH3050 - Introduction to Geometries (6.00)~~ ~~▪ Passed the following: SC/MATH3052 - Exploring Geometries (6.00)~~ ~~o Earned at least 3 credits from the following:~~ ~~▪ SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~o Completed at least 12 credits from the following types of courses: additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. SC/MATH 4400 6.00, and one of SC/MATH 3090 3.00 or SC/MATH 4090 3.00 recommended.~~ ~~o A total of 45 credits in mathematics is required, including at least 12 credits at the 4000 level~~	Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ▪ **SC/MATH3054 – Geometries and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ▪ **SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** ▪ **SC/MATH4401 – History of Mathematics (3.00)** o **3 additional MATH credits at the 3000 level or higher.** o **6 additional MATH credits at the 4000 level.** o The courses for the second major or the minor.

~~o~~ The courses for the second major or the minor.	
Additional Elective Credits ~~39 Total Credits~~ • Complete all of the following o As required for an overall total of at least 120 credits. o Completed at least ~~18 credits~~ from the following types of courses: additional elective credits. o Completed at least 21 credits from the following types of courses: at the 3000 level or above to fulfill the upper-level credits.	Additional Elective Credits **33 Total Credits** • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least **12 credits** from the following types of courses: additional elective credits. o Completed at least 21 credits from the following types of courses: at the 3000 level or above to fulfill the upper-level credits.

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Science Honours Minor

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Decrease to the number of Minor credits
   Change to list of required courses

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Most Major/Minor programs leave space for 30 credits for the courses required to satisfy the Minor, so this program reduces the requirement from 33 credits to 30 credits to make the Minor more appealing to majors in other departments. This program also prescribes courses more carefully and clearly to differentiate this Minor from other minors in the department.

   This Minor would appeal most strongly to majors in other departments wishing to complete a second teachable in mathematics for a future career in secondary education. Most teacher training programs require 18 credits in MATH; some require 30 credits in MATH. This program will satisfy both versions of this requirement.

   This proposal is designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   This Minor will satisfy the requirements of a minor in any other Major/Minor program. There are no program level outcomes to map.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   n/a

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

n/a

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit reduction of MATH 4400. Students can complete Option 1 as originally written despite this change. In the case of Option 2, students can take an additional 3.0 credits in 4000 level MATH to compensate.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Minor Credits ~~33 Total Credits~~ ~~• Complete all of the following~~ ~~Three credits of computer science, LE/EECS 1560 3.00 is recommended;~~ ~~○ Complete 1 of the following~~ ~~▪ Completed at least 3 credits from the following types of courses: computer science~~ ~~▪ Earned at least 3 credits from the following:~~ ~~▪ LE/EECS1560 - Introduction to Computing for Mathematics and Statistics (3.00)~~ ~~○ Passed the following:~~ ~~▪ SC/MATH1021 - Linear Algebra I (3.00)~~ ~~▪ SC/MATH1131 - Introduction to Statistics I (3.00)~~ ~~▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)~~ ~~▪ SC/MATH1300 - Differential Calculus with Applications (3.00)~~ ~~▪ SC/MATH1310 - Integral Calculus with Applications (3.00)~~ ~~▪ SC/MATH2022 - Linear Algebra II (3.00)~~ ~~▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)~~ ~~At least nine credits of mathematics without second digit 5 at the 3000 or 4000 level, including at least six credits at the 4000 level, to include: SC/MATH 4100 3.00 or SC/MATH 4400 6.00;~~ ~~○ Complete 1 of the following~~ ~~Option 1~~ ~~▪ Complete all of the following~~ ~~▪ Earned at least 3 credits from the following:~~ ~~▪ SC/MATH41~~	Minor Credits **30 Total Credits** • **Passed the following:** ○ **SC/MATH1021 - Linear Algebra I (3.00)** ○ **SC/MATH1131 - Introduction to Statistics I (3.00)** ○ **SC/MATH1200 - Problems, Conjectures and Proofs (3.00)** ○ **SC/MATH1300 - Differential Calculus with Applications (3.00)** ○ **SC/MATH1310 - Integral Calculus with Applications (3.00)** ○ **LE/EECS1560 - Introduction to Computing for Mathematics and Statistics (3.00)** ○ **At least three credits of mathematics, chosen from the following:** ▪ **SC/MATH2030 – Elementary Probability (3.00)** ▪ **SC/MATH2022 – Linear Algebra II (3.00)** ▪ **SC/MATH2270 – Differential Equations (3.00)** ▪ **SC/MATH2280 - The Mathematical Theory of Interest (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ○ **At least three credits of mathematics, chosen from the following:** ▪ **SC/MATH3054 – Geometry and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ○ **SC/MATH4100 – Topics in Mathematics Education (3.00)** ○ **SC/MATH4401 – History of Mathematics (3.00)** **Grand Total Credits: 30**

00A - Topics in Mathematics Education: Theory and Practice (3.00) ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 3000 or 4000 level ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 4000 level Option 2 ▪ Complete all of the following ▪ Earned at least 6 credits from the following: ▪ SC/MATH4400 - The History of Mathematics (6.00) ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 3000 or 4000 level o At least three credits above should be chosen from proof-based courses approved by the director, such as SC/MATH 2001 3.00, SC/MATH 3021 3.00, SC/MATH 3022 3.00, SC/MATH 3050 6.00 or SC/MATH 3052 6.00, SC/MATH 3141 3.00, SC/MATH 3260 3.00, SC/MATH 4160 3.00; o A total of 33 credits in mathematics without second digit 5 is required, of which at least six will be at the 4000 level.	

~~Grand Total Credits: 33~~	

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Arts Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   A. communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple

forms (including orally, written, and visually).

B. recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
C. identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
D. effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Major Requirements ~~45 Total Credits~~ • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~o Complete 1 of the following~~ ~~▪ Passed the following: SC/MATH3050 - Introduction to Geometries (6.00)~~ ~~▪ Passed the following: SC/MATH3052 - Exploring Geometries (6.00)~~	Major Requirements **51 Total Credits** • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ▪ **SC/MATH3054 – Geometries and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ▪ **SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** ▪ **SC/MATH4401 – History of Mathematics (3.00)** o **3 additional MATH credits at the 3000 level or higher.**

~~o Earned at least 3 credits from the following:~~ ~~▪ SC/MATH4100A – Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~o Completed at least 12 credits from the following types of courses: additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. SC/MATH 4400 6.00, and one of SC/MATH 3090 3.00 or SC/MATH 4090 3.00 recommended.~~ ~~o A total of 45 credits in mathematics is required, including at least 12 credits at the 4000 level~~	o **6 additional MATH credits at the 4000 level.**
Additional Elective Credits ~~48 Total Credits~~ • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least ~~18 credits~~ from the following types of courses: additional elective credits. o Completed at least ~~15 credits~~ from the following types of courses: non-MATH credits. o Completed at least 9 credits from the following types of courses: at the 3000-level or above. o Completed at least 6 credits from the following types of courses: the 4000-level.	Additional Elective Credits **42 Total Credits** • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least **15 credits** from the following types of courses: additional elective credits. o Completed at least **12 credits** from the following types of courses: non-MATH credits. o Completed at least 9 credits from the following types of courses: at the 3000-level or above. o Completed at least 6 credits from the following types of courses: the 4000-level.

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Arts Specialized Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 66 credits in the Specialized Honours Major, while Mathematics for Education requires only 54. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   - communicate mathematical and statistical concepts, models, reasoning,

explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Major Requirements ~~54 Total Credits~~ • Complete all of the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ • SC/MATH1021 - Linear Algebra I (3.00) • SC/MATH1131 - Introduction to Statistics I (3.00) • SC/MATH1200 - Problems, Conjectures and Proofs (3.00) • SC/MATH1300 - Differential Calculus with Applications (3.00) • SC/MATH1310 - Integral Calculus with Applications (3.00) • SC/MATH2022 - Linear Algebra II (3.00) • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) • SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~One of~~ ▪ ~~Complete 1 of the following~~ • ~~Passed the following:~~ o ~~SC/MATH2001 - Real Analysis I (3.00)~~ • ~~Passed the following:~~	Major Requirements **66 Total Credits** • Complete all of the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **At least three credits of mathematics, chosen from the following:** ▪ **SC/MATH2001 – Real Analysis I (3.00)** ▪ **SC/MATH2131 – Introduction to Statistics II (3.00)** ▪ **SC/MATH2270 – Differential Equations (3.00)** ▪ **SC/MATH2280 – The Mathematical Theory of Interest (3.00)** o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)**

~~○ SC/MATH2131 – Introduction to Statistics II (3.00)~~ ~~● Passed the following:~~ ~~○ SC/MATH2270 – Differential Equations (3.00)~~ ~~● Passed the following:~~ ~~○ SC/MATH2280 – The Mathematical Theory of Interest (3.00)~~ ~~▪ Complete 1 of the following~~ ~~● Passed the following:~~ ~~○ SC/MATH3050 – Introduction to Geometries (6.00)~~ ~~● Passed the following:~~ ~~○ SC/MATH3052 – Exploring Geometries (6.00)~~ ~~▪ Passed the following:~~ ~~● SC/MATH3090 – Computational Mathematics (3.00)~~ ~~● SC/MATH4400 – The History of Mathematics (6.00)~~ ~~● SC/MATH4100A – Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~○ Completed at least 9 credits from the following types of courses: additional credits from mathematics courses (i.e. without second digit 5) at the 3000 or higher level, of which at least three credits are at the 4000 level, for a total of 54 credits in mathematics.~~	**▪ SC/MATH3054 – Geometry and Education (3.00)** **▪ SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** **▪ SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** **▪ SC/MATH4401 – History of Mathematics (3.00)** **○ 6 additional MATH credits, without second digit 5, at the 2000 level or higher** **○ 9 additional MATH credits, without second digit 5, at the 3000 level or higher.** **○ 6 additional MATH credits, without second digit 5, at the 4000 level.**

Additional Elective Credits
~~39 Total Credits~~
• Complete all of the following as required for an overall total of at least 120 credits.
  o Completed at least ~~12 credits~~ from the following types of courses: additional elective credits.
  o Completed at least ~~18 credits~~ from the following types of courses: non-MATH credits.
  o Completed at least 3 credits from the following types of courses: at the 3000-level or above.
  o Completed at least 6 credits from the following types of courses: at the 4000-level.
	Additional Elective Credits
	27 Total Credits
	• Complete all of the following as required for an overall total of at least 120 credits.
	  o Completed at least **3 credits** from the following types of courses: additional elective credits.
	  o Completed at least **15 credits** from the following types of courses: non-MATH credits.
	  o Completed at least 3 credits from the following types of courses: at the 3000-level or above.
	  o Completed at least 6 credits from the following types of courses: the 4000-level.

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Arts Honours Major/Minor

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   - communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple

forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Major Requirements ~~45 Total Credits~~ • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~o Complete 1 of the following~~ ~~▪ Passed the following: SC/MATH3050 - Introduction to Geometries (6.00)~~ ~~▪ Passed the following: SC/MATH3052 - Exploring Geometries (6.00)~~	Major Requirements **51 Total Credits** • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ▪ **SC/MATH3054 – Geometries and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ▪ **SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** ▪ **SC/MATH4401 – History of Mathematics (3.00)** o **3 additional MATH credits at the 3000 level or higher.**

~~o Earned at least 3 credits from the following:~~ ~~▪ SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~o Completed at least 12 credits from the following types of courses: additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. SC/MATH 4400 6.00, and one of SC/MATH 3090 3.00 or SC/MATH 4090 3.00 recommended.~~ ~~o A total of 45 credits in mathematics is required, including at least 12 credits at the 4000 level~~ o The courses for the second major or minor	o **6 additional MATH credits at the 4000 level.** o The courses for the second major or minor
Additional Elective Credits ~~18 Total Credits~~ • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least ~~3 credits~~ from the following types of courses: additional elective credits. o Completed at least 0 credits from the following types of courses: non-MATH credits. Not applicable to double majors and major/minor programs. Students who graduate in this program are deemed to have fulfilled this requirement. o Completed at least 9 credits from the following types of courses: the 3000-level or above. o Completed at least 6 credits from the following types of courses: the 4000-level.	Additional Elective Credits **12 Total Credits** • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least **0 credits** from the following types of courses: additional elective credits. **Additional credits for this requirement may be needed depending on the choice of minor.** o Completed at least 0 credits from the following types of courses: non-MATH credits. Not applicable to double majors and major/minor programs. Students who graduate in this program are deemed to have fulfilled this requirement. o Completed at least 9 credits from the following types of courses: at the 3000-level or above. **Some of this requirement may be fulfilled by the completion of the minor.** o Completed at least 6 credits from the following types of courses: the 4000-level. **Some of this requirement may be fulfilled by the completion of the minor.**

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Arts Honours Double Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Increase to the number of Major credits
   Change to list of required courses
   Housekeeping changes.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

   This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

   Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in our department. It will simply mandate the completion of specialist courses.

   This proposal is also designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

   This proposed exists in its current form also because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap.

   These changes are designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major, program level outcomes that were determined in the cyclical review to be under-serviced by the current degree offerings:

   - communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple

forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.
- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   The creation of SC/MATH 3700 will target items A) and C) above
   The inclusion of SC/MATH 2041 will target items A), B), and D) above
   The creation of ED/EDST 1000 will target items A) and C) above
   The inclusion of SC/MATH 4401 as a requirement will target items A) and B) above
   The modification of SC/MATH 3504 will target items A) and C) above

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   The Faculty of Education has confirmed that they will be increasing enrollment in EDST 1000 to accommodate the additional 30 students per year from MAED.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   One 3.00 credit course is being created and two 6.00 credit courses are being reduced to 3.00 credit courses, so there will be a net decrease to the teaching load obligation within the Department of Mathematics and Statistics. The inclusion of ED/EDST 1000 is an additional requirement taking the place of a free elective, so it does not take away revenue from the Faculty of Science.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit value reduction of MATH 4400 and MATH 3052. In the case of MATH 4400, this was not previously a required course, so students can take an additional 3.0 credits in 4000 level MATH to compensate. In the case of MATH 3052, students will be permitted to take an additional 3.0 credits in 3000 level MATH to compensate if they do not wish to take MATH 3700.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Major Requirements ~~45 Total Credits~~ • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ ~~SC - Mathematics for Education - BSc Mathematics/Statistics Honours Core~~ ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) ~~o Complete 1 of the following~~ ~~▪ Passed the following: SC/MATH3050 - Introduction to Geometries (6.00)~~ ~~▪ Passed the following: SC/MATH3052 - Exploring Geometries (6.00)~~	Major Requirements **51 Total Credits** • Complete all the following The Mathematics/Statistics Core (24 credits) o Completed all courses from the following: ▪ SC/MATH1021 - Linear Algebra I (3.00) ▪ SC/MATH1131 - Introduction to Statistics I (3.00) ▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00) ▪ SC/MATH1300 - Differential Calculus with Applications (3.00) ▪ SC/MATH1310 - Integral Calculus with Applications (3.00) ▪ SC/MATH2022 - Linear Algebra II (3.00) ▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00) ▪ SC/MATH2310 - Calculus of Several Variables with Applications (3.00) o **Passed the following:** ▪ **ED/EDST1000 - What Is Education For? (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** ▪ **SC/MATH3054 – Geometries and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** ▪ **SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)** ▪ **SC/MATH4401 – History of Mathematics (3.00)** o **3 additional MATH credits at the 3000 level or higher.**

~~o Earned at least 3 credits from the following:~~ ~~▪ SC/MATH4100A - Topics in Mathematics Education: Theory and Practice (3.00)~~ ~~o Completed at least 12 credits from the following types of courses: additional credits selected from SC/MATH courses (without second digit 5) at the 3000 level or higher. At least nine of these additional mathematics credits must be at the 4000 level. SC/MATH 4400 6.00, and one of SC/MATH 3090 3.00 or SC/MATH 4090 3.00 recommended.~~ ~~o A total of 45 credits in mathematics is required, including at least 12 credits at the 4000 level~~ o The courses for the second major or the minor.	o **6 additional MATH credits at the 4000 level.** o The courses for the second major or the minor.
Additional Elective Credits ~~48 Total Credits~~ • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least ~~33 credits~~ from the following types of courses: additional elective credits. o Completed at least 0 credits from the following types of courses: non-MATH credits. Not applicable to double majors and major/minor programs. Students who graduate in this program are deemed to have fulfilled this requirement. o Completed at least 9 credits from the following types of courses: the 3000-level or above. o Completed at least 6 credits from the following types of courses: the 4000-level.	Additional Elective Credits **42 Total Credits** • Complete all of the following as required for an overall total of at least 120 credits. o Completed at least **27 credits** from the following types of courses: additional elective credits. o Completed at least 0 credits from the following types of courses: non-MATH credits. Not applicable to double majors and major/minor programs. Students who graduate in this program are deemed to have fulfilled this requirement. o Completed at least 9 credits from the following types of courses: at the 3000-level or above. o Completed at least 6 credits from the following types of courses: the 4000-level.

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: Bachelor of Arts Honours Minor

3. Type of Modification: Changes to degree requirements

4. Effective Date: Fall 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

   Decrease to the number of Minor credits
   Change to list of required courses

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

   Most Major/Minor programs leave space for 30 credits for the courses required to satisfy the Minor, so this program reduces the requirement from 33 credits to 30 credits to make the Minor more appealing to majors in other departments. This program also prescribes courses more carefully and clearly to differentiate this Minor from other minors in the department.

   This Minor would appeal most strongly to majors in other departments wishing to complete a second teachable in mathematics for a future career in secondary education. Most teacher training programs require 18 credits in MATH; some require 30 credits in MATH. This program will satisfy both versions of this requirement.

   This proposal is designed to further York's goal of providing Experiential Education opportunities to its students by providing a structured EE opportunity to a group of students to whom opportunities are not currently available.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   This Minor will satisfy the requirements of a minor in any other Major/Minor program. There are no program level outcomes to map.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   n/a

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to

implement the changes.

n/a

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students in the program will be affected only by the credit reduction of MATH 4400. Students can complete Option 1 as originally written despite this change. In the case of Option 2, students can take an additional 3.0 credits in 4000 level MATH to compensate.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes
Minor Credits ~~33 Total Credits~~ ~~• Complete all of the following~~ ~~Three credits of computer science,~~ ~~LE/EECS 1560 3.00 is recommended;~~ ~~o Complete 1 of the following~~ ~~▪ Completed at least 3 credits from the following types of courses: computer science~~ ~~▪ Earned at least 3 credits from the following:~~ ~~▪ LE/EECS1560 - Introduction to Computing for Mathematics and Statistics (3.00)~~ ~~o Passed the following:~~ ~~▪ SC/MATH1021 - Linear Algebra I (3.00)~~ ~~▪ SC/MATH1131 - Introduction to Statistics I (3.00)~~ ~~▪ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)~~ ~~▪ SC/MATH1300 - Differential Calculus with Applications (3.00)~~ ~~▪ SC/MATH1310 - Integral Calculus with Applications (3.00)~~ ~~▪ SC/MATH2022 - Linear Algebra II (3.00)~~ ~~▪ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)~~ ~~At least nine credits of mathematics without second digit 5 at the 3000 or 4000 level, including at least six credits at the 4000 level, to include: SC/MATH 4100 3.00 or SC/MATH 4400 6.00;~~ ~~o Complete 1 of the following~~ ~~Option 1~~ ~~▪ Complete all of the following~~ ~~▪ Earned at least 3 credits from the following:~~ ~~▪ SC/MATH41~~	Minor Credits **30 Total Credits** • **Passed the following:** o **SC/MATH1021 - Linear Algebra I (3.00)** o **SC/MATH1131 - Introduction to Statistics I (3.00)** o **SC/MATH1200 - Problems, Conjectures and Proofs (3.00)** o **SC/MATH1300 - Differential Calculus with Applications (3.00)** o **SC/MATH1310 - Integral Calculus with Applications (3.00)** o **LE/EECS1560 - Introduction to Computing for Mathematics and Statistics (3.00)** o **At least three credits of mathematics, chosen from the following:** ▪ **SC/MATH2030 – Elementary Probability (3.00)** ▪ **SC/MATH2022 – Linear Algebra II (3.00)** ▪ **SC/MATH2270 – Differential Equations (3.00)** ▪ **SC/MATH2280 - The Mathematical Theory of Interest (3.00)** ▪ **SC/MATH2041 – Symbolic Computation Laboratory I (3.00)** o **At least three credits of mathematics, chosen from the following:** ▪ **SC/MATH3054 – Geometry and Education (3.00)** ▪ **SC/MATH3700 – Mathematics Pedagogy Practicum (3.00)** o **SC/MATH4100 – Topics in Mathematics Education (3.00)** o **SC/MATH4401 – History of Mathematics (3.00)** **Grand Total Credits: 30**

00A - Topics in Mathematics Education: Theory and Practice (3.00) ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 3000 or 4000 level ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 4000 level Option 2 ▪ Complete all of the following ▪ Earned at least 6 credits from the following: ▪ SC/MATH4400 - The History of Mathematics (6.00) ▪ Completed at least 3 credits from the following types of courses: mathematics without second digit 5 at the 3000 or 4000 level o At least three credits above should be chosen from proof-based courses approved by the director, such as SC/MATH 2001 3.00, SC/MATH 3021 3.00, SC/MATH 3022 3.00, SC/MATH 3050 6.00 or SC/MATH 3052 6.00, SC/MATH 3141 3.00, SC/MATH 3260 3.00, SC/MATH 4160 3.00; o A total of 33 credits in mathematics without second digit 5 is required, of which at least six will be at the 4000 level.	

~~Grand Total Credits: 33~~	

Changes to Existing Course

Faculty: Science

Department:	Mathematics and Statistics	**Date of Submission:**	Dec 13, 2023
Course Number:	3052	**Effective Session:**	Fall 2025
Course Title:	Exploring Geometries		

Type of Change:

[x]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[x]	in course number/level	[ ]	in degree credit exclusion(s)
[x]	in credit value	[ ]	regularize course (from Special Topics)
[x]	in title (max. 40 characters for short title)	[ ]	in course format/mode of delivery *
[x]	in Calendar description (max. 40 words or 200 characters)	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
SC/MATH 3052 6.00 Exploring Geometries Exploration of various geometries, including basics of Euclidean and Spherical geometry, focusing on symmetry and transformations. A focus on geometric reasoning and multiple representations, including both synthetic and analytic approaches. Learning with hands-on materials, dynamic geometry software, group work, reflection, communication. Prerequisite: SC/MATH 2022 3.00 or SC/MATH 2222 3.00 or permission of the Instructor. Course credit exclusion: SC/MATH 3050 6.00.	SC/MATH 3054 3.00 Geometries and Education Axiomatic and analytic treatment of various geometries, including incident geometry, plane geometry, spherical geometry, hyperbolic geometry, and Poincaré disk model from Riemannian geometry. Students will also reflect on the teaching and learning of geometry and spatial reasoning. Prerequisite: SC/MATH 1021 3.00 or SC/MATH 1025 3.00 or GL/MATH 1660 3.00 and a minimum of 21 credits in SC/MATH courses without second digit "5". Course credit exclusion: SC/MATH 3052 6.00; SC/MATH 3050 6.00.

Rationale:

SC/MATH 2222 3.00 has been retired by the department and is removed as a potential prerequisite.

The change in credit value from 6.00 to 3.00 is being made for three purposes:

- to make room for an additional MAED course at the 3000 level to diversify our offerings to students in this major, without impacting department resources
- as part of a general faculty-wide strategy to decrease the number of 6.00 credit courses for ease scheduling and instructor assignment,
- to increase enrollment in this course by making it more appealing for students to add to their schedule

The change in course description and name is being made for three purposes:

- to better reflect current practice in the course, rather than a change in curriculum (the course description was previously vague; the new description explicitly outlines content to be covered),
- to highlight the essential role this course plays within the Mathematics for Education curriculum (this course is primarily taken by MAED students, yet cannot be considered a specialist course in its current form – the new form will make it clear that this is a specialist course)
- to allow the Pure Mathematics Curriculum Committee more objective evidence to decide whether to revive a 3.0 credit version of SC/MATH 3050 6.0 Introduction to Geometries that may better suit their students. This course has not been offered in a number of years.

The change in the prerequisite is being made for two purposes:

- to better reflect the reason for including SC/MATH 2022 as a prerequisite as a maturity restriction, rather than a specific content restriction,
- to ensure this course is accessible for students both majoring and minoring in Mathematics for Education.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

COMMITTEE ON ACADEMIC STANDARDS, CURRICULUM AND PEDAGOGY TEMPLATE

NEW COURSE PROPOSAL FORM

Faculty: Indicate all relevant Faculty(ies)	Science
Department: Indicate department and course prefix (e.g. Languages, GER)	Mathematics and Statistics, MATH
Date of Submission:	Dec 15, 2023
Course Number: Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is "C")	MATH 3700
Var:	
Academic Credit Weight: Indicate both the fee, and MTCU weight if different from academic weight (e.g. AC=6, FEE=8, MET=6	3
Course Title: The official name of the course as it will appear in the Undergraduate Calendar and on the Repository	Mathematics Pedagogy Practicum
Short Title: Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 characters**	Mathematics Pedagogy Practicum

With every new course proposal it is the Department's responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.

Brief Course Description:

Maximum 2000 characters *(approximately 300 words including spaces and punctuation).*

The course description should be carefully written to convey what the course is about. It should be followed by a statement of prerequisites and co-requisites, if applicable. This description appears in the calendar.

For editorial consistency, and in consideration of the various uses of the Calendars, verbs should be in the present tense (i.e., "This course analyzes the nature and extent of...," rather than "This course will analyze...")

This course provides opportunities for students to examine the teaching and learning of undergraduate mathematics and statistics in the context of individual and small group tutoring and reflect on their pedagogical practice. Students explore and apply modern pedagogical theories. Practicum includes 3 hours per week of volunteer work in an on-campus tutoring center and reflection on the experience.

Prerequisite. a minimum of 21 credits in SC/MATH courses without second digit "5".

Corequisite. SC/BC 3000 0.0 Introduction to Peer Leadership.

Generic Course Description:

This is the description of the “Parent / Generic course” for Special Topics courses under which variances of the “Generic” course can be offered in different years (Max. 40 words). Generic course descriptions are published in the calendar.

List all degree credit exclusions, prerequisites, integrated courses, and notes below the course description.

n/a

Expanded Course Description:

Please provide a detailed course description, including topics / theories and learning objectives, as it will appear in supplemental calendars.

This course provides opportunities for students to examine the teaching and learning of undergraduate mathematics in the context of individual tutoring.

Students will explore pedagogical theories including multiple representations of mathematics, facilitating meaningful mathematical discourse, cognitive load theory, establishing mathematical goals to aid learning, building procedural fluency from conceptual understanding, supporting productive struggle in mathematics, and identifying evidence of student thinking. Students will also develop general peer tutoring skills such as professionalism, interpersonal skills, and respect for equity and diversity.

This course will consist of in-class learning and includes an additional 3 hours per week of volunteer work in an on-campus tutoring center and reflection on the experience.

After successful completion of this course, students will:

- review and reinforce concepts from core first-year courses,
- explore, apply, and reflect on how mathematical pedagogical theory enhances student learning,
- demonstrate information literacy by analyzing and summarizing pedagogical research papers,
- reflect on professional and ethical issues and challenges with peer support programming, including responsibilities for upholding academic honesty,
- assess the extent of their transferable skills development, potentially in preparation for a future educational career.
- communicate mathematical and statistical concepts, reasoning, explanations, and interpretations clearly to multiple audiences in multiple forms, work effectively and respectfully with diverse groups of students.

Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

This course is designed to have 3 hours of scheduled contact hours per week, plus 3 hours per week of volunteer work in an on-campus tutoring center.

The scheduled contact hours are included to formalize the learning of pedagogical theory and peer support skills, give students space to reflect on their practice with their peers, and participate in group discussions. These hours will be used to engage with case studies, reflective discussions, and guided reading of pedagogical literature.

The scheduled volunteer work gives students an opportunity to put their learning into practice and obtain experience for future applications (potentially if applying to a Bachelor of Education program, this experience can be counted as Volunteer/Community Experience or Work Experience Related to Teaching, as required). Students will engage in 1:1 teaching, small group teaching, answering questions, and diagnosing understand. Students will then be guided on reflecting on their volunteer work in the context of the work, thus satisfying a key requirement of Experiential Education.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained **OR** in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. This course will be offered once per year in the Fall semester. It is estimated that one section of the course will be sufficient.
2. All members of the Teaching Stream (Andrew Skelton, Amenda Chow, Andrew McEachern, Carly Rozins) are competent to teach the course. Other faculty members with a strong interest in pedagogy will also be considered competent.
3. Andrew Skelton is likely to be the instructor for the first offering of this course.
4. 3 hours per week of contact hours + 3 hours per week practicum. Students will also be expected to engage in readings and other work outside of the classroom in proportion to other 3 credit courses.

Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

To take into consideration the principles of universal course design (flexible, accessible, enabling students to make choices and be more involved in the learning process), the final the detailed percentage grade breakdown is as follows:

- 10% Diagnostic Mathematics Assessment
    - Students will complete a diagnostic assessment covering introductory first-year core materials to determine the courses they are eligible to support.
- 40% Reflective Assignments (x2)
    - Using pedagogical theory to explain their experiences in their volunteer roles.
- 20% Readings
    - on a regular schedule, there will be an assigned reading on which students will be expected to reflect. Each reading follows a three-stage peer-graded cycle CREATE-EVALUATE-FEEDBACK using the Kritik software.
- 10% Class Participation
    - Attendance and participation in the scheduled course time
- 20% Final Report on Practicum Experience

Students will also be evaluated on a PASS/FAIL basis on their volunteer experience. Students must earn a PASS grade in their volunteer experience to pass the course. Detailed criteria will be provided to both the student and volunteer experience coordinator but will include attending at least 80% of their assigned shifts on time and actively attending to students.

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/

Required Readings

- Barton C. (2018). *How I wish I'd taught maths: lessons learned from research conversations with experts and 12 years of mistakes*. John Catt Educational.

Suggested Readings

- Lipsky, S. A. (2011). *A training guide for college tutors and peer educators*. Pearson.
- Ender, S. C., & Newton, F. B. (2000). *Students helping students: a guide for peer educators on college campuses* / Steven C. Ender, Fred B. Newton. (1st ed.). Jossey-Bass Publishers.

undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Other Resources:

A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

No specialized equipment or resources are needed to mount this course.

This course is being proposed along with a reduction in credit weight to other courses to minimize the impact on teaching resources.

Volunteer peer-tutoring spaces exist across campus with established space, and each program is below capacity, so no additional space is required for the practicum portion of the course. Placing the students in the placements will be the work of the course director. We have agreements in place with multiple peer-tutoring spaces across campus.

Students in the course will be required, as part of the course grade, to complete a diagnostic assessment covering material from the 1st year Core. Based on this result, students may be assigned different roles. For example, based on current (as of 2024) resources on campus, a potential screening might look like this:

- a student who scores highly can work in the Math Lab
- a student with a moderate score can work for Bethune College because they could be restricted to only helping with courses such as MATH 1510/1520, or they could work for the SPARK program in LA&PS since this program targets similar levels of courses.
- a student with a low score can work with the Faculty of Education - they need tutors who can help Teacher Candidates with elementary school mathematics content as part of their math qualification test (this option was suggested by the Faculty of Ed)

For the contact hours, a classroom with flexible seating for group work is needed. TA support at normal levels is sufficient to mount this course.

