



**Faculty of Science, including School of Computer
Science (Graduate)
Programs, Courses and University Regulations
2024-2025**

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This publication provides guidance to prospects, applicants, students, faculty and staff.

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- 2 . In the interpretation of academic regulations, the Senate is the final authority.
- 3 . Students are responsible for informing themselves of the University's procedures, policies and regulations, and the specific requirements associated with the degree, diploma, or certificate sought.
- 4 . All students registered at McGill University are considered to have agreed to act in accordance with the University procedures, policies and regulations.
- 5 . Although advice is readily available on request, the responsibility of selecting the appropriate courses for graduation must ultimately rest with the student.
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Note: Throughout this publication, "you" refers to students newly admitted, readmitted or returning to McGill.

Publication Information

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1 Graduate and Postdoctoral Studies

1.1 Administrative Officers

Administrative Officers

Josephine Nalbantoglu; B.Sc., Ph.D.(McG.)

Associate Provost (Graduate Education) and Dean (Graduate and Postdoctoral Studies)

Lorraine Chalifour; B.Sc., Ph.D. (Manit.)

Associate Dean (Graduate and Postdoctoral Studies)

Nathan Hall; B.A., M.A., Ph.D. (Manit.)

Associate Dean (Graduate and Postdoctoral Studies)

Russell Steele; B.S., M.S. (Carn. Mell), Ph.D. (Wash.)

Associate Dean (Graduate and Postdoctoral Studies)

1.2 Location

James Administration Building, Room 400
845 Sherbrooke Street West
Montreal QC H3A 0G4
Website: mcgill.ca/gps



Note: For inquiries regarding specific graduate programs, please contact the appropriate department.

1.3 Graduate and Postdoctoral Studies' Mission

The mission of Graduate and Postdoctoral Studies (GPS) is to promote university-wide academic excellence for graduate and postdoctoral education at McGill. GPS provides leadership and strategic direction across the university in close collaboration with the academic and administrative units, and the graduate and postdoctoral community.

2 Important Dates

For all dates relating to the academic year, consult mcgill.ca/importantdates.

3 Graduate Studies at a Glance

Please refer to [University Regulations & Resources](#) > *Graduate* > : [Graduate Studies at a Glance](#) for a list of all graduate departments and degrees currently being offered.

4 Program Requirements

Refer to [University Regulations & Resources](#) > *Graduate* > *Regulations* > : [Program Requirements](#) for graduate program requirements for the following:

- Master's Degrees
- Doctoral Degrees

- Coursework for Graduate Programs, Diplomas, and Certificates

5 Graduate Admissions and Application Procedures

Please refer to [University Regulations & Resources > Graduate > : Graduate Admissions and Application Procedures](#) for information on:

- Application for admission;
- Admission requirements;
- Application procedures;
- Competency in English; and
- Other information regarding admissions and application procedures for Graduate and Postdoctoral Studies.

6 Fellowships, Awards, and Assistantships

Please refer to [University Regulations & Resources > Graduate > : Fellowships, Awards, and Assistantships](#) for information and contact information regarding fellowships, awards, and assistantships in Graduate and Postdoctoral Studies.

7 Postdoctoral Research

Students must inform themselves of University rules and regulations and keep abreast of any changes that may occur. The *Postdoctoral Research* section of this publication contains important details postdoctoral scholars will require during their studies at McGill and should be periodically consulted, along with other sections and related publications.

7.1 Postdocs

Postdocs are recent graduates with a Ph.D. or equivalent (i.e., Medical Specialist Diploma) engaged by a member of the University's academic staff, including Adjunct Professors, to assist them in research.

Postdocs must be appointed by their department and registered with Enrolment Services in order to have access to University facilities (library, computer, etc.).

7.2 Guidelines and Policy for Academic Units on Postdoctoral Education

Every unit hosting postdocs should apply institutional policies and procedures for the provision of postdoctoral education and have established means for informing postdocs of policies, procedures, and privileges (available at mcgill.ca/gps/postdocs), as well as mechanisms for addressing complaints. For their part, postdocs are responsible for informing themselves of such policies, procedures, and privileges.

1. Definition and Status

- Postdoctoral status will be recognized by the University in accordance with Quebec provincial regulations as may be modified from time to time. The eligibility period for postdoctoral status is up to five years from the date when the Ph.D. or equivalent degree was awarded. A : *leave of absence* for parental or health reasons may extend the eligibility period. Leaves for other reasons, including vacation, do not impact the eligibility period.
- Some McGill postdocs have dual status as both students and employees (unionized or non-unionized). Consult the [Graduate and Postdoctoral Studies website](#) for definitions of Postdoctoral Fellows, Postdoctoral Scholars, and Postdoctoral Researchers.
- Postdocs must conduct research under the supervision of a McGill professor (including Adjunct Professors), qualified in the discipline in which training is being provided and with the ability to fulfil supervisory responsibilities and act as a mentor for career development. Postdocs are expected to engage primarily in research with minimal teaching or other responsibilities.

2. Registration

- Postdocs must *register* annually with the University through Enrolment Services. Registration will be limited to postdocs who fulfil the definition above, and who meet the eligibility criteria as stipulated on the [Graduate and Postdoctoral Studies website](#).

- ii. Upon registration, postdocs will be eligible for a University identity card issued by Enrolment Services.
- iii. Leaves of absence must comply with the Graduate and Postdoctoral Studies Policies for Vacation, Parental/Familial, and Health Leave (see [section 7.3: Vacation Policy for Graduate Students and Postdocs](#) and [University Regulations & Resources](#) > Graduate > Regulations > Categories of Students > : [Leave of Absence Status](#)).

3. Appointment, Funding, Letter of Agreement

- i. Postdoctoral appointments may not exceed the registration eligibility period as defined above.
- ii. In order to be registered, the postdoc must be assured of financial support other than from personal means during their stay at McGill University. This amount must be equivalent to the minimal stipend requirement set by the University in accordance with guidelines issued by federal and provincial research granting agencies or the collective agreement, as applicable. Funding during parental leave is subject to the conditions of the funding agency or the collective agreement, as applicable.
- iii. Postdocs require a [Letter of Agreement for Postdoctoral Education](#) signed by the postdoc, the supervisor, and the department/unit head or delegate.
- iv. Postdocs with full responsibility for teaching a course should be compensated over and above their postdoctoral funding as course lecturers. This applies to all postdocs, except those for whom teaching is part of the award.
- v. The amount of research, teaching, or other tasks that postdocs engage in over and above postdoctoral activities should conform to the regulations for postdocs specified by the Canadian research council of their discipline or the collective agreement. This applies to all postdocs, including those whose funding does not come from the Canadian research councils.

4. Privileges

- i. Postdocs have the same pertinent rights as the ones granted to McGill students under [mcgill.ca/students/srr](#), and those granted by the policies listed at [mcgill.ca/secretariat/policies-and-regulations](#).
- ii. Postdocs have full graduate student borrowing privileges in McGill libraries through their identity card.
- iii. As a general rule, postdocs may take courses for credit as Special Students following the admissions procedures outlined at [mcgill.ca/gradapplicants/apply/prepare/visiting](#). [Tuition and other charges](#) will apply.
- iv. Postdocs may be listed in the McGill directory.
- v. Access to sports facilities may be purchased on a monthly basis through McGill Athletics and Recreation.
- vi. Postdoctoral Fellows and Scholars are mandatory members of the Post-Graduate Students' Society (PGSS) and an annual association fee is automatically charged.
- vii. Postdocs are permitted membership in the Faculty Club; an annual fee will be charged for this membership.
- viii. Postdocs are encouraged to participate in Professional Development Workshops provided by Graduate and Postdoctoral Studies, and Teaching and Learning services. These sessions are usually free of charge.
- ix. Postdocs have access to the services provided by the Ombudsperson.
- x. Postdocs may enrol as part-time students in the second language written and spoken English/French courses offered by the School of Continuing Studies/French Language Centre. Postdocs will be charged tuition for these courses. International Postdocs may be required to obtain a CAQ and a Study Permit.
- xi. Access to student services is granted to non-unionized postdocs, who are charged the Student Services fee in the Fall and Winter terms, through their student fee accounts.