Course Rationale:

The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

The Mathematics for Education major exists as one of six majors housed within the Department of Mathematics and Statistics. It currently comprises 16% of the undergraduate student enrollment and less than 5% of courses at the 2000+ level. This course is designed to fill this service gap by offering Mathematics for Education majors a specialized course in their field, in line with other departmental majors.

Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This course will help bridge this gap.

Finally, this course is designed to further York's goal of providing Experiential Education opportunities to its students. This course will provide a structured EE opportunity to a group of students to whom opportunities are not currently available.

This course was proposed because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap. This course is designed to target the following University Undergraduate Degree Level Expectations for the Mathematics for Education major:

- analyze arguments in mathematics, applied mathematics and statistics, provide counter examples, and develop supporting arguments for statements at the appropriate level designed for an appropriate audience.
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually).
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world.
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education.

The expected enrollment is 30 students per year.

Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women's Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date

Accessible format can be provided upon request.

Changes to Existing Course

Faculty: Science

Department:	Mathematics and Statistics	**Date of Submission:**	Dec 15, 2023
Course Number:	4400	**Effective Session:**	Winter 2026
Course Title:	History of Mathematics		

Type of Change:

[ ]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[x]	in course number/level	[x]	in degree credit exclusion(s)
[x]	in credit value	[ ]	regularize course (from Special Topics)
[ ]	in title (max. 40 characters for short title)	[ ]	in course format/mode of delivery *
[ ]	in Calendar description (max. 40 words or 200 characters)	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
SC/MATH 4400 6.00 History of Mathematics Selected topics in the history of mathematics, discussed in full technical detail but with stress on the underlying ideas, their evolution and their context. Prerequisite: 36 credits required from SC/MATH courses without second digit 5, including at least 12 credits at or above the 3000-level. (12 of the 36 credits may be taken as corequisites.)	SC/MATH 4401 3.00 History of Mathematics Selected topics in the history of mathematics, discussed in full technical detail but with stress on the underlying ideas, their evolution and their context. Prerequisite: 36 credits required from SC/MATH courses without second digit 5, including at least 12 credits at or above the 3000-level. (12 of the 36 credits may be taken as corequisites.) Course Credit Exclusion: SC/MATH 4400 6.00.

Rationale:

The change in credit value from 6.00 to 3.00 is being made for four purposes:

- to make room for an additional MAED course at the 3000 level to diversify our offerings to students in this major, without impacting department resources
- as part of a general faculty-wide strategy to decrease the number of 6.00 credit courses for ease scheduling and instructor assignment,
- to increase enrollment in this important course by making it more appealing for students to add to their schedule.
- this course satisfies key elements of the Mathematics for Education UUDLES, so by reducing the credit value from 6.00 to 3.00, it better fits within the Major requirements and can be made mandatory, rather than recommended.
- this course is a topics course, so the change will have the impact of reducing the scope of the topics taught in the course, but still accomplishing the same learning outcomes and targeting the same UUDLES.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

Mathematics for Education

Executive Summary of Changes

Impact on Departmental Resources

This proposal reduces the number of FCE offered by the department and increases the number of departmental courses taken by our majors, so has a net positive impact on resources.

Service Gaps

Mathematics for Education comprises 16% of the undergrad enrollment in our department and less than 5% of non-core, specialist courses at the 2000+ level. There are currently a minimal number of courses that differentiate this major from other majors within the department. The first time that MAED students take a specialist course in their subject area is Winter of fourth year. This is unacceptably late in the degree progress for these students.

From the table below, students in comparable majors Applied Mathematics, Mathematics, and Statistics currently take a significant number of specialist credits beyond the Math and Stats Core. The entire 3000 level degree requirement and, in some cases, a good chunk of the 4000-level degree requirement, is comprised of specialist courses in their area of interest. This is important to differentiate these majors from the other majors. The MAED students deserve the same experience. This proposal is designed to fill this service gap by offering Mathematics for Education majors specialized courses in their field, in line with offerings to students in other majors. This major has not had any changes or modifications since it was first created.

The MATH 3052 6-credit course was never a specialist course in mathematics education, but rather informally took that role due to the instructor who used to frequently teach this course. This proposal makes it clear that this course can and should be a specialist course.

Comparison of Honours Major (BA and BSC)

Major Req.	Level	APMA	MATH	STAT	MAED (current)	MAED (new)
Core	Lower	24 credits	24 credits	24 credits	24 credits	24 credits
Major Specific	Lower	2041 2271	2001	2131	0	EDST1000 2041
	3000	3241 3271 3242/3260/3171/3172	3001 3010 3021 3022	3131 3132 3330 3430	(3052) +3 credits	3054 3700 +3 credits
	4000	4090 +9 credits	4021 4011/4012 +6 credits	4330 4730 4939 +3 credits	4100 +9 credits	4100 4401 +6 credits
Total		51	51	51	45	51

Align MAED with Other Majors

Comparable majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 51 credits in the Major, while Mathematics for Education requires only 45. This proposal will align our programs. This proposal will not decrease the number of additional math courses taken by MAED majors in the other streams in our department. It will simply mandate the completion of specialist courses.

An additional characteristic of the MAED major is that students can explore one of the other areas of the department (i.e. APMA, MATH, STAT). Students will retain a free choice of 9 credits of senior level math to learn advanced content that they can take into their classrooms.

Pedagogical Considerations

This course was proposed because of the recent cyclical review of our department. It was identified that certain degree level expectations (identified below) had less coverage within our program and courses needed to be strategically proposed to cover this gap. The Mathematics for Education UUDLES to be targeted are:

- effectively employ technology (including scientific computing software, algorithms, and educational software) to investigate problems in the mathematical sciences, including those in mathematics education (targeted by the inclusion of MATH 2041)
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually). (targeted by the creation of MATH 3700, and the inclusion of MATH 4401)
- recognize the limits of their knowledge of mathematics and statistics - and the limits of mathematics and statistics to address problems in the world. (targeted by the creation of MATH 3700, and the inclusion of MATH 2041 and MATH 4401)
- identify and describe some of the current professional and ethical issues and challenges within the mathematical sciences, including mathematics education. (targeted by the inclusion of EDST 1000 and creation of MATH 3700)

Experiential Education

This proposal is designed to further York's goal of providing Experiential Education opportunities to its students. This course will provide a structured EE opportunity to a group of students to whom opportunities are not currently available. (targeted by the creation of MATH 3700)

Coding

Coding has been added to the K-12 Ontario Mathematics Curriculum, but our students are not confident with their coding skills, even after taking EECS 1560. Including the MATH 2041 requirement will aim to close that confidence and skills gap for future educators by building on EECS 1560. (targeted by the inclusion of MATH 2041)

New Course:

- SC/MATH3700: Mathematics Pedagogy Practicum
    - required for MAED students, but available to students in other departmental majors with an interest in gaining expertise in mathematics education.
        - NOTE: there might be a fear that students will take this course because it is perceived to be an `easy' replacement for a core math course, the chart on the previous page shows that most majors in our department will only be able to use this as general upper-year electives, and not as a replacement of major requirements as there is no credit room
    - it is hoped that this course will attract students from other majors in our department and within the faculty and that enrollment will be high.

Modified Courses:

- SC/MATH3052: Exploring Geometries (6.00)
    - to reduce in credit value to become SC/MATH3054: Geometries and Education (3.00) and kept as a mandatory part of the major
    - this is currently described as a topics course, this proposal would mandate the content, add specialist major content, and reduce to 3-credits.
- SC/MATH4400: History of Mathematics (6.00)
    - to reduce in credit value to become SC/MATH4401: History of Mathematics (3.00) and made a mandatory requirement of the major.
    - this is currently described as a topics courses, this proposal would allow the course to remain a topics course, but reduce the scope of the content covered, which still targeting the same valuable learning outcomes.
    - this new MATH4401 course existing as a 4000-level winter course will be incredibly helpful for students needing a final 3-credits at the 4000-level before graduating – this could be particularly useful to such students from pedagogical considerations.
- by changing both courses from 6 credit to 3 credit courses, it is hoped that this will increase enrollment in each course and also satisfy the financial requirement to reduce credits offered by the department.

New Major Requirements:

- ED/EDST 1000 3.00: What Is Education For?
    - Mathematical Biology requires 1000-level credits outside of the department as part of the major requirement and Data Science requires 1000/2000-level credits outside of the department as part of the major requirement; this proposal is in the same spirit.

Changes to Specialized Honours (BA and BSC)

Comparable specialized honours majors within the Department of Mathematics and Statistics (Mathematics, Applied Mathematics and Statistics) each require 66 credits in the Major, while Mathematics for Education requires only 54. This proposal will align our programs.

Major Req.	Level	APMA	MATH	STAT	MAED (current)	MAED (new)
Core	Lower	24 credits	24 credits	24 credits	24 credits	24 credits
Major Specific	Lower	2001 2041 2270	2001	2001 2131	[2001/2131/ 2270/2280]	[2001/2131/ 2270/2280] EDST1000 2041
	3000	3001 3241 3242 3271 3410 3260/3171/3172	3001 3010 3021 3022	3001 3131 3132 3330 3430	3090 (3052) (3052) +6 credits	3054 3700 +9 credits
	4000	4090 +9 credits	4021 4011/4012 +6 credits	4330 4730 4939 +3 credits	4100 (4400) (4400) +3 credits	4100 4401 +6 credits
	Any	0	15 credits	9 credits	0	6 credits
Total		63	66	66	54	66

Changes to Minor (BA and BSC)

Reduce from 33 credits to 30 credits, in line with other minors.
Simplify and prescribe specific list of courses, including new course offerings.

Non-Major Modification Program Changes

1. Program: Data Science
2. Degree Designation: Bachelor of Science – Honours
3. Type of Modification: Changes to degree course requirements
4. Effective Date: Fall 2025

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5. State what the changes are:

(CHANGE 1) Foundational Science: Department of Physics has altered two of their first-year courses from 6.00 credit versions to two 3.00 credit versions. These housekeeping changes reflect that alteration. This change applies only to the Bachelor of Science – Honours version.

(CHANGE 2) Major Requirements: The currently required courses AP/ITEC2620 and LE/EECS2101 are both being taught using the coding language Java. Students in Data Science will be taught coding only in the coding language Python. The original plan was for EECS to create a special section of LE/EECS2011 for DASC students in which the same content was taught but using Python instead of Java. When we met with EECS this year, they decided that a better option was to create a new course with second-digit 5, which will be coded as EECS2502. This course has been approved by LE and will be mounted in F24. There is no need for both EECS and ITEC to do this for a cohort of only 100 students, so the ITEC alternative is being removed from the list of required courses. This applies to both versions of the program.

(CHANGE 3) Business Stream: (CHANGE 3A) the stream should include the course MKTG 1030 and not MGMT 1030. This appears to be a typo when converting the program proposal into the academic calendar. This applies to both versions of the program. (CHANGE 3B) A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification (reducing the required credits from 15 to 12, by making one of the courses SB/MGMT1000 3.0, SB/MGMT1030 3.0, SB/FINE2000 3.0, SB/ACTG2010 3.0, SB/OMIS2010 3.0 optional) proposed will help to alleviate that burden for Business. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

(CHANGE 4) Computational Arts Stream: A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification proposed (change so that students are required to take 6 credits from FA/DATT2300 3.0, FA/DATT2310 3.0, FA/DATT2040 3.0, FA/DATT2050 3.0, FA/DATT3935 3.0 instead of requiring FA/DATT2300 3.0 and FA/DATT2310 3.0) will help to alleviate that burden for Computational Arts. This addition was proposed by senior leadership in DATT. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

(CHANGE 5) Health Stream: A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification proposed (removing the requirement of HLST1011) will help to alleviate that burden for Health. This course was identified by HLST leadership as being unnecessary to success in the higher-level courses and not ideal for our students. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes:

   CHANGE 1 is strictly housekeeping.

   CHANGE 2 will ensure that the senior coding courses taken by DASC students align with the coding language used in their foundational coding courses.

   CHANGE 3A is to correct typos and reflect the original intention of the program.

   The following UUDLES are targeted by the stream courses:
   - 1.2 Connect Data Science components to a stream of their choice, such as Economics, Geography, Biology, Psychology, Business Administrative Studies, or Environmental Studies.
   - 2.3 Identify and analyze data science complexities when applying to stream specific models.
   - 3.2 Work collaboratively across disciplines to address data science solutions.

   CHANGES 3B/4/5 – address the degree completion issues raised on the previous page – it was discussed that the respective changes to the streams would not impact the completion of the appropriate UUDLES – students would still connect Data Science to their chosen stream, they would contextualize data science within those fields, have the opportunity to work alongside students from other majors and be exposed to the issues and relevant of Data Science in those fields. We feel comfortable that the changes do not reduce the coverage of these UUDLES.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives: There are no changes to program learning outcomes or which courses satisfy each.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support:

   The only changes that affect resources of other departments are CHANGES 2/4/5.
   CHANGE 2 was made in collaboration with EECS and ITEC.
   CHANGE 4 was made after consultation with leadership in DATT.
   CHANGE 5 was made after consultation with leadership in HLST.
   The effects are mostly operational, so each department contributed to the changes.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   There are no resource implications to the home department of the program.

10. Provide a summary of how students currently enrolled in the program will be accommodated:

    CHANGE 1: the affected courses have already been changed; this change is to keep the calendar up to date with current practice. For CHANGE 2, students will be taking the new course since it is the only one that will be mounted for them – this calendar change simply reflects this reality. For CHANGE 3, students will be given waivers if they took the wrong 1000-level course and any excess credits completed by students will be counted as general electives and will not impact degree completion. CHANGE 4 will not affect any students as it only increases flexibility. CHANGE 5 – excess credits completed will be counted as general.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Foundational Science Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • ~~SC/PHYS1410 - Physical Science (6.00)~~ • ~~SC/PHYS1010 - Physics (6.00)~~	**Foundational Science** Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • **SC/PHYS1411 – Physics Fundamentals 1 (3.00)** • **SC/PHYS1412 – Physics Fundamentals 2 (3.00)** • **Note: Students wishing to pursue higher level studies in Physics should instead complete SC/PHYS1011 – Physics 1 (3.00) and SC/PHYS1012 – Physics 2 (3.00).**
Major Requirements • Passed the following: ○ LE/EECS1015 - Introduction to Computer Science and Programming (3.00) ○ LE/EECS1516 - Object Oriented Design and Principles using Python (3.00) • ~~Complete 1 of the following~~ ○ ~~Passed the following:~~ ▪ ~~LE/EECS2011 - Fundamentals of Data Structures (3.00)~~ ○ ~~Passed the following:~~ ▪ ~~AP/ITEC2620 - Introduction to Data Structures (3.00)~~	**Major Requirements** • Passed the following: ○ LE/EECS1015 - Introduction to Computer Science and Programming (3.00) ○ LE/EECS1516 - Object Oriented Design and Principles using Python (3.00) ○ **LE/EECS2502 - Fundamentals of Data Structures for Data Science (3.00)**
Stream Requirements Business Complete all of the following • Earned at least 12 credits from the following: ○ SB/MGMT1000 - Introduction to Business (3.00) ○ ~~SB/MGMT1030 - History of Capitalism: Structures, Agents, Artefacts (3.00)~~ ○ SB/FINE2000 - Introduction To Finance (3.00) ○ SB/ACTG2010 - Introduction To Financial Accounting I (3.00) ○ SB/OMIS2010 - Introduction to Operations and Supply Chain Management (3.00) • ~~All of the courses in this category must be successfully passed. The 3 extra credits will be counted towards the additional electives category.~~	**Stream Requirements** Business Complete all of the following • Earned at least 12 credits from the following: ○ SB/MGMT1000 - Introduction to Business (3.00) ○ **SB/MKTG1030 - Marketing Management (3.00)** ○ SB/FINE2000 - Introduction To Finance (3.00) ○ SB/ACTG2010 - Introduction To Financial Accounting I (3.00) ○ SB/OMIS2010 - Introduction to Operations and Supply Chain Management (3.00)

Computational Arts ☐ Passed the following: • FA/DATT1010 - Introduction to Interactive Digital Media I (3.00) • FA/DATT1020 - Introduction to Interactive Digital Media II (3.00) • ~~FA/DATT2300 - Game Design and Prototyping I (3.00)~~ • ~~FA/DATT2310 - Game Design and Prototyping II (3.00)~~	Computational Arts Passed the following: • FA/DATT1010 - Introduction to Interactive Digital Media I (3.00) • FA/DATT1020 - Introduction to Interactive Digital Media II (3.00) **Earned at least 6 credits from the following:** • **FA/DATT2300 - Game Design and Prototyping I (3.00)** • **FA/DATT2310 - Game Design and Prototyping II (3.00)** • **FA/DATT2040 – Math, Art, Code (3.00)** • **FA/DATT2050 – Media Signal Processing (3.00)** • **FA/DATT3935 – Creative Data Visualization (3.00)**
Health ☐ ~~Complete all of the following~~ • ~~Earned at least 6 credits from the following:~~ ○ ~~HH/HLST1010 - Foundations of Health Studies I (3.00)~~ ○ ~~HH/HLST1011 - Foundations of Health Studies II (3.00)~~ ○ ~~HH/HLST2040 - Health Informatics 1: Introduction to Health Informatics (3.00)~~ • ~~All of the courses in this category must be successfully passed. The 3 extra credits will be counted towards the additional electives category.~~ • ~~Complete 1 of the following~~ ○ ~~Passed the following:~~ ▪ ~~HH/HLST3350 - Health Data Analytics, Machine Learning and AI (3.00)~~ ○ ~~Passed the following:~~ ▪ ~~HH/HLST3060 - Introduction to Health Care System Dynamics (3.00)~~ ○ ~~Passed the following:~~ ▪ ~~HH/HLST3500 - Quality and Operational Excellence in Healthcare - Introduction to Lean Six Sigma (3.00)~~ • ~~Complete 1 of the following~~ ○ ~~Passed the following:~~ ▪ ~~HH/HLST4310 - Analysis and Design of Health Information Systems (3.00)~~ ○ ~~Passed the following:~~ ▪ ~~HH/HLST4330 - Decision Making and Decision Support Systems in Healthcare (3.00)~~	Health **Passed the following:** • **HH/HLST1010 - Foundations of Health Studies I (3.00)** • **HH/HLST2040 - Health Informatics 1: Introduction to Health Informatics (3.00)** **Earned at least 6 credits from the following:** • **HH/HLST3350 - Health Data Analytics, Machine Learning and AI (3.00)** • **HH/HLST3060 - Introduction to Health Care System Dynamics (3.00)** • **HH/HLST3500 - Quality and Operational Excellence in Healthcare - Introduction to Lean Six Sigma (3.00)** • **HH/HLST4310 - Analysis and Design of Health Information Systems (3.00)** • **HH/HLST4330 - Decision Making and Decision Support Systems in Healthcare (3.00)**

Non-Major Modification Program Changes

1. Program: Data Science
2. Degree Designation: Bachelor of Arts – Honours
3. Type of Modification: Changes to degree course requirements
4. Effective Date: Fall 2025

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5. State what the changes are:

(CHANGE 1) This change referred only to the Bachelor of Science – Honours version of this course, but for ease of reading, I have kept the numbering system of the changes.

(CHANGE 2) Major Requirements: The currently required courses AP/ITEC2620 and LE/EECS2101 are both being taught using the coding language Java. Students in Data Science will be taught coding only in the coding language Python. The original plan was for EECS to create a special section of LE/EECS2011 for DASC students in which the same content was taught but using Python instead of Java. When we met with EECS this year, they decided that a better option was to create a new course with second-digit 5, which will be coded as EECS2502. This course has been approved by LE and will be mounted in F24. There is no need for both EECS and ITEC to do this for a cohort of only 100 students, so the ITEC alternative is being removed from the list of required courses. This applies to both versions of the program.

(CHANGE 3) Business Stream: (CHANGE 3A) the stream should include the course MKTG 1030 and not MGMT 1030. This appears to be a typo when converting the program proposal into the academic calendar. This applies to both versions of the program. (CHANGE 3B) A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification (reducing the required credits from 15 to 12, by making one of the courses SB/MGMT1000 3.0, SB/MGMT1030 3.0, SB/FINE2000 3.0, SB/ACTG2010 3.0, SB/OMIS2010 3.0 optional) proposed will help to alleviate that burden for Business. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

(CHANGE 4) Computational Arts Stream: A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification proposed (change so that students are required to take 6 credits from FA/DATT2300 3.0, FA/DATT2310 3.0, FA/DATT2040 3.0, FA/DATT2050 3.0, FA/DATT3935 3.0 instead of requiring FA/DATT2300 3.0 and FA/DATT2310 3.0) will help to alleviate that burden for Computational Arts. This addition was proposed by senior leadership in DATT. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

(CHANGE 5) Health Stream: A careful examination of the number of 3000 level credits required by students to complete their degree was conducted and it was recognized that students completing the Business, Computational Arts, and Health streams have disproportionately limited remaining elective room in their degrees to complete this senior level requirement, so this modification proposed (removing the requirement of HLST1011) will help to alleviate that burden for Health. This course was identified by HLST leadership as being unnecessary to success in the higher-level courses and not ideal for our students. The change also provides students more flexibility should one of the courses conflict with their required courses, or seat space be limited.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes:

   CHANGE 1 is strictly housekeeping.

   CHANGE 2 will ensure that the senior coding courses taken by DASC students align with the coding language used in their foundational coding courses.

   CHANGE 3A is to correct typos and reflect the original intention of the program.

   The following UUDLES are targeted by the stream courses:
   - 1.2 Connect Data Science components to a stream of their choice, such as Economics, Geography, Biology, Psychology, Business Administrative Studies, or Environmental Studies.
   - 2.3 Identify and analyze data science complexities when applying to stream specific models.
   - 3.2 Work collaboratively across disciplines to address data science solutions.

   CHANGES 3B/4/5 – address the degree completion issues raised on the previous page – it was discussed that the respective changes to the streams would not impact the completion of the appropriate UUDLES – students would still connect Data Science to their chosen stream, they would contextualize data science within those fields, have the opportunity to work alongside students from other majors and be exposed to the issues and relevant of Data Science in those fields. We feel comfortable that the changes do not reduce the coverage of these UUDLES.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives: There are no changes to program learning outcomes or which courses satisfy each.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support:

   The only changes that affect resources of other departments are CHANGES 2/4/5.
   CHANGE 2 was made in collaboration with EECS and ITEC.
   CHANGE 4 was made after consultation with leadership in DATT.
   CHANGE 5 was made after consultation with leadership in HLST.
   The effects are mostly operational, so each department contributed to the changes.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   There are no resource implications to the home department of the program.

10. Provide a summary of how students currently enrolled in the program will be accommodated:

    CHANGE 1: the affected courses have already been changed; this change is to keep the calendar up to date with current practice. For CHANGE 2, students will be taking the new course since it is the only one that will be mounted for them – this calendar change simply reflects this reality. For CHANGE 3, students will be given waivers if they took the wrong 1000-level course and any excess credits completed by students will be counted as general electives and will not impact degree completion. CHANGE 4 will not affect any students as it only increases flexibility. CHANGE 5 – excess credits completed will be counted as general.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Major Requirements
• Passed the following:
  ○ LE/EECS1015 - Introduction to Computer Science and Programming (3.00)
  ○ LE/EECS1516 - Object Oriented Design and Principles using Python (3.00)
• ~~Complete 1 of the following~~
  ○ ~~Passed the following:~~
  ▪ ~~LE/EECS2011 - Fundamentals of Data Structures (3.00)~~
  ○ ~~Passed the following:~~
  ▪ ~~AP/ITEC2620 - Introduction to Data Structures (3.00)~~
	Major Requirements
	• Passed the following:
	  ○ LE/EECS1015 - Introduction to Computer Science and Programming (3.00)
	  ○ LE/EECS1516 - Object Oriented Design and Principles using Python (3.00)
	  ○ **LE/EECS2502 - Fundamentals of Data Structures for Data Science (3.00)**

Stream Requirements
Business
Complete all of the following
• Earned at least 12 credits from the following:
  ○ SB/MGMT1000 - Introduction to Business (3.00)
  ○ ~~SB/MGMT1030 - History of Capitalism: Structures, Agents, Artefacts (3.00)~~
  ○ SB/FINE2000 - Introduction To Finance (3.00)
  ○ SB/ACTG2010 - Introduction To Financial Accounting I (3.00)
  ○ SB/OMIS2010 - Introduction to Operations and Supply Chain Management (3.00)
• ~~All of the courses in this category must be successfully passed. The 3 extra credits will be counted towards the additional electives category.~~
 	
Computational Arts
Passed the following:
• FA/DATT1010 - Introduction to Interactive Digital Media I (3.00)
• FA/DATT1020 - Introduction to Interactive Digital Media II (3.00)
• ~~FA/DATT2300 - Game Design and Prototyping I (3.00)~~
• ~~FA/DATT2310 - Game Design and Prototyping II (3.00)~~
	Stream Requirements
	Business
	Complete all of the following
	• Earned at least 12 credits from the following:
	  ○ SB/MGMT1000 - Introduction to Business (3.00)
	  ○ **SB/MKTG1030 - Marketing Management (3.00)**
	  ○ SB/FINE2000 - Introduction To Finance (3.00)
	  ○ SB/ACTG2010 - Introduction To Financial Accounting I (3.00)
	  ○ SB/OMIS2010 - Introduction to Operations and Supply Chain Management (3.00)
	
	Computational Arts
	Passed the following:
	• FA/DATT1010 - Introduction to Interactive Digital Media I (3.00)
	• FA/DATT1020 - Introduction to Interactive Digital Media II (3.00)
	Earned at least 6 credits from the following:
	• **FA/DATT2300 - Game Design and Prototyping I (3.00)**
	• **FA/DATT2310 - Game Design and Prototyping II (3.00)**
	• **FA/DATT2040 – Math, Art, Code (3.00)**
	• **FA/DATT2050 – Media Signal Processing (3.00)**
	• **FA/DATT3935 – Creative Data Visualization (3.00)**

Health ~~Complete all of the following~~ ~~• Earned at least 6 credits from the following:~~ ~~○ HH/HLST1010 - Foundations of Health Studies I (3.00)~~ ~~○ HH/HLST1011 - Foundations of Health Studies II (3.00)~~ ~~○ HH/HLST2040 - Health Informatics 1: Introduction to Health Informatics (3.00)~~ ~~• All of the courses in this category must be successfully passed. The 3 extra credits will be counted towards the additional electives category.~~ ~~• Complete 1 of the following~~ ~~○ Passed the following:~~ ~~▪ HH/HLST3350 - Health Data Analytics, Machine Learning and AI (3.00)~~ ~~○ Passed the following:~~ ~~▪ HH/HLST3060 - Introduction to Health Care System Dynamics (3.00)~~ ~~○ Passed the following:~~ ~~▪ HH/HLST3500 - Quality and Operational Excellence in Healthcare - Introduction to Lean Six Sigma (3.00)~~ ~~• Complete 1 of the following~~ ~~○ Passed the following:~~ ~~▪ HH/HLST4310 - Analysis and Design of Health Information Systems (3.00)~~ ~~○ Passed the following:~~ ~~▪ HH/HLST4330 - Decision Making and Decision Support Systems in Healthcare (3.00)~~	Health **Passed the following:** • **HH/HLST1010 - Foundations of Health Studies I (3.00)** • **HH/HLST2040 - Health Informatics 1: Introduction to Health Informatics (3.00)** **Earned at least 6 credits from the following:** • **HH/HLST3350 - Health Data Analytics, Machine Learning and AI (3.00)** • **HH/HLST3060 - Introduction to Health Care System Dynamics (3.00)** • **HH/HLST3500 - Quality and Operational Excellence in Healthcare - Introduction to Lean Six Sigma (3.00)** • **HH/HLST4310 - Analysis and Design of Health Information Systems (3.00)** • **HH/HLST4330 - Decision Making and Decision Support Systems in Healthcare (3.00)**

Items for Approval from the Teaching Committee June 2024

1. Updating academic calendar to change CHEM 3071 to CHEM 3075 for "Biology (Biotechnology) - Bachelor of Science - Specialized Honours" since CHEM 3075 has been implemented as a direct replacement for CHEM 3071.

2. Updating the pre-requisites in the course description for BIOL 4095 (Applied Plant Ecology).

3. Updating the Academic Calendar to replace BIOL 3001/3002 with BIOL 4001/4002.

4. Updating the Academic Calendar so that students require a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.

5. Expanding the list of Biomedical Science approved course to include BIOL 3095 (Bioinformatics).

6. Changing the credit weighting of BIOL 4275 (Fungi: Threads of Life) to 4.0 due to a change from 2 to 3 lecture hours per week.

Proposal For Minor Modifications to Biology Degree Requirements

1. **Program:** BSc Honours Programs in Biology

2. **Degree Designation:**
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)
   Biology (Biotechnology) - Bachelor of Science - Specialized Honours

3. **Type of Modification**: Replacing SC/BIOL 3071 3.0 and/or SC/CHEM 3071 3.0 in the current academic calendar with SC/BIOL 3075 3.0 and/or SC/CHEM 3075 3.0 for the following:
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)
   Biology (Biotechnology) - Bachelor of Science - Specialized Honours

4. **Effective Date:** Fall 2025

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5. Provide a general description of the proposed changes to the program.

Replacing SC/BIOL 3071 3.0 and/or SC/CHEM 3071 3.0 in the current academic calendar with SC/BIOL 3075 3.0 and/or SC/CHEM 3075 3.0

Provide the rationale for the proposed changes.

SC/CHEM 3075 3.0 (Introduction to Drug Discovery and Development) was created by the Department of Chemistry as a direct successor course for SC/CHEM 3071 (Pharmaceutical Discovery). Chemistry accepts CHEM 3075 3.0 to satisfy degree requirements in place of CHEM 3071.

Since SC/CHEM 3075 3.0 is cross-listed to SC/BIOL 3075 3.0, this change updates the current calendar copy for students in our program.

6. **Describe any resource implications and how they are being addressed.** There are no resource implications associated with this change.

7. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Current Calendar Copy	Proposed Calendar Copy
Biology (Biomedical Science) - Bachelo Science – Honours Credit Completion Requirements/Exigences d'achèvement du crédit **General Education** 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:	**Biology (Biomedical Science) - Bachelo Science – Honours** Credit Completion Requirements/Exigences d'achèvement du crédit **General Education** 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:

▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:	▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:

▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then	▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then

another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)	another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)

▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ ~~SC/BIOL3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)	▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL 3075 - Introduction to Drug Discovery and Development (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)

▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)

▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.	▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.
Science Breadth 9Total Credits • Complete all of the following A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.	**Science Breadth** 9Total Credits • Complete all of the following A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

○ Completed at least 9 credits from the following types of courses: in science disciplines outside the major ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.	○ Completed at least 9 credits from the following types of courses: in science disciplines outside the major ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.
Upper-level Credits 0Total Credits • 42 credits at the 3000 level or above.	**Upper-level Credits** 0Total Credits • 42 credits at the 3000 level or above.
Credits Outside the Major 6Total Credits • Earned at least 6 credits from the following: ○ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)	**Credits Outside the Major** 6Total Credits • Earned at least 6 credits from the following: ○ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;	• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;

- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)

- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)

▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following:	▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following:

- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

51Total Credits

- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

51Total Credits

• Complete all of the following
  ○ Passed the following:
  ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
  ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
  ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
  ▪ SC/BIOL2060 - Statistics for Biologists (3.00)
  ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00
  A minimum of nine credits chosen from the following courses:
  ○ Earned at least 9 credits from the following:
  ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
  ▪ SC/BIOL3070 - Animal Physiology II (4.00)
  ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
  ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
  ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
  ▪ SC/BIOL3155 - Virology (3.00)
	• Complete all of the following
	  ○ Passed the following:
	  ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
	  ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
	  ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
	  ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
	  ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
	  ▪ SC/BIOL2060 - Statistics for Biologists (3.00)
	  ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
	  ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00
	  A minimum of nine credits chosen from the following courses:
	  ○ Earned at least 9 credits from the following:
	  ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
	  ▪ SC/BIOL3070 - Animal Physiology II (4.00)
	  ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
	  ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
	  ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
	  ▪ SC/BIOL3155 - Virology (3.00)

▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ ~~SC/BIOL3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00)	▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL 3075 - Introduction to Drug Discovery and Development (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00)

▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)	▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)

▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
Minor Requirements 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses:	**Minor Requirements** 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses:

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;

• AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.	• AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.
Biology (Biomedical Science) - Bachelor of Science - Specialized Honours Credit Completion Requirements/Exigences d’achèvement du crédit	**Biology (Biomedical Science) - Bachelor of Science - Specialized Honours** Credit Completion Requirements/Exigences d’achèvement du crédit
General Education 33Total Credits	**General Education** 33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Complete 1 of the following
  - Passed the following:

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Complete 1 of the following
  - Passed the following:

▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following:	▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following:

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following	○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following

▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ ~~SC/BIOL3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00)	▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3075 - Introduction to Drug Discovery and Development (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00)

- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

0Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of

- SC/BIOL4120 - Applied Immunology (3.00)
- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

0Total Credits

- Complete all of the following

which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))

• modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00;	• languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00;

- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science	by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science

○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:	○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:

▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.	▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.
Major Requirements 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:	**Major Requirements** 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:

▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ ~~SC/BIOL3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)	▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3075 - Introduction to Drug Discovery and Development (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)

▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)

▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
Science Breadth 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of	**Science Breadth** 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of

these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major
24Total Credits
In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following

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- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
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24Total Credits
In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following

- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

21Total Credits

- Complete all of the following
  - As required for an overall total of 85 credits from science disciplines (including the major) and an overall total of atleast 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

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  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

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Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;

psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
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- social science (courses not cross-listed with with science and technology studies (STS))
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- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;

- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.

- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such

3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.	courses are offered in the areas marked with an * above. 9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
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Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose

language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
4. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:	▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:

▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:	▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ ~~SC/BIOL3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)	▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3075 - Introduction to Drug Discovery and Development (3.00)

- SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
- SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00)
- SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
- SC/BIOL3155 - Virology (3.00)
- SC/BIOL3350 - Comparative Chordate Anatomy (4.00)
- SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00)
- SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00)
- SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00)
- SC/BIOL4010 - Biology of Cancer (3.00)
- SC/BIOL4020 - Genomics (3.00)
- SC/BIOL4030 - Proteomics (3.00)
- SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00)
- SC/BIOL4061 - Cell and Molecular Biology of Development (3.00)
- SC/BIOL4120 - Applied Immunology (3.00)
- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)

- SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
- SC/BIOL3120 - Immunobiology (3.00)
- SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
- SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00)
- SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
- SC/BIOL3155 - Virology (3.00)
- SC/BIOL3350 - Comparative Chordate Anatomy (4.00)
- SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00)
- SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00)
- SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00)
- SC/BIOL4010 - Biology of Cancer (3.00)
- SC/BIOL4020 - Genomics (3.00)
- SC/BIOL4030 - Proteomics (3.00)
- SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00)
- SC/BIOL4061 - Cell and Molecular Biology of Development (3.00)
- SC/BIOL4120 - Applied Immunology (3.00)
- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)

- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
    - SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
    - Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component

Minor Requirements

30Total Credits

- Complete all of the following
    - Completed at least 30 credits from the following types of courses:

      in the minor subject area normally including at least six credits at the 4000 level;

    - The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Science Breadth

0Total Credits

- Complete all of the following
    - A total of 24 credits in science disciplines outside the major, of

- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
    - SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
    - Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component

Minor Requirements

30Total Credits

- Complete all of the following
    - Completed at least 30 credits from the following types of courses:

      in the minor subject area normally including at least six credits at the 4000 level;

    - The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Science Breadth

0Total Credits

which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

24Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

    Note: the following will not count towards this requirement:

  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
    - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

Credits Outside the Major

24Total Credits

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
    - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies,

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies,

environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.	environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.
## Non-Science Requirement • non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)	## Non-Science Requirement • non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)
### Non-science course areas Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies: • anthropology • classical studies* • english • french studies* • gender and women's studies*** • history • humanities (courses not cross-listed with with science and technology studies (STS)) • languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**;	### Non-science course areas Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies: • anthropology • classical studies* • english • french studies* • gender and women's studies*** • history • humanities (courses not cross-listed with with science and technology studies (STS)) • languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**;

- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above. 3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.	7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above. 9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.
Notes: 1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will	Notes: 5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will

fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an

fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

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Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

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- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biotechnology) - Bachelor of Science - Specialized Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

27Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.

In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biotechnology) - Bachelor of Science - Specialized Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

27Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following	▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following

▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00)	▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00)

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

57Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
- SC/BIOL2060 - Statistics for Biologists (3.00)
- SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Completed at least 2 credits from the following types of courses:

    SC/BIOL 3100 2.00;

  - Passed the following:
- SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
- SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

57Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
- SC/BIOL2060 - Statistics for Biologists (3.00)
- SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Completed at least 2 credits from the following types of courses:

    SC/BIOL 3100 2.00;

  - Passed the following:
- SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
- SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)

▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ○ Passed the following: ▪ SC/CHEM2080 - Analytical Chemistry (4.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 ○ Passed the following: ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) A minimum of 9 credits chosen from the following courses in lists A and B, with a minimum of six credits chosen from list A. ○ Earned at least 9 credits from the following course sets: ▪ SC - Biology (Biotechnology) - List A: ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC - Biology (Biotechnology) - List B: ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)	▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ○ Passed the following: ▪ SC/CHEM2080 - Analytical Chemistry (4.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 ○ Passed the following: ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) A minimum of 9 credits chosen from the following courses in lists A and B, with a minimum of six credits chosen from list A. ○ Earned at least 9 credits from the following course sets: ▪ SC - Biology (Biotechnology) - List A: ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC - Biology (Biotechnology) - List B: ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)

- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
    - Completed at least 4 courses of the following types:

      additional biology (SC/BIOL) credits as required for an overall total of at least 57 biology credits, including at least 12 credits at the 4000 level.

Science Breadth

0Total Credits

- Complete all of the following
    - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. In the biotechnology stream, this requirement is fully satisfied by general education requirement and the credits outside the major requirement.
    - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

      Note: the following will not count towards this requirement:

    - Not taken any of the following:
        - SC/BIOL1500 - Introduction to Biology (3.00)
        - SC/CHEM1500 - Introduction to Chemistry (4.00)
        - SC/MATH1510 - Fundamentals of Mathematics (6.00)
        - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
    - Completed at least 4 courses of the following types:

      additional biology (SC/BIOL) credits as required for an overall total of at least 57 biology credits, including at least 12 credits at the 4000 level.

Science Breadth

0Total Credits

- Complete all of the following
    - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. In the biotechnology stream, this requirement is fully satisfied by general education requirement and the credits outside the major requirement.
    - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

      Note: the following will not count towards this requirement:

    - Not taken any of the following:
        - SC/BIOL1500 - Introduction to Biology (3.00)
        - SC/CHEM1500 - Introduction to Chemistry (4.00)
        - SC/MATH1510 - Fundamentals of Mathematics (6.00)
        - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline. **Upper-level Credits** 0Total Credits • A minimum of 42 credits at the 3000 level or above. **Credits Outside the Major** 17Total Credits • Complete all of the following ○ Passed the following: ▪ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00) ▪ SC/CHEM2021 - Introductory Organic Chemistry II (3.00) ▪ SC/CHEM2080 - Analytical Chemistry (4.00) ▪ SC/CHEM3080 - Instrumental Methods of Chemical Analysis (4.00) ○ Earned at least 3 credits from the following: ▪ SC/CHEM3070 - Industrial and Green Chemistry (3.00) ▪ ~~SC/CHEM3071 - Pharmaceutical Discovery (3.00)~~ ▪ SC/CHEM4050 - Bioanalytical Chemistry (3.00) **Additional Elective Credits** 19Total Credits • Complete all of the following ○ As required for an overall total of at least 120 credits.	▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline. **Upper-level Credits** 0Total Credits • A minimum of 42 credits at the 3000 level or above. **Credits Outside the Major** 17Total Credits • Complete all of the following ○ Passed the following: ▪ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00) ▪ SC/CHEM2021 - Introductory Organic Chemistry II (3.00) ▪ SC/CHEM2080 - Analytical Chemistry (4.00) ▪ SC/CHEM3080 - Instrumental Methods of Chemical Analysis (4.00) ○ Earned at least 3 credits from the following: ▪ SC/CHEM3070 - Industrial and Green Chemistry (3.00) ▪ SC/CHEM3075 - Introduction to Drug Discovery and Development (3.00) ▪ SC/CHEM4050 - Bioanalytical Chemistry (3.00) **Additional Elective Credits** 19Total Credits • Complete all of the following

- Completed at least 13 credits from the following types of courses:

  additional elective credits.

- Completed at least 6 credits from the following types of courses:

  at the 3000-level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

One of AP/PHIL 2070 3.00 or AP/PHIL 2075 3.00 (this course will count towards the non-science requirement in the General Education component);

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

- As required for an overall total of at least 120 credits.
- Completed at least 13 credits from the following types of courses:

  additional elective credits.

- Completed at least 6 credits from the following types of courses:

  at the 3000-level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

One of AP/PHIL 2070 3.00 or AP/PHIL 2075 3.00 (this course will count towards the non-science requirement in the General Education component);

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning

• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;	• philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00;

• FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.	• FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.

Proposal For Minor Modifications to Biology Degree Requirements

1. **Program:** BSc Programs in Environmental Biology and Environmental Science

2. **Degree Designation:**
   Environmental Biology - Bachelor of Science - 90 Credits
   Environmental Biology - Bachelor of Science – Honours
   Environmental Biology - Bachelor of Science - Honours Double Major
   Environmental Biology - Bachelor of Science - Honours Major/Minor
   Environmental Biology - Bachelor of Science - Honours Minor

   Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science - 90 Credits
   Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science – Honours
   Environmental Science (Environmental Dynamics Stream) - Bachelor of Science - 90 Credits
   Environmental Science (Environmental Dynamics Stream) - Bachelor of Science – Honours

3. **Type of Modification**: Replacing SC/BIOL 3001 3.0, SC/ENVB 3001 3.0, SC/BIOL 3002 3.0 and SC/ENVB 3002 3.0 in the current academic calendar with SC/BIOL 4001 3.0, SC/ENVB 4001 3.0, SC/BIOL 4002 3.0 and SC/ENVB 4002 3.0 for the following:
   Environmental Biology - Bachelor of Science - 90 Credits
   Environmental Biology - Bachelor of Science – Honours
   Environmental Biology - Bachelor of Science - Honours Double Major
   Environmental Biology - Bachelor of Science - Honours Major/Minor
   Environmental Biology - Bachelor of Science - Honours Minor

   Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science - 90 Credits
   Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science – Honours
   Environmental Science (Environmental Dynamics Stream) - Bachelor of Science - 90 Credits
   Environmental Science (Environmental Dynamics Stream) - Bachelor of Science – Honours

4. **Effective Date:** Fall 2025

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5. Provide a general description of the proposed changes to the program.

Replacing SC/BIOL 3001 3.0, SC/ENVB 3001 3.0, SC/BIOL 3002 3.0 and SC/ENVB 3002 3.0 in the current academic calendar with SC/BIOL 4001 3.0, SC/ENVB 4001 3.0, SC/BIOL 4002 3.0 and SC/ENVB 4002 3.0

Provide the rationale for the proposed changes.

The course codes for SC/BIOL 3001 3.0, SC/ENVB 3001 3.0, SC/BIOL 3002 3.0 and SC/ENVB 3002 3.0 were changed to SC/BIOL 4001 3.0, SC/ENVB 4001 3.0, SC/BIOL 4002 3.0 and SC/ENVB 4002 3.0 between 2021 and 2023.

This modification updates the current academic calendar reflect these new course codes.

6. **Describe any resource implications and how they are being addressed.** There are no resource implications associated with this change.

7. **Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.**

Current Calendar Copy	Proposed Calendar Copy
Environmental Biology - Bachelor of Science - 90 Credits Credit Completion Requirements/Exigences d'achèvement du crédit	**Environmental Biology - Bachelor of Science - 90 Credits** Credit Completion Requirements/Exigences d'achèvement du crédit
General Education 27Total Credits • Complete all of the following Non-Science Requirement ○ Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to	**General Education** 27Total Credits • Complete all of the following Non-Science Requirement ○ Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to

satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following:	satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following:

▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding:	▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirement

48Total Credits

- Complete all of the following

The Program Core

- Complete all of the following
  - Passed the following:
  - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - SC/BIOL2060 - Statistics for Biologists (3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/ENVB2050 Cr=3.00 EN - Ecology (3.00)
  - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/ENVB2080 - Ecology in Practice - Research

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirement

48Total Credits

- Complete all of the following

The Program Core

- Complete all of the following
  - Passed the following:
  - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - SC/BIOL2060 - Statistics for Biologists (3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/ENVB2050 Cr=3.00 EN - Ecology (3.00)
  - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/ENVB2080 - Ecology in Practice - Research

Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ ~~SC/ENVB3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~Note: SC/ENVB 3001 3.00 (cross-listed to: SC/BIOL 3001 3.00)~~ ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00)	Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ Note: SC/ENVB 4001 3.00 (cross-listed to: SC/BIOL 4001 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00)

▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) Additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses of which at least 12 credits are at the 3000 or higher level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (90 credits) - 3000 or higher level: ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00)	▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) Additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses of which at least 12 credits are at the 3000 or higher level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (90 credits) - 3000 or higher level: ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00)

▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ ~~SC/ENVB3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/ENVB3172 - Community Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00)	▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ SC/ENVB4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/ENVB3172 - Community Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00)

▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4250 3.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 SC/GEOG 3500 3.00) ▪ ~~Note: SC/ENVB 3002 3.00 (cross-listed to: SC/BIOL 3002 3.00)~~ ▪ Note: SC/ENVB 3172 3.00 (cross-listed to: SC/BIOL 3172 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00)	▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4250 3.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 SC/GEOG 3500 3.00) ▪ Note: SC/ENVB 4002 3.00 (cross-listed to: SC/BIOL 4002 3.00) ▪ Note: SC/ENVB 3172 3.00 (cross-listed to: SC/BIOL 3172 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00)

▪ Note: SC/ENVB 4700 3.00 (cross-listed to: SC/BIOL 4700 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)	▪ Note: SC/ENVB 4700 3.00 (cross-listed to: SC/BIOL 4700 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
Science Breadth 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. • Complete all of the following ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies. ○ Completed at least 3 credits from the following types of courses: in science disciplines outside the major • Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)	**Science Breadth** 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. • Complete all of the following ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies. ○ Completed at least 3 credits from the following types of courses: in science disciplines outside the major • Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.	▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.
Upper-level Credits 0Total Credits • A minimum of 18 credits at the 3000 level or above.	**Upper-level Credits** 0Total Credits • A minimum of 18 credits at the 3000 level or above.
Additional Elective Credits 12Total Credits • Complete all of the following ○ As required for an overall total of at least 90 credits. ○ Completed at least 12 credits from the following types of courses: additional elective credits.	**Additional Elective Credits** 12Total Credits • Complete all of the following ○ As required for an overall total of at least 90 credits. ○ Completed at least 12 credits from the following types of courses: additional elective credits.
Grand Total Credits: 90	**Grand Total Credits: 90**
Environmental Biology - Bachelor of Science – Honours Credit Completion Requirements/Exigences d'achèvement du crédit	**Environmental Biology - Bachelor of Science – Honours** Credit Completion Requirements/Exigences d'achèvement du crédit
General Education 27Total Credits • Complete all of the following Non-Science Requirement ○ Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each	**General Education** 27Total Credits • Complete all of the following Non-Science Requirement ○ Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each

area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ○ Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and	area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ○ Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and

astronomy or statistics should not take SC/MATH 1505 6.00. Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following:	astronomy or statistics should not take SC/MATH 1505 6.00. Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following:

▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories. ○ Note: both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00 in the program core.	▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories. ○ Note: both SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 are required as prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00 in the program core.
Major Requirement 51Total Credits • Complete all of the following The Program Core ○ Complete all of the following ▪ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following:	**Major Requirement** 51Total Credits • Complete all of the following The Program Core ○ Complete all of the following ▪ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following:

▪ SC/ENVB2050 Cr=3.00 EN - Ecology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ▪ Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ ~~SC/ENVB3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~Note: SC/ENVB 3001 3.00 (cross-listed to: SC/BIOL 3001 3.00)~~ ▪ Complete all of the following ▪ Earned at least 3 credits from the following:	▪ SC/ENVB2050 Cr=3.00 EN - Ecology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ▪ Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ Note: SC/ENVB 4001 3.00 (cross-listed to: SC/BIOL 4001 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following:

▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00); ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ○ Passed the following: ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) Additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00)	▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00); ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ○ Passed the following: ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) Additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00)

▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ ~~SC/ENVB3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4265 3.00	▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ SC/ENVB4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4265 3.00

▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ~~▪ Note: SC/ENVB 3002 3.00 (cross-listed to: SC/BIOL 3002 3.00)~~ ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)	▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ Note: SC/ENVB 4002 3.00 (cross-listed to: SC/BIOL 4002 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
Science Breadth 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. • Complete all of the following ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.	**Science Breadth** 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above requirements. • Complete all of the following ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

○ Completed at least 3 credits from the following types of courses: in science disciplines outside the major • Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.	○ Completed at least 3 credits from the following types of courses: in science disciplines outside the major • Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.
Upper-level Credits 0Total Credits • A minimum of 42 credits at the 3000 level or above.	**Upper-level Credits** 0Total Credits • A minimum of 42 credits at the 3000 level or above.
Additional Elective Credits 39Total Credits • Complete all of the following ○ As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of at least 120 credits. ○ Completed at least 24 credits from the following types of courses: additional elective credits.	**Additional Elective Credits** 39Total Credits • Complete all of the following ○ As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of at least 120 credits. ○ Completed at least 24 credits from the following types of courses: additional elective credits.

- Completed at least 15 credits from the following types of courses:

  at the 3000 level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Double Major

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

27Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following

- Completed at least 15 credits from the following types of courses:

  at the 3000 level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Double Major

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

27Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following

▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ○ Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00. Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following:	▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ○ Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1505 6.00. Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following:

▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00)	▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

- SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00)

Major Requirement

42Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/ENVB2050 Cr=4.00 EN - Ecology (4.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
  - Earned at least 6 credits from the following:
    - SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2030 Cr=4.00 EN - Animals (4.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

- SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00)

Major Requirement

42Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/ENVB2050 Cr=4.00 EN - Ecology (4.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
  - Earned at least 6 credits from the following:
    - SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2030 Cr=4.00 EN - Animals (4.00)

▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ ~~SC/ENVB3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~Note: SC/ENVB 3001 3.00 (cross-listed to SC/BIOL 3001 3.00~~ Additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology (SC/ENVB) and biology courses (SC/BIOL), including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 20 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00)	▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ Note: SC/ENVB 4001 3.00 (cross-listed to SC/BIOL 4001 3.00 Additional credits from the following list of courses for an overall total of at least 42 credits from environmental biology (SC/ENVB) and biology courses (SC/BIOL), including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 20 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00)

▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ ~~SC/ENVB3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00;	▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ SC/ENVB4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00;

SC/ENVB4230 4.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ ~~Note: SC/ENVB 3002 3.00 (cross-listed to: SC/BIOL 3002 3.00)~~ ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.	SC/ENVB4230 4.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ Note: SC/ENVB 4002 3.00 (cross-listed to: SC/BIOL 4002 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.
Science Breadth 9Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above	**Science Breadth** 9Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these 24 credits are satisfied by the above

requirements. Satisfied if the second major is another science discipline.

- Complete all of the following
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.
  - Completed at least 9 credits from the following types of courses:

    in science disciplines outside the major
    - Note: the following will not count towards this requirement:
  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Additional Elective Credits

42Total Credits

requirements. Satisfied if the second major is another science discipline.

- Complete all of the following
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.
  - Completed at least 9 credits from the following types of courses:

    in science disciplines outside the major
    - Note: the following will not count towards this requirement:
  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Additional Elective Credits

42Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

  - Completed at least 21 credits from the following types of courses:

    at the 3000 level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

27Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

  - Completed at least 21 credits from the following types of courses:

    at the 3000 level or above to fulfill the upper-level credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

27Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
- SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
- Earned at least 6 credits from the following:
- SC/MATH1013 - Applied Calculus I (3.00)
- SC/MATH1014 - Applied Calculus II (3.00)
- SC/MATH1025 - Applied Linear Algebra (3.00)

Excluding:

- Not taken any of the following:
- SC/MATH1510 - Fundamentals of Mathematics (6.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1506 3.00 and SC/MATH 1507 3.00.

Computer Science

- Complete 1 of the following
  - Passed the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - Passed the following:

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
- SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
- Earned at least 6 credits from the following:
- SC/MATH1013 - Applied Calculus I (3.00)
- SC/MATH1014 - Applied Calculus II (3.00)
- SC/MATH1025 - Applied Linear Algebra (3.00)

Excluding:

- Not taken any of the following:
- SC/MATH1510 - Fundamentals of Mathematics (6.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - Note: students intending to combine environmental biology with applied mathematics, chemistry, computer science, earth and atmospheric science, mathematics, mathematics for education, physics and astronomy or statistics should not take SC/MATH 1506 3.00 and SC/MATH 1507 3.00.

Computer Science

- Complete 1 of the following
  - Passed the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - Passed the following:

▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding: ▪ Not taken any of the following:	▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete 1 of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) Excluding: ▪ Not taken any of the following:

▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories. ○ SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00)	▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories. ○ SC/CHEM 1000 3.00 and SC/CHEM 1001 3.00 (prerequisites for SC/BIOL 2020 3.00 and SC/CHEM 2020 3.00)
Major Requirement 51Total Credits • Complete all of the following The Program Core ○ Complete all of the following ▪ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB2050 Cr=3.00 EN - Ecology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ▪ Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following:	**Major Requirement** 51Total Credits • Complete all of the following The Program Core ○ Complete all of the following ▪ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB2050 Cr=3.00 EN - Ecology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ▪ Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following:

▪ SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ~~▪ SC/ENVB3001 Cr=3.00 EN - Field Course (3.00)~~ ~~▪ SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ~~▪ Note: SC/ENVB 3001 3.00 (cross-listed to: SC/BIOL 3001 3.00)~~ ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00); ▪ Complete all of the following ▪ Earned at least 3 credits from the following:	▪ SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) Additional courses as required for a total of at least 18 2000-level credits chosen from the following: ▪ Earned at least 9 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ Note: SC/ENVB 4001 3.00 (cross-listed to: SC/BIOL 4001 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/ENVB3171 - Population Ecology (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00); ▪ Complete all of the following ▪ Earned at least 3 credits from the following:

▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ○ Passed the following: ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) Additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00)	▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ○ Passed the following: ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) Additional credits from the following list of courses for an overall total of at least 51 credits from environmental biology (SC/ENVB) and biology (SC/BIOL) courses, including at least 18 credits at the 3000 or higher level, of which at least 12 credits must be at the 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets: ▪ SC - Environmental Biology (Honours) - 3000 or higher level ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00)

▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ ~~SC/ENVB3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ ~~Note: SC/ENVB 3002 3.00 (cross-listed to: SC/BIOL 3002 3.00)~~	▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ SC/ENVB4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/ENVB4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/ENVB4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/ENVB4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4230 4.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ Note: SC/ENVB 4002 3.00 (cross-listed to: SC/BIOL 4002 3.00)

▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)	▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4000 3.00 or SC/ENVB 4000 8.00 ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00) ○ Passed the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
Minor Requirements 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses: in the minor subject area normally including at least six credits at the 4000 level; ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.	**Minor Requirements** 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses: in the minor subject area normally including at least six credits at the 4000 level; ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.
Science Breadth 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these	**Science Breadth** 3Total Credits 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 21 of these

24 credits are satisfied by the above requirements. Satisfied if the minor is another science discipline.

- Complete all of the following
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.
  - Completed at least 3 credits from the following types of courses:

    in science disciplines outside the major
    - Note: the following will not count towards this requirement:
  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Additional Elective Credits

24 credits are satisfied by the above requirements. Satisfied if the minor is another science discipline.

- Complete all of the following
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematical biology, mathematics and statistics, physics and astronomy, psychology, science and technology studies.
  - Completed at least 3 credits from the following types of courses:

    in science disciplines outside the major
    - Note: the following will not count towards this requirement:
  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Additional Elective Credits

9Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 9 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

Minor Credits

30Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - Completed at least 1 of the following:
    - SC/ENVB2050 Cr=3.00 EN - Ecology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00)
  - Completed at least 1 of the following:
    - SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00)
    - SC/BIOL2080 - Ecology in Practice - Research

9Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 9 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Environmental Biology - Bachelor of Science - Honours Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

Minor Credits

30Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - Completed at least 1 of the following:
    - SC/ENVB2050 Cr=3.00 EN - Ecology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Note: SC/ENVB 2050 3.00 (cross-listed to SC/BIOL 2050 3.00)
  - Completed at least 1 of the following:
    - SC/ENVB2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00)
    - SC/BIOL2080 - Ecology in Practice - Research

Fundamentals in Ecology and Evolution (3.00) ○ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) ○ Passed the following: ▪ SC/BIOL2060 - Statistics for Biologists (3.00) Any two of: ○ Earned at least 6 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ ~~SC/ENVB3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~Passed the following:~~ ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~Note: SC/ENVB 3001 3.00 (cross-listed to: SC/BIOL 3001 3.00)~~ Additional credits from the following list of courses for an overall total of at least nine credits from environmental biology and biology courses at the 3000 or 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets:	Fundamentals in Ecology and Evolution (3.00) ○ Note: SC/ENVB 2080 3.00 (cross-listed to SC/BIOL 2080 3.00) ○ Passed the following: ▪ SC/BIOL2060 - Statistics for Biologists (3.00) Any two of: ○ Earned at least 6 credits from the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/ENVB4001 Cr=3.00 EN - Field Course (3.00) ▪ Passed the following: ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ Note: SC/ENVB 4001 3.00 (cross-listed to: SC/BIOL 4001 3.00) Additional credits from the following list of courses for an overall total of at least nine credits from environmental biology and biology courses at the 3000 or 4000 level: ○ Complete all of the following ▪ Earned at least 6 credits from the following course sets:

▪ SC - Environmental Biology (Minor) - 3000 or higher level: ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ ~~SC/ENVB3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/ENVB3171 - Population Ecology (3.00)	▪ SC - Environmental Biology (Minor) - 3000 or higher level: ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL4085 Cr=4.00 EN - Quantitative Methods in Biology (4.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4305 - Controversies in the Modern Life Sciences (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4710 - Integrative Environmental Physiology (3.00) ▪ SC/BIOL4720 - Environmental Contaminants: Impacts on Organisms and Ecosystems (3.00) ▪ SC/ENVB4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/ENVB3171 - Population Ecology (3.00)

▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/ENVB3172 - Community Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00)	▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/ENVB3172 - Community Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/ENVB3270 - Sociobiology (3.00) ▪ SC/BIOL3270 - Sociobiology (3.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4230 Cr=4.00 EN - Entomology (4.00) ▪ SC/ENVB4245 - Conservation Biology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4265 - Biology in Environmental Management (3.00) ▪ SC/ENVB4700 - Current Topics in Environmental Biology (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00)

▪ SC/ENVB 4255 3.00; SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4250 3.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ ~~Note: SC/ENVB 3002 3.00 (cross-listed to: SC/BIOL 3002 3.00)~~ ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00) ▪ Note: SC/ENVB 3172 3.00 (cross-listed to SC/BIOL 3172 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00)	▪ SC/ENVB 4255 3.00; SC/ENVB3250 4.00; SC/ENVB3280 4.00; SC/ENVB3290 4.00; SC/ENVB4095 3.00; SC/ENVB4250 3.00; SC/ENVB4265 3.00 ▪ Note: SC/BIOL 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/GEOG 3500 3.00) ▪ Note: SC/ENVB 4002 3.00 (cross-listed to: SC/BIOL 4002 3.00) ▪ Note: SC/ENVB 3171 3.00 (cross-listed to SC/BIOL 3171 3.00) ▪ Note: SC/ENVB 3172 3.00 (cross-listed to SC/BIOL 3172 3.00) ▪ Note: SC/ENVB 3250 4.00 (cross-listed to: SC/BIOL 3250 4.00) ▪ Note: SC/ENVB 3270 3.00 (cross-listed to: SC/BIOL 3270 3.00) ▪ Note: SC/ENVB 3280 4.00 (cross-listed to: SC/BIOL 3280 4.00) ▪ Note: SC/ENVB 3290 4.00 (cross-listed to: SC/BIOL 3290 4.00) ▪ Note: SC/ENVB 4095 3.00 (cross-listed to: SC/BIOL 4095 3.00) ▪ Note: SC/ENVB 4230 4.00 (cross-listed to: SC/BIOL 4230 4.00) ▪ Note: SC/ENVB 4245 3.00 (cross-listed to: SC/BIOL 4245 3.00) ▪ Note: SC/ENVB 4250 3.00 (cross-listed to: SC/BIOL 4250 3.00) ▪ Note: SC/ENVB 4265 3.00 (cross-listed to: SC/BIOL 4265 3.00)

- Note: SC/ENVB 4700 3.00 (cross-listed to: SC/BIOL 4700 3.00)

- Additional credits from the above listed environmental biology and biology courses at the 2000 or higher level, as required for an overall total of at least 30 environmental biology (SC/ENVB) or biology (SC/BIOL) credits.

Grand Total Credits: 30

Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science - 90 Credits

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

12Total Credits

To fulfill the environmental and urban change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
    - Completed at least 2 of the following:
      - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
      - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

- Note: SC/ENVB 4700 3.00 (cross-listed to: SC/BIOL 4700 3.00)

- Additional credits from the above listed environmental biology and biology courses at the 2000 or higher level, as required for an overall total of at least 30 environmental biology (SC/ENVB) or biology (SC/BIOL) credits.