5. Responsibilities

- i. Postdocs are subject to the responsibilities outlined at [mcgill.ca/students/srr](#) and must abide by the policies listed at [mcgill.ca/secretariat/policies-and-regulations](#).
- ii. Each academic unit hosting postdocs should clearly identify postdocs' needs and the means by which they will be met by the unit.
- iii. Each academic unit should assess the availability of research supervision facilities, office space, and research funding before recruiting postdocs.
- iv. Some examples of the responsibilities of the academic unit are:
 - to verify the postdoc's eligibility period for registration;
 - to provide postdocs with departmental policy and procedures that pertain to them;
 - to facilitate the registration and appointment of postdocs;
 - to assign departmental personnel the responsibility for postdoctoral affairs in the unit;
 - to oversee and sign off on the Letter of Agreement for Postdoctoral Education;
 - to ensure that each postdoc has a supervisor, lab and/or office space, access to research operating costs and necessary equipment;
 - to include postdocs in departmental career and placement opportunities; and
 - to refer postdocs to the appropriate University policies and personnel for the resolution of conflict that may arise between a postdoc and a supervisor.
- v. Some examples of the responsibilities of the supervisor are:
 - to uphold and transmit to their postdocs the highest professional standards of research and/or scholarship;
 - to provide research guidance;
 - to meet regularly with their postdocs;
 - to provide feedback on research submitted by the postdocs;

- to clarify expectations regarding intellectual property rights in accordance with the University's policy;
- to provide mentorship for career development; and
- to prepare, sign, and adhere to a Letter of Agreement for Postdoctoral Education.

vi. Some examples of the responsibilities of postdocs are:

- to inform themselves of and adhere to the University's policies and/or regulations for postdocs as outlined at mcgill.ca/gps/postdocs and mcgill.ca/students/srr, and the Graduate and Postdoctoral Studies [University Regulations and Resources](#);
- to submit a complete file for registration to Enrolment Services;
- to sign and adhere to their Letter of Agreement for Postdoctoral Education;
- to communicate regularly with their supervisor; and
- to inform their supervisor of their absences.

vii. Some examples of the responsibilities of the University are:

- to register postdocs;
- to provide an appeal mechanism in cases of conflict;
- to provide documented policies and procedures to postdocs;
- to provide postdocs with the necessary information on McGill University student services (Postdoctoral Fellows and Scholars) and HR policies and guidelines (Postdoctoral Researchers).

Approved by Senate, April 2000; revised May 2014; February 2020.

7.3 Vacation Policy for Postdocs

Please refer to the : [Vacation Policy for Graduate Students and Postdocs](#).

7.4 Leave of Absence for Health and Parental/Familial Reasons

A leave of absence may be granted for maternity or parental reasons or for health reasons (see [University Regulations & Resources > Graduate > : Leave of Absence Status](#)).

Such a leave must be requested on a term-by-term basis and may be granted for a period of up to 52 weeks. For a maternity or parental leave, the eligibility period of a maximum of 52 consecutive weeks is determined based on when the child is born; if the leave is interrupted for one or two terms, the eligibility period cannot be extended. Students and Postdocs must make a request for such a leave in writing to their department and submit a medical certificate. The department shall forward the request to Enrolment Services. See the procedure in [University Regulations & Resources > Graduate > : Leave of Absence Status](#).

Students who have been granted such a leave will have to register for the term(s) in question and their registration will show as "leave of absence" on their record. No tuition fees will be charged for the duration of the authorized leave. Research supervisors are not obligated to remunerate students and Postdocs on leave. A summary table of various leave policies (paid or unpaid) for students and Postdocs paid from the Federal and Quebec Councils through fellowships or research grants is available at mcgill.ca/gps/funding/getting-paid under "Leave Policies and Form."

7.5 Postdoctoral Research Trainees

Eligibility

If your situation does not conform to the Government of Quebec's definition of a Postdoctoral Fellow, you may be eligible to attend McGill as a Postdoctoral Research Trainee. While at McGill, you can perform research only (you may not register for courses or engage in clinical practice). Medical specialists who will have clinical exposure and require a training card must register through Postgraduate Medical Education of the Faculty of Medicine and Health Sciences—not Graduate and Postdoctoral Studies.

The category of Postdoctoral Research Trainee is for:

Category 1: An individual who has completed requirements for the Doctoral degree or medical specialty, but whose degree/certification has not yet been awarded. An individual in this category will subsequently be eligible for registration as a Postdoctoral Fellow.

Category 2: An individual who is not eligible for Postdoctoral Registration according to the Government of Quebec's definition, but is a recipient of an external postdoctoral award from a recognized Canadian funding agency.

Category 3: An individual who holds a professional degree (or equivalent) in a regulated health profession (as defined under CIHR-eligible health profession) and is enrolled in a program of postgraduate medical education at another institution. This individual wishes to conduct the research stage or elective component of their program of study at McGill University under the supervision of a McGill professor. This individual will be engaged in full-time research with well-defined objectives, responsibilities, and methods of reporting. Applications must be accompanied by a letter of permission from the applicant's home institution (signed by the Department Chair, Dean, or equivalent) confirming registration in their program and stating the expected duration of the

research stage. Individuals who are expecting to spend more than one year are encouraged to obtain formal training (Master's or Ph.D.) through application to a relevant graduate program.

Category 4: An individual with a regulated health professional degree (as defined under CIHR-eligible health profession), but not a Ph.D. or equivalent or medical specialty training, but who fulfils criteria for funding on a tri-council operating grant or by a CIHR fellowship (up to maximum of five years post-degree).



Note: Individuals who are not Canadian citizens or permanent residents must inquire about eligibility for a work permit.

General Conditions

- The maximum duration is three years.
- The individual must be engaged in full-time research.
- The individual must provide copies of official transcripts/diplomas.
- The individual must have the approval of a McGill professor to supervise the research and of the Unit.
- The individual must have adequate proficiency in English, but is not required to provide official proof of English competency to Enrolment Services.
- The individual must comply with regulations and procedures governing research ethics and safety and obtain the necessary training.
- The individual will be provided access to McGill libraries, email, and required training in research ethics and safety. Any other University services must be purchased (e.g., access to athletic facilities).
- The individual must arrange for basic health insurance coverage prior to arrival at McGill and may be required to provide proof of coverage.

8 Graduate Studies Guidelines and Policies

Refer to [University Regulations & Resources > Graduate > : Guidelines and Policies](#) for information on the following:

- Guidelines and Regulations for Academic Units on Graduate Student Advising and Supervision
- Policy on Graduate Student Research Progress Tracking
- Ph.D. Comprehensives Policy
- Graduate Studies Reread Policy
- Failure Policy
- Guideline on Hours of Work

9 Graduate Student Services and Information

Graduate students are encouraged to refer to [: Student Services and Information](#) for information on the following topics:

- Service Point
- Student Rights and Responsibilities
- Student Services – Downtown and Macdonald Campuses
- Residential Facilities
- Athletics and Recreation
- Ombudsperson for Students
- Extra-Curricular and Co-Curricular Activities
- Bookstore
- Computer Store
- Day Care

10 Information on Research Policies and Guidelines, Patents, Postdocs, Associates, Trainees

Refer to [University Regulations & Resources](#) > *Graduate* > : [Research Policy and Guidelines](#) for information on the following:

- Regulations on Research Policy
- Regulations Concerning the Investigation of Research Misconduct
- Requirements for Research Involving Human Participants
- Policy on the Study and Care of Animals
- Policy on Intellectual Property
- Regulations Governing Conflicts of Interest
- Safety in Field Work
- Office of Sponsored Research
- Postdocs
- Research Associates

11 Browse Academic Units & Programs

The programs and courses in the following sections have been approved for the 2024–2025 session as listed.

11.1 Atmospheric and Oceanic Sciences

11.1.1 Location

Department of Atmospheric and Oceanic Sciences
Burnside Hall
805 Sherbrooke Street West, Room 305
Montreal QC H3A 0B9
Canada
Telephone: 514-398-3764
Fax: 514-398-6115
Email: info.aos@mcgill.ca; graduate studies: graduateinfo.aos@mcgill.ca
Website: mcgill.ca/meteo

11.1.2 About Atmospheric and Oceanic Sciences

The Department of Atmospheric and Oceanic Sciences offers courses and research opportunities in atmospheric sciences and physical oceanography leading to the **M.Sc.** and **Ph.D.** degrees. Research programs borrow from fundamental fields such as mathematics, statistics, physics, chemistry, and computing to address a broad range of topics relating to weather and climate. Examples include:

- atmospheric chemistry;
- climate dynamics;
- cloud and precipitation physics;
- dynamical oceanography and meteorology;
- geophysical turbulence;
- numerical modelling;
- numerical weather prediction;
- ocean carbon budgets;
- sea ice dynamics;

- synoptic and mesoscale meteorology; and
- remote sensing of weather and climate.

Some faculty members have close ties with other departments, schools, and centres, including the Chemistry and the Mathematics and Statistics departments; the *Bieler School of Environment*; *ArcticNet*; and *Quebec Ocean*. Facilities include the McGill Atmospheric Profiling Observatory, as well as state-of-the-art field and laboratory equipment for atmospheric chemistry. Graduate students have access to computers, ranging from desktop PCs to the high-performance computing clusters available through the Digital Research Alliance of Canada. In some cases, M.Sc. and Ph.D. research may include a field component. Most students also participate in national and international conferences.

Financial assistance in the form of research stipends is available for all qualified graduate students. Additional financial support is provided in the form of teaching assistantships, subject to availability and eligibility constraints.

section 11.1.4: Master of Science (M.Sc.) Atmospheric and Oceanic Sciences (Thesis) (45 credits)

Our program applies mathematics, physics, computing, and sometimes chemistry to study the atmosphere and/or oceans. The ideal student would therefore have a strong quantitative background in one or more of these fields. Although some of our students have undergraduate knowledge of meteorology or physical oceanography, this background is not necessary to succeed in the program. McGill offers the only program in Canada that includes both atmospheric and oceanic sciences. Students benefit from a high professor-to-student ratio and access to state-of-the-art computing, remote sensing, and atmospheric chemistry laboratory equipment. The Department also has close ties with Environment & Climate Change Canada's numerical weather prediction centre in Dorval, Quebec.

Our program allows considerable flexibility as to the choice of research topics, and gives students both a strong classroom knowledge of the subject as well as the opportunity to choose from a variety of thesis research projects. Students who do not choose to continue in academia find employment in a variety of areas and places; for example, working with Environment & Climate Change Canada as research associates or weather forecasters.

section 11.1.5: Doctor of Philosophy (Ph.D.) Atmospheric and Oceanic Sciences

Our program applies mathematics, physics, computing, and sometimes chemistry to study the atmosphere and/or oceans. The ideal student would therefore have a strong quantitative background in one or more of these fields. Although some of our students have undergraduate knowledge of meteorology or physical oceanography, this background is not necessary to succeed in the program. McGill offers the only program in Canada that includes both atmospheric and oceanic sciences. Students benefit from a high professor-to-student ratio and access to state-of-the-art computing, remote sensing, and atmospheric chemistry laboratory equipment. The Department also has close ties with Environment & Climate Change Canada's numerical weather prediction centre in Dorval, Quebec. Students who do not choose to continue in academia find employment in a variety of areas including research careers at government labs such as Environment & Climate Change Canada.

section 11.1.6: Doctor of Philosophy (Ph.D.) Atmospheric and Oceanic Sciences: Environment

****This program is currently not offered.****

The Ph.D. in Atmospheric and Oceanic Sciences: Environment (option) is a research program offered in collaboration with the *Bieler School of Environment*. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues. The Environment option builds on the same program and a similar undergraduate background as described under Doctor of Philosophy (Ph.D.) Atmospheric and Oceanic Sciences. In addition, the Environment option includes required courses from Atmospheric and Oceanic Sciences and from Environment, as well as complementary courses in Atmospheric and Oceanic Sciences and in Environment.

Prospective Environment Option students must apply for admission to both Atmospheric and Oceanic Sciences and the School of Environment and must meet the entrance requirements of both. Acceptability into the Environment option will be based on academic experience and performance, availability of a supervisor or co-supervisor, the proposed research, and plans for funding as articulated by the supervisor(s). This option is not available to students entering at the Ph.D. 1 level, but can be chosen in subsequent years.

11.1.3 Atmospheric and Oceanic Sciences Admission Requirements and Application Procedures

11.1.3.1 Admission Requirements

Applicants to the M.Sc. program must meet the general requirements of Graduate and Postdoctoral Studies and hold a bachelor's degree with high standing in atmospheric science, oceanic science, physics, mathematics, engineering, chemistry, or a similar field.

Applicants to the Ph.D. program would normally have a strong background in meteorology, physical oceanography, or related disciplines such as mathematics, physics, chemistry, and engineering. Many students will have an M.Sc. degree in one of these fields, although this is not a formal requirement. All Ph.D. students are required to take at least two graduate-level courses in atmospheric and oceanic sciences. Students entering without a master's degree or without a sufficient background in atmospheric and/or oceanic sciences are admitted at the Ph.D. 1 level and are required to take an additional five graduate-level courses in atmospheric and oceanic sciences, these usually being completed in the first two semesters.

Applicants to the Environment Option of our Ph.D. program must apply for admission to both Atmospheric and Oceanic Sciences and the Bieler School of Environment and must meet the entrance requirements of both programs (see also information here: mcgill.ca/environment/envroption). Acceptability into the Environment option will be based on academic experience and performance, availability of a supervisor or co-supervisor, the proposed research, and plans for funding as articulated by the supervisor(s). This option is not available to students entering at the PhD 1 level, but can be chosen in subsequent years.

Inquiries should be addressed directly to the [Student Affairs Coordinator](#), Department of Atmospheric and Oceanic Sciences; see the [department website](#) for more information.

English Language Proficiency

For graduate applicants whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized Canadian or American (English or French) institution or from a recognized foreign institution where English is the language of instruction, documented proof of English proficiency is required prior to admission. For a list of acceptable test scores and minimum requirements, visit mcgill.ca/gradapplicants/international/proficiency

11.1.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/how-apply.

See [University Regulations & Resources](#) > Graduate > Graduate Admissions and Application Procedures > : [Application Procedures](#) for detailed application procedures.

11.1.3.2.1 Additional Requirements

The item below is an additional requirement set by this department:

- Acceptance by a research supervisor – required for the Ph.D. program

11.1.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Atmospheric and Oceanic Sciences. Applicants are responsible for verifying all deadlines and documentation requirements well in advance by consulting the departmental website at mcgill.ca/meteo/programs-0/graduate-studies/prospective-graduate-students.

Please note that application deadlines may exceptionally be revised during the application cycle. For current deadline information, please visit the above-mentioned departmental website ().

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.



Note: Applications for Summer term admission will not be considered.

11.1.4 Master of Science (M.Sc.) Atmospheric and Oceanic Sciences (Thesis) (45 credits)

The M.Sc. degree requires a minimum of 45 credits, up to a maximum of 51 credits. The program includes from 9 to 27 credits of coursework (depending on the student's background).

Thesis Courses (24 credits)

ATOC 691	(3)	Master's Thesis Literature Review
ATOC 692	(6)	Master's Thesis Research 1
ATOC 694	(3)	Master's Thesis Progress Report and Seminar
ATOC 699	(12)	Master's Thesis

Although registration is not required, students registered in M.Sc. programs are expected to regularly attend one of the student seminar series (ATOC 751D1/D2 or ATOC 752D1/D2) and the Department seminar series during the entire period of their enrolment in the program.

Complementary Courses (21 credits)

Must complete or have completed the following courses or equivalent:

ATOC 512	(3)	Atmospheric and Oceanic Dynamics
ATOC 513	(3)	Waves and Stability
ATOC 515	(3)	Turbulence in Atmosphere and Oceans
ATOC 519*	(3)	Advances in Chemistry of Atmosphere
ATOC 521	(3)	Cloud Physics
ATOC 525	(3)	Atmospheric Radiation

ATOC 531	(3)	Dynamics of Current Climates
ATOC 540	(3)	Synoptic Meteorology 1
ATOC 541	(3)	Synoptic Meteorology 2
ATOC 548	(3)	Mesoscale Meteorology
ATOC 568	(3)	Ocean Physics
ATOC 626	(3)	Atmospheric/Oceanic Remote Sensing
CHEM 519*	(3)	Advances in Chemistry of Atmosphere

* Students may select either ATOC 519 or CHEM 519.

Or other courses at the 500 level or higher recommended by the Department's Graduate Program Director.

Students with a strong background in atmospheric or oceanic science, or a Diploma in Meteorology, will take at least the 7-credit minimum. Students with no previous background in atmospheric or oceanic science must take the 20-credit maximum.

11.1.5 Doctor of Philosophy (Ph.D.) Atmospheric and Oceanic Sciences

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

(1 credit)

ATOC 700	(1)	Ph.D. Proposal Seminar
ATOC 701	(0)	Ph.D. Comprehensive (General)

Complementary Courses (7 credits)

Students are required to take ATOC 751D1 and ATOC 751D2 OR ATOC 752D1 and ATOC 752D2.

1 credit from:

ATOC 751D1	(.5)	Seminar: Physical Meteorology
ATOC 751D2	(.5)	Seminar: Physical Meteorology
ATOC 752D1	(.5)	Atmospheric, Oceanic and Climate Dynamics
ATOC 752D2	(.5)	Atmospheric, Oceanic and Climate Dynamics

And 6 credits from the Department of Atmospheric and Oceanic Sciences, at the 500 or 600 level, as approved by the Graduate Program Director.