Grand Total Credits: 30

Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science - 90 Credits

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

12Total Credits

To fulfill the environmental and urban change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
    - Completed at least 2 of the following:
      - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
      - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement. Social Science (SOSC) ○ Complete 1 of the following ▪ Passed the following: ▪ EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00) ▪ Completed at least 6 credits from the following types of courses: any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.	any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement. Social Science (SOSC) ○ Complete 1 of the following ▪ Passed the following: ▪ EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00) ▪ Completed at least 6 credits from the following types of courses: any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.
Non-Major Science Requirement 15Total Credits • Complete all of the following Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Passed the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) Excluding ▪ Not taken any of the following:	**Non-Major Science Requirement** 15Total Credits • Complete all of the following Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Passed the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) Excluding ▪ Not taken any of the following:

- SC/MATH1530 - Introductory Mathematics for Economists I (3.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

Computer Science

- Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational Science

- Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:
  - SC/PHYS1011 - Physics 1 (3.00)
  - SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

24Total Credits

Students will take at least 24 credits, including:

- Complete all of the following
  - Passed the following:

- SC/MATH1530 - Introductory Mathematics for Economists I (3.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

Computer Science

- Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational Science

- Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:
  - SC/PHYS1011 - Physics 1 (3.00)
  - SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

24Total Credits

Students will take at least 24 credits, including:

- Complete all of the following
  - Passed the following:

▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ EU/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00) ▪ EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00) ▪ Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG2401 - Hydrosphere I (3.00) ▪ EU/GEOG2401 - Hydrosphere I (3.00) ▪ Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following:	▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2050 Cr=3.00 EN - Ecology (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ EU/GEOG1401 - Physical Geography: Weather and Climate (3.00) ▪ Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00) ▪ EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00) ▪ Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG2401 - Hydrosphere I (3.00) ▪ EU/GEOG2401 - Hydrosphere I (3.00) ▪ Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following:

▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00) ▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00)	▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00) ▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00)
Biodiversity and Conservation Stream 25Total Credits Including Major credits listed above (24 credits) and the following: • Complete all of the following ○ Passed the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Passed the following: ▪ EU/ENVS4110 - Conservation Biology (3.00) 12 additional credits from the following:	**Biodiversity and Conservation Stream** 25Total Credits Including Major credits listed above (24 credits) and the following: • Complete all of the following ○ Passed the following: ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ Passed the following: ▪ EU/ENVS4110 - Conservation Biology (3.00) 12 additional credits from the following:

○ Complete all of the following Three credits chosen from: ▪ Earned at least 3 credits from the following: ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) 9 additional credits chosen from the following for a total of 12 credits: ▪ Complete all of the following ▪ (Note: SC/GEOG 4205 3.00, SC/GEOG 4210 3.00, SC/GEOG 4215 3.00, SC/GEOG 4310 3.00 and SC/GEOG 4400 3.00 have additional course prerequites that are not specified in the required courses for this academic program —such as SC/GEOG 2402 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Earned at least 9 credits from the following: ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00)	○ Complete all of the following Three credits chosen from: ▪ Earned at least 3 credits from the following: ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) 9 additional credits chosen from the following for a total of 12 credits: ▪ Complete all of the following ▪ (Note: SC/GEOG 4205 3.00, SC/GEOG 4210 3.00, SC/GEOG 4215 3.00, SC/GEOG 4310 3.00 and SC/GEOG 4400 3.00 have additional course prerequites that are not specified in the required courses for this academic program —such as SC/GEOG 2402 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Earned at least 9 credits from the following: ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00)

▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00)	▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00)

▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/GEOG 4410 3.00; EU/GEOG 4410 3.00 ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 and SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00)	▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/GEOG 4410 3.00; EU/GEOG 4410 3.00 ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 and SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00)

▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00) ▪ Note: one of the following: SC/BIOL 4000 3.00; SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00) ▪ Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00) ▪ Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00) ▪ Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00) ▪ Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00) ▪ Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00 ▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00) ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00) ▪ Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00) ▪ List of courses includes: SC/BIOL 4070 Behavioural Ecology	▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00) ▪ Note: one of the following: SC/BIOL 4000 3.00; SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00) ▪ Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00) ▪ Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00) ▪ Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00) ▪ Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00) ▪ Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00 ▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00) ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00) ▪ Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00) ▪ List of courses includes: SC/BIOL 4070 Behavioural Ecology
Upper-level Credits 0Total Credits • At least 18 credits be at the 3000 level or higher.	**Upper-level Credits** 0Total Credits • At least 18 credits be at the 3000 level or higher.
Additional Elective Credits 14Total Credits • Complete all of the following	**Additional Elective Credits** 14Total Credits • Complete all of the following

- As required for an overall total of at least 90 credits.
- Completed at least 14 credits from the following types of courses:

  additional elective credits.

- Note: at least 12 credits from the major courses (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.

Grand Total Credits: 90

Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science – Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

12Total Credits

- Complete all of the following

  To fulfill the Environmental and Urban Change general education requirements students must take 12 credits general education credits as follows:

  - Complete all of the following

    Humanities (HUMA)

    - Complete 1 of the following
    - Completed at least 2 of the following:
    - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
    - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

- As required for an overall total of at least 90 credits.
- Completed at least 14 credits from the following types of courses:

  additional elective credits.

- Note: at least 12 credits from the major courses (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.

Grand Total Credits: 90

Environmental Science (Biodiversity and Conservation Stream) - Bachelor of Science – Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

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- Complete all of the following

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    - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
    - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement. Social Science (SOSC) ▪ Complete 1 of the following ▪ Passed the following: ▪ EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00) ▪ Completed at least 6 credits from the following types of courses: any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement. **Non-Major Science Requirement** 15Total Credits • Complete all of the following Mathematics: ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Passed the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) Excluding:	any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement. Social Science (SOSC) ▪ Complete 1 of the following ▪ Passed the following: ▪ EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00) ▪ Completed at least 6 credits from the following types of courses: any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement. **Non-Major Science Requirement** 15Total Credits • Complete all of the following Mathematics: ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Passed the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) Excluding:

- Not taken any of the following:
- SC/MATH1510 - Fundamentals of Mathematics (6.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

Computer science:

- Completed at least 1 of the following:
- LE/EECS1520 - Computer Use: Fundamentals (3.00)
- LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational science:

- Complete 1 of the following
- Passed the following:
- SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
- SC/CHEM1001 - Chemical Dynamics (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements
63Total Credits

- Not taken any of the following:
- SC/MATH1510 - Fundamentals of Mathematics (6.00)
- SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

Computer science:

- Completed at least 1 of the following:
- LE/EECS1520 - Computer Use: Fundamentals (3.00)
- LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational science:

- Complete 1 of the following
- Passed the following:
- SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
- SC/CHEM1001 - Chemical Dynamics (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements
63Total Credits

- Complete all of the following

Program core (27 credits)

  - Complete all of the following
  - Passed the following:
  - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG2401 - Hydrosphere I (3.00)
  - EU/GEOG2401 - Hydrosphere I (3.00)
  - Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/BIOL2060 - Statistics for Biologists (3.00)
  - SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00)

- Complete all of the following

Program core (27 credits)

  - Complete all of the following
  - Passed the following:
  - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/GEOG2401 - Hydrosphere I (3.00)
  - EU/GEOG2401 - Hydrosphere I (3.00)
  - Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00);
  - Complete all of the following
  - Earned at least 3 credits from the following:
  - SC/BIOL2060 - Statistics for Biologists (3.00)
  - SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00)

▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ▪ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4800 - Environmental Science Capstone (3.00) ▪ EU/GEOG4800 - Environmental Science Capstone (3.00) ▪ Note: SC/BIOL 4800 3.00 (cross-listed to: EU/GEOG 4800 3.00). Biodiversity and Conservation Stream ○ Complete all of the following ▪ Completed at least 3 credits from the following types of courses: SC/BIOL 2010 3.00 ▪ Passed the following: ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL4245 - Conservation Biology (3.00) 21 credits from the following: ▪ Complete all of the following	▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ▪ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00) ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4800 - Environmental Science Capstone (3.00) ▪ EU/GEOG4800 - Environmental Science Capstone (3.00) ▪ Note: SC/BIOL 4800 3.00 (cross-listed to: EU/GEOG 4800 3.00). Biodiversity and Conservation Stream ○ Complete all of the following ▪ Completed at least 3 credits from the following types of courses: SC/BIOL 2010 3.00 ▪ Passed the following: ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2080 - Ecology in Practice - Research Fundamentals in Ecology and Evolution (3.00) ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) 21 credits from the following: ▪ Complete all of the following

Three credits from: ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL 4070 3.00; 18 additional credits chosen from the following for a total of 21 credits: ▪ Complete all of the following ▪ (Note: SC/GEOG 4205 3.00, SC/GEOG 4210 3.00, SC/GEOG 4215 3.00, SC/GEOG 4310 3.00 and SC/GEOG 4400 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/GEOG 2402 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Earned at least 18 credits from the following course sets: ▪ SC - Environmental Science (Biodiversity and Conservation Stream) - Additional credits ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00)	Three credits from: ▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL 4070 3.00; 18 additional credits chosen from the following for a total of 21 credits: ▪ Complete all of the following ▪ (Note: SC/GEOG 4205 3.00, SC/GEOG 4210 3.00, SC/GEOG 4215 3.00, SC/GEOG 4310 3.00 and SC/GEOG 4400 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/GEOG 2402 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Earned at least 18 credits from the following course sets: ▪ SC - Environmental Science (Biodiversity and Conservation Stream) - Additional credits ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00)

▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00)	▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00)

▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4070 3.00; SC/GEOG4410 3.00; EU/GEOG4410 3.00 ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00), ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00), ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 and SC/BIOL 3500 3.00), ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00), ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00), ▪ Note: one of the following: SC/BIOL 4000 3.00, SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00,	▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4070 3.00; SC/GEOG4410 3.00; EU/GEOG4410 3.00 ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00), ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00), ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00 and SC/BIOL 3500 3.00), ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00), ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00), ▪ Note: one of the following: SC/BIOL 4000 3.00, SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00,

▪ Note: SC/BIOL 4255 3.00 (cross-listed as EU/ENVS 4111 3.00), ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00), ▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00), ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00), ▪ Note: SC/GEOG 4600 3.00, (cross-listed to: EU/GEOG 4600 3.00); o Additional credits as required for at least 12 major credits (SC/BIOL or ENVS or GEOG) at the 4000 level.	▪ Note: SC/BIOL 4255 3.00 (cross-listed as EU/ENVS 4111 3.00), ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00), ▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00), ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00), ▪ Note: SC/GEOG 4600 3.00, (cross-listed to: EU/GEOG 4600 3.00); o Additional credits as required for at least 12 major credits (SC/BIOL or ENVS or GEOG) at the 4000 level.
Upper-level Credits 0Total Credits • A minimum of 42 credits at the 3000 or higher level.	**Upper-level Credits** 0Total Credits • A minimum of 42 credits at the 3000 or higher level.
Additional Elective Credits 30Total Credits • Complete all of the following o As required for an overall total of at least 120 credits. o Completed at least 21 credits from the following types of courses: additional elective credits. o Completed at least 9 credits from the following types of courses: at the 3000-level or above to fulfill the upper-level credits. o Note: at least 12 major credits from (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.	**Additional Elective Credits** 30Total Credits • Complete all of the following o As required for an overall total of at least 120 credits. o Completed at least 21 credits from the following types of courses: additional elective credits. o Completed at least 9 credits from the following types of courses: at the 3000-level or above to fulfill the upper-level credits. o Note: at least 12 major credits from (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.
Grand Total Credits: 120	**Grand Total Credits: 120**

Environmental Science (Environmental Dynamics Stream) - Bachelor of Science - 90 Credits

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

12Total Credits

To fulfill the environmental and urban change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
  - Completed at least 2 of the following:
  - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
  - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
  - Completed at least 6 credits from the following types of courses:

    any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement.

    Social Science (SOSC)

  - Complete 1 of the following
  - Passed the following:
  - EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00)
  - Completed at least 6 credits from the following types of courses:

    any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.

Non-Major Science Requirement

15Total Credits

Environmental Science (Environmental Dynamics Stream) - Bachelor of Science - 90 Credits

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

12Total Credits

To fulfill the environmental and urban change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
  - Completed at least 2 of the following:
  - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
  - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
  - Completed at least 6 credits from the following types of courses:

    any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement.

    Social Science (SOSC)

  - Complete 1 of the following
  - Passed the following:
  - EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00)
  - Completed at least 6 credits from the following types of courses:

    any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.

Non-Major Science Requirement

15Total Credits

- Complete all of the following

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Passed the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)

  Excluding

  - Not taken any of the following:
  - SC/MATH1530 - Introductory Mathematics for Economists I (3.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

  Foundational Science

  - Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:
  - SC/PHYS1011 - Physics 1 (3.00)
  - SC/PHYS1012 - Physics 2 (3.00)

  Note:

- Complete all of the following

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Passed the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)

  Excluding

  - Not taken any of the following:
  - SC/MATH1530 - Introductory Mathematics for Economists I (3.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

  Foundational Science

  - Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:
  - SC/PHYS1011 - Physics 1 (3.00)
  - SC/PHYS1012 - Physics 2 (3.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

24Total Credits
Students will take at least 24 credits, including:

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - Complete 1 of the following
    - Passed the following:
    - SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00)
    - Passed the following:
    - EU/GEOG2420 - Quantitative Methods (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - Passed the following:
    - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
    - Passed the following:
    - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG2401 - Hydrosphere I (3.00)

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

24Total Credits
Students will take at least 24 credits, including:

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - Complete 1 of the following
    - Passed the following:
    - SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00)
    - Passed the following:
    - EU/GEOG2420 - Quantitative Methods (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - Passed the following:
    - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
    - Passed the following:
    - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
  - Complete 1 of the following
    - Passed the following:
    - SC/GEOG2401 - Hydrosphere I (3.00)

▪ Passed the following: ▪ EU/GEOG2401 - Hydrosphere I (3.00) Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00)	▪ Passed the following: ▪ EU/GEOG2401 - Hydrosphere I (3.00) Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00)
Environmental Dynamics Stream 24Total Credits Including Major credits listed above (24 credits) and the following: • Complete all of the following ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2402 - Hydrosphere II (3.00) ▪ Passed the following: ▪ EU/GEOG2402 - Hydrosphere II (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2500 - Introduction to Vegetation and Soils (3.00) ▪ Passed the following: ▪ EU/GEOG2500 - Introduction to Vegetation and Soils (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2600 - Geomorphology I (3.00) ▪ Passed the following: ▪ EU/GEOG2600 - Geomorphology I (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ Passed the following: ▪ EU/GEOG3540 - Field Studies in Physical Geography (3.00) 12 additional credits from the following: ○ Complete all of the following Three credits chosen from:	**Environmental Dynamics Stream** 24Total Credits Including Major credits listed above (24 credits) and the following: • Complete all of the following ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2402 - Hydrosphere II (3.00) ▪ Passed the following: ▪ EU/GEOG2402 - Hydrosphere II (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2500 - Introduction to Vegetation and Soils (3.00) ▪ Passed the following: ▪ EU/GEOG2500 - Introduction to Vegetation and Soils (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG2600 - Geomorphology I (3.00) ▪ Passed the following: ▪ EU/GEOG2600 - Geomorphology I (3.00) ○ Complete 1 of the following ▪ Passed the following: ▪ SC/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ Passed the following: ▪ EU/GEOG3540 - Field Studies in Physical Geography (3.00) 12 additional credits from the following: ○ Complete all of the following Three credits chosen from:

▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) 9 additional credits chosen from the following for a total of 12 credits: ▪ Complete all of the following ▪ (Note: SC/BIOL 3290 3.00, SC/BIOL 4095 3.00 and SC/BIOL 4390 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/BIOL 2010 4.00, SC/BIOL 2040 3.00 or SC/BIOL 2080 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Earned at least 9 credits from the following: ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ ~~SC/BIOL3002 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00)	▪ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) 9 additional credits chosen from the following for a total of 12 credits: ▪ Complete all of the following ▪ (Note: SC/BIOL 3290 3.00, SC/BIOL 4095 3.00 and SC/BIOL 4390 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/BIOL 2010 4.00, SC/BIOL 2040 3.00 or SC/BIOL 2080 3.00. Students are responsible for ensuring that course prerequisites are satisfied and that chosen courses are not exclusions of other courses already taken.) ▪ Earned at least 9 credits from the following: ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL4002 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00)

▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ EU/ENVS4110 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00)	▪ SC/BIOL3250 - Experimental design for environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ EU/ENVS4110 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00) ▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00)

▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/GEOG 4410 3.00; EU/GEOG 4410 3.00 ▪ Note: one of the following: SC/BIOL 4000 3.00; SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4245 3.00 (cross-listed to: EU/ENVS 4110 3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00)	▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ EU/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00) ▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/GEOG 4410 3.00; EU/GEOG 4410 3.00 ▪ Note: one of the following: SC/BIOL 4000 3.00; SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4245 3.00 (cross-listed to: EU/ENVS 4110 3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00)

- Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00)
- Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00)
- Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00)
- Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00)
- Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00)
- Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00)
- Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00)
- Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00)
- Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00)

Upper-level Credits

0Total Credits

- At least 18 credits be at the 3000 level or higher.

Additional Elective Credits

15Total Credits

- Complete all of the following
  - As required for an overall total of at least 90 credits.
  - Completed at least 15 credits from the following types of courses:

    additional elective credits.

  - Note: at least 12 credits from the major courses (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.

Grand Total Credits: 90

Environmental Science (Environmental Dynamics Stream) - Bachelor of Science – Honours

- Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00)
- Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00)
- Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00)
- Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00)
- Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00)
- Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00)
- Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00)
- Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00)
- Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00)

Upper-level Credits

0Total Credits

- At least 18 credits be at the 3000 level or higher.

Additional Elective Credits

15Total Credits

- Complete all of the following
  - As required for an overall total of at least 90 credits.
  - Completed at least 15 credits from the following types of courses:

    additional elective credits.

  - Note: at least 12 credits from the major courses (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.

Grand Total Credits: 90

Environmental Science (Environmental Dynamics Stream) - Bachelor of Science – Honours

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

12Total Credits

To fulfill the Environmental and Urban Change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
    - Completed at least 2 of the following:
    - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
    - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

      any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement.

  Social Science (SOSC)

  - Complete 1 of the following
    - Passed the following:
    - EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00)
    - Completed at least 6 credits from the following types of courses:

      any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.

Non-Major Science Requirement

15Total Credits

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

12Total Credits

To fulfill the Environmental and Urban Change general education requirements students must take 12 credits general education credits as follows:

- Complete all of the following

  Humanities (HUMA)

  - Complete 1 of the following
    - Completed at least 2 of the following:
    - EU/ENVS1010 - Introduction to Environmental Documentaries (3.00)
    - EU/ENVS1100 - The land we're on: Treaties, Art and Environment (3.00)
    - Completed at least 6 credits from the following types of courses:

      any other 1000-level humanities general education course (at least 6 credits) not listed as satisfying the social science requirement.

  Social Science (SOSC)

  - Complete 1 of the following
    - Passed the following:
    - EU/GEOG1000 - The World Today: An Introduction to World Geography (6.00)
    - Completed at least 6 credits from the following types of courses:

      any other 1000-level social sciences general education course (at least 6 credits) not listed as satisfying the Humanities requirement.

Non-Major Science Requirement

15Total Credits

- Complete all of the following

  Mathematics:

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Passed the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)

    Excluding

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

    Computer Science

  - Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

    Foundational Science

  - Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:

- Complete all of the following

  Mathematics:

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Passed the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)

    Excluding

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

    Computer Science

  - Completed at least 1 of the following:
  - LE/EECS1520 - Computer Use: Fundamentals (3.00)
  - LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

    Foundational Science

  - Complete 1 of the following
  - Passed the following:
  - SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
  - SC/CHEM1001 - Chemical Dynamics (3.00)
  - Passed the following:
  - SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
  - SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
  - Passed the following:

- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

27Total Credits

Program Core (27 Credits)

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete all of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00);
    - Complete all of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
    - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)

- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Credits

27Total Credits

Program Core (27 Credits)

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2050 Cr=3.00 EN - Ecology (3.00)
  - Complete all of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - EU/GEOG1401 - Physical Geography: Weather and Climate (3.00)
    - Note: SC/GEOG 1401 3.00 (cross-listed to: EU/GEOG 1401 3.00);
    - Complete all of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)
    - EU/GEOG1402 - Physical Geography: The Dynamic Earth (3.00)

▪ Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG2401 - Hydrosphere I (3.00) ▪ EU/GEOG2401 - Hydrosphere I (3.00) ▪ Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00) ▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4800 - Environmental Science Capstone (3.00) ▪ EU/GEOG4800 - Environmental	▪ Note: SC/GEOG 1402 3.00 (cross-listed to: EU/GEOG 1402 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG2401 - Hydrosphere I (3.00) ▪ EU/GEOG2401 - Hydrosphere I (3.00) ▪ Note: SC/GEOG 2401 3.00 (cross-listed to: EU/GEOG 2401 3.00); ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/GEOG2420 Cr=3.00 EN - Quantitative Methods (3.00) ▪ EU/GEOG2420 - Quantitative Methods (3.00) ▪ Note: SC/BIOL 2060 3.00 or SC/GEOG 2420 3.00 (cross-listed to: EU/GEOG 2420 3.00); Three credits from: ○ Earned at least 3 credits from the following: ▪ EU/ENVS3420 - Environmental Law (3.00) ▪ EU/ENVS3430 - Environmental Assessment (3.00) ▪ EU/ENVS4445 - Ontario Environmental Politics and Policy (3.00) ○ Complete all of the following ▪ Earned at least 3 credits from the following: ▪ SC/BIOL4800 - Environmental Science Capstone (3.00) ▪ EU/GEOG4800 - Environmental

Science Capstone (3.00)

- Note: SC/BIOL 4800 3.00 (cross-listed to: EU/GEOG 4800 3.00).

Environmental Dynamics Stream

36Total Credits

- Complete all of the following

  Including Major credits above (27 credits) and the following:

  - Complete all of the following
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2402 - Hydrosphere II (3.00)
    - SC/GEOG2402 - Hydrosphere II (3.00)
    - Note: SC/GEOG 2402 3.00 (cross-listed to: EU/GEOG 2402 3.00);
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2500 - Introduction to Vegetation and Soils (3.00)
    - EU/GEOG2500 - Introduction to Vegetation and Soils (3.00)
    - Note: SC/GEOG 2500 3.00 (cross-listed to: EU/GEOG 2500 3.00);
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2600 - Geomorphology I (3.00)
    - EU/GEOG2600 - Geomorphology I (3.00)
    - Note: SC/GEOG 2600 3.00 (cross-listed to: EU/GEOG 2600 3.00);
    - Complete 1 of the following

Science Capstone (3.00)

- Note: SC/BIOL 4800 3.00 (cross-listed to: EU/GEOG 4800 3.00).

Environmental Dynamics Stream

36Total Credits

- Complete all of the following

  Including Major credits above (27 credits) and the following:

  - Complete all of the following
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2402 - Hydrosphere II (3.00)
    - SC/GEOG2402 - Hydrosphere II (3.00)
    - Note: SC/GEOG 2402 3.00 (cross-listed to: EU/GEOG 2402 3.00);
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2500 - Introduction to Vegetation and Soils (3.00)
    - EU/GEOG2500 - Introduction to Vegetation and Soils (3.00)
    - Note: SC/GEOG 2500 3.00 (cross-listed to: EU/GEOG 2500 3.00);
    - Complete 1 of the following
    - Earned at least 3 credits from the following:
    - SC/GEOG2600 - Geomorphology I (3.00)
    - EU/GEOG2600 - Geomorphology I (3.00)
    - Note: SC/GEOG 2600 3.00 (cross-listed to: EU/GEOG 2600 3.00);
    - Complete 1 of the following

	▪ Earned at least 3 credits from the following: ▪ SC/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ EU/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ Note: SC/GEOG 3540 3.00 (cross-listed to: EU/GEOG 3540 3.00); 24 additional credits from the following: ○ Complete all of the following Six credits from: ▪ Complete 2 of the following ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00), ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00), ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following:	▪ Earned at least 3 credits from the following: ▪ SC/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ EU/GEOG3540 - Field Studies in Physical Geography (3.00) ▪ Note: SC/GEOG 3540 3.00 (cross-listed to: EU/GEOG 3540 3.00); 24 additional credits from the following: ○ Complete all of the following Six credits from: ▪ Complete 2 of the following ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00), ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following: ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00), ▪ Complete 1 of the following ▪ Earned at least 3 credits from the following:

	▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00); 18 additional credits chosen from the following for a total of 24 credits: ▪ Complete all of the following ▪ Note: SC/BIOL 3290 4.00, SC/BIOL 4095 3.00 and SC/BIOL 4390 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/BIOL 2010 4.00, SC/BIOL 2040 3.00 or SC/BIOL 2080 3.00. Students are responsible for ensuring that these prerequisites are satisfied before enrolling and that the chosen courses are not course credit exclusions to other courses already taken.) ▪ Earned at least 18 credits from the following course sets: ▪ SC - Environmental Science (Environmental Dynamics Stream) - Additional credits ▪ ~~SC/BIOL3001 Cr=3.00 EN - Field Course (3.00)~~ ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3250 - Experimental design for	▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00); 18 additional credits chosen from the following for a total of 24 credits: ▪ Complete all of the following ▪ Note: SC/BIOL 3290 4.00, SC/BIOL 4095 3.00 and SC/BIOL 4390 3.00 have additional course prerequites that are not specified in the required courses for this academic program — such as SC/BIOL 2010 4.00, SC/BIOL 2040 3.00 or SC/BIOL 2080 3.00. Students are responsible for ensuring that these prerequisites are satisfied before enrolling and that the chosen courses are not course credit exclusions to other courses already taken.) ▪ Earned at least 18 credits from the following course sets: ▪ SC - Environmental Science (Environmental Dynamics Stream) - Additional credits ▪ SC/BIOL4001 Cr=3.00 EN - Field Course (3.00) ▪ SC/BIOL3171 - Population Ecology (3.00) ▪ SC/BIOL3172 - Community Ecology (3.00) ▪ SC/BIOL3200 - Processes of Evolution (3.00) ▪ SC/BIOL3250 - Experimental design for

	environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ EU/ENVS4110 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00)	environmental and evolutionary biology (4.00) ▪ SC/BIOL3280 - Freshwater Biology (4.00) ▪ SC/BIOL3290 - Plant Ecology (4.00) ▪ SC/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ EU/GEOG3100 - Global Biogeochemical Cycles (3.00) ▪ SC/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ EU/GEOG3200 - Terrestrial Ecosystems (3.00) ▪ SC/GEOG3500 - Biogeography (3.00) ▪ EU/GEOG3500 - Biogeography (3.00) ▪ SC/BIOL3500 - Biogeography (3.00) ▪ SC/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ EU/GEOG3700 - Disaster! The Earth's Extreme Natural Events (3.00) ▪ SC/GEOG3900 - Physical Geography of the City (3.00) ▪ EU/GEOG3900 - Physical Geography of the City (3.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/GEOG4000 - Honours Thesis (6.00) ▪ SC/BIOL4095 - Applied Plant Ecology (3.00) ▪ SC/BIOL4245 - Conservation Biology (3.00) ▪ EU/ENVS4110 - Conservation Biology (3.00) ▪ SC/BIOL4250 - Birds and the Environment (3.00)

	▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00)	▪ SC/BIOL4255 - Biodiversity (3.00) ▪ EU/ENVS4111 - Biodiversity (3.00) ▪ SC/BIOL4390 - Population Genetics (3.00) ▪ SC/BIOL4700 - Current Topics in Environmental Biology (3.00) ▪ SC/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ EU/GEOG4200 - Water Quality and Stream Ecosystems (3.00) ▪ SC/GEOG4205 - Climatology of High Latitudes (3.00) ▪ EU/GEOG4205 - Climatology of High Latitudes (3.00) ▪ SC/GEOG4210 - Hydrometeorology (3.00) ▪ EU/GEOG4210 - Hydrometeorology (3.00) ▪ SC/GEOG4215 - Ecological Climatology (3.00) ▪ EU/GEOG4215 - Ecological Climatology (3.00) ▪ SC/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ EU/GEOG4310 - Dynamics of Snow and Ice (3.00) ▪ SC/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ EU/GEOG4400 - Physical Hydrology and Water Resources (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4541 - Advanced Field Studies in Physical Geography (3.00) ▪ SC/GEOG4600 - Rivers: Environment and Process (3.00)

	▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/BIOL4070 3.00 ▪ Note: one of the following: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4245 3.00 (cross-listed to: EU/ENVS 4110 3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00) ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00) ▪ Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00) ▪ Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00) ▪ Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00) ▪ Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00) ▪ Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00)	▪ EU/GEOG4600 - Rivers: Environment and Process (3.00) ▪ SC/BIOL4070 3.00 ▪ Note: one of the following: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 or SC/GEOG 4000 6.00 ▪ Note: SC/BIOL 4245 3.00 (cross-listed to: EU/ENVS 4110 3.00) ▪ Note: SC/BIOL 4255 3.00 (cross-listed to: EU/ENVS 4111 3.00) ▪ Note: SC/GEOG 3100 3.00 (cross-listed to: EU/GEOG 3100 3.00) ▪ Note: SC/GEOG 3200 3.00 (cross-listed to: EU/GEOG 3200 3.00) ▪ Note: SC/GEOG 3500 3.00 (cross-listed to: EU/GEOG 3500 3.00, SC/BIOL 3500 3.00) ▪ Note: SC/GEOG 3700 3.00 (cross-listed to: EU/GEOG 3700 3.00) ▪ Note: SC/GEOG 3900 3.00 (cross-listed to: EU/GEOG 3900 3.00) ▪ Note: SC/GEOG 4200 3.00 (cross-listed to: EU/GEOG 4200 3.00) ▪ Note: SC/GEOG 4205 3.00 (cross-listed to: EU/GEOG 4205 3.00) ▪ Note: SC/GEOG 4210 3.00 (cross-listed to: EU/GEOG 4210 3.00) ▪ Note: SC/GEOG 4215 3.00 (cross-listed to: EU/GEOG 4215 3.00) ▪ Note: SC/GEOG 4310 3.00 (cross-listed to: EU/GEOG 4310 3.00) ▪ Note: SC/GEOG 4400 3.00 (cross-listed to: EU/GEOG 4400 3.00)

▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00) ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00) ▪ Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00)	▪ Note: SC/GEOG 4410 3.00 (cross-listed to: EU/GEOG 4410 3.00) ▪ Note: SC/GEOG 4541 3.00 (cross-listed to: EU/GEOG 4541 3.00) ▪ Note: SC/GEOG 4600 3.00 (cross-listed to: EU/GEOG 4600 3.00)
Upper-level Credits 0Total Credits • At least 42 credits be at three 3000 level or higher.	**Upper-level Credits** 0Total Credits • At least 42 credits be at three 3000 level or higher.
Additional Elective Credits 30Total Credits • Complete all of the following ○ As required for an overall total of at least 120 credits. ○ Completed at least 21 credits from the following types of courses: additional elective credits. ○ Completed at least 9 credits from the following types of courses: at the 3000-level or above to fulfill the upper-level credits. ○ Note: at least 12 major credits from (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.	**Additional Elective Credits** 30Total Credits • Complete all of the following ○ As required for an overall total of at least 120 credits. ○ Completed at least 21 credits from the following types of courses: additional elective credits. ○ Completed at least 9 credits from the following types of courses: at the 3000-level or above to fulfill the upper-level credits. ○ Note: at least 12 major credits from (SC/BIOL or EU/ENVS or EU/GEOG) must be at the 4000 level.
Grand Total Credits: 120	**Grand Total Credits: 120**

Proposal For Minor Modifications to Biology Degree Requirements

1. **Program:** BSc Honours Programs in Biology

2. **Degree Designation:**
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)

3. **Type of Modification**: Increasing the minimum of number of credits for biology (SC/BIOL) courses at the 3000 level or with an associated laboratory component from seven to eight for the following:
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)

4. **Effective Date:** Fall 2025

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5. Provide a general description of the proposed changes to the program.