11.1.6 Doctor of Philosophy (Ph.D.) Atmospheric and Oceanic Sciences: Environment

This program is currently not offered.

The Ph.D. in Atmospheric and Oceanic Sciences; Environment is a research program operated in collaboration with the School of Environment. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (4 credits)

ATOC 700	(1)	Ph.D. Proposal Seminar
ATOC 701	(0)	Ph.D. Comprehensive (General)
ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability

Complementary Courses (13 credits)

Students are required to take ATOC 751D1 and ATOC 751D2 OR ATOC 752D1 and ATOC 752D2.

1 credit from:

ATOC 751D1	(.5)	Seminar: Physical Meteorology
ATOC 751D2	(.5)	Seminar: Physical Meteorology
ATOC 752D1	(.5)	Atmospheric, Oceanic and Climate Dynamics
ATOC 752D2	(.5)	Atmospheric, Oceanic and Climate Dynamics

6 credits from the Department of Atmospheric and Oceanic Sciences, at the 500 level or higher, as approved by the department Graduate Program Director.

3-6 credits from:

ENVR 610	(3)	Foundations of Environmental Policy
ENVR 614	(3)	Mobilizing Research for Sustainability

0-3 credits from:

ENVR 585	(3)	Readings in Environment 2
ENVR 630	(3)	Civilization and Environment
ENVR 680	(3)	Topics in Environment 4

or 3 credits at the 500 level or higher recommended by the Advisory Committee and approved by the Environment Option Committee.

11.2 Biology

11.2.1 Location

Department of Biology
Stewart Biological Sciences Building
1205 Dr. Penfield Avenue
Montreal QC H3A 1B1
Telephone: 514-398-5478
Fax: 514-398-5069
Email: ancil.gittens@mcgill.ca
Website: mcgill.ca/biology

11.2.2 About Biology

The M.Sc. and Ph.D. graduate training programs in the Department of Biology are focused on excellence in research across all scales of the biological world, from molecules to cells, from cells to organisms, and from organisms to ecosystems. Our research is highly interdisciplinary, and so are our trainees and faculty members. Our programs offer graduate trainees the opportunity to do cutting-edge research and develop their professional skills, including writing and communication, which are essential for careers inside and outside of academia. McGill Biology graduate students enjoy a rigorous training program with the goal of becoming successful research scientists. A graduate degree in Biology prepares students for a wide range of careers. Alumni have gone on to pursue careers in academia and beyond, including researchers in industry, and work as wildlife biologists, forensic technologists, and science policy advisors, to name a few.

Graduate students choose a project in one of the department's three main research focus areas:

- [Conservation, Ecology, Evolution and Behaviour](#)
- [Molecular, Cellular and Developmental Biology](#)
- [Neurobiology and Behaviour](#)

In addition to the regular M.Sc. and Ph.D. programs, the Biology Department offers specialized program options in Environment and Neotropical Environment (NEO) (see below).

Both the M.Sc. and Ph.D. are research-intensive degrees, and the emphasis in both programs is on developing the intellectual and technical skills necessary for independent research. The main component of both degrees is a thesis presenting the results of this work in the form of a student's original contribution to scientific knowledge. Formal coursework includes a two-course sequence on research and professional skills, and one to two topical courses, usually in the form of literature-based seminars. To complement their classroom and research training, students regularly attend seminar series and journal clubs, and present their own work annually in a formal seminar.

The Department of Biology is embedded in an outstanding and collaborative research environment with access to state-of-the-art infrastructure in the Stewart Biology Building and the Bellini Life Science Complex, as well as excellent field facilities in Canada and abroad. Affiliated centres and field stations include:

- [McGill University Phytotron](#)
- [Redpath Museum](#)
- [Integrated Quantitative Biology Initiative \(IQBI\)](#)
- [Advanced BioImaging Facility \(ABIF\)](#)
- [Gault Nature Reserve](#) at Mont St. Hilaire (Quebec)
- [Penfield Nature Conservancy](#) on Lake Memphrémagog (Quebec)
- [McGill Subarctic Research Station](#) at Schefferville (Quebec)
- [Bellairs Research Institute](#) (Barbados)
- [Smithsonian Tropical Research Institute \(STRI\)](#) (Panama)

The Department of Biology offers financial support to both Canadian and international students. Funding packages include a stipend to offset living expenses and a tuition and fees subsidy. For more information on graduate student funding in Biology, please visit [Biology > Graduate Studies > Current Graduate Students > Graduate Funding](#).

[section 11.2.4: Master of Science \(M.Sc.\) Biology \(Thesis\) \(45 credits\)](#)

The Master of Science in Biology is a research-focused program that encompasses a diverse range of topics in biology, from molecules and cells to organisms and ecosystems, including development, behaviour and evolution. Research themes include: (1) molecular, cellular and developmental biology, (2) conservation, ecology and evolution, and (3) neurobiology and behaviour. This program allows students considerable flexibility in their choice of research and coursework and encourages cross-disciplinary thinking.

Incoming graduate students will have a strong background in the biological sciences, often with specific strengths in their proposed area of study. To encourage interdisciplinary work, the program may also accept students with a high scholastic standing in fields other than biology (medicine, engineering, chemistry, physics, etc.). Alumni have gone on to pursue a wide range of careers in academia and beyond, including as researchers in industry, wildlife biologists, forensic technologists, or science policy advisors, to name a few.

[section 11.2.5: Master of Science \(M.Sc.\) Biology \(Thesis\): Environment \(45 credits\)](#)

This program is not currently offered.

The M.Sc. in Biology; [Environment option](#) is a research program offered in collaboration with the [Bieler School of Environment \(BSE\)](#). As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues. Students learn to explain and defend their research and thinking in a broader context and understand how knowledge is transferred into action with regard to the environment and sustainability.

[section 11.2.6: Master of Science \(M.Sc.\) Biology \(Thesis\): Neotropical Environment \(45 credits\)](#)

The McGill-Smithsonian Tropical Research Institute (STRI) [Neotropical Environment Option](#) is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. NEO favors interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America and NEO's core and complementary courses will be taught in Panama. NEO's educational approach seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

[section 11.2.7: Doctor of Philosophy \(Ph.D.\) Biology](#)

The Doctor of Philosophy in Biology is a research-focused program that encompasses a diverse range of topics in biology, from molecules and cells to organisms and ecosystems, including development, behaviour, and evolution. Research themes include: (1) molecular, cellular, and developmental biology; (2) conservation, ecology, and evolution; and (3) neurobiology and behaviour. This program allows students considerable flexibility in their choice of research and coursework and encourages cross-disciplinary thinking.

section 11.2.7: Doctor of Philosophy (Ph.D.) Biology

Incoming graduate students will have a strong background in the biological sciences, often with specific strengths in their proposed area of study. To encourage interdisciplinary work, the program may also accept students with a high scholastic standing in fields other than biology (medicine, engineering, chemistry, physics, etc.). Alumni have gone on to pursue a wide range of careers in academia and beyond, including as researchers in industry, wildlife biologists, forensic technologists, or science policy advisors, to name a few.

section 11.2.8: Doctor of Philosophy (Ph.D.) Biology: Environment

****This program is not currently offered.****

The Ph.D. in Biology - *Environment option* is coordinated by the *Bieler School of Environment (BSE)* in partnership with the Biology Department, among several other departments. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical, etc.) interact to define environment and sustainability issues. Students learn to explain and defend their research and thinking in a broader context and understand how knowledge is transferred into action with regard to the environment and sustainability.

section 11.2.9: Doctor of Philosophy (Ph.D.) Biology: Neotropical Environment

The McGill-STRI *Neotropical Environment Option (NEO)* is a research-based program in which students work under the supervision of researchers from McGill and/or the *Smithsonian Tropical Research Institute (STRI)*. Aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries, the NEO favors interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America, and the NEO's core and complementary courses will be taught in Panama.

11.2.3 Biology Admission Requirements and Application Procedures**11.2.3.1 Admission Requirements**

Admission is based on evaluation by the Graduate Training Committee and acceptance by a faculty member within the department who agrees to supervise and fund the applicant. Before applying to Graduate Studies in Biology, students should contact faculty members with whom they wish to study to see if they are accepting new students (see [Faculty Member Profiles](#)).

Prospective Biology graduate students will have a strong background in the biological sciences, often with specific strengths in their proposed area of study. To encourage interdisciplinary work, the program may also accept students with high scholastic standing in fields other than biology (medicine, engineering, chemistry, physics, etc.).

The minimum Cumulative Grade Point Average (CGPA) is 3.0/4.0, or a Grade Point Average (GPA) of 3.2/4.0 in the last two years of full-time studies. B.Sc. students who wish to apply directly to Ph.D.1 must have a minimum CGPA of 3.5/4.

The Test of English as a Foreign Language (*TOEFL*) is required of applicants to graduate studies whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized foreign institution where English is the language of instruction or from a recognized Canadian institution (anglophone or francophone). A score of 86 on the TOEFL Internet-based test (iBT) with each component score not less than 20, or 6.5 on *IELTS* is the minimum standard for admission.

11.2.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply. All applicants should consult [Biology > Graduate Studies > How to Apply](#) page of the Biology Department's website before completing the application form for departmental information on the application process, required documents, summaries of faculty research areas, and contact information.

See [University Regulations & Resources > Graduate > Graduate Admissions and Application Procedures > Application Procedures](#) for detailed application procedures.

11.2.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Biology Department and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit. All inquiries pertaining to admission procedures should be directed to the Graduate Admissions Coordinator, [Ancil Gittens](#).



Note: Applications for Summer term admission will not be considered.

11.2.4 Master of Science (M.Sc.) Biology (Thesis) (45 credits)

The Master of Science in Biology is a research-focused program that encompasses a diverse range of topics in biology, from molecules and cells to organisms and ecosystems, including development, behaviour and evolution. Research themes include: (1) molecular, cellular and developmental biology, (2) conservation, ecology and evolution, and (3) neurobiology and behaviour. This program allows students considerable flexibility in their choice of research and coursework and encourages cross-disciplinary thinking.

Required Courses (39 credits)

BIOL 697	(13)	Master's Thesis Research 1
BIOL 698	(13)	Master's Thesis Research 2
BIOL 699	(13)	Master's Thesis Research 3

Complementary Courses (6 credits)

3 credits from the following [choose BIOL 601 and either BIOL 602 or BIOL 603]:

BIOL 601	(1.5)	Introduction to Graduate Studies in Biology
BIOL 602	(1.5)	Molecular Biology Research and Professional Skills
BIOL 603	(1.5)	Organismal Biology Research and Professional Skills

*Or 3 credits at the 500 level or higher with the approval of the Graduate Program Director.

3 credits at the 500, 600, or 700 level in Biology or other departments, and approved by the Supervisory Committee.

11.2.5 Master of Science (M.Sc.) Biology (Thesis): Environment (45 credits)

This program is currently not offered.

The M.Sc. in Biology; Environment option is a research program offered in collaboration with the Bieler School of Environment. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues.

Thesis Courses (36 credits)

BIOL 690	(10)	Master's Thesis Research 4
BIOL 697	(13)	Master's Thesis Research 1
BIOL 698	(13)	Master's Thesis Research 2

Required Courses (3 credits)

ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability
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Complementary Courses (6 credits)

3-6 credits, one of the following courses:

ENVR 610	(3)	Foundations of Environmental Policy
ENVR 614	(3)	Mobilizing Research for Sustainability

0-3 credits chosen from:

ENVR 585	(3)	Readings in Environment 2
ENVR 630	(3)	Civilization and Environment
ENVR 680	(3)	Topics in Environment 4

or 3 credits at the 500 level or higher recommended by the Advisory Committee and approved by the Environment Option Committee.

11.2.6 Master of Science (M.Sc.) Biology (Thesis): Neotropical Environment (45 credits)

The McGill-STRI Neotropical Environment Option (NEO) is a research-based option for Masters students in the departments of Anthropology, Biology, Bioresource Engineering, Geography, Natural Resource Sciences, Plant Science, and Political Science at McGill University. NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. NEO favors interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America and NEO's core and complementary courses will be taught in Panama. NEO's educational approach seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

Whether applying to a Master or a PhD, students are expected to meet all the degree requirements of the department in which they are registered. In addition, NEO students will have to meet the specific requirements of the option.

Thesis Courses (36 credits)

BIOL 690	(10)	Master's Thesis Research 4
BIOL 697	(13)	Master's Thesis Research 1
BIOL 698	(13)	Master's Thesis Research 2

Required Courses (6 credits)

BIOL 640	(3)	Tropical Biology and Conservation
ENVR 610	(3)	Foundations of Environmental Policy

Elective Courses (3 credits)

3 credits, at the 500 level or higher, on environmental issues to be chosen in consultation with and approved by the student's supervisor AND the Neotropical Environment Options Director.

11.2.7 Doctor of Philosophy (Ph.D.) Biology

The Doctor of Philosophy in Biology is a research-focused program that encompasses a diverse range of topics in biology, from molecules and cells to organisms and ecosystems, including development, behaviour and evolution. Research themes include: (1) molecular, cellular and developmental biology, (2) conservation, ecology and evolution, and (3) neurobiology and behaviour. This program allows students considerable flexibility in their choice of research and coursework and encourages cross-disciplinary thinking.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (6 credits)

BIOL 700	(0)	Doctoral Qualifying Examination
BIOL 702	(6)	Ph.D. Seminar

Complementary Courses (9 credits)

3 credits from the following [choose BIOL 601 and either BIOL 602 or BIOL 603]:

BIOL 601	(1.5)	Introduction to Graduate Studies in Biology
BIOL 602	(1.5)	Molecular Biology Research and Professional Skills
BIOL 603	(1.5)	Organismal Biology Research and Professional Skills

*Or 3 credits at the 500 level or higher with the approval of the Graduate Program Director.

6 credits at the 500, 600, or 700 level in Biology or other departments, and approved by the Supervisory Committee

11.2.8 Doctor of Philosophy (Ph.D.) Biology: Environment

This program is currently not offered.

The Ph.D. in Biology- Environment Option is a research program offered with the Bieler School of Environment and other academic units at McGill. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (9 credits)

BIOL 700	(0)	Doctoral Qualifying Examination
BIOL 702	(6)	Ph.D. Seminar
ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability

Complementary Courses (6 credits)

3-6 credits chosen from:

ENVR 610	(3)	Foundations of Environmental Policy
ENVR 614	(3)	Mobilizing Research for Sustainability

0-3 credits chosen from:

ENVR 585	(3)	Readings in Environment 2
ENVR 630	(3)	Civilization and Environment
ENVR 680	(3)	Topics in Environment 4

or 3 credits at the 500 level or higher recommended by the Advisory Committee and approved by the Environment Option Committee.

11.2.9 Doctor of Philosophy (Ph.D.) Biology: Neotropical Environment

Participation in the MSE-Panama Symposium presentation in Montreal is also required.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (12 credits)

BIOL 640	(3)	Tropical Biology and Conservation
BIOL 700	(0)	Doctoral Qualifying Examination
BIOL 702	(6)	Ph.D. Seminar
ENVR 610	(3)	Foundations of Environmental Policy

Elective Courses (3 credits)

3 credits, at the 500 level or higher, on environmental issues to be chosen in consultation with and approved by the student's supervisor AND the Neotropical Environment Options Director.

11.3 Chemistry

11.3.1 Location

Department of Chemistry
Otto Maass Chemistry Building
801 Sherbrooke Street West
Montreal QC H3A 0B8
Canada
Telephone: 514-398-6999
Fax: 514-398-3797
Email: graduate.chemistry@mcgill.ca
Website: mcgill.ca/chemistry

11.3.2 About Chemistry

Research in Chemistry

Members of the Department are organized into various research themes. Some of the current research interests are listed below, and are presented in much more detail on the [Departmental website](#).

Analytical/Environmental

The Analytical/Environmental Thematic Research Group at McGill is involved in a wide range of exciting fundamental and applied research with focus on: state-of-the-art instrumental development in spectroscopy; imaging; chemometric and analytical bio-spectroscopy; artificial intelligence; ultra trace sampling; thermochemical, box, and cloud modelling; and state-of-the-art atmospheric kinetics and photochemistry; as well as the development and application of state-of-the-art numerical models of the chemistry of the regional and global atmosphere. Our collective research has direct implications in fields such as materials, environmental, and biomedical chemistry.

Chemical Biology

The Chemical Biology Thematic Research Group is engaged in a diverse range of research topics, which span structural biology, enzymology, nucleic acid research, signalling pathways, single-molecule biophysics, and biophysical chemistry of living tissues. Among the themes that unite the research being performed in this group is the attempt to learn new chemistry and physics from biological systems.