Increasing the minimum of number of credits for biology (SC/BIOL) courses at the 3000 level or with an associated laboratory component from seven to eight

Provide the rationale for the proposed changes.

Since laboratory courses in the Dept. of Biology (at the 3000 level or higher) all have a 4.0 credit value there is no combination of lab courses that adds up to seven credits. This causes student confusion and results in the student exceeding these 7 credits to meet the requirement. Increasing the requirement to eight credits better aligns the minimum requirement with the credit value of these laboratory courses and avoids student confusion.

Note: There is no change to the major credit total (120 credits) for these degrees.

6. **Describe any resource implications and how they are being addressed.** There are no resource implications associated with this change.

7. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Current Calendar Copy	Proposed Calendar Copy
Biology (Biomedical Science) - Bachelor of Science – Honours Credit Completion Requirements/Exigences d'achèvement du crédit	**Biology (Biomedical Science) - Bachelor of Science – Honours** Credit Completion Requirements/Exigences d'achèvement du crédit
General Education 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:	**General Education** 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:

▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:	▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:

▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then	▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then

another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)	another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)

▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of ~~seven~~ credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)	○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)

▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)

▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.	▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.
Science Breadth 9Total Credits • Complete all of the following A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.	**Science Breadth** 9Total Credits • Complete all of the following A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

○ Completed at least 9 credits from the following types of courses: in science disciplines outside the major ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.	○ Completed at least 9 credits from the following types of courses: in science disciplines outside the major ○ Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies. Note: the following will not count towards this requirement: ○ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) ○ These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.
Upper-level Credits 0Total Credits • 42 credits at the 3000 level or above.	**Upper-level Credits** 0Total Credits • 42 credits at the 3000 level or above.
Credits Outside the Major 6Total Credits • Earned at least 6 credits from the following: ○ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)	**Credits Outside the Major** 6Total Credits • Earned at least 6 credits from the following: ○ SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;	• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;

- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)

- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)

▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following:	▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following:

- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

51Total Credits

- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

51Total Credits

• Complete all of the following
  ○ Passed the following:
  ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
  ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
  ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
  ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
  ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
  ▪ SC/BIOL2060 - Statistics for Biologists (3.00)
  ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00
  A minimum of nine credits chosen from the following courses:
  ○ Earned at least 9 credits from the following:
  ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
  ▪ SC/BIOL3070 - Animal Physiology II (4.00)
  ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
  ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
  ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
  ▪ SC/BIOL3155 - Virology (3.00)
	• Complete all of the following
	  ○ Passed the following:
	  ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
	  ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
	  ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
	  ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
	  ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
	  ▪ SC/BIOL2060 - Statistics for Biologists (3.00)
	  ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
	  ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00
	  A minimum of nine credits chosen from the following courses:
	  ○ Earned at least 9 credits from the following:
	  ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
	  ▪ SC/BIOL3070 - Animal Physiology II (4.00)
	  ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
	  ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
	  ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
	  ▪ SC/BIOL3155 - Virology (3.00)

▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00)	▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00)

▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)	▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)

▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of ~~seven~~ credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
Minor Requirements 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses:	**Minor Requirements** 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses:

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;

• AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.	• AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00.
Biology (Biomedical Science) - Bachelor of Science - Specialized Honours Credit Completion Requirements/Exigences d’achèvement du crédit	**Biology (Biomedical Science) - Bachelor of Science - Specialized Honours** Credit Completion Requirements/Exigences d’achèvement du crédit
General Education 33Total Credits	**General Education** 33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Complete 1 of the following
  - Passed the following:

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

  Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

  Computer Science

  - Complete 1 of the following
  - Passed the following:

▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following:	▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following:

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of ~~seven~~ credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following	○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following

▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00)	▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00)

▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.	▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Note: Lab credits are any courses with a credit value of 4 or 8.
Science Breadth 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of	**Science Breadth** 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of

which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*

• modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00;	• modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00;

- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science	by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science

○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:	○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:

▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.	▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.
Major Requirements 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:	**Major Requirements** 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:

▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)	▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)

▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)

▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of ~~seven~~ credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00) ▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ▪ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
Science Breadth 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of	**Science Breadth** 0Total Credits • Complete all of the following ○ A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of

these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major
24Total Credits
In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following

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- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

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Credits Outside the Major
24Total Credits
In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following

- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

21Total Credits

- Complete all of the following
  - As required for an overall total of 85 credits from science disciplines (including the major) and an overall total of atleast 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

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  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

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Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

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Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

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- classical studies*
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- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
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- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;

• AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00. ## Non-Science Requirement Restrictions (for BSc, Honours BSc, iBSc Candidates) 1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.	• AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00; • FA/MUSI 1500 6.00; • FA/MUSI 1510 6.00; • FA/MUSI 1520 6.00; • FA/MUSI 1530 6.00; • FA/MUSI 1540 6.00; • FA/MUSI 1550 6.00; • FA/MUSI 2520 6.00; • FA/THEA 1500 6.00; • FA/VISA 2110 6.00; • FA/VISA 2620 6.00. ## Non-Science Requirement Restrictions (for BSc, Honours BSc, iBSc Candidates) 7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.

3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.	9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose

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- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
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Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose

language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
4. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following

▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:	▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:

▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:	▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00)	▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00)

▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)	▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)

▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ○ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of ~~seven~~ credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component	▪ SC/BIOL4310 - Physiology of Circadian Timing (3.00) ▪ SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00) ▪ SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00) ▪ SC/BIOL4370 - Neurobiology (3.00) ▪ SC/BIOL4380 - Systems Neuroscience (3.00) ▪ SC/BIOL4410 - Advanced Drosophila Genetics (3.00) ▪ SC/BIOL4450 - Animal Development (4.00) ▪ SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00) ○ SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN ○ Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of eight credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component
Minor Requirements 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses: in the minor subject area normally including at least six credits at the 4000 level; ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.	**Minor Requirements** 30Total Credits • Complete all of the following ○ Completed at least 30 credits from the following types of courses: in the minor subject area normally including at least six credits at the 4000 level; ○ The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.
Science Breadth 0Total Credits	**Science Breadth** 0Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

    Note: the following will not count towards this requirement:

  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

    Note: the following will not count towards this requirement:

  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

24Total Credits

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
    - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

Credits Outside the Major

24Total Credits

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
    - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies,

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies,

environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish. ## Non-Science Requirement • non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component) ### Non-science course areas Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies: • anthropology • classical studies* • english • french studies* • gender and women's studies*** • history • humanities (courses not cross-listed with with science and technology studies (STS)) • languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**;	environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish. ## Non-Science Requirement • non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component) ### Non-science course areas Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies: • anthropology • classical studies* • english • french studies* • gender and women's studies*** • history • humanities (courses not cross-listed with with science and technology studies (STS)) • languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**;

- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above. 3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.	7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement. 8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above. 9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.
Notes: 1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will	Notes: 5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will

fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an

fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

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International Content Courses

Sample list of relevant country, region and thematic courses:

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- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
4. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Proposal For Minor Modifications to Biology Degree Requirements

1. **Program:** BSc Honours Programs in Biology

2. **Degree Designation:**
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)

3. **Type of Modification**: Addition of SC/BIOL 3095 3.0 as an approved course for the following:
   BSc Biology Hons. Specialized (Biomedical Science stream)
   BSc Biology Hons. Major Program (Biomedical Science Stream)
   BCs Biology Hons. Major/Minor Program (Biomedical Science Stream)
   International BSc Biology Hons. Major Program (Biomedical Science Stream)
   International BSc Biology Hons. Major/Minor Program (Biomedical Science Stream)

4. **Effective Date:** Fall 2025

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5. Provide a general description of the proposed changes to the program.

Addition of SC/BIOL 3095 3.0 (Introduction to Bioinformatics) to the list of approved courses for the Biomedical Sciences stream.

Provide the rationale for the proposed changes.

SC/BIOL 3095 3.0 is being offered for the first time in Fall 2024 and is not yet listed as an approved course for the Biomedical Sciences Stream.

6. **Describe any resource implications and how they are being addressed.** There are no resource implications associated with this change.

7. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Current Calendar Copy	Proposed Calendar Copy
Biology (Biomedical Science) - Bachelo Science – Honours Credit Completion Requirements/Exigences d'achèvement du crédit	**Biology (Biomedical Science) - Bachelo Science – Honours** Credit Completion Requirements/Exigences d'achèvement du crédit
General Education 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:	**General Education** 33Total Credits • Complete all of the following Non-Science Requirement o Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics o Complete 1 of the following ▪ Passed the following:

▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:	▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:

▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then	▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding: ▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then

another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)	another six credits are required from courses with laboratories. **Major Requirements** 51Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)

▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.	▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits. Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.
○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00)	○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major - Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL 3095 – Introduction to Bioinformatics (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)

▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00)

- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

9Total Credits

- Complete all of the following

  A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

9Total Credits

- Complete all of the following

  A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this

- Completed at least 9 credits from the following types of courses:

  in science disciplines outside the major

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major
6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)

requirement is fully satisfied by the above requirements.

- Completed at least 9 credits from the following types of courses:

  in science disciplines outside the major

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major
6Total Credits

- Earned at least 6 credits from the following:

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science

- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits
21Total Credits

- Complete all of the following
  - As required for an overall minimum total of 85 credits from science disciplines (including the major) and an overall total of 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy

• social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00; • FA/FACS 1900 6.00;	• political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00; • FA/DANC 1340 3.00; • FA/DANC 2340 3.00;

- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:
- SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)

- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

Non-Science Requirement

- Complete all of the following
- Completed at least 12 credits from the following types of courses:

from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

- For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

Mathematics

- Complete 1 of the following
- Passed the following:

▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following:	▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following:

- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

51Total Credits

- SC/PHYS1410 - Physical Science (6.00)
- Passed the following:
- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

    A minimum of nine credits chosen from the following courses:

  - Earned at least 9 credits from the following:
    - SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
    - SC/BIOL3070 - Animal Physiology II (4.00)
    - SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
    - SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
    - SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)
    - SC/BIOL3155 - Virology (3.00)

Major Requirements

51Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

    A minimum of nine credits chosen from the following courses:

  - Earned at least 9 credits from the following:
    - SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00)
    - SC/BIOL3070 - Animal Physiology II (4.00)
    - SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)
    - SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00)
    - SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00)

▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00)	▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology credits from the following courses, as required, for an overall total of 51 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 21 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major / Minor- Additional Biology (Sc/Biol) Credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL 3095 – Introduction to Bioinformatics (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00)

▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)	▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction:

- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.

Minor Requirements

30Total Credits

- Complete all of the following
  - Completed at least 30 credits from the following types of courses:

Questions and Concepts (3.00)

- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Within the 51 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.

Minor Requirements

30Total Credits

- Complete all of the following

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty of Science Undergraduate Degree and Certificate Programs section.

- Completed at least 30 credits from the following types of courses:

in the minor subject area normally including at least six credits at the 4000 level;

- The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

An Honours Major in biology may be combined with an Honours Minor in another subject area in an Honours Major/Minor BSc degree program. Possible subject combinations are listed under Undergraduate Degree Programs in the Faculty

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;

of Science Undergraduate Degree and Certificate Programs section.

Students may follow a stream within the Honours Major/Minor program in Biomedical Science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;

- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Specialized Honours

Credit Completion Requirements/Exigences d’achèvement du crédit

General Education
33Total Credits

- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - Bachelor of Science - Specialized Honours

Credit Completion Requirements/Exigences d’achèvement du crédit

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

    Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

    Computer Science

  - Complete 1 of the following
  - Passed the following:

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
  - Completed at least 12 credits from the following types of courses:

    from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

  - For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below.

    Mathematics

  - Complete 1 of the following
  - Passed the following:
  - SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00)
  - SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00)
  - Earned at least 6 credits from the following:
  - SC/MATH1013 - Applied Calculus I (3.00)
  - SC/MATH1014 - Applied Calculus II (3.00)
  - SC/MATH1025 - Applied Linear Algebra (3.00)

    Excluding:

  - Not taken any of the following:
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)

    Computer Science

  - Complete 1 of the following

- LE/EECS1520 - Computer Use: Fundamentals (3.00)
- Passed the following:
- LE/EECS1530 - Computer Use: Programming (3.00)
- Passed the following:
- LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational Science

- Complete all of the following
- Passed the following:
- SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
- SC/CHEM1001 - Chemical Dynamics (3.00)

An additional 6 credits from the following:

- Complete 1 of the following
- Passed the following:
- SC/PHYS1410 - Physical Science (6.00)
- Passed the following:
- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:

- Passed the following:
- LE/EECS1520 - Computer Use: Fundamentals (3.00)
- Passed the following:
- LE/EECS1530 - Computer Use: Programming (3.00)
- Passed the following:
- LE/EECS1540 - Computer Use for the Natural Sciences (3.00)

Foundational Science

- Complete all of the following
- Passed the following:
- SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00)
- SC/CHEM1001 - Chemical Dynamics (3.00)

An additional 6 credits from the following:

- Complete 1 of the following
- Passed the following:
- SC/PHYS1410 - Physical Science (6.00)
- Passed the following:
- SC/PHYS1420 - Physics with Applications to Life Sciences (6.00)
- Passed the following:
- SC/PHYS1010 - Physics (6.00)
- Passed the following:
- SC/ISCI1310 - Integrated Science (Physics) (6.00)
- Passed the following:
- SC/PHYS1411 - Physics Fundamentals 1 (3.00)
- SC/PHYS1412 - Physics Fundamentals 2 (3.00)
- Passed the following:
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

68Total Credits

- Complete all of the following
  - Passed the following:
    - SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
    - SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
    - SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
    - SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
    - SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)
    - SC/BIOL2060 - Statistics for Biologists (3.00)
    - SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00)
  - Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00

○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following	○ Earned at least 3 credits from the following: ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ○ Note: SC/BIOL 4000 3.00 or SC/BIOL 4000 8.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 68 biology (SC/BIOL) credits. Within the 68 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component. ○ Complete all of the following

▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00)	▪ Earned at least 35 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - SPECIALIZATION- Additional biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL 3095 – Introduction to Bioinformatics (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00)

- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

0Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of

- SC/BIOL4120 - Applied Immunology (3.00)
- SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00)
- SC/BIOL4150 - Cellular Regulation (3.00)
- SC/BIOL4151 - Membrane Transport (3.00)
- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
  - Note: Lab credits are any courses with a credit value of 4 or 8.

Science Breadth

0Total Credits

- Complete all of the following

which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

6Total Credits

- A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*

6Total Credits

- Earned at least 6 credits from the following:
  - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
  - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

13Total Credits

- Complete all of the following
  - As required for an overall total of at least 120 credits.
  - Completed at least 13 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))

• modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00; • FA/CMA 2401 6.00;	• languages, literature and linguistics* • modes of reasoning • philosophy • political science • social science (courses not cross-listed with with science and technology studies (STS)) • sociology In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement: • AP/ARB 2700 6.00; • AP/CH 2200 6.00; • AP/CLTR 1953 6.00; • AP/ECON 1000 3.00; • AP/ECON 1010 3.00; • AP/ECON 1900 3.00; • AP/GEOG 1000 6.00**; • AP/GEOG 1410 6.00**; • AP/GEOG 2060 3.00**; • AP/HND 2700 6.00; • AP/IT 2751 9.00; • AP/JP 2700 6.00; • AP/LING 1000 6.00; • AP/LING 2400 6.00; • AP/LING 2410 3.00; • AP/LING 2430 3.00; • AP/LING 2450 3.00; • AP/MODR 1730 6.00; • AP/MODR 1760 6.00; • AP/MODR 1770 6.00. **Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography. The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement: • EU/ENVS 1000 6.00; • EU/ENVS 2100 6.00 • EU/ENVS 2150 3.00 The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement: • FA/CMA 1401 6.00; • FA/CMA 1701 3.00;

- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Biology (Biomedical Science) - International Bachelor of Science - Honours

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties.

    - The non-science requirements may be satisfied in whole or part

by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science	by courses in the international component. ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following: ▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science

○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:	○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1421 - Physics with Life Science Applications 1 (3.00) ▪ SC/PHYS1422 - Physics with Life Science Applications 2 (3.00) ▪ Passed the following: ▪ SC/PHYS1011 - Physics 1 (3.00) ▪ SC/PHYS1012 - Physics 2 (3.00) ▪ Passed the following: ▪ SC/ISCI1301 - Integrated Science I (Physics) (3.00) ▪ SC/ISCI1302 - Integrated Science II (Physics) (3.00) ▪ Passed the following: ▪ HH/PSYC1010 - Introduction to Psychology (6.00) Excluding:

▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.	▪ Not taken any of the following: ▪ SC/BIOL1500 - Introduction to Biology (3.00) ▪ SC/CHEM1500 - Introduction to Chemistry (4.00) ▪ SC/PHYS1510 - Introduction to Physics (4.00) Note: ▪ If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.
Major Requirements 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:	**Major Requirements** 42Total Credits • Complete all of the following ○ Passed the following: ▪ SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) ▪ SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) ▪ SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00) ▪ SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00) ▪ SC/BIOL2040 Cr=3.00 EN - Genetics (3.00) ▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following:

▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00)	▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Complete all of the following ▪ Earned at least 12 credits from the following course sets: ▪ SC - Biology (Biomedical Science) - Honours Major (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00) ▪ SC/BIOL 3095 - Introduction to Bioinformatics (3.00)

▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00)	▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00)

- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN

- Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.

Science Breadth

0Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of

- SC/BIOL4154 - The Human Microbiome (3.00)
- SC/BIOL4155 - Advanced Virology (3.00)
- SC/BIOL4200 - Selected Readings in Biology (3.00)
- SC/BIOL4220 - Histology (4.00)
- SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00)
- SC/BIOL4285 - Human Molecular Genetics (3.00)
- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
- SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN

- Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component.

Science Breadth

0Total Credits

these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.

- Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

  Note: the following will not count towards this requirement:

- Not taken any of the following:
  - SC/BIOL1500 - Introduction to Biology (3.00)
  - SC/CHEM1500 - Introduction to Chemistry (4.00)
  - SC/MATH1510 - Fundamentals of Mathematics (6.00)
  - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
  - SC/PHYS1510 - Introduction to Physics (4.00)
- These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major
24Total Credits
In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
    - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

      Note: the following will not count towards this requirement:

    - Not taken any of the following:
      - SC/BIOL1500 - Introduction to Biology (3.00)
      - SC/CHEM1500 - Introduction to Chemistry (4.00)
      - SC/MATH1510 - Fundamentals of Mathematics (6.00)
      - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
      - SC/PHYS1510 - Introduction to Physics (4.00)
    - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits
0Total Credits

- A minimum of 42 credits at the 3000 level or above.

Credits Outside the Major
24Total Credits

- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
- Completed at least 6 credits from the following types of courses:

  of language study or non-science international component courses for a total of 30 credits.

- One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
- Earned at least 6 credits from the following:
- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

21Total Credits

- Complete all of the following
  - As required for an overall total of 85 credits from science disciplines (including the major) and an overall total of atleast 120 credits.
  - Completed at least 21 credits from the following types of courses:

    additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

In addition, the following must be completed for the international component:

- Complete all of the following
- Complete all of the following
- Completed at least 12 credits from the following types of courses:

  of language study in one of the languages offered at York University;

- A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
- Completed at least 6 credits from the following types of courses:

  of language study or non-science international component courses for a total of 30 credits.

- One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
- Earned at least 6 credits from the following:
- SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

21Total Credits

- Complete all of the following
  - As required for an overall total of 85 credits from science disciplines (including the major) and an overall total of atleast 120 credits.
  - Completed at least 21 credits from the following types of courses:

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

additional elective credits.

Grand Total Credits: 120

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies,

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;

history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;

- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.

- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

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- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

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- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
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- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.

3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.	8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above. 9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement. 10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography. 11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses. 12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement. Notes: 5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*). 6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits). 7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment. 8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose

International Bachelor of Science (Honours)

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Students intending to study abroad in a language other than English should also get an

language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

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Europe

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- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

  - Complete all of the following

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
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Biology (Biomedical Science) - International Bachelor of Science - Honours Major/Minor

Credit Completion Requirements/Exigences d'achèvement du crédit

General Education

33Total Credits

- Complete all of the following

  Non-Science Requirement

▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:	○ Complete all of the following ▪ Completed at least 12 credits from the following types of courses: from two different areas of study, including at least three credits from each area, subject to the restrictions noted below. For the purposes of this regulation "different area" means offered by different academic units such as divisions, departments or Faculties. ▪ Non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component). ▪ For details about which courses can be used to satisfy the Non-Science Requirement, please consult the Additional Notes section below. Mathematics ○ Complete 1 of the following ▪ Passed the following: ▪ SC/MATH1506 - Mathematics I for the Biological and Health Sciences (3.00) ▪ SC/MATH1507 - Mathematics II for the Biological and Health Sciences (3.00) ▪ Earned at least 6 credits from the following: ▪ SC/MATH1013 - Applied Calculus I (3.00) ▪ SC/MATH1014 - Applied Calculus II (3.00) ▪ SC/MATH1025 - Applied Linear Algebra (3.00) Excluding: ▪ Not taken any of the following:

▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:	▪ SC/MATH1510 - Fundamentals of Mathematics (6.00) ▪ SC/MATH1520 - Introduction to Calculus, with Vectors (3.00) Computer Science ○ Complete 1 of the following ▪ Passed the following: ▪ LE/EECS1520 - Computer Use: Fundamentals (3.00) ▪ Passed the following: ▪ LE/EECS1530 - Computer Use: Programming (3.00) ▪ Passed the following: ▪ LE/EECS1540 - Computer Use for the Natural Sciences (3.00) Foundational Science ○ Complete all of the following ▪ Passed the following: ▪ SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) ▪ SC/CHEM1001 - Chemical Dynamics (3.00) An additional 6 credits from the following: ▪ Complete 1 of the following ▪ Passed the following: ▪ SC/PHYS1410 - Physical Science (6.00) ▪ Passed the following: ▪ SC/PHYS1420 - Physics with Applications to Life Sciences (6.00) ▪ Passed the following: ▪ SC/PHYS1010 - Physics (6.00) ▪ Passed the following: ▪ SC/ISCI1310 - Integrated Science (Physics) (6.00) ▪ Passed the following: ▪ SC/PHYS1411 - Physics Fundamentals 1 (3.00) ▪ SC/PHYS1412 - Physics Fundamentals 2 (3.00) ▪ Passed the following:

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

- SC/PHYS1421 - Physics with Life Science Applications 1 (3.00)
- SC/PHYS1422 - Physics with Life Science Applications 2 (3.00)
- Passed the following:
- SC/PHYS1011 - Physics 1 (3.00)
- SC/PHYS1012 - Physics 2 (3.00)
- Passed the following:
- SC/ISCI1301 - Integrated Science I (Physics) (3.00)
- SC/ISCI1302 - Integrated Science II (Physics) (3.00)
- Passed the following:
- HH/PSYC1010 - Introduction to Psychology (6.00)

  Excluding:

- Not taken any of the following:
- SC/BIOL1500 - Introduction to Biology (3.00)
- SC/CHEM1500 - Introduction to Chemistry (4.00)
- SC/PHYS1510 - Introduction to Physics (4.00)

  Note:

- If the major is one of biology, chemistry or physics, then another six credits are required from courses with laboratories.

Major Requirements

42Total Credits

- Complete all of the following
  - Passed the following:
- SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00)
- SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00)
- SC/BIOL2020 Cr=3.00 EN - Biochemistry (3.00)
- SC/BIOL2021 Cr=3.00 EN - Cell Biology (3.00)
- SC/BIOL2040 Cr=3.00 EN - Genetics (3.00)

▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00)	▪ SC/BIOL2060 - Statistics for Biologists (3.00) ▪ SC/BIOL2070 - Research Methods in Cell and Molecular Biology (3.00) ○ Note: students intending to take physiology courses must also complete SC/BIOL 2030 4.00 A minimum of nine credits chosen from the following courses: ○ Earned at least 9 credits from the following: ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) Additional biology (SC/BIOL) credits from the following courses, as required, for an overall total of 42 biology (SC/BIOL) credits: ○ Earned at least 12 credits from the following course sets: ▪ Biology (Biomedical Science) - Honours Major/Minor (iBSc) - Additional Biology (SC/BIOL) credits ▪ SC/BIOL2010 Cr=4.00 EN - Plant Biology (4.00) ▪ SC/BIOL2030 Cr=4.00 EN - Animals (4.00) ▪ SC/BIOL3010 - Advanced Biochemistry (3.00) ▪ SC/BIOL3060 Cr=4.00 EN - Animal Physiology I (4.00) ▪ SC/BIOL3070 - Animal Physiology II (4.00) ▪ SC/BIOL3071 - Pharmaceutical Discovery (3.00)

▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00) ▪ SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)	▪ SC/BIOL 3095 – Introduction to Bioinformatics (3.00) ▪ SC/BIOL3110 - Molecular Biology I: Nucleic Acid Metabolism (3.00) ▪ SC/BIOL3120 - Immunobiology (3.00) ▪ SC/BIOL3130 Cr=3.00 EN - Molecular Biology II: Regulation of Gene Expression (3.00) ▪ SC/BIOL3140 Cr=4.00 EN - Advanced Biochemistry and Molecular Genetics Laboratory (4.00) ▪ SC/BIOL3150 Cr=4.00 EN - Microbiology (4.00) ▪ SC/BIOL3155 - Virology (3.00) ▪ SC/BIOL3350 - Comparative Chordate Anatomy (4.00) ▪ SC/BIOL4000 Cr=3.00 EN - Honours Thesis (3.00) ▪ SC/BIOL4000 Cr=8.00 EN - Honours Thesis (8.00) ▪ SC/BIOL4005 - The Scientific Method: Applications and Controversies (3.00) ▪ SC/BIOL4010 - Biology of Cancer (3.00) ▪ SC/BIOL4020 - Genomics (3.00) ▪ SC/BIOL4030 - Proteomics (3.00) ▪ SC/BIOL4050 - Protein Structure and Mechanisms of Disease (3.00) ▪ SC/BIOL4061 - Cell and Molecular Biology of Development (3.00) ▪ SC/BIOL4120 - Applied Immunology (3.00) ▪ SC/BIOL4141 - Current Topics and Methods in Cell Biology (3.00) ▪ SC/BIOL4150 - Cellular Regulation (3.00) ▪ SC/BIOL4151 - Membrane Transport (3.00) ▪ SC/BIOL4154 - The Human Microbiome (3.00) ▪ SC/BIOL4155 - Advanced Virology (3.00) ▪ SC/BIOL4200 - Selected Readings in Biology (3.00) ▪ SC/BIOL4220 - Histology (4.00) ▪ SC/BIOL4270 - Integrative Reproduction: Questions and Concepts (3.00) ▪ SC/BIOL4285 - Human Molecular Genetics (3.00)

- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
    - SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
    - Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component

Minor Requirements

30Total Credits

- Complete all of the following
    - Completed at least 30 credits from the following types of courses:

      in the minor subject area normally including at least six credits at the 4000 level;

    - The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Science Breadth

0Total Credits

- SC/BIOL4290 Cr=4.00 EN - Biotechnology (4.00)
- SC/BIOL4310 - Physiology of Circadian Timing (3.00)
- SC/BIOL4320 Cr=3.00 EN - Vertebrate Endocrinology (3.00)
- SC/BIOL4360 Cr=3.00 EN - Parasitology (3.00)
- SC/BIOL4370 - Neurobiology (3.00)
- SC/BIOL4380 - Systems Neuroscience (3.00)
- SC/BIOL4410 - Advanced Drosophila Genetics (3.00)
- SC/BIOL4450 - Animal Development (4.00)
- SC/BIOL4510 - Cellular and Molecular Basis of Muscle Physiology (3.00)
    - SC/BIOL 4110 4.00; SC/BIOL4350 Cr=4.00 EN
    - Within the 42 biology (SC/BIOL) credits at least 18 credits must be at the 3000 level or higher, of which at least 12 credits must be at the 4000 level. This must also include a minimum of seven credits from 3000 level or higher biology (SC/BIOL) courses with an associated laboratory component

Minor Requirements

30Total Credits

- Complete all of the following
    - Completed at least 30 credits from the following types of courses:

      in the minor subject area normally including at least six credits at the 4000 level;

    - The course requirements for the second major or the minor if the program is an Honours Double Major or Major/Minor. The grand total of 120 may be exceeded depending on the other major or minor.

Science Breadth

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

    Note: the following will not count towards this requirement:

  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

- 42 credits at the 3000 level or above.

0Total Credits

- Complete all of the following
  - A total of 24 credits in science disciplines outside the major, of which three credits must be at the 2000 level or above. 15 of these 24 credits are satisfied by the General Education requirement. In the biomedical science stream this requirement is fully satisfied by the above requirements.
  - Current science disciplines are: chemistry, computer science, earth and atmospheric science, geography, kinesiology and health science, mathematics and statistics, physics and astronomy, psychology, science and technology studies.

    Note: the following will not count towards this requirement:

  - Not taken any of the following:
    - SC/BIOL1500 - Introduction to Biology (3.00)
    - SC/CHEM1500 - Introduction to Chemistry (4.00)
    - SC/MATH1510 - Fundamentals of Mathematics (6.00)
    - SC/MATH1520 - Introduction to Calculus, with Vectors (3.00)
    - SC/PHYS1510 - Introduction to Physics (4.00)
  - These 24 credits may include science credits in the general education requirement that are not in the major, and science credits required by the major that are not in the major discipline.

Upper-level Credits

0Total Credits

Credits Outside the Major

24Total Credits

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)
    - SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

- 42 credits at the 3000 level or above.

Credits Outside the Major

24Total Credits

In addition, the following must be completed for the international component:

- Complete all of the following
  - Complete all of the following
    - Completed at least 12 credits from the following types of courses:

      of language study in one of the languages offered at York University;

    - A minimum of 12 credits of non-science courses with an international component (refer to sample list of courses in the section on international degrees), which will also serve to meet the non-science requirement of the general education component;
  - Completed at least 6 credits from the following types of courses:

    of language study or non-science international component courses for a total of 30 credits.

  - One to two exchange terms abroad as a full-time student at an institution with which York University has a formal exchange agreement.
  - Earned at least 6 credits from the following:
    - SC/CHEM2020 Cr=3.00 EN - Introductory Organic Chemistry I (3.00)

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies,

- SC/CHEM2021 - Introductory Organic Chemistry II (3.00)

Additional Elective Credits

0Total Credits

- As required for an overall total of at least 120 credits.

Grand Total Credits: 129

Course Availability/Offre de cours

Not all courses are offered in every academic year. **Courses that are not hyperlinked are not being offered in this academic year. Tous les cours ne sont pas offerts chaque année universitaire. **Les cours qui ne comportent pas de lien hypertexte ne sont pas offerts cette année universitaire.

Additional Notes

All Honours iBSc degree candidates must complete an international component in addition to the normal requirements of biology and the BSc. For further information about the international Bachelor of Science, refer to the International Bachelor of Arts and International Bachelor of Science in the Faculty of Science programs of study section.