We have projects relating to pharmaceutically relevant enzymes such as those involved in drug metabolism and antibiotic resistance; development of therapeutic agents in the control of inflammation, cancer and viral infections; the chemical biology of NO; quantification of bioenergetic markers of metabolism; self-assembly mechanisms of the HIV-1 virion capsid; liposome microarray systems to address membrane protein dynamics and recognition; studies on reactive oxygen species translocation across the aqueous/lipid membrane interface; RNAi/antisense technologies; dynamic combinatorial chemistry; protein dynamics and function; mechanistic aspects involved in cellular adhesion and transport in membrane and zeolite channels; and cutting-edge microscopes used to examine transport, motility, and reactivity in cells.

Chemical Physics

The research interests of the members of the Chemical Physics Thematic Research Group are diverse, with groups focusing on high-end laser and NMR spectroscopies, kinetics and modelling of atmospheric chemical reactions, experimental and theoretical biophysical chemistry, polymers at interfaces, and statistical and quantum mechanics. In the field of biophysical chemistry, single molecule spectroscopy is being used to probe enzyme function as well as DNA recombination and repair. Our recent advances in image correlation spectroscopic techniques now allow researchers to precisely follow the macromolecular dynamics in living cells. In a similar vein, breakthrough ultra-fast electron diffraction experiments have opened the window to real-time observation of the making and breaking of chemical bonds. State-of-the-art multi-pulse femtosecond spectroscopy experiments are being applied to interesting and technologically important new materials such as photonic crystals and quantum dot superlattices. A molecular-level picture of polymer dynamics and structure at surfaces and interfaces is being developed through theoretical modelling, high-field solids NMR spectroscopy, electron microscopy, and other surface characterization methods. In the area of atmospheric chemistry, the chemical transformation of the atmosphere is being modelled both experimentally and theoretically to understand how these processes are currently affecting and driving climate change. Finally, we have basic theory projects relating to the experimental work just described, as well as in transport and structure in complex colloidal or zeolite systems, protein dynamics, and fundamental issues in quantum and statistical mechanics.

Materials Chemistry

The chemistry of materials is a rapidly evolving domain of research. Materials chemistry seeks to understand how composition, reactivity, and structure are related to function from a molecular perspective. The functionality of materials is expressed in a variety of areas including photonics, micro- and nano-electronics, biosystems, nanotechnology, drug delivery, catalysis, polymer science, molecular biology, and chemical and biological sensing. Activities of the Materials Chemistry Thematic Research Group are often broadly interdisciplinary. University-wide synergies among members of this group have led to the creation of the [McGill Institute for Advanced Materials](#) (MIAM) and the [McGill Nanotools Facility](#). The latter comprises state-of-the-art **micro/nanofabrication**, atomic manipulation and high-performance computing facilities. MIAM and members of the Chemistry Department have established research links to the [Quebec Centre for Advanced Materials](#), the Centre for Biorecognition and Biosensors, the [Centre for the Physics of Materials](#), and the [Centre for Bone and Periodontal Research](#). Synthetic approaches to new materials include research in dendrimers, polynucleic acid architectures, polymers that conduct electrons or light, and biopolymers. Polymer and colloid science figure prominently as does research and applications of the chemistry and

physical properties of nanostructures. There is significant activity in understanding directed molecular assembly at interfaces and in the application of sophisticated spectroscopic tools to explore them.

Green and Sustainable Chemistry

Green Chemistry is a concept developed in the 1990s by pioneers Paul Anastas and John Warner. It proposes a vision for chemistry in which its products and processes are designed so as to not harm our health or our environment. The sister concept of sustainable chemistry was developed in parallel, with the idea to add the notion of ensuring the renewability of resources. Green and Sustainable Chemistry is now a strategic, key area of research development, with its own vibrant community, dedicated journals and international research centres. It is also identified as a key strategic area for McGill University, as the Department of Chemistry has pioneered the teaching of the topic since 1999. Typically Green and Sustainable Chemistry covers research using tools in organic, inorganic, physical, and biological chemistries with the goal to develop concepts and solutions to grand challenges in sustainability. This field is directly harnessing the powers of chemistry as a toolbox to enable the Sustainable Development Goals, set by the United Nations in 2015.

Synthesis/Catalysis

The Synthesis/Catalysis Research Activity Group is a collective that develops state-of-art catalysts, synthetic methodologies, reaction mechanisms, and synthetic routes for organic chemicals, natural products, and materials. The collective's major research activities at McGill include: (1) Development of novel catalysts and catalytic reactions for highly efficient organic synthesis; Green Chemistry. This includes the study and discovery of novel transition-metal catalysts, biological catalysts, nano- and dendrimer-based catalysts for synthetic purposes; new chemical reactivity such as C-H activation, asymmetric catalysis and theory, multi-component reactions and combinatorial chemistry; innovative chemistry in alternative solvents such as water, sub-critical water, ionic liquids, and liquid CO₂; photocatalytic reactions, reaction mechanisms, and physical organic chemistry; and computational chemistry. (2) Synthesis of biological compounds, organic materials, and natural products. Focus areas are total synthesis of natural products, synthesis of DNA and RNA analogues; synthesis of antiviral and anticancer nucleoside analogues, synthesis of amino acid and peptides; synthesis and study of carbohydrate derivatives; design, synthesis, and study of specialty organic chemical and materials.

section 11.3.4: Master of Science (M.Sc.) Chemistry (Thesis) (45 credits)

Please consult the Department for more information about this program.

section 11.3.5: Doctor of Philosophy (Ph.D.) Chemistry

Please consult the Department for more information about this program.

11.3.3 Chemistry Admission Requirements and Application Procedures

11.3.3.1 Admission Requirements

The minimum academic standard for admission to the M.Sc. and Ph.D degree programs is normally a high second class standing (cGPA > 3.00). Students applying from B.Sc. to Ph.D (without completing a M.Sc.) must have a cGPA of at least 3.5. . Applicants from other institutions should have an academic background equivalent to that of a McGill graduate in the Chemistry Honours/Major programs or related fields such as Physics or Biochemistry.

11.3.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources](#) > [Graduate](#) > [Graduate Admissions and Application Procedures](#) > : [Application Procedures](#) for detailed application procedures.

11.3.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Chemistry and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.



Note: Applications for Summer term admission will not be considered.

All inquiries concerning graduate work in the Department should be addressed to the Director of Graduate Studies, Department of Chemistry.

11.3.4 Master of Science (M.Sc.) Chemistry (Thesis) (45 credits)

Thesis Courses

(24-31 credits)

At least 24 credits chosen from the following:

CHEM 691 (3) M.Sc. Thesis Research 1

CHEM 692	(6)	M.Sc. Thesis Research 2
CHEM 693	(9)	M.Sc. Thesis Research 3
CHEM 694	(12)	M.Sc. Thesis Research 4
CHEM 695	(15)	M.Sc. Thesis Research 5

Required Courses

(5 credits)

CHEM 650	(1)	Seminars in Chemistry 1
CHEM 651	(1)	Seminars in Chemistry 2
CHEM 688	(3)	Progress Assessment 1

Complementary Courses

(9-16 credits)

Students will normally take 9-16 credits of CHEM (or approved) courses at the 500 or 600 level.

11.3.5 Doctor of Philosophy (Ph.D.) Chemistry**Thesis**

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

CHEM 650	(1)	Seminars in Chemistry 1
CHEM 651	(1)	Seminars in Chemistry 2
CHEM 688	(3)	Progress Assessment 1
CHEM 701	(0)	Comprehensive Examination
CHEM 702	(0)	Progress Assessment 2

Complementary Courses

Students entering the program with an M.Sc. degree will normally take three (3) graduate-level courses. Students entering without an M.Sc. degree will normally take five (5) graduate-level courses.

Students may be required to take advanced undergraduate courses if background deficient.

11.4 Computer Science**11.4.1 Location**

School of Computer Science
McConnell Engineering, Room 318
3480 University Street
Montreal QC H3A 0E9
Canada
Telephone: 514-398-7071
Fax: 514-398-3883
Email: grad.cs@mcgill.ca
Website: cs.mcgill.ca

11.4.2 About Computer Science

The School of Computer Science is one of the leading teaching and research centres for computer science in Canada and offers several graduate programs. The Master of Science (M.Sc.) Thesis and Doctor of Philosophy (Ph.D.) are research-centric programs preparing students for research careers in academia or industry. They both offer an option in bioinformatics. The Master of Science (M.Sc.) Non-Thesis program is targeted at students looking for careers in applied research and development in industry. In all programs, students will be exposed to cutting-edge computer science developments. Research in the School covers a broad range of areas, including:

- **Theory:** algorithms, combinatorial optimization, computational geometry, cryptography, graph theory, logic and computation, programming languages, quantum computing, theory of computation, and scientific computing;
- **Systems:** compilers, computer games, distributed systems, storage systems, database systems, embedded and real-time systems, systems for data science, networks, software engineering, and model engineering;
- **Applications:** bioinformatics, many areas of artificial intelligence and machine learning, bioinformatics, robotics, computer animation, graphics, vision, and Human Factors in Computing.