Students may follow a stream within the Honours Major/Minor program in biomedical science (stream requirements are listed under the Biology Honours Major program). This stream may be combined with other approved science minors.

Important note: some major/minor combinations will require students to complete more than 120 credits. Students are advised to consult minor requirements as early as possible and to plan their program of study in consultation with an academic adviser and the iBSc supplemental calendar. Courses taken to meet requirements of the minor can also count as international component and/or non-science requirements for the BSc General Education Requirement. In fact, in order to complete the

environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;
- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;

degree requirements within the minimum number of credits some double counting will be necessary. Minors that can, with appropriate planning, be completed with the biology major within 120 credits include African studies, culture and expression, East Asian studies, environmental studies, European studies, geography, German studies, French studies, history, international development studies, Italian culture, Italian studies, Latin American and Caribbean studies, Portuguese studies, psychology, race, ethnicity and indigeneity, South Asian studies and Spanish.

Non-Science Requirement

- non-science requirement: 12 credits (may be satisfied in whole or part by courses in the international component)

Non-science course areas

Subject to the restrictions listed below, courses in the following areas may be taken at the Glendon Campus or the Faculty of Liberal Arts and Professional Studies:

- anthropology
- classical studies*
- english
- french studies*
- gender and women's studies***
- history
- humanities (courses not cross-listed with with science and technology studies (STS))
- languages, literature and linguistics*
- modes of reasoning
- philosophy
- political science
- social science (courses not cross-listed with with science and technology studies (STS))
- sociology

In addition, the following courses offered by the Faculty of Liberal Arts and Professional Studies may be taken to satisfy this requirement:

- AP/ARB 2700 6.00;
- AP/CH 2200 6.00;
- AP/CLTR 1953 6.00;

- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

- AP/ECON 1000 3.00;
- AP/ECON 1010 3.00;
- AP/ECON 1900 3.00;
- AP/GEOG 1000 6.00**;
- AP/GEOG 1410 6.00**;
- AP/GEOG 2060 3.00**;
- AP/HND 2700 6.00;
- AP/IT 2751 9.00;
- AP/JP 2700 6.00;
- AP/LING 1000 6.00;
- AP/LING 2400 6.00;
- AP/LING 2410 3.00;
- AP/LING 2430 3.00;
- AP/LING 2450 3.00;
- AP/MODR 1730 6.00;
- AP/MODR 1760 6.00;
- AP/MODR 1770 6.00.

**Geography courses (AP/GEOG 1000 6.00, AP/GEOG 1410 6.00 and AP/GEOG 2060 3.00) cannot be used to satisfy the requirement for students majoring in geography.

The following courses offered by the Faculty of Environmental and Urban Change may be taken to satisfy this requirement:

- EU/ENVS 1000 6.00;
- EU/ENVS 2100 6.00
- EU/ENVS 2150 3.00

The following courses offered by the School of the Arts, Media, Performance and Design may be taken to satisfy this requirement:

- FA/CMA 1401 6.00;
- FA/CMA 1701 3.00;
- FA/CMA 2401 6.00;
- FA/DANC 1340 3.00;
- FA/DANC 2340 3.00;
- FA/FACS 1900 6.00;
- FA/MUSI 1500 6.00;
- FA/MUSI 1510 6.00;
- FA/MUSI 1520 6.00;
- FA/MUSI 1530 6.00;
- FA/MUSI 1540 6.00;
- FA/MUSI 1550 6.00;
- FA/MUSI 2520 6.00;
- FA/THEA 1500 6.00;
- FA/VISA 2110 6.00;
- FA/VISA 2620 6.00.

1. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
2. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.
3. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement.
4. **Geography courses cannot be used to satisfy the requirement for students majoring in geography.
5. ***Excluding gender and women's studies courses which are cross-listed with natural science courses.
6. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.

Notes:

1. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*).
2. Students may not take for credit any more than three humanities/social science foundations courses (27 credits).
3. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment.
4. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will

Non-Science Requirement

Restrictions (for BSc, Honours BSc, iBSc Candidates)

7. Courses which are cross-listed as SC courses or which are eligible for SC credit cannot count towards this requirement.
8. Courses whose major focus is increased facility in the use of a language cannot count towards this requirement. Such courses are offered in the areas marked with an * above.
9. Quantitative courses focusing on techniques of mathematics or statistics cannot count towards this requirement.
10. **Geography courses cannot be used to satisfy the requirement for students majoring in geography.
11. ***Excluding gender and women's studies courses which are cross-listed with natural science courses.
12. Humanities and social science courses cross-listed with science and technology studies (STS) courses or which are listed as Course Credit Exclusions (CCEs) cannot count towards this requirement.

Notes:

5. Courses taken in fulfilment of this requirement may not be taken on a pass/fail basis (refer to Pass/Fail Grading Option in the Faculty of Science *Regulations Governing Examinations and Academic Standards* section of the *Faculty Rules*).
6. Students may not take for credit any more than three humanities/social science foundations courses (27 credits).
7. Non-science courses are normally taken at the 1000 or 2000 level, but higher-level courses are acceptable, subject only to prerequisites and course access specifications for enrolment.
8. Permission may be granted by the Office of Science Academic Services, on an individual basis, for a student to take a course outside the areas and Faculties listed above in fulfilment of the requirement subject to the course fulfilling the Faculty of Science breadth and critical skills requirements, the

fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an

student having the appropriate prerequisites and the course access specifications permitting enrolment. A student who is in doubt regarding whether or not any specific course will fulfill the requirement should consult the Office of Science Academic Services.

International Bachelor of Science (Honours)

- a total of 120 credits;
- 30 required credits outside the major, consisting of:
    - a minimum of 12 credits of language study in one of the languages offered at York University;
    - a minimum of 12 credits of non-science international content courses;
    - an additional six credits of language study or non-science international component courses for a total of 30 credits;
- one or two exchange terms abroad as a full-time student at an institution with which York has a formal exchange agreement.

Language Study

Each student will choose a modern language of study as an integral part of the program. The languages are those offered at York University. No prior knowledge of the language is necessary. All entering students will be given a placement test by the Department of Languages, Literature and Linguistics to determine their appropriate course entry level. All students must successfully complete at least the second university-level course in their chosen language. If entering students are placed in a course above the 1000 level, they must successfully complete 12 credits in that language; if students have a very high level of competence in the language, so that there are not 12 credits which they can do, i.e. the students are placed in the 4000 level, they must successfully complete the six credits in that language and the remaining credits of another language. If entering students already have a second-language competency in one of

assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00
- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00

the designated program languages, they must select an additional language.

Students intending to study abroad in a language other than English should also get an assessment of their language ability from a member of the Department of Languages, Literature and Linguistics. Students whose language ability is deemed insufficient for exchange may do their exchange in an English-speaking country or take courses taught in English at a university where English is not the principal language of instruction.

International Exchange (Mandatory)

Every student is required to spend at least one full term abroad at one of York University's exchange partners. While on exchange, students must carry a full-time course load. The exchange should take place during the student's second or third year, depending on the requirements of the specific program, and/or the student's language capacity.

International Content Courses

Sample list of relevant country, region and thematic courses:

East Asia

- AP/HIST 1030 6.00
- AP/HIST 2710 6.00
- AP/HIST 3760 6.00
- AP/HUMA 1400 9.00
- AP/HUMA 2420 9.00
- AP/POLS 2930 6.00
- AP/POLS 3510 3.00
- AP/POLS 3515 3.00
- EU/GEOG 1000 6.00

Europe

- AP/GER 3790 6.00
- AP/HIST 2300 6.00
- AP/HIST 3355 6.00
- AP/HIST 3391 6.00
- AP/HUMA 2195 9.00
- AP/POLS 2930 6.00
- AP/POLS 3520 3.00

- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

1. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.
2. In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

- AP/RU 3770 6.00

Latin America

- AP/HIST 2720 6.00
- AP/HIST 3731 6.00
- AP/POLS 2930 6.00
- AP/POLS 3553 6.00

Themes

Health

- AP/ANTH 3190 3.00
- AP/ANTH 3200 3.00
- AP/SOSC 2102 3.00

Cities

- AP/SOSC 1731 9.00
- AP/SOSC 2730 6.00
- AP/SOSC 3730 6.00

Notes:

3. This list indicates types of courses that will fulfil the requirement for courses that focus on a particular country or region or a particular theme. Other relevant courses, including those offered at the Faculty of Environmental and Urban Change, the Glendon Campus, and the School of the Arts, Media, Performance, and Design, will also be acceptable.

In order to also meet the non-science requirement in the iBSc, courses must be chosen from two different disciplines, i.e. for a focus on Latin America, take at least one history course and at least one political science course.

Changes to Existing Course

Faculty: FSc

Department:	Biology	**Date of Submission:**	March 2024
Course Number:	BIOL 4275 3.0	**Effective Session:**	Summer 2025
Course Title:	Fungi: Threads of Life		

Type of Change:

[ ]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[ ]	in course number/level	[ ]	in degree credit exclusion(s)
[X]	in credit value	[ ]	regularize course (from Special Topics)
[ ]	in title (max. 40 characters for short title)	[ ]	in course format/mode of delivery *
[ ]	in Calendar description (max. 40 words or 200	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
SC/BIOL 4275 ~~3.00~~ Fungi: Threads of Life	**SC/BIOL 4275 4.00 Fungi: Threads of Life**
Course Description:	**Course Description:**
This course explores the evolution, ecology, physiology and human impact of the ubiquitous yet enigmatic group of organisms classified as fungi. Lectures examine the diversity, phylogeny and taxonomy of major groups of fungi and fungus-like organisms; the unique cell and reproductive biology of fungi; basic features of fungal primary and secondary metabolism; the ecological roles and importance of fungi; the practical uses of fungi in food and medicine; and the roles of fungi as agents of disease. A special focus is placed on mutualistic and antagonistic interactions of fungi with other organisms. In labs students learn to identify major groups using traditional methods based on morphology and microscopy as well as molecular techniques; aseptic techniques for working with microorganisms; how to culture fungi on artificial media; and how to conduct bioassays for novel antibacterial metabolites produced by fungi. Labs include an experiential project in which students work collaboratively to explore the fungal microbiome of a selected host plant using metabarcoding and methods for isolating asymptomatic fungi from plant tissues. A one-day field trip to a local woodlot provides further experiential learning. Prerequisites: must be in enrolled in a Biology program and have earned at least 53 credits.	This course explores the evolution, ecology, physiology and human impact of the ubiquitous yet enigmatic group of organisms classified as fungi. Lectures examine the diversity, phylogeny and taxonomy of major groups of fungi and fungus-like organisms; the unique cell and reproductive biology of fungi; basic features of fungal primary and secondary metabolism; the ecological roles and importance of fungi; the practical uses of fungi in food and medicine; and the roles of fungi as agents of disease. A special focus is placed on mutualistic and antagonistic interactions of fungi with other organisms. In labs students learn to identify major groups using traditional methods based on morphology and microscopy as well as molecular techniques; aseptic techniques for working with microorganisms; how to culture fungi on artificial media; and how to conduct bioassays for novel antibacterial metabolites produced by fungi. Labs include an experiential project in which students work collaboratively to explore the fungal microbiome of a selected host plant using metabarcoding and methods for isolating asymptomatic fungi from plant tissues. A one-day field trip to a local woodlot provides further experiential learning. Prerequisites: must be in enrolled in a Biology program and have earned at least 53 credits. Course credit exclusion: SC/BIOL 4275 3.0

Rationale:

BIOL 4275 currently has 2 lectures hours and 3 lab hours per week. The number of lecture hours per week will be increased to 3 to allow for more contact time with students.

An additional hour of lecture time will also increase the credit value of the course to 4.0. This does not involve a change in the format as the course will still consist of lecture and lab components; the change is just to increase the number of lecture hours.

This change will align the credit value with other 4.0 credit 3000 level or higher lab based courses.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

CURRICULUM COMMITTEE REPORT

SEPTEMBER 2024

The Faculty of Science Curriculum Committee has reviewed proposals for changes to course information and degree requirements and recommends to the Executive Committee that the following changes be submitted to Council for approval.

Details regarding these proposals (and other minor changes to Calendar/Repository course descriptions and prerequisites which were approved by the Committee but are not reported here) are included in the working papers of September 17, 2024 meeting of the Curriculum Committee, which are on file for your inspection in the Office of the Dean, with all members of the Curriculum Committee or by contacting the Secretary of the Committee at scicurri@yorku.ca

1.1 MATHEMATICS AND STATISTICS:

1.3.1 Minor Modification to Degree Requirements to Applied Mathematics Programs: MATH 2015 3.0 will replace MATH 2310 3.0 effective Summer 2025 – **change applies to all the following programs:**

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialized Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialized Honours Major

1.3.2 Minor Modification to Degree Requirements to Actuarial Science Programs: MATH 2015 3.0 will replace MATH 2310 3.0 effective Summer 2025 – **change applies to all the following programs:**

a) Bachelor of Arts Honours Major
b) Bachelor of Arts Honours Double Major
c) Bachelor of Arts Honours Major/Minor
d) Bachelor of Arts Specialized Honours Major
e)

1.3.3 Minor Modification to Degree Requirements to Mathematics for Education Programs: MATH 2015 3.0 will replace MATH 2310 3.0 effective Summer 2025 – **change applies to all the following programs:**

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialist Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialist Honours Major

1.3.4 Minor Modification to Degree Requirements to Mathematics Programs: MATH 2015 3.0 will replace MATH 2310 3.0 effective Summer 2025 – **change applies to all the following programs:**

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialized Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialized Honours Major

1.3.5 Minor Modification to Degree Requirements to Statistics Programs: MATH 2015 3.0 will replace MATH 2310 3.0 effective Summer 2025 – **change applies to all the following programs:**

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialist Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialist Honours Major

1.3.6 Minor Modification to Degree Requirements to Mathematics Programs: change will remove MATH 3010 3.0 from Mathematics programs and replace the requirement with four replacement options for a credit at the 3000 level effective Summer 2025 – **change applies to all the following programs:**

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialist Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialist Honours Major

1.3.7 Change in pre-requisite: SC/MATH 2015 3.0 – Applied Multivariate and Vector Calculus

1.3.8 Change in Calendar Description: SC/MATH 1200 3.0 – Problems, Conjectures and Proofs

All the Math proposals were submitted by Prof. Haslam, and Susy submitted MATH 1200.

1.4 NATURAL SCIENCE:

1.4.1 New Course Proposal: SC/NATS 1815 3.0 – The Science of Sustainable Energy

1.4.2 New Course Proposal: SC/NATS 1532 3.0 – Human Spaceflight: Exploring the Final Frontier

1.4.3 New Course Proposal: SC/NATS 1520 3.0 – The Science and Technology of Music

Non-Major Modification Program Changes

1. Program: Applied Mathematics

2. Degree Designation: This change applies to all the following programs:

    a. Bachelor of Arts Honours Major
    b. Bachelor of Arts Honours Double Major
    c. Bachelor of Arts Honours Major/Minor
    d. Bachelor of Arts Specialized Honours Major
    e. Bachelor of Science Honours Major
    f. Bachelor of Science Honours Double Major
    g. Bachelor of Science Honours Major/Minor
    h. Bachelor of Science Specialized Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Summer 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

    Change to specific major credit options. Math 2015 will officially be used as an option in place of Math 2310.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

    As part of the course reduction exercise in the Faculty of Science, MATH 2310 may no longer be offered every year. This course, however, is part of the Mathematics and Statistics Core. This proposal allows students instead to complete MATH 2015, which is a current course credit exclusion to MATH 2310. This change makes it clear to students that either course will be accepted towards their degree requirements.

    This is a change to the mathematics “common core” and so this document is repeated for Mathematics, Applied Mathematics, Mathematics for Education, Actuarial Science and Statistics with minor differences.

    MATH 2015 covers the same content from the same chapters and textbook as MATH 2310, thus satisfies the same program learning outcomes. It has long been best practice in our department to grant waivers for MATH 2310 for transfer students presenting MATH 2015. This proposal formalizes this arrangement for all students.

    In our most recent cyclical review, MATH 2310 was identified with the following degree level expectations (each at the INTRODUCTORY level):

    - integrate relevant knowledge to pose questions, solve problems and apply underlying concepts, principles and techniques of analysis, across a wide range of fundamental mathematics, applied mathematics and statistics as well as applications outside the discipline

- analyze and interpret mathematical models using appropriate concepts and techniques from applied mathematics
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually)

The course level outcomes for MATH 2015 are as follows:

CLO-1: Describe curves and surfaces in three-dimensional space using graphical techniques, parameterization and calculus.
CLO-2: Extend the concepts of single variable calculus to vector valued function. Compute tangent vectors, curvature, etc.
CLO-3: Define and apply vector operations, such as the dot product, cross product, gradient, Laplacian, curl and divergence.
CLO-4: Extend the concepts of differential calculus to functions of several variables, i.e., compute limits, derivatives, etc.
CLO-5: Apply concepts of multivariate differential calculus such as linear approximation, optimization, directional derivatives, and direction of steepest descent.
CLO-6: Extend the concepts of integral calculus to functions of several variables, i.e., multiple integrals in two and three dimensions, line integrals, surface integrals.
CLO-7: Apply concepts of multivariate integral calculus such as moment of inertia, centre of mass, arclength.
CLO-8: Apply calculus techniques to various coordinate systems such as polar coordinates, cylindrical coordinates, and spherical coordinates, and understand when to use them.
CLO-9: Demonstrate the connections between differentiation and integration through the fundamental theorem of line integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem and conservative vector fields

These CLO satisfy the same UUDLES as MATH 2310, also at the INTRODUCTORY level.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   MATH 2310 and MATH 2015 satisfy the same program learning outcomes.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   This change does not impact students in other academic units.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   This change will reduce the number of courses offered by the department in line with current Faculty of Science requirements.

10. Provide a summary of how students currently enrolled in the program will be

accommodated.

Current students will not be impacted by the change.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Non-Major Modification Program Changes

1. Program: Actuarial Science

2. Degree Designation: This change applies to all the following programs:

    a. Bachelor of Arts Honours Major
    b. Bachelor of Arts Honours Double Major
    c. Bachelor of Arts Honours Major/Minor
    d. Bachelor of Arts Specialized Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Summer 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

    Change to specific major credit options. Math 2015 will officially be used as an option in place of Math 2310.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

    As part of the course reduction exercise in the Faculty of Science, MATH 2310 may no longer be offered every year. This course, however, is part of the Mathematics and Statistics Core. This proposal allows students instead to complete MATH 2015, which is a current course credit exclusion to MATH 2310. This change makes it clear to students that either course will be accepted towards their degree requirements.

    This is a change to the mathematics “common core” and so this document is repeated for Mathematics, Applied Mathematics, Mathematics for Education, Actuarial Science and Statistics with minor differences.

    MATH 2015 covers the same content from the same chapters and textbook as MATH 2310, thus satisfies the same program learning outcomes. It has long been best practice in our department to grant waivers for MATH 2310 for transfer students presenting MATH 2015. This proposal formalizes this arrangement for all students.

    In our most recent cyclical review, MATH 2310 was identified with the following degree level expectations (each at the INTRODUCTORY level):

    - integrate relevant knowledge to pose questions, solve problems and apply underlying concepts, principles and techniques of analysis, across a wide range of fundamental mathematics, applied mathematics and statistics as well as applications outside the discipline
    - analyze and interpret mathematical models using appropriate concepts and techniques from applied mathematics
    - communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including

orally, written, and visually)
The course level outcomes for MATH 2015 are as follows:

CLO-1: Describe curves and surfaces in three-dimensional space using graphical techniques, parameterization and calculus.
CLO-2: Extend the concepts of single variable calculus to vector valued function. Compute tangent vectors, curvature, etc.
CLO-3: Define and apply vector operations, such as the dot product, cross product, gradient, Laplacian, curl and divergence.
CLO-4: Extend the concepts of differential calculus to functions of several variables, i.e., compute limits, derivatives, etc.
CLO-5: Apply concepts of multivariate differential calculus such as linear approximation, optimization, directional derivatives, and direction of steepest descent.
CLO-6: Extend the concepts of integral calculus to functions of several variables, i.e., multiple integrals in two and three dimensions, line integrals, surface integrals.
CLO-7: Apply concepts of multivariate integral calculus such as moment of inertia, centre of mass, arclength.
CLO-8: Apply calculus techniques to various coordinate systems such as polar coordinates, cylindrical coordinates, and spherical coordinates, and understand when to use them.
CLO-9: Demonstrate the connections between differentiation and integration through the fundamental theorem of line integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem and conservative vector fields

These CLO satisfy the same UUDLES as MATH 2310, also at the INTRODUCTORY level.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   MATH 2310 and MATH 2015 satisfy the same program learning outcomes.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   This change does not impact students in other academic units.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   This change will reduce the number of courses offered by the department in line with current Faculty of Science requirements.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students will not be impacted by the change.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Non-Major Modification Program Changes

1. Program: Mathematics for Education

2. Degree Designation: This change applies to all the following programs:

    a. Bachelor of Arts Honours Major
    b. Bachelor of Arts Honours Double Major
    c. Bachelor of Arts Honours Major/Minor
    d. Bachelor of Arts Specialist Honours Major
    e. Bachelor of Science Honours Major
    f. Bachelor of Science Honours Double Major
    g. Bachelor of Science Honours Major/Minor
    h. Bachelor of Science Specialist Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Summer 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

    Change to specific major credit options. Math 2015 will officially be used as an option in place of Math 2310.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

    As part of the course reduction exercise in the Faculty of Science, MATH 2310 may no longer be offered every year. This course, however, is part of the Mathematics and Statistics Core. This proposal allows students instead to complete MATH 2015, which is a current course credit exclusion to MATH 2310. This change makes it clear to students that either course will be accepted towards their degree requirements.

    This is a change to the mathematics “common core” and so this document is repeated for Mathematics, Applied Mathematics, Mathematics for Education, Actuarial Science and Statistics with minor differences.

    MATH 2015 covers the same content from the same chapters and textbook as MATH 2310, thus satisfies the same program learning outcomes. It has long been best practice in our department to grant waivers for MATH 2310 for transfer students presenting MATH 2015. This proposal formalizes this arrangement for all students.

    In our most recent cyclical review, MATH 2310 was identified with the following degree level expectations (each at the INTRODUCTORY level):

    - integrate relevant knowledge to pose questions, solve problems and apply underlying concepts, principles and techniques of analysis, across a wide range of fundamental mathematics, applied mathematics and statistics as well as applications outside the discipline

- analyze and interpret mathematical models using appropriate concepts and techniques from applied mathematics
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually)

The course level outcomes for MATH 2015 are as follows:

CLO-1: Describe curves and surfaces in three-dimensional space using graphical techniques, parameterization and calculus.
CLO-2: Extend the concepts of single variable calculus to vector valued function. Compute tangent vectors, curvature, etc.
CLO-3: Define and apply vector operations, such as the dot product, cross product, gradient, Laplacian, curl and divergence.
CLO-4: Extend the concepts of differential calculus to functions of several variables, i.e., compute limits, derivatives, etc.
CLO-5: Apply concepts of multivariate differential calculus such as linear approximation, optimization, directional derivatives, and direction of steepest descent.
CLO-6: Extend the concepts of integral calculus to functions of several variables, i.e., multiple integrals in two and three dimensions, line integrals, surface integrals.
CLO-7: Apply concepts of multivariate integral calculus such as moment of inertia, centre of mass, arclength.
CLO-8: Apply calculus techniques to various coordinate systems such as polar coordinates, cylindrical coordinates, and spherical coordinates, and understand when to use them.
CLO-9: Demonstrate the connections between differentiation and integration through the fundamental theorem of line integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem and conservative vector fields

These CLO satisfy the same UUDLES as MATH 2310, also at the INTRODUCTORY level.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   MATH 2310 and MATH 2015 satisfy the same program learning outcomes.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   This change does not impact students in other academic units.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   This change will reduce the number of courses offered by the department in line with current Faculty of Science requirements.

10. Provide a summary of how students currently enrolled in the program will be

accommodated.

Current students will not be impacted by the change.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Non-Major Modification Program Changes

1. Program: Mathematics

2. Degree Designation: This change applies to all the following programs:

    a. Bachelor of Arts Honours Major
    b. Bachelor of Arts Honours Double Major
    c. Bachelor of Arts Honours Major/Minor
    d. Bachelor of Arts Specialized Honours Major
    e. Bachelor of Science Honours Major
    f. Bachelor of Science Honours Double Major
    g. Bachelor of Science Honours Major/Minor
    h. Bachelor of Science Specialized Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Summer 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

    Change to specific major credit options. Math 2015 will officially be used as an option in place of Math 2310.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

    As part of the course reduction exercise in the Faculty of Science, MATH 2310 may no longer be offered every year. This course, however, is part of the Mathematics and Statistics Core. This proposal allows students instead to complete MATH 2015, which is a current course credit exclusion to MATH 2310. This change makes it clear to students that either course will be accepted towards their degree requirements.

    This is a change to the mathematics “common core” and so this document is repeated for Mathematics, Applied Mathematics, Mathematics for Education, Actuarial Science and Statistics with minor differences.

    MATH 2015 covers the same content from the same chapters and textbook as MATH 2310, thus satisfies the same program learning outcomes. It has long been best practice in our department to grant waivers for MATH 2310 for transfer students presenting MATH 2015. This proposal formalizes this arrangement for all students.

    In our most recent cyclical review, MATH 2310 was identified with the following degree level expectations (each at the INTRODUCTORY level):

    - integrate relevant knowledge to pose questions, solve problems and apply underlying concepts, principles and techniques of analysis, across a wide range of fundamental mathematics, applied mathematics and statistics as well as applications outside the discipline

- analyze and interpret mathematical models using appropriate concepts and techniques from applied mathematics
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually)

The course level outcomes for MATH 2015 are as follows:

CLO-1: Describe curves and surfaces in three-dimensional space using graphical techniques, parameterization and calculus.
CLO-2: Extend the concepts of single variable calculus to vector valued function. Compute tangent vectors, curvature, etc.
CLO-3: Define and apply vector operations, such as the dot product, cross product, gradient, Laplacian, curl and divergence.
CLO-4: Extend the concepts of differential calculus to functions of several variables, i.e., compute limits, derivatives, etc.
CLO-5: Apply concepts of multivariate differential calculus such as linear approximation, optimization, directional derivatives, and direction of steepest descent.
CLO-6: Extend the concepts of integral calculus to functions of several variables, i.e., multiple integrals in two and three dimensions, line integrals, surface integrals.
CLO-7: Apply concepts of multivariate integral calculus such as moment of inertia, centre of mass, arclength.
CLO-8: Apply calculus techniques to various coordinate systems such as polar coordinates, cylindrical coordinates, and spherical coordinates, and understand when to use them.
CLO-9: Demonstrate the connections between differentiation and integration through the fundamental theorem of line integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem and conservative vector fields

These CLO satisfy the same UUDLES as MATH 2310, also at the INTRODUCTORY level.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   MATH 2310 and MATH 2015 satisfy the same program learning outcomes.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   This change does not impact students in other academic units.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   This change will reduce the number of courses offered by the department in line with current Faculty of Science requirements.

10. Provide a summary of how students currently enrolled in the program will be

accommodated.

Current students will not be impacted by the change.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Non-Major Modification Program Changes

1. Program: Statistics

2. Degree Designation: This change applies to all the following programs:

    a. Bachelor of Arts Honours Major
    b. Bachelor of Arts Honours Double Major
    c. Bachelor of Arts Honours Major/Minor
    d. Bachelor of Arts Specialist Honours Major
    e. Bachelor of Science Honours Major
    f. Bachelor of Science Honours Double Major
    g. Bachelor of Science Honours Major/Minor
    h. Bachelor of Science Specialist Honours Major

3. Type of Modification: Changes to degree requirements

4. Effective Date: Summer 2025

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5. State what the changes are (Example: increase / decrease to the number of major credits)

    Change to specific major credit options. Math 2015 will officially be used as an option in place of Math 2310. For B.Sc. programs updates to Foundational Science course numberings that were previously made by Physics.

6. Provide the rationale for the proposed changes that is rooted in the program learning outcomes.

    As part of the course reduction exercise in the Faculty of Science, MATH 2310 may no longer be offered every year. This course, however, is part of the Mathematics and Statistics Core. This proposal allows students instead to complete MATH 2015, which is a current course credit exclusion to MATH 2310. This change makes it clear to students that either course will be accepted towards their degree requirements.

    This is a change to the mathematics “common core” and so this document is repeated for Mathematics, Applied Mathematics, Mathematics for Education, Actuarial Science and Statistics with minor differences.

    MATH 2015 covers the same content from the same chapters and textbook as MATH 2310, thus satisfies the same program learning outcomes. It has long been best practice in our department to grant waivers for MATH 2310 for transfer students presenting MATH 2015. This proposal formalizes this arrangement for all students.

    In our most recent cyclical review, MATH 2310 was identified with the following degree level expectations (each at the INTRODUCTORY level):

    - integrate relevant knowledge to pose questions, solve problems and apply underlying concepts, principles and techniques of analysis, across a wide range of fundamental mathematics, applied mathematics and statistics as well as applications outside the

discipline
- analyze and interpret mathematical models using appropriate concepts and techniques from applied mathematics
- communicate mathematical and statistical concepts, models, reasoning, explanations, interpretations, and solutions clearly, to multiple audiences in multiple forms (including orally, written, and visually)
The course level outcomes for MATH 2015 are as follows:

CLO-1: Describe curves and surfaces in three-dimensional space using graphical techniques, parameterization and calculus.
CLO-2: Extend the concepts of single variable calculus to vector valued function. Compute tangent vectors, curvature, etc.
CLO-3: Define and apply vector operations, such as the dot product, cross product, gradient, Laplacian, curl and divergence.
CLO-4: Extend the concepts of differential calculus to functions of several variables, i.e., compute limits, derivatives, etc.
CLO-5: Apply concepts of multivariate differential calculus such as linear approximation, optimization, directional derivatives, and direction of steepest descent.
CLO-6: Extend the concepts of integral calculus to functions of several variables, i.e., multiple integrals in two and three dimensions, line integrals, surface integrals.
CLO-7: Apply concepts of multivariate integral calculus such as moment of inertia, centre of mass, arclength.
CLO-8: Apply calculus techniques to various coordinate systems such as polar coordinates, cylindrical coordinates, and spherical coordinates, and understand when to use them.
CLO-9: Demonstrate the connections between differentiation and integration through the fundamental theorem of line integrals, Green's Theorem, Stokes' Theorem, Divergence Theorem and conservative vector fields

These CLO satisfy the same UUDLES as MATH 2310, also at the INTRODUCTORY level.

7. Provide an updated mapping of the program requirements to the program learning outcomes to illustrate how the proposed requirements will support the achievement of program learning objectives.

   MATH 2310 and MATH 2015 satisfy the same program learning outcomes.

8. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

   This change does not impact students in other academic units.

9. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

   This change will reduce the number of courses offered by the department in line with current Faculty of Science requirements.

10. Provide a summary of how students currently enrolled in the program will be accommodated.

    Current students will not be impacted by the change.