More information can be found on the School's website.

section 11.4.4: Master of Science (M.Sc.) Computer Science (Thesis) (45 credits)

This program is designed for students with a strong interest in research in computer science who hold at least the equivalent of an undergraduate minor in CS. This program combines a strong course component with a research thesis. It is the usual (but not mandatory) entry point for students who wish to do a Ph.D., but is also the program of choice for students who want to find challenging and exciting jobs after their master's.

section 11.4.5: Master of Science (M.Sc.) Computer Science (Thesis): Bioinformatics (45 credits)

Bioinformatics research lies at the intersection of biological/medical sciences and mathematics/computer science/engineering. The intention of the Bioinformatics option is to train students to become researchers in this interdisciplinary field. This includes the development of strategies for experimental design, the construction of tools to analyze datasets, the application of modelling techniques, the creation of tools for manipulating bioinformatics data, the integration of biological databases, and the use of algorithms and statistics.

section 11.4.6: Master of Science (M.Sc.) Computer Science (Non-Thesis) (45 credits)

This program is designed for students who want to obtain broad knowledge of advanced topics in computer science but without the requirement of a thesis. It offers an excellent preparation for the job market, but is not recommended for students interested in eventually pursuing a Ph.D.

section 11.4.7: Doctor of Philosophy (Ph.D.) Computer Science

The Ph.D. program trains students to become strong, independent researchers in the field of their choice. Our graduates take challenging positions in industry or take academic positions at universities and research labs. In order to apply to the Ph.D. program, applicants should normally hold a master's degree in Computer Science or a closely related area, from a well-recognized university, but exceptional students can be admitted to the Ph.D. program directly without a master's degree.

section 11.4.8: Doctor of Philosophy (Ph.D.) Computer Science: Bioinformatics

Bioinformatics research lies at the intersection of biological/medical sciences and mathematics/computer science/engineering. The intention of the Bioinformatics option is to train students to become researchers in this interdisciplinary field. This includes the development of strategies for experimental design, the construction of tools to analyze datasets, the application of modelling techniques, the creation of tools for manipulating bioinformatics data, the integration of biological databases, and the use of algorithms and statistics.

11.4.3 Computer Science Admission Requirements and Application Procedures

11.4.3.1 Admission Requirements

Master of Science (M.Sc.)

The minimum requirement for admission is a bachelor's degree (cumulative grade point average (CGPA) of 3.2 out of 4.0 or better, or equivalent) with the coursework in Computer Science and Mathematics as listed on our [School's website](#). The website supplements the information in this publication, and should be consulted by all graduate students.

Ph.D.

In order to apply to the Ph.D. program, applicants should hold an M.Sc. degree in Computer Science or a closely related area from a well-recognized university. Students who hold a B.Sc. degree in Computer Science but have an exceptionally strong academic record may be admitted directly to the Ph.D. program, but they must initially apply to the M.Sc. program. Students who are in the M.Sc. program have the option to be fast-tracked into the Ph.D. program at the end of their first academic year, contingent on excellent performance as judged by the Ph.D. committee.

11.4.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources](#) > [Graduate](#) > [Graduate Admissions and Application Procedures](#) > : [Application Procedures](#) for detailed application procedures.

11.4.3.2.1 Additional Requirements

The items and clarifications below are additional requirements set by this department:

- Curriculum Vitae – required for both M.Sc. and Ph.D. programs
- Statement of Purpose – required for both M.Sc. and Ph.D. programs
- [Graduate Record Examination](#) (GRE General Test) is optional for all programs.

For further details about each required document, consult the [School of Computer Science's website](#).

11.4.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the School of Computer Science and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

For further details on our admission requirements, please visit our website at cs.mcgill.ca/graduate/future/overview/.



Scholarship Deadlines: December 15 for applicants who wish to be considered for scholarship awards; otherwise, December 15 for International and February 15 for Canadian students for admission to the Fall term.

11.4.4 Master of Science (M.Sc.) Computer Science (Thesis) (45 credits)**Thesis Courses (29 credits)**

29 credits selected from:

COMP 691	(3)	Thesis Research 1
COMP 696	(3)	Thesis Research 2
COMP 697	(4)	Thesis Research 3
COMP 698	(10)	Thesis Research 4
COMP 699	(12)	Thesis Research 5

Required Courses (2 credits)

COMP 602	(1)	Computer Science Seminar 1
COMP 603	(1)	Computer Science Seminar 2

Complementary Courses (14 credits)

14 credits of COMP (or approved) courses at the 500-, 600-, or 700-level.

Complementary courses must satisfy a Computer Science breadth requirement, with at least one course in two of the Theory, Systems, and Application areas. Areas covered by specific courses are determined by the Computer Science graduate program director.

Category A: Theory

COMP 523	(3)	Language-based Security
COMP 525	(3)	Formal Verification
COMP 527	(3)	Logic and Computation
COMP 531	(3)	Advanced Theory of Computation
COMP 540	(4)	Matrix Computations

COMP 547	(4)	Cryptography and Data Security
COMP 552	(4)	Combinatorial Optimization
COMP 553	(4)	Algorithmic Game Theory
COMP 554	(4)	Approximation Algorithms
COMP 562	(4)	Theory of Machine Learning
COMP 566	(3)	Discrete Optimization 1
COMP 567	(3)	Discrete Optimization 2
COMP 610	(4)	Information Structures 1
COMP 611	(4)	Mathematical Tools for Computer Science
COMP 642	(4)	Numerical Estimation Methods
COMP 647	(4)	Advanced Cryptography
COMP 649	(4)	Quantum Cryptography
COMP 690	(4)	Probabilistic Analysis of Algorithms
COMP 760	(4)	Advanced Topics Theory 1
COMP 761	(4)	Advanced Topics Theory 2

Category B: Systems

COMP 512	(4)	Distributed Systems
COMP 520	(4)	Compiler Design
COMP 529	(4)	Software Architecture
COMP 533	(3)	Model-Driven Software Development
COMP 535	(4)	Computer Networks 1
COMP 555	(4)	Information Privacy
COMP 614	(4)	Distributed Data Management
COMP 621	(4)	Program Analysis and Transformations
COMP 655	(4)	Distributed Simulation
COMP 667	(4)	Software Fault Tolerance
COMP 762	(4)	Advanced Topics Programming 1
COMP 763	(4)	Advanced Topics Programming 2
COMP 764	(4)	Advanced Topics Systems 1
COMP 765	(4)	Advanced Topics Systems 2

Category C: Applications

COMP 514	(4)	Applied Robotics
COMP 521	(4)	Modern Computer Games
COMP 546	(4)	Computational Perception
COMP 549	(3)	Brain-Inspired Artificial Intelligence
COMP 550	(3)	Natural Language Processing
COMP 551	(4)	Applied Machine Learning
COMP 557	(4)	Fundamentals of Computer Graphics
COMP 558	(4)	Fundamentals of Computer Vision
COMP 559	(4)	Fundamentals of Computer Animation

COMP 561	(4)	Computational Biology Methods and Research
COMP 564	(3)	Advanced Computational Biology Methods and Research
COMP 565	(4)	Machine Learning in Genomics and Healthcare
COMP 579	(4)	Reinforcement Learning
COMP 585	(4)	Intelligent Software Systems
COMP 588	(4)	Probabilistic Graphical Models
COMP 618	(3)	Bioinformatics: Functional Genomics
COMP 652	(4)	Machine Learning
COMP 654	(4)	Graph Representation Learning
COMP 680	(4)	Mining Biological Sequences
COMP 766	(4)	Advanced Topics Applications 1
COMP 767	(4)	Advanced Topics: Applications 2

11.4.5 Master of Science (M.Sc.) Computer Science (Thesis): Bioinformatics (45 credits)

Thesis Courses (24 credits)

22 credits selected from:

COMP 691	(3)	Thesis Research 1
COMP 696	(3)	Thesis Research 2
COMP 697	(4)	Thesis Research 3
COMP 698	(10)	Thesis Research 4
COMP 699	(12)	Thesis Research 5

Required Courses (3 credits)

COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar

Required Course

COMP 601	(2)	Thesis Literature Review
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Complementary Courses (18 credits)

6 credits chosen from the following courses:

BINF 621	(3)	Bioinformatics: Molecular Biology
BMDE 652	(3)	Bioinformatics: Proteomics
BTEC 555	(3)	Structural Bioinformatics
COMP 618	(3)	Bioinformatics: Functional Genomics
PHGY 603	(3)	Systems Biology and Biophysics

12 credits of 4-credit courses chosen from 500-, 600-, or 700-level Computer Science courses in consultation with the candidate's supervisor.

Note: Students with an appropriate background can substitute 4 credits by COMP 697.

11.4.6 Master of Science (M.Sc.) Computer Science (Non-Thesis) (45 credits)

The M.Sc. in Computer Science; Non-Thesis offers an in depth study of advanced topics in computer science, mainly through course-based work. The program includes the possibility to complete a short research project or to conduct an internship for practical experience.

Required Courses (2 credits)

COMP 602	(1)	Computer Science Seminar 1
COMP 603	(1)	Computer Science Seminar 2

Complementary Courses (43 credits)

Choose either: project courses and course work; or internship and course work; or all course work.

Research Project

0-15 credits from:

COMP 693	(3)	Research Project 1
COMP 694	(6)	Research Project 2
COMP 695	(6)	Research Project 3

Internship

0-15 credits from:

COMP 689	(15)	Internship in Computer Science
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Course Work

28-43 credits of lecture- or seminar-based COMP courses at the 500 level or higher.

The following courses outside of the School of Computer Science may count towards the complementary courses, subject to approval by an academic adviser.

ECSE 507	(3)	Optimization and Optimal Control
ECSE 508	(3)	Multi-Agent Systems
ECSE 516	(3)	Nonlinear and Hybrid Control Systems
ECSE 518	(3)	Telecommunication Network Analysis
ECSE 523	(3)	Speech Communications
ECSE 526	(3)	Artificial Intelligence
ECSE 539	(4)	Advanced Software Language Engineering
ECSE 542	(4)	Human Computer Interaction
ECSE 546	(4)	Advanced Image Synthesis
ECSE 551	(4)	Machine Learning for Engineers
ECSE 552	(4)	Deep Learning
ECSE 556	(4)	Machine Learning in Network Biology
ECSE 570	(3)	Automatic Speech Recognition
ECSE 626	(4)	Statistical Computer Vision
MATH 523	(4)	Generalized Linear Models
MATH 524	(4)	Nonparametric Statistics
MATH 533	(4)	Regression and Analysis of Variance
MATH 559	(4)	Bayesian Theory and Methods
MATH 563	(4)	Honours Convex Optimization

MATH 578	(4)	Numerical Analysis 1
MATH 680	(4)	Computation Intensive Statistics
MECH 513	(3)	Control Systems

11.4.7 Doctor of Philosophy (Ph.D.) Computer Science

Required coursework: Students must take eight graduate courses, of which at least five are computer science courses. These courses should be chosen by the student in consultation with the supervisor (or co-supervisor) and the Progress Committee.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

COMP 700	(0)	Ph.D. Comprehensive Examination
COMP 701	(3)	Thesis Proposal and Area Examination

Complementary Courses

18-24 credits selected from:

Category A: Theory and Applications

COMP 523	(3)	Language-based Security
COMP 525	(3)	Formal Verification
COMP 531	(3)	Advanced Theory of Computation
COMP 540	(4)	Matrix Computations
COMP 547	(4)	Cryptography and Data Security
COMP 549	(3)	Brain-Inspired Artificial Intelligence
COMP 552	(4)	Combinatorial Optimization
COMP 554	(4)	Approximation Algorithms
COMP 561	(4)	Computational Biology Methods and Research
COMP 562	(4)	Theory of Machine Learning
COMP 564	(3)	Advanced Computational Biology Methods and Research
COMP 565	(4)	Machine Learning in Genomics and Healthcare
COMP 566	(3)	Discrete Optimization 1
COMP 567	(3)	Discrete Optimization 2
COMP 588	(4)	Probabilistic Graphical Models
COMP 598	(3)	Topics in Computer Science 1
COMP 599	(4)	Topics in Computer Science 2
COMP 610	(4)	Information Structures 1
COMP 611	(4)	Mathematical Tools for Computer Science
COMP 618	(3)	Bioinformatics: Functional Genomics
COMP 642	(4)	Numerical Estimation Methods
COMP 647	(4)	Advanced Cryptography
COMP 649	(4)	Quantum Cryptography

COMP 654	(4)	Graph Representation Learning
COMP 680	(4)	Mining Biological Sequences
COMP 690	(4)	Probabilistic Analysis of Algorithms
COMP 760	(4)	Advanced Topics Theory 1
COMP 761	(4)	Advanced Topics Theory 2

Category B: Systems and Applications

COMP 512	(4)	Distributed Systems
COMP 514	(4)	Applied Robotics
COMP 520	(4)	Compiler Design
COMP 521	(4)	Modern Computer Games
COMP 529	(4)	Software Architecture
COMP 533	(3)	Model-Driven Software Development
COMP 535	(4)	Computer Networks 1
COMP 546	(4)	Computational Perception
COMP 555	(4)	Information Privacy
COMP 557	(4)	Fundamentals of Computer Graphics
COMP 558	(4)	Fundamentals of Computer Vision
COMP 585	(4)	Intelligent Software Systems
COMP 598	(3)	Topics in Computer Science 1
COMP 599	(4)	Topics in Computer Science 2
COMP 614	(4)	Distributed Data Management
COMP 621	(4)	Program Analysis and Transformations
COMP 652	(4)	Machine Learning
COMP 655	(4)	Distributed Simulation
COMP 667	(4)	Software Fault Tolerance
COMP 762	(4)	Advanced Topics Programming 1
COMP 763	(4)	Advanced Topics Programming 2
COMP 764	(4)	Advanced Topics Systems 1
COMP 765	(4)	Advanced Topics Systems 2
COMP 766	(4)	Advanced Topics Applications 1
COMP 767	(4)	Advanced Topics: Applications 2

Note: Each year the Ph.D. Committee will determine which category COMP 598 and COMP 599 belong to according to the subjects taught in those courses.

11.4.8 Doctor of Philosophy (Ph.D.) Computer Science: Bioinformatics

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

COMP 616D1	(1.5)	Bioinformatics Seminar
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COMP 616D2	(1.5)	Bioinformatics Seminar
COMP 700	(0)	Ph.D. Comprehensive Examination
COMP 701	(3)	Thesis Proposal and Area Examination

Complementary Courses

Two courses chosen from the following:

BINF 621	(3)	Bioinformatics: Molecular Biology
BMDE 652	(3)	Bioinformatics: Proteomics
BTEC 555	(3)	Structural Bioinformatics
COMP 618	(3)	Bioinformatics: Functional Genomics
PHGY 603	(3)	Systems Biology and Biophysics

Additional courses at the 500, 600, or 700 level may be required at the discretion of the candidate's supervisory committee. Students who have completed the M.Sc.-level option in Bioinformatics must complete 6 credits of complementary courses not taken in the master's program.

11.5 Earth and Planetary Sciences

11.5.1 Location

Department of Earth and Planetary Sciences
Frank Dawson Adams Building
3450 University Street
Montreal QC H3A 0E8
Telephone: 514-398-6767
Email: grad.eps@mcgill.ca
Website: mcgill.ca/eps

11.5.2 About Earth and Planetary Sciences

The Department of Earth and Planetary Sciences offers both **M.Sc.** and **Ph.D.** degree programs. Graduate programs are based on research, although some courses are required to build the backgrounds of students. Research in the Department is wide-ranging, and includes:

- the geochemistry of the mantle;
- the nature of processes concentrating metals in hydrothermal mineral deposits;
- the controls of viscosity in magmas and the mechanisms of volcanic eruption;
- the fate of carbon and trace metals in marine sediments;
- the nature of changes in atmospheric and oceanic chemistry during Earth's history;
- earthquakes and fault mechanisms;
- geomicrobiology;
- the movement of water and nutrients within complex ecohydrological systems;
- wetland hydrogeology;
- interactions between the cryosphere, solid Earth, and climate systems;
- global human processes and their relationship to planetary boundaries.

There is a very substantial interdisciplinary basis to much of the research.

Facilities in the Department include low-temperature and pressure to high-temperature and pressure experimental laboratories, a stable-isotope mass spectrometer, laser-ablation ICP-MS, and electron microprobe, as well as atomic absorption spectrometers. Our students also make substantial use of other facilities at McGill and at nearby *Université du Québec à Montréal*.

Financial assistance is available in the form of teaching assistantships, graduate student stipends, and scholarships.

Areas of Research :

Aquatic Geochemistry

Application of chemical thermodynamics, kinetics, and surface chemistry to the characterization of mineral–solution interactions in aquatic environments; carbonate geochemistry; early diagenesis of marine and coastal sediments; and trace metal and environmental geochemistry in freshwater