11. Provide as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Calendar.

Existing Program	Proposed Changes

Major Requirements
 	
• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
  • SC/MATH1021 - Linear Algebra I (3.00)
  • SC/MATH1131 - Introduction to Statistics I (3.00)
  • SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
  • SC/MATH1300 - Differential Calculus with Applications (3.00)
  • SC/MATH1310 - Integral Calculus with Applications (3.00)
  • SC/MATH2022 - Linear Algebra II (3.00)
  • SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
  • ~~SC/MATH2310 - Calculus of Several Variables with Applications (3.00)~~
	Major Requirements
	
	• SC - Mathematics for Education - BA Mathematics/Statistics Honours Core
	  ○ SC/MATH1021 - Linear Algebra I (3.00)
	  ○ SC/MATH1131 - Introduction to Statistics I (3.00)
	  ○ SC/MATH1200 - Problems, Conjectures and Proofs (3.00)
	  ○ SC/MATH1300 - Differential Calculus with Applications (3.00)
	  ○ SC/MATH1310 - Integral Calculus with Applications (3.00)
	  ○ SC/MATH2022 - Linear Algebra II (3.00)
	  ○ SC/MATH2030 Cr=3.00 EN - Elementary Probability (3.00)
	  ○ **Complete 1 of the following:**
	  ▪ **SC/MATH2310 - Calculus of Several Variables with Applications (3.00)**
	  ▪ **SC/MATH2015 - Applied Multivariate and Vector Calculus (3.00)**

Foundational Science **(B.Sc. only)** Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • SC/PHYS1410 - Physical Science (6.00) • SC/PHYS1010 - Physics (6.00)	Foundational Science **(B.Sc. only)** Earned at least 6 credits from the following: • SC/BIOL1000 - Biology I - Cells, Molecular Biology and Genetics (3.00) • SC/BIOL1001 - Biology II - Evolution, Ecology, Biodiversity and Conservation Biology (3.00) • SC/CHEM1000 Cr=3.00 EN - Chemical Structure (3.00) • SC/CHEM1001 - Chemical Dynamics (3.00) • SC/PHYS1410 – Physical Science (6.00) • SC/PHYS1010 – Physics (6.00) • **SC/PHYS1411 – Physics Fundamentals 1 (3.00)** • **SC/PHYS1412 – Physics Fundamentals 2 (3.00)** • **Note: Students wishing to pursue higher level studies in Physics should instead complete SC/PHYS1011 – Physics 1 (3.00) and SC/PHYS1012 – Physics 2 (3.00).**

York University

Detailed Minor Modifications to Existing Programs

TEMPLATE

Modifications to Existing Programs fall under Section 5 of the York University Quality Assurance Procedures (YUQAP).

Full YUQAP can be found here: https://www.yorku.ca/unit/yuqap/

DETAILED MINOR MODIFICATIONS USUALLY INCLUDE ONE OR MORE OF THE FOLLOWING FEATURES:

- Addition of part-time/full-time program options, or a change from option to the other, where no significant change in resources is required
- Addition of an optional, standalone work-integrated learning element, e.g., an internship course or similar non-credit element.
- Substantive changes in admission requirements
- Substantive changes in progression requirements
- Substantial changes to required/core courses for a major/graduate degree that do not rise to the level of a major modification
- Substantial changes to an existing program option that was previously established through a major modification (i.e., substantial change to a minor, option, certificate, work-integrated learning option, or graduate specialization.)

OTHER STANDARD MINOR MODIFICATIONS CAN BE UNDERTAKEN THROUGH YOUR FACULTY. THESE USUALLY INCLUDE ONE OR MORE OF THE FOLLOWING FEATURES:

- Calendar copy corrections
- Revisions and/or updates to Program Learning Outcomes (PLOs) that do not change the substance of the PLOs
- Changes program name or nomenclature where there are no changes to PLOs
- Course changes – revisions, additions, deletions, repositioning, resequencing, etc. – where there are no changes to PLOs
- Changes in program requirements or sequencing where less than 1/3 of the program courses are affected

Minor changes (changes to less than 1/3 of the program) to an existing minor, specialization, option, certificate, or WIL option (i.e., minor change to anything established through a major modification)

- Closure of any degree option, e.g. honours specialization

See the YUQAP website for further details, resources, and templates.

Detailed Minor Modification Proposal

Faculty: Science

Department: Mathematics and Statistics

Program: Mathematics

Degree Designation: This change applies to the following programs:

a. Bachelor of Arts Honours Major
b. Bachelor of Arts Honours Double Major
c. Bachelor of Arts Honours Major/Minor
d. Bachelor of Arts Specialist Honours Major
e. Bachelor of Science Honours Major
f. Bachelor of Science Honours Double Major
g. Bachelor of Science Honours Major/Minor
h. Bachelor of Science Specialist Honours Major

Type of Modification: Changes to degree requirements

Location *(current campus and, if applicable, proposed)*:

Effective Date: Summer 2025

Approval Date at Faculty Council:

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1. Describe the proposed modifications to the program.

As part of the course reduction exercise in the Faculty of Science, MATH 3010 3.0: Vector Integral Calculus may no longer be offered every year. MATH 3010 3.0 is required by Mathematics programs and the prerequisite class MATH 2310 3.0 will also not be offered every year. This program change will replace MATH 3010 3.0 with other optional courses that will provide more breadth in the course options for students in the program.

The department also offers MATH 2015 3.00 which has overlap with both MATH 2310 3.0 and MATH 3010 3.0. In practice, the syllabus for MATH 2015 3.00 includes the same sections of the textbook as MATH 2310 3.0 plus topics from MATH 3010 3.0. It has been past practice of program directors to allow waivers to complete MATH 2015 3.00 in place of MATH 2310 3.00.

This program change will remove MATH 3010 3.0 from Mathematics programs and replace the requirement with four replacement options for a credit at the 3000 level. Going forward, MATH 2310 3.0 in the common core will be replaced with MATH 2015 3.0 in a separate program change. The

Mathematics programs listed above are the only programs that require the common core and that have MATH 3010 3.0 as a requirement.

2. Include as an appendix a side-by-side comparison of the existing and proposed program requirements as they will appear in the Undergraduate or Graduate Academic Calendar. Please indicate deletions as strikethrough text and additions as underlined text in a contrasting colour.

See attached.

3.1 List the current and/or updated Program Learning Outcomes for the proposed modified program.[1]

In the most recent cyclical review, the course MATH 3010 3.0 was listed under the following program learning outcomes:

1.1 Demonstrate general understanding and knowledge of the key concepts and methodologies in mathematics.

1.2 Obtain a broad and deep understanding of mathematical concepts, techniques, and mathematical disciplines.

2.1 Be able to think critically, analyze and interpret mathematical problems, pose the correct questions to solve the problem, and identify an appropriate technique to solve the problem.

3.1 Be able to initiate and undertake critical evaluations of mathematical arguments, frame conjectures for the purpose of problem solving, prove conjectures or provide counterexamples.

No modification of these program learning outcomes is required.

3.2 Provide a rationale for the proposed changes as articulated through the Program Learning Outcomes.

The change in course for the Mathematics programs was initiated by the course reduction exercise in Science. Overall this will reduce the number of calculus courses required by the program from four to three, but there is high overlap in the material of MATH 2015 3.00 with both courses MATH 2310 3.00 and MATH 3010 3.00. This change to the program will have positive side effect of increasing the breadth of the courses that students will take during their program beyond calculus. All of the replacement courses meet the PLO listed above. Three of the four courses also meet the PLO:

3.2 Obtain a broad understanding of the interactions and applications of mathematics with other disciplines and applying mathematical concepts and processes to solve problems in these disciplines.

Another three of the four also meet the PLO:

[1] Ideally, a program would have 8-12 Program Learning Outcomes (PLOs) that reflect the program and demonstrate how the program meets Ontario's Degree Level Expectations. Support for visioning, defining, and mapping your PLOs can be found in the Office of the Vice Provost Academic.

4.1 Be able to present and comprehend sophisticated mathematical arguments in both written and oral form.

3.3 How will the proposed modification support the achievement of Program Learning Outcomes?

The four options for a course to fulfill the program requirements at the 3000 level are:
MATH 3141: Number Theory
MATH 3260: Introduction to Graph Theory
MATH 3271: Partial Differential Equations
MATH 3410: Complex Variables

Each of these courses meets the PLO 1.1, 1.2, 2.1, 3.1.

4. Describe how students currently enrolled in the program will be accommodated.

Students in the program who have not taken MATH 3010 3.00 and will be unable to going forward will be granted a waiver to complete another 3.00 credits from the courses above (or potentially a course at the 4000 level if the course meets the same PLO).

5. Describe any resource implications and how they are being addressed (e.g., through a reallocation of existing resources). If new/additional resources are required, provide a statement from the relevant Dean(s)/Principal confirming resources will be in place to implement the changes.

The reduction in courses that covers similar material will provide better clarity in the program offerings reducing the need for additional advising. The changes will also allow the department to better focus resources of course coordinators.

6. If relevant, summarize the consultation undertaken with relevant academic units, including commentary on the impact of the proposed changes on other programs. Provide individual statements from the relevant program(s) confirming consultation and their support.

The department chair made the decisions to cut low enrollment course such as MATH 3010 3.00 in consultation with the section directors.

7. For optional work-integrated learning elements (e.g., an optional internship course), please describe the consultation to ensure these elements are in line with best practice for experiential education and York's established other practices in this area. The Office of the Vice Provost, Teaching and Learning can provide further guidance.

APPENDICES

Appendix: Side-by-Side Academic Calendar Copy Comparison

Ensure that deletions are indicated with strikethrough text and additions are made in a contrasting colour.

Current calendar copy:	**Proposed Calendar Copy:**
* Passed the following:	* Passed the following:
SC/MATH2001 - Real Analysis I (3.00)	SC/MATH2001 - Real Analysis I (3.00)
SC/MATH3001 - Real Analysis II (3.00)	SC/MATH3001 - Real Analysis II (3.00)
SC/MATH3010 - Vector Integral Calculus (3.00)	~~SC/MATH3010 - Vector Integral Calculus (3.00)~~
SC/MATH3021 - Algebra I (3.00)	SC/MATH3021 - Algebra I (3.00)
SC/MATH3022 - Algebra II (3.00)	SC/MATH3022 - Algebra II (3.00)
SC/MATH4021 - Algebra III (3.00)	SC/MATH4021 - Algebra III (3.00)
* Complete 1 of the following	*** Passed 1 of the following**
Passed the following:	**SC/MATH3010- Vector Integral Calculus (3.00)**
SC/MATH4011 - Metric Spaces (3.00)	**SC/MATH3141- Number Theory (3.00)**
Passed the following:	**SC/MATH3260- Introduction to Graph Theory (3.00)**
SC/MATH4012 - Lebesgue Measure Theory (3.00)	**SC/MATH3271- Partial Differential Equations (3.00)**
* Completed at least 6 credits from the following types of courses:	**SC/MATH3410- Complex Variables (3.00)**
additional major MATH credits at the 4000 level, for a total of at least 51 credits from major mathematics courses.	* Complete 1 of the following
	Passed the following:
	SC/MATH4011 - Metric Spaces (3.00)
	Passed the following:
	SC/MATH4012 - Lebesgue Measure Theory (3.00)
	* Completed at least 6 credits from the following types of courses:
	additional major MATH credits at the 4000 level, for a total of at least 51 credits from major mathematics courses.

Appendix: Consultation and Support Letters

Changes to Existing Course

Faculty:

Department:	Mathematics & Statistics	**Date of Submission:**	June 30, 2024
Course Number:	MATH 2015 3.0	**Effective Session:**	
Course Title:	Applied Multivariate and Vector Calculus		

Type of Change:

[x]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[ ]	in course number/level	[ ]	in degree credit exclusion(s)
[ ]	in credit value	[ ]	regularize course (from Special Topics)
[ ]	in title (max. 40 characters for short title)	[ ]	in course format/mode of delivery *
[ ]	in Calendar description (max. 40 words or 200 characters)	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
Prerequisite: One of SC/MATH 1010 3.00, SC/MATH 1014 3.00, SC/MATH 1310 3.00; or SC/MATH 1505 6.00 plus permission of the course coordinator. Course credit exclusions: SC/MATH 2010 3.00, SC/MATH 2310 3.00, GL/MATH 2670 3.00, GL/MODR 2670 3.00, GL/MATH 3200 3.00.	Prerequisite: One of SC/MATH 1021 3.00 or SC/MATH 1025 3.00 and one of SC/MATH 1010 3.00, SC/MATH 1014 3.00, SC/MATH 1310 3.00; or SC/MATH 1505 6.00 plus permission of the course coordinator. Course credit exclusions: SC/MATH 2010 3.00, SC/MATH 2310 3.00, GL/MATH 2670 3.00, GL/MODR 2670 3.00, GL/MATH 3200 3.00.

Rationale:

The course material for MATH 2015 3.00 includes the cross and dot product of vectors and the use of linear operators on vectors. MATH 1021 3.00 and MATH 1025 3.00 cover linear operators, vector geometry and vector spaces of R^n which are reviewed in MATH 2015 3.00. Instructors felt that students would be better prepared for MATH 2015 3.00 with a better background in these topics.

Programs which require MATH 2015 3.00 also require either MATH 1021 3.00 or MATH 1025 3.00, hence this change does not add requirements for students completing their degree, it only requires that students complete the courses in order.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

Changes to Existing Course

Faculty:

Department:	Mathematics & Statistics	**Date of Submission:**	September 4, 2024
Course Number:	MATH 1200 3.0	**Effective Session:**	FW 25-26
Course Title:	Problems, Conjectures and Proofs		

Type of Change:

[ ]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[ ]	in course number/level	[ ]	in degree credit exclusion(s)
[ ]	in credit value	[ ]	regularize course (from Special Topics)
[ ]	in title (max. 40 characters for short title)	[ ]	in course format/mode of delivery *
[X]	in Calendar description (max. 40 words or 200 characters)	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
Extended exploration of elementary problems leading to conjectures, partial solutions, revisions, and convincing reasoning, and hence to proofs. Emphasis on problem solving, reasoning, and proving. Regular participation is required. Prerequisite: 12U Advanced Functions (MHF4U) or equivalent. Course credit exclusion 2200 3.00. NCR note: Not open to any student who is taking or has passed a MATH course at the 3000 level or higher.	Extended exploration of elementary problems leading to conjectures, partial solutions, revisions, and convincing reasoning, and hence to proofs. Emphasis on problem solving, reasoning, and proving. Regular participation is required. Prerequisite: 12U Advanced Functions (MHF4U) or equivalent. Course credit exclusion 2200 3.00.

Rationale:

Math 1200 is part of the common core of courses in Mathematics and Statistics. For several years a small number of students have been putting off taking this course (or repeatedly failing it) until third year or later, despite it being a prerequisite for courses at the second year level. Departmental curriculum committees in the past have been apprehensive about granting first-year credits to students who have enrolled in 3XXX level courses, and even included language forbidding this in the case of Math 1200 (this language is not present in any other of our current first-year course descriptions). The small number of students in those cases are required to take Math 2200 3.0 Extended Problems Conjectures and Proofs in place of Math 1200. Math 2200 has suffered from chronic low enrollments. Further, recent instructors report that the Math 2200 curriculum is the same as Math 1200 for all intents and purposes; essentially Math 1200 is being retaught in Math 2200. The department has determined that a better (and more economic solution) to dealing with this problem is to enforce prerequisites on second year courses (and higher) and allow any students who still have missed Math 1200 by third or fourth year to enroll in that class. We therefore propose to strike the language "Not open to any student who is taking or has passed a MATH course at the 3000 level or higher."

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

COMMITTEE ON ACADEMIC STANDARDS, CURRICULUM AND PEDAGOGY TEMPLATE

NEW COURSE PROPOSAL FORM

Faculty: Indicate all relevant Faculty(ies)	Science

Department: Indicate department and course prefix (e.g. Languages, GER)	Natural Science	**Date of Submission:**	8-Sept-2024

Course Number: Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is "C")	NATS1815	**Var:**	**Academic Credit Weight:** Indicate both the fee, and MTCU weight if different from academic weight (e.g. AC=6, FEE=8, MET=6	3

Course Title: The official name of the course as it will appear in the Undergraduate Calendar and on the Repository	The Science of Sustainable Energy

Short Title: Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 characters**	Sustainable Energy

With every new course proposal it is the Department's responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.

Brief Course Description:

Maximum 2000 characters
(approximately 300 words including spaces and punctuation).

The course description should be carefully written to convey what the course is about. It should be followed by a statement of prerequisites and co-requisites, if applicable. This description appears in the calendar.

For editorial consistency, and in consideration of the various uses of the Calendars, verbs should be in the present tense (i.e., "This course analyzes the nature and extent of...," rather than "This course will analyze...")

This course begins by introducing students to the fundamental physical concepts relevant to energy in all its forms. The course then delves deeper into the science and technology involved in the production and use of sustainable energy, such as solar, wind, wave, tidal, ocean thermal, geothermal and biomass. The course equips students with the ability to construct informed opinions on the cost and benefits of the different forms of sustainable energy and to critically examine energy policy both nationally and internationally.

Prerequisites: None
Co-requisites: None
CCE: SC/NATS1810 6.0 Energy
NCR: No credit will be retained for any student who has passed or is taking NATS1810 6.0 Energy.

Generic Course Description:

This is the description of the "Parent / Generic course" for Special Topics courses under which variances of the "Generic" course can be offered in different years (Max. 40 words). Generic course descriptions are published in the calendar.

List all degree credit exclusions, prerequisites, integrated courses, and notes below the course description.

Expanded Course Description:

Please provide a detailed course description, including topics / theories and learning objectives, as it will appear in supplemental calendars.

Course Topics:

- Unit 1: Units and Dimensions of Physical Quantities, Work, Energy and Power, Energy Consumption Patterns, Forms of Energy, Law of Conservation of Energy, Potential Energy, Kinetic Energy.

- Unit 2: Environmental Consequences of Fossil Fuel Use, Pollution and Pollution Monitoring, The Greenhouse Effect, Climate Change, Mitigation Strategies, International Climate Change Initiatives.

- Unit 3: Solar Energy, Heat Transfer, Heat Storage, Solar Thermal Power Generation, Solar Voltaic Power Generation, Photovoltaic Devices.

- Unit 4: Wind Energy, Wind Turbines, Wave Energy, Tidal Energy, Ocean Thermal Energy, Geothermal Energy, Ocean Salinity Gradient Energy.

- Unit 5: Biomass Energy, Environmental Impact of Biofuels, Efficient Utilization of Energy, Smart Grids, LEDs, Heating and Cooling Efficiency, Energy Storage, Batteries, Electric Vehicles, New Sources of Energy.

Learning Objectives: By the end of the course, students will be able to:

1. Describe the world's energy consumption patterns and predict the availability of energy in different forms.
2. Estimate the carbon footprints of various forms of energy and their impact on climate change.
3. Critically examine various energy policies at both national and international levels.
4. Identify the sources of various forms of sustainable energy, explain how they are produced and describe the technology involved in their production.
5. Describe practical methods for the storage and efficient utilization of sustainable energy.
6. Construct well-informed arguments based on reliable data, and counter mis-information, about the utilization of sustainable energy.
7. Utilize and interpret simple equations, graphs, and units of energy.
8. Construct quantitative scaling arguments to predict trends related to energy use.

Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

This course can be delivered in either the in-person (LECT) format, the blended format (BLEN), or as an online, asynchronous course with in-person exams (ONCA). The range of delivery formats provides students with flexibility when scheduling their courses, thereby increasing the likelihood that they can find a course in their area of interest. The different formats also provide the flexibility to offer the course in a format that best fits with the scheduling needs of course directors.

LECT: All components of the course (i.e. lectures, in-class activities, midterms, and final exams) are held in-person. Lectures will introduce students to the course concepts, clarify and expand on text readings, and offer students opportunities to work with course concepts via clicker questions, in-class activities, group discussion and problem sets, and in-class case studies.

BLEN: A subset of the lecture material will be delivered asynchronously online. Regular in-person meets will comprise roughly half of the meeting time in a LECT course. During in-person meets, additional lecture material will be interspersed with the active learning activities described above.

ONCA (Summer Only): All lectures will be delivered asynchronously online. In-class activities will be replaced with online assessments, such as eclass quizzes, forum discussions, homework problem sets and asynchronous case studies. All tests and exams will be held in person.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained **OR** in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. This course will be offered once per year, in either the F, W or SU terms, depending on instructor availability. If popular, it could be offered twice per term.

2. The following course directors have the expertise to teach this course, based on their experience with teaching similar NATS courses:
   - Banafsheh Hashemi-Pour (NATS & PHAS, CUPE Unit 2)
   - Robin Metcalfe (NATS, Associate Professor)
   - Stephanie Domenikos (NATS, Associate Professor)
   - Alireza Rafiee (NATS & PHAS, CUPE Unit 2)
   - Anantharaman Kumarakrishnan (PHAS, Full Professor)

3. Banafsheh Hashemi-Pour is expected to teach the course in its first iterations.

4. As a 3.0 credit course, students will receive three hours of lecture per week (36 in total), which can be broken into direct lecturing, in-class activities, and/or asynchronous lecture videos, depending on the format (described in more detail below). A further one hour of office hours will be available to students.

Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

In-Class Activities: 10 %

May include clicker surveys, case studies, think-pair-share, mini-quizzes, etc.

Unit Assignments: 20 %

4% each x 5 problem sets, lowest grade will be dropped.

Research Assignment: 10%

Students are assigned a broad challenge question pertaining to the UN Sustainable Development Goal of Clean and Affordable Energy. They are required to propose how they will address this theme and to present their study as a poster.

- Proposal: 1 %
- Annotated Bibliography: 2 %
- Academic Poster: 7 %

Midterm 1: 15 %

Will include multiple-choice, problem-solving, and short answer questions

Midterm 2: 15 %

Will include multiple-choice, problem-solving, and short answer questions

Final Exam (in exam period): 30 %

Will include multiple-choice, problem-solving, short and long answer questions

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

Required: Course kit containing selected topics from Richard A. Dunlap, Sustainable Energy, (SI Edition, 2nd Edition, Cengage Learning 2019, ISBN-13: 978-1-337-55167-0).

In addition to the textbook, students will occasionally be assigned articles from newspapers and popular science journals on topics pertaining to energy. Students will also engage in this reading material for their research project. These reading materials will be made available online at no cost to the student.

If the course is to be integrated (graduate/ undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Other Resources:

A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

In the LECT and BLEN formats, this course will require the regular lecture hall facilities (with standard York University lecture hall IT equipment): classroom space for 150-200 as well as access to an eClass course. The ONCA format will require an eClass course online.

Teaching assistants (T3) will be needed to assist with marking the assessments and invigilating tests and exams.

Course Rationale:

The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in

Affordable and clean energy is one the United Nation's Sustainable Development Goals, as well as Sustainable Cities and Communities. Thus, the ability to comprehend the production, consumption and impact of sustainable energy, informed by reliable scientific data as opposed to mis-information, is becoming increasingly important as we adopt effective strategies for combating climate change as voters, consumers, and care-takers of our planet. To address this need, the Division of Natural Science has been offering a course called NATS1810 6.0 Energy for a number of years. Over the last 5 years, enrolment in this course dropped from a historical average of 100-150 students to under 50 students. Not only did fewer students enroll in the course, but

objectives and/or content. If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

typically a third would drop it, primarily due to a recent emphasis on numerical problem solving in the first term. By re-branding the course in a 3-credit format which focuses on the topical units pertaining to sustainable energy and excludes the physical concepts not needed to comprehend the selected topics, the course is very likely to increase in popularity. Also, as non-science majors are required to take 6 credits in NATS, we expect that this course will be a popular pairing with our other 3-credit course offerings in the physical and environmental sciences, such as NATS1755 Natural Hazards or NATS1515 Environmental Pollution. Lastly, in keeping with trends in other departments at York, NATS is seeking to increase its complete of 3-credit courses while retiring some of its 6-credit courses (such as NATS1810 Energy), as 3-credit courses are easier for students to fit into their schedules. 3-credit NATS courses are also more desirable to students as electives.

In regards to CCEs/NCRs: While some of the physical concepts covered in NATS1810 Energy are covered in 1st-year PHYS courses, course directors of NATS1810 from the Department of Physics and Astronomy have expressed that neither Physics majors nor any students who has completed a Physics course should be barred from NATS1810. In their opinion, NATS1810 is of value to Physics majors as a possible elective owing to its topical discussions and the practice it provides for science communication and data analysis in real-world applications. Since the NATS1815 topics are a subset of NATS1800, it follows that NATS1815 should have no CCEs/NCRs with Physics courses.

The primary purpose of courses offered by the Division of Natural Science is to:

- broaden student horizons (“breadth”)
- expose students to some of the fundamental ideas of the course’s major discipline (“scientific knowledge”)
- Promote multi-or interdisciplinarity (“multi/interdisciplinarity”)
- Develop skills, problem-solving tools and assessment strategies, some of which are specific to the courses discipline (“critical skills” and “critical thinking”)

The science of renewable energy is a **multi-disciplinary field** in that it introduces students to **scientific knowledge** in physics as well as in environmental science. The course addresses **breadth** by also investigating economic and sociological issues pertaining to energy production and consumption. In addition, students gain **critical skills** in the analysis of scientific data pertaining to energy use, while employing **critical thinking** in constructing informed arguments on the impact of sustainable energy use.

Expected enrollment: 150-200.

Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women's Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be

Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date

Accessible format can be provided upon request.

MEMORANDUM

York University Libraries

To: Robin Metcalfe

From: William Denton

Date: 12 September 2024

Subject: Library Statement of Support – NATS 1815 (Science of Sustainable Energy)

Summary

York University Libraries (YUL) is well positioned to support this proposed course. As always with a new course in NATS, faculty and students will be served by our large collections and the usual array of library resources and services, which support the multi- and interdisciplinary approach of the program and the critical skills and thinking it provokes.

Collections

The required readings are in a course kit, but "students will occasionally be assigned articles from newspapers and popular science journals on topics pertaining to energy." Many, many newspapers and magazines are available to support this.

Further, Omni provides students with access to a wide range of materials, including books, book chapters, articles, dissertations, streaming media, etc. Library users may also request items from partner libraries through Omni. A selection of electronic collections of particular interest are highlighted below. The A-Z list on the Libraries' website provides a complete register of electronic offerings.

Canadian Content: Canadian Periodicals Index Quarterly (CPI.Q)

Newspaper/ Magazine Collections: Press Reader, Factiva, Nexis Uni

Services

Library Instruction

Librarians and archivists help students build research skills and digital fluencies through workshops, online research guides, and individual research assistance. Instructors can arrange a research skills workshop (or seminar) geared to a specific assignment, course, or competency.

Research Guides of Interest:

- Data and Statistics
- Environmental Studies
- Natural Science

Research Help

Online research assistance is available in both English and French via chat and email. In addition, students and faculty can book one-hour research consultations with a specialist librarian.

Accessibility Services

Library Accessibility Services (LAS) provides alternative content formats, as well as adaptive technologies and spaces. With a referral, York University faculty and students can request transcription services or reserve an accessibility lab workstation. Contact lashelp@yorku.ca with questions.

COMMITTEE ON ACADEMIC STANDARDS, CURRICULUM AND PEDAGOGY TEMPLATE

NEW COURSE PROPOSAL FORM

Faculty: Indicate all relevant Faculty(ies)	Science

Department: Indicate department and course prefix (e.g. Languages, GER)	Natural Science	**Date of Submission:**	8-Jul-2024

Course Number: Special Topics courses Include variance (e.g. HUMA 3000C 6.0, Variance is "C")	NATS 1532	**Var:**	**Academic Credit Weight:** Indicate both the fee, and MTCU weight if different from academic weight (e.g. AC=6, FEE=8, MET=6	3	

Course Title: The official name of the course as it will appear in the Undergraduate Calendar and on the Repository	Human Spaceflight: Exploring the Final Frontier

Short Title: Appears on any documents where space is limited - e.g. transcripts and lecture schedules - **maximum 40 charactersl**	Human Spaceflight

With every new course proposal it is the Department's responsibility to ensure that new courses do not overlap with existing courses in other units. If similarities exist, consultation with the respective departments is necessary to determine degree credit exclusions and/or cross-listed courses.

Brief Course Description:

Maximum 2000 characters (approximately 300 words including spaces and punctuation).

The course description should be carefully written to convey what the course is about. It should be followed by a statement of prerequisites and co-requisites, if applicable. This description appears in the calendar.

For editorial consistency, and in consideration of the various uses of the Calendars, verbs should be in the present tense (i.e., "This course analyzes the nature and extent of...," rather than "This course will analyze...")

Human beings have long desired to travel amongst the stars, with the 20th century yielding the first human in space, humans walking on the moon, the operation of a space shuttle and the construction of a massive international space station. Since the year 2000, there has been a nearly continuous presence of humanity in space. These accomplishments are incredible considering that space is an extremely inhospitable environment due to low temperatures and pressure, microgravity, harmful radiation, meteoroids, and debris. This course begins with a discussion of historical and contemporary motivations for establishing a human presence in space. This is followed by an examination of the past, present, and potential future of human space travel. Students learn how both the space environment and the surface environments of other worlds in our solar system affect the human body. The course also explores the various technologies and methods used to mitigate these effects as much as possible. By the end of the course, students will have an understanding of the challenges faced by human space travel, be able to evaluate the plausibility of establishing off-world settlements, be familiar with how space law influences human space travel, and discuss theories for traveling beyond our solar system.

Co/Prerequisites: None
CCE: None
NCR: None

Generic Course Description:

This is the description of the "Parent / Generic course" for Special Topics courses under which variances of the "Generic" course can be offered in different years (Max. 40 words). Generic course descriptions are published in the calendar.

List all degree credit exclusions, prerequisites, integrated courses, and notes below the course description.

In this course, students learn how human beings are affected by the space environment and the steps that have been taken to make human space flight possible throughout history. Students evaluate the habitability of other bodies in our solar system that could serve as future human settlements, explore how space law affects current and future space missions, and examine the possibility of interstellar travel.

Co/Prerequisites: None
CCE: None
NCR: None

Expanded Course Description:

Please provide a detailed course description, <u>including topics / theories and learning objectives.</u>

<u>Course Topics:</u>

Students will learn the history of human space flight and how astronauts are protected from the physical and psychological dangers of space missions. We will also discuss reasons for establishing permanent space or planetary settlements and the challenges faced by such endeavors. The course ends with a look at how humans may even travel

as it will appear in supplemental calendars.

beyond the confines of our solar system and visit worlds orbiting around distant stars. An outline of the course's major themes is provided below:

1. The Case for Space: Historical and contemporary motivations for establishing a human presence in space. These include political motivations, scientific motivations, the urge to explore, and the need for survival.

2. The Space Environment: Gravity, vacuums, the temperature of space, space radiation, meteoroids and space debris.

3. The History of Human Spaceflight to the present:
    - From Soyuz and Mercury to Artemis
    - Space Stations
    - Commercial crewed space travel

4. Space and Human Health
    - Space Physiology
        - Life Support Systems
        - Space Suits
    - Space Psychology
        - Short Duration Missions
        - Long Duration Missions

5. Living Off-World
    - The Moon and other Space Rocks
    - Mars
    - Giant Space Stations
    - Terraforming Other Worlds

6. Space Law and Governance
    - The Outer Space Treaty
        - Implications for future human spaceflight
        - Implications for future off-world settlements
    - The Moon Treaty
        - Successes and Failures

7. Interstellar Travel
    - Potentially habitable worlds beyond our Solar System
    - Possible future forms of human interstellar travel
    - Space Physiology and Psychology during Interstellar Travel

Learning Outcomes:

Upon successful completion of this course students should be able to:

1. Discuss different arguments for the human presence in space

2. Describe the evolution of technology involved in human spaceflight
3. Explain how the space environment differs from various environments on Earth and describe strategies for mitigating its negative effects on human beings
4. Examine how space law affects the present and future human presence in space
5. Evaluate the habitability of bodies in our solar system as potential sites of human settlements
6. Discuss the technological and physical challenges faced by interstellar travel

Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

This course can be delivered in either the in-person (LECT) format, the blended format (BLEN), or as an online, asynchronous course with in-person exams (ONCA). The range of delivery formats provides students with flexibility when scheduling their courses, thereby increasing the likelihood that they can find a course in their area of interest. The different formats also provide the flexibility to offer the course in a format that best fits with the scheduling needs of course directors.

The breakdown of each format is as follows:

LECT: All components of the course (i.e. lectures, in-class activities, midterms, and final exams) are held in-person. In-class activities will consist of active learning exercises such as pre-instruction testing, clicker surveys, pop talks, think-pair-share sessions, and hands-on activities and demonstrations in support of the course project (described in the evaluation scheme below).

BLEN: All lectures will be delivered asynchronously online. In-person sessions will take place every second or third week, during which students will complete the active learning components described in the LECT section above. Clicker activities will be replaced with online quizzes to be taken after viewing lecture videos, to ensure students come prepared to participate in class activities. Pre-instruction testing will occur at the end of in-person sessions in preparation for the following week's material.

ONCA (summer term only): All lectures will be delivered asynchronously online. Pre-instruction testing and clicker activities will be replaced with online quizzes to be taken before and after viewing lecture videos. Demonstrations and pop-talks can be pre-recorded and posted for students to view and engage with in online forum discussions. Think-pair-share sessions can be conducted via online forum discussions. Hands-on activities will be designed for students to complete at home.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained **OR** in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. It is anticipated that the course will be offered every winter term, as a Part 2 to NATS1572 Introduction to Astrobiology, though NATS1532 Human Spaceflight can be taken on its own. It may also be offered in the summer based on popularity.

2. Currently there are 3 NATS faculty members competent to teach the course (Jeremy Webb, Robin Metcalfe, and Jesse Rogerson). Paul Delaney (Professor Emeritus from the Dept of Physics and Astronomy) is also competent to teach this course. It may also be taught by qualified faculty in the Dept of Physics and Astronomy (e.g., Sarah Rugheimer, when available).

3. Jeremy Webb is expected to teach the initial offering of this course.

4. There will be approximately 2-2.5 hours of lecture contact and 0.5-1 hour of learning activities per week (in-person or asynchronous online) for a total of 36 hours, with the course director also being available via weekly office hours, online help sessions, online forums and email.

Evaluation:

A detailed percentage breakdown of the basis of evaluation in the proposed course must be provided.

If the course is to be integrated, the additional requirements for graduate students are to be listed.

If the course is amenable to technologically mediated forms of delivery please identify how the integrity of learning evaluation will be maintained. (e.g. will "on-site" examinations be required, etc.)

Activity Grade: 25%

This will include pre-instruction testing, clicker activities, think-pair-share, pop-talks, hands-on activities in support of the projects (described below), and assignments in which students apply concepts from the lecture materials and selected reading materials to explore problem-solving methods used by scientists involved in human spaceflight. These activities will be completed either in-person or online, depending on the course delivery format (described above in Course Design).

Major Project: 30%

Proposing and Designing the First Human Settlement Beyond Earth: Throughout the semester, students will work to propose and design their own plan for establishing a human space settlement on another world in our solar system. The project will have three separate deliverables that will be due at different points in the semester.

1) Habitability Study – students will do preliminary research on their target of choice and provide a report that outlines how their target's environment affects human beings and what resources (if any) could be available.
2) Cost-Benefit Analysis – students will outline the short and long-term benefits of settling on their proposed destination in terms of the impact it will have on humanity. Students will be expected to weigh challenging factors such as financial cost,

technological feasibility, and legality under space law against the benefits of their proposed off-world settlement.

3) Settlement Design – students will provide a design for the settlement which will include a preliminary layout, an outline of the energy source and life support systems, and daily life activities. Students will also provide an approximate timeline for how infrastructure, settlers, and supplies will be launched to the target site.

Tests: 45% (three tests worth 15% each will be conducted during the semester and will include multiple choice, problem-solving, and short answer questions based on lecture and reading materials)

Bibliography:

A READING LIST MUST BE INCLUDED FOR ALL NEW COURSES

The Library has requested that the reading list contain complete bibliographical information, such as full name of author, title, year of publication, etc., and that you distinguish between required and suggested readings. A statement is required from the bibliographer responsible for the discipline to indicate whether resources are adequate to support the course.

Also please list any online resources.

If the course is to be integrated (graduate/ undergraduate), a list of the additional readings to be required of graduate students must be included. If no additional readings are to be required, a rationale should be supplied.

LIBRARY SUPPORT STATEMENT MUST BE INCLUDED.

Internal:

The below textbooks, along with select scientific papers, will be used for generating the majority of the course content.

- Weinersmith, K. & Weinersmith, Z. 2023, “A City on Mars”, Penguin Press
- Norberg, C. 2013, “Human Spaceflight and Exploration”, Springer-Praxis
- Zubrin, Z. 2019, “The Case for Space”, Prometheus Book
- Impey, C., 2015, “Beyond: Our Future in Space”, W.W. Norton and Company

Required Student Reading:

Students will occasionally be assigned recent new articles and popular science publications on topics pertaining to human spaceflight in order to participate in pop talks and think-pair-share activities. Examples of such readings include:

- Aleci, C. 2020, “From International Ophthamology to Space Ophthamology: The Threats to Vision on the Way to Moon and Mars Colonization”, International Ophthamology 40, 775-86
- Angelis, D. et al. 2002, “Lunar Lava Tube Radiation Safety Analysis”, Journal of Radiation Research 43, S41-45
- Maggie, F. & Pallud, C. 2010 “Martian base agriculture: The effect of low gravity on water flow, nutrient cycles, and microbial biomass”, Advances in Space Research, 46, 10
- Wetzel, H., “A Novel Approach To Growing Gardens in Space”, NASA’s eXposed Root On-Orbit Test Systems Project, https://science.nasa.gov/technology/technology-highlights/a-novel-approach-to-growing-gardens-in-space

Other Resources:

In the LECT and BLEN formats, this course will require the regular lecture hall facilities (with standard York University lecture hall IT

A statement regarding the adequacy of physical resources (equipment, space, etc.) must be appended. If other resources will be required to mount this course, please explain

COURSES WILL NOT BE APPROVED UNLESS IT IS CLEAR THAT ADEQUATE RESOURCES ARE AVAILABLE TO SUPPORT IT.

equipment), classroom space for 150-200 as well as access to an eClass course. The ONCA format will require an eClass site only.

Teaching assistants (T3) will be needed to assist with marking assessments and invigilating tests and exams.

Course Rationale:

The following points should be addressed in the rationale:

How the course contributes to the learning objectives of the program / degree.

The relationship of the proposed course to other existing offerings, particularly in terms of overlap in objectives and/or content.

If inter-Faculty overlap exists, some indication of consultation with the Faculty affected should be given.

The expected enrolment in the course.

Contribution to Program Learning Objectives

As stated in the document "What is a NATS Course?" developed by the Division of Natural Science, the primary goal of a NATS course is to develop students' scientific literacy and critical thinking in a scientific context. To this end, NATS courses aim to achieve the following:

- broaden student horizons ("**breadth**")
- expose students to some of the fundamental ideas of the course's major discipline ("**scientific knowledge**")
- promote multi- or interdisciplinarity ("**multi/interdisciplinarity**")
- develop skills, problem-solving tools and assessment strategies, some of which are specific to the course's discipline ("**critical skills**" and "**critical thinking**")

Human spaceflight is truly **interdisciplinary**, as students will develop scientific literacy in the context of astronomy, engineering, law, psychology and human health. As stated in the course's learning outcomes, students will acquire working **scientific knowledge** of fundamental topics in all of these fields. In addition, the examination of the economic and sociological impacts of the human presence in space expands the course's **breadth** beyond the scientific content.

The course's major project will require students to take what they have learned in class and apply it to a real-world scenario. This approach, in addition to the active-learning activities and homework assignments that involve analyzing scientific articles, will provide opportunities for students to develop their **critical skills** and **critical thinking** while learning new problem-solving tools.

Relationship of the Course to Program Offerings

Over the past two decades, significant advancements in the field of astrobiology have led to an increase in the popularity of NATS1880 Life Beyond Earth and expressions of interest for more courses in

this exciting field. As such, NATS has recently hired a faculty member (Jeremy Webb) for the purpose of developing its astrobiology course offerings.

At present, NATS1880 6.0 is offered twice per year, but as students typically choose their NATS courses after scheduling the courses required for their major, a 6-credit in-person NATS course can be difficult for students to fit in their schedules. Meanwhile, the popular 3-credit course NATS1570 Exploring the Solar System is offered 2-3 times per year, but NATS1570 students who want to delve further into the search for life in our Solar System do not have another 3-credit option in this area to complete their required 6 NATS credits. Similarly, NATS1530 3.0 The Science of Space Flight is offered 2-3 times per year, but students who want to learn more about human space exploration do not have a 3-credit option.

Thus, NATS1532 is one of two new 3-credit courses being proposed for 2025-26. The other (NATS1572 Introduction to Astrobiology) has been approved by FSc Council and is currently under development by Dr. Webb, who has been awarded a YUFA Release-Time Teaching Fellowship to propose and develop these courses in 2024-25. Once both of these courses are developed, it is anticipated that NATS will offer NATS1880 once per year in addition to NATS1530 and NATS1570 in the fall and NATS1532 and NATS1572 in the winter, with the option of offering one or more of the 3-credit courses in the summer term based on popularity and the availability of instructors. This suite of courses will provide more options and greater flexibility for students who want to complete all of their NATS credits in this fascinating and increasingly topical area.

Faculty and Department Approval for Cross-listings:

If the course is to be cross-listed with another department, this section needs to be signed by all parties. In some cases there may be more than two signatures required (i.e. Mathematics, Women's Studies). In the majority of the cases either the Undergraduate Director or Chair of a unit approves the agreement to cross-list. All relevant signatures must be obtained prior to submission to the Faculty curriculum committee.

Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date
Dept:	Signature (Authorizing cross-listing)	Department	Date

Accessible format can be provided upon request.

MEMORANDUM

York University Libraries

To: Robin Metcalfe

From: William Denton

Date: 12 September 2024

Subject: Library Statement of Support – NATS 1532 (Human Spaceflight)

Summary

York University Libraries (YUL) is well positioned to support this proposed course. As usual with a new course in NATS, faculty and students will be served by our large collections and the usual array of library resources and services, which support the multi- and interdisciplinary approach of the program and the critical skills and thinking it provokes.

Collections

I bought the one book on the reading list that we did not have, and added extra copies of the Weinersmiths' *A City on Mars*, including an electronic copy to make access easier.

Omni provides students with access to a wide range of materials, including books, book chapters, articles, dissertations, streaming media, etc. Library users may also request items from partner libraries through Omni. A selection of electronic collections of particular interest are highlighted below. The A-Z list on the Libraries' website provides a complete register of electronic offerings.

eBook Platforms: De Gruyter eBooks, Oxford Scholarship Online, Cambridge Core, Taylor & Francis eBooks, ProQuest eBook Central, Scholars Portal Books

Subject Databases: Web of Science

Canadian Content: Canadian Periodicals Index Quarterly (CPI.Q)

Newspaper/ Magazine Collections: Press Reader, Factiva, Nexis Uni

Services

Library Instruction

Librarians and archivists help students build research skills and digital fluencies through workshops, online research guides, and individual research assistance. Instructors can arrange a research skills workshop (or seminar) geared to a specific assignment, course, or competency.

Research Guides of Interest:

- Astronomy
- Disaster and Emergency Management
- Earth and Space Science
- Natural Science

Research Help

Online research assistance is available in both English and French via chat and email. In addition, students and faculty can book one-hour research consultations with a specialist librarian.

Accessibility Services

Library Accessibility Services (LAS) provides alternative content formats, as well as adaptive technologies and spaces. With a referral, York University faculty and students can request transcription services or reserve an accessibility lab workstation. Contact lashelp@yorku.ca with questions.

Changes to Existing Course

Faculty:

Department:	STS/NATS	**Date of Submission:**	Sept 10, 2024
Course Number:	NATS 1520 3.0	**Effective Session:**	25-26
Course Title:	The Science and Technology of Music		

Type of Change:

[ ]	in pre-requisite(s)/co-requisite(s)	[ ]	in cross-listing
[ ]	in course number/level	[ ]	in degree credit exclusion(s)
[ ]	in credit value	[ ]	regularize course (from Special Topics)
[ ]	in title (max. 40 characters for short title)	[X]	in course format/mode of delivery *
[ ]	in Calendar description (max. 40 words or 200 characters)	[ ]	retire/expire course
[ ]	other (please specify):	[ ]	

Change From:	**To:**
LECT format	LECT, ONLN, or ONCA format

Rationale:

A goal of the Faculty of Science Strategic Plan 2021-2025 is to "optimize online and blended in-person/online courses and programs to diversify learning". This is particularly relevant to NATS courses, as students tend to choose their NATS courses after their core courses are already scheduled, leaving limited scheduling windows for NATS LECT courses. Thus, NATS seeks to increase our range of delivery formats to provide our students with more flexibility when scheduling their courses, thereby increasing the likelihood that they can find a course in their area of interest. Offering a course in multiple formats also provides the flexibility to offer the course in a format that best fits with the scheduling needs of course directors.

Experience gained during the pandemic period of remote teaching of NATS 1720 (Light & Sound) suggests that sound-related topics are particularly well-suited to online delivery. With a suitable set of headphones or ear-buds, many demonstrations and activities can be effectively completed. In particular, a suite of sound labs developed for NATS 1720 could be readily adapted to be used as the basis of assignments in an online version of NATS 1520 The Science and Technology of Music.

Note: For course proposals involving cross-listings, integrations and degree credit exclusions, approval from all of the relevant Faculties/department is required.

Note: Since one change (such as a change in year level or credit value) may result in several other changes (e.g., to the course description, evaluation, instruction, bibliography, etc.), please submit as many details as possible. If there are several changes, please feel free to use a New Course Proposal Form in order to ensure that all the required information is included.

* Note: If there is a technology component to the course, a statement is required from ATS indicating whether resources are adequate to support the course. Courses converted from face-to-face to an on-line delivery mode should follow the instructions provided on page 4 of the New Course Proposal Form to provide revised 'Course Design' and 'Method of Instruction" information.

Course Design:

Indicate how the course design supports students in achieving the learning objectives. For example, in the absence of scheduled contact hours what role does student-to-student and/or student-to-instructor communication play, and how is it encouraged?

Detail any aspects of the content, delivery, or learning goals that involve "face-to-face" communication, non-campus attendance or experiential education components.

Alternatively, explain how the course design encourages student engagement and supports student learning in the absence of substantial on-campus attendance.

Asynchronous content delivery consisting of readings and video/audio lessons and demonstrations. Although delivery will be asynchronous, students will be provided with clear milestones to keep them on track, eg. regular quizzes.

Students will be invited to regular (but optional) online Q&A sessions, and a discussion forum will be set up to promote discussion of readings.

Readings will be drawn from several textbooks since none cover the breadth of material at the desired level. Textbooks used in past iterations of this course have included

- *Measured Tones* (Johnston)
- *The Physics & Psychophysics of Music* (Roederer)

Readings on the neuropsychology of music may be drawn from *This is Your Brain on Music* (Levitin).

In the LECT format of NATS1520, 50% of the assessment scheme is in the form of an in-person midterm and final exam. An additional 10% is assigned to weekly eClass quizzes to keep students on track with the course material. The remaining 40% is composed of unit assignments and a research assignment. The ONCA format will use the same assessment scheme as the LECT format.

The ONLN format of NATS1520 will follow the same assessment model currently used in the ONLN format of NATS1840 Science, Technology and the Environment, which has been running successfully for several years during the SU term, enabling students to take the course while travelling or at home in a different country. Academic honesty is managed by replacing the midterm and final exam with weekly smaller-weight online unit tests. The tests are timed (30-45min) and consist of both multiple-choice/numerical and short-answer questions. Using this format, NATS1840 has maintained a grade distribution that is consistent with the LECT format of the course.

Instruction:

1. Planned frequency of offering and number of sections anticipated (every year, alternate years, etc.).
2. Number of department members currently competent to teach the course.
3. Instructor(s) likely to teach the course in the coming year.
4. An indication of the number of contact hours (defined in terms of hours, weeks, etc.) involved, in order to indicate whether an effective length of term is being maintained **OR** in the absence of scheduled contact hours a detailed breakdown of the estimated time students are likely to spend engaged in learning activities required by the course.

1. Once or twice per year, depending on popularity.

2. Carl Wolfe.

3. Carl Wolfe.

4. The ONCA and ONLN modes will have the following learning hours:
   - Reading/watching online lecture material (3-4 hrs/wk; approx. 36 hours total)
   - Quizzes (1 hr/wk)
   - Unit assignments/activities (2-3 hrs/wk)

   TOTAL HOURS: 72-96 hours (over 12 weeks)

Final January 30, 2018

York University
Procedures for Decanal Searches
Updated January 2018

Attracting capable Deans is critical to advancing the institutional priorities and mandate of York University. The York Act vests in the President the power to recommend to the Board the appointment of officers of the University (13 (2) d). Under the terms of the current Collective Agreement with YUFA, the importance of collegial participation in the selection of academic administrators and Librarian Administrators is acknowledged in 12.27 (b): *Unless otherwise agreed to between the President and the Faculty Council of the Faculty in question, candidates for appointment as Deans or Principals shall be recommended to the President by search committees established by and advisory to the President, a majority of which have been elected by Faculty Council, and a majority of the members of which are full-time faculty members.*

In light of feedback from the York community and following a review of current practices at other leading Canadian universities, the Procedures for Decanal Searches are being updated, effective immediately.

University Procedures for Decanal Searches

The Deans/Principal play a crucial role in the academic leadership and governance of the university, as well as in the direction and administration of their Faculties and the promotion of teaching and research in those Faculties. It is therefore essential that a decanal search canvas widely to attract candidates who are best qualified for the position in relation to leadership and administrative capacities and experience and scholarly reputation.

The following general procedures shall govern all searches for Faculty Deans, Principal, and, as applicable, the Dean of Libraries. At the outset of a given search, any further specific or supplemental procedures may be agreed upon between the President and the Faculty Council Executive and presented to Faculty Council for approval.

1. The President initiates a search by communication with Faculty Council normally 14 months before the end of the incumbent Dean's/Principal's term, or in the case of an unanticipated vacancy, as soon as possible.
2. Faculty Council normally elects 6 full-time faculty members, one staff and two student members (one undergraduate and one graduate student).
3. Ensuring the best possible outcome will be facilitated by a Search Committee that reflects the breadth and diversity of the Faculty. Each Council should therefore establish procedures reflecting the following principles:
    a. A Search Committee should have some representation from full-time faculty members with familiarity of the job of Dean – that is, with academic administrative experience – typically no fewer than two colleagues who have been or who are currently chairs or directors of departments, or in non-departmentalized

Faculties, members of the senior administrative team such as previous Associate Deans, UPDs, or GPDs.

b. Search Committees should broadly reflect the diversity of academic departments including at least one member from each department if possible, and if not, normally no department should have more than one member on the Search Committee; in non-departmentalized faculties, the Committee should broadly reflect the program areas or fields in the Faculty.
c. Search Committees should also reflect broadly the gender and demographic diversity of the Faculty.

4. Faculties with a significant proportion of contract faculty or who may desire to have an external member such as an alumnus may request adding an additional member to the Search Committee representing contract faculty, alumnus, etc. (to be agreed upon with the President).
5. The President appoints one member drawn from outside the Faculty concerned but who is familiar with the Faculty.
6. The President also names the Chair of the Search Committee, normally the Provost; names a non-voting secretary, normally an experienced senior staff member from outside the Faculty; may retain a Search Consultant to assist the Committee; and formally establishes the Search Committee as a committee advisory to the President, whose mandate is to conduct a search for a new Dean/Principal, in accordance with the agreed-upon procedures, and to recommend to the President, by a specified date, the best-qualified candidate(s) for Dean/Principal.
7. The Search Committee is responsible for preparing the position profile drawing on input from Faculty Council and in consultation with the President.
8. The Search Committee will advertise the position in university publications and, if external nominations are being sought, may advertise in national and international professional publications. The Search Committee may also solicit recommendations for the position.
9. The Search Committee assesses and screens applicants/nominees, and conducts interviews. The names of all the candidates considered at any stage, including the list of those interviewed, shall be kept confidential to the Search Committee and the Consultant. By agreeing to serve on the Committee, all members agree to be bound by these requirements of confidentiality.
10. The Search Committee prepares its recommendations for the President, identifying the candidate or candidates who present the knowledge, skills and capacities to undertake the responsibilities of Dean/Principal. The Committee may, if it wishes, rank order candidates.
11. The President consults with the Executive Committee of the Board of Governors which may act on behalf of the Board in appointing the candidate or may recommend the appointment to the Board, at its next regular meeting.
12. The President announces the name of the new Dean/Principal to the Faculty and the Board of Governors, and subsequently to the wider York community.

Pilot Provision (2017 – 2019) for Open Searches

For Faculties wishing to incorporate an open stage into their search, the following is being provided as a pilot for searches in 2017 - 2018 and 2018 – 2019 to be reviewed before incorporating as a standing option.

Where a Faculty Council indicates a preference for an open search, an open stage may be added to the process after the Search Committee has interviewed its shortlisted candidates confidentially and has identified its top ranked candidates – normally the top two ranked candidates. In order to ensure that York has access to the very best candidates, the Consultant (or if there is no Consultant, the Secretary to the Committee) will ask the top ranked candidates whether they are willing to meet with Faculty Council. That information will be kept in confidence by the Search Consultant (or Secretary).

If both/all the top ranked candidates agree to do so, they will be invited to present to a closed session of Faculty Council. The Search Committee will solicit input from Faculty Council about those candidates and consider this input in their final rankings to be presented to the President. In this event, all members of Faculty Council agree to be bound by the same requirements of confidentiality as the Search Committee. Council members will provide input to the Search Committee but members of Council will be expected to keep the names of the candidates confidential in perpetuity.

If any of the top ranked candidates indicate a requirement for a confidential search, the open stage will not occur for any candidate. The Consultant will report to the Search Committee that at least one candidate requires a confidential search, without disclosing which candidate or candidates have not agreed to meet with Faculty Council. The Search Committee will in any respect consult extensively with Faculty Council about the position profile for the Dean, and provide regular updates throughout the search.

Whether or not the search proceeds to an open stage, the top ranked candidates will also meet with the President, and the Search Committee may elect to hold follow-up interviews with them.

For Approval: Faculty of Science Decanal Search Procedures

On August 30, 2018, the Provost met with the Chair and Vice Chair of Faculty Council, and asked that the Faculty Executive Committee draft a procedure for establishing a search committee for the new Dean of the Faculty of Science. The procedure has been developed to comply with the University Procedures for Decanal Searches updated January 2018, and to follow the general spirit of past procedures for establishing such committees within the Faculty of Science.

1. Search Committee Composition
Voting Members
a) Chair (Presidential appointee, as per UPDS)
b) Outside faculty member (Presidential appointee, as per UPDS, "drawn from outside the Faculty concerned but who is familiar with the Faculty")
c) Six full-time faculty members, elected by the Faculty Council (as per UPDS)
d) One staff member (as per UPDS)
e) Two student members, one undergraduate and one graduate student (as per UPDS)

Non-Voting Members
f) Secretary (Presidential appointee, as per UPDS)

2. Principles of Membership
a) All members of the Search Committee must be available for meetings between September 2018 and the conclusion of its work.
b) Membership of the Search Committee should reflect the diversity of the Faculty and the Faculty's commitment to maintaining and increasing that diversity.

3. Candidacy Information and Procedures
b) Candidates standing for election to committee membership will be invited to self-identify in relation to affirmative action designated groups: women, racial/visible minorities, persons with disabilities, and aboriginal peoples.
c) The Executive Committee will work proactively to ensure that the slate of candidates for election are reflective of the demographic diversity of the Faculty, and able to meet the specifications outlined in the Selection Process with respect to levels of seniority, rank, administrative experience, department and gender.
d) Candidates will be invited to provide a brief candidate statement up to 150 words which responds to the following question:
"What expertise and strengths do you bring to the committee?"
e) Candidate statements shall be made available to the voters in advance of the balloting.

4. Selection Process

a) Undergraduate student member. The undergraduate student member will be chosen by the Faculty of Science Student Caucus (elected student leaders and members of Faculty Council).

b) Graduate student member. The graduate student member will be elected by graduate students within the Faculty of Science. All full-time Faculty of Science graduate students will be invited to nominate themselves for candidacy or nominate another full-time graduate student (with the nominee's permission). All Faculty of Science graduate students will be eligible to vote for one candidate. A confidential electronic ballot will be overseen by the Secretary to Council. The candidate who receives the most votes will be selected.

c) Staff member. All full-time staff in the Faculty of Science will be invited to nominate themselves for candidacy or to nominate another full-time staff member (with the nominee's permission). All full-time staff members will be eligible to vote for one candidate. A confidential electronic ballot will be overseen by the Secretary to Council. The candidate who receives the most votes will be selected.

d) Faculty members. Each department will vote to select two candidate nominees for the committee. These two candidates will be the two candidates who received the most votes in a confidential electronic departmental ballot, and may be ranked. All full-time faculty members in the Faculty of Science will be eligible for candidacy in his or her respective constituency and may become a candidate by self-nomination or by being nominated by another member of the community (with the permission of the nominee). All full-time faculty members will be eligible to vote within their constituency. Elections will be overseen by a trusted staff member within the department, or the department may ask the Secretary to Council to arrange and oversee a confidential electronic ballot. The two candidate nominees for the committee will be communicated to the Executive Committee.

The Executive Committee will select one of the two candidates from each department to serve on the committee. Decisions will be made subject to the following selection criteria:

- ranking by the department (if provided).
- there is one faculty member from each department (Biology; Chemistry; Mathematics and Statistics; Physics and Astronomy; Science and Technology Studies/Natural Science).
- there are at least 2 female faculty members.
- there are "at least two colleagues who have served in leadership positions within the Faculty", such as current or past chairs or directors of departments, or past Associate Deans [as per UPDS].

A sixth "member at large" will be selected from the remaining departmental candidates by the Executive Committee in order to meet the diversity requirements described in this document.

Note: A single candidate may fulfill more than one selection criterion.

5. Voting

a) If the number of candidates for a constituency is not greater than the number of available places on the search committee for that constituency, then the vote shall be considered to be a ratification vote.

b) In the case of a tie, the candidate will be selected from the affirmative action designated groups: women, racial/visible minorities, persons with disabilities, and aboriginal peoples. If affirmative action criteria do not assist in breaking a tie vote, the Department or the Faculty Council Executive may hold a run off vote between the two candidates receiving the most votes.

c) The results of the balloting will be made available to the Executive Committee of Faculty Council in de-identified format and shall be kept confidential. The data shall be retained until the formal appointment of the Search Committee, after which it shall be discarded. When results are announced, the only information revealed will be the names of those who form the committee; no break down of votes received will be circulated.

6. Incomplete Slate of Nominees

In the event that the procedure described above does not result in a fully-formed slate of nominees for the Search Committee, then the Executive Committee shall formulate a proposal for remediating action and bring it forward for approval by an electronic vote or at the next Faculty Council Meeting.

7. Upon Formulation of Slate of Committee Membership

a) Once the slate of nominees for committee membership has been identified by the Faculty Council as per the provisions above, the President shall "formally establish[es] the Search Committee as a committee advisory to the President" as per the UPDS.

b) The nominees become recognized as members of the Search Committee only once the Search Committee has been formally established by the President. "In the unlikely event that the election results fail broadly to reflect School's diversity (for example if there were no faculty with senior administrative experience elected, or no senior faculty, or if a majority of elected faculty were untenured), the President does reserve the right to take further steps to address this imbalance." as per the UPDS.

c) Once formed, the Search Committee will then conduct its duties in accordance with the provisions of the UPDS.

Safeguarding Research Considerations

QUESTIONS TO CONSIDER FOR FUNDING APPLICATIONS

When applying for Tri-Agency, Canada Foundation for Innovation (CFI), Ontario Research Fund (ORF) or international funding opportunities, you may encounter research security requirements. Consult the most up-to-date instructions for each process to confirm requirements. One or more of these policies may apply.

For assistance, please visit York University's Safeguarding Research Site or contact York's Safeguarding Research Office.

More than one may apply

	Research Security Consideration	Resources
Are you applying for Tri-Agency / CFI funding for research that aims to advance a Sensitive Technology Research Area?	**YES**: Each named researcher may need to complete a Sensitive Technology Research and Affiliations of Concern (STRAC) attestation form confirming there are no affiliations with / receipt of support from institutions on the Named Research Organizations (NRO) list. **NO**: No further action **UNSURE**: Consult the STRAC Affiliations Questionnaire on Safeguarding Research - Research & Innovation (yorku.ca)	Tri-Agency Guidance Tri-Agency Attestation Form CFI STRAC Attestation CFI Guidance STRAC Policy & Definitions / FAQs
Are you applying for federal Tri-Agency / CFI funding with one or more industry partners?	**YES**: You may need to complete a Risk Assessment Form (RAF) under the National Security Guidelines for Research Partnerships (NSGRP). You may need to complete a Partner ID form for CFI. **NO**: You are not required to complete the NSGRP RAF. **UNSURE**: Consult the definition of Partner Organization	NSGRP Form Tri-agency guidance CFI Guidance CFI Partner ID form Developing risk mitigation plans
Are you applying for an Ontario Research Fund (ORF) Opportunity?	**YES**: Each named researcher must complete the Ontario attestation form confirming there are no affiliations with institutions on the NRO list. For each application, one Mitigating Economic and Geopolitical Risk (MEGR) checklist must also be completed. *Disclosure requirements and definitions of risk and affiliation are unique to the Province. All applicants should review the Guidelines.* **NO**: You are not required to complete the Ontario attestation form or MERG checklist.	ORF Guidelines, Definitions and FAQs Developing risk mitigation plans
International Funding Opportunities	International funding bodies have various research security requirements in place. Please contact the Safeguarding Research Team for guidance.	

How can York's Office of Safeguarding Research Assist?

Due Diligence

- Understanding risk assessment processes in funding applications
- Training and support to help you craft meaningful risk assessments and effective mitigation strategies
- Supporting due diligence measures as you consider new partners, team members or visitors

Education and Training

- Training and support to conduct open-source due diligence
- Sharing information and resources about the risk environment
- Providing advice to help safeguard research while you travel

Compliance

- Guidance to implement your risk mitigation strategy

For assistance, please visit York University's Safeguarding Research Site or contact York's Safeguarding Research Office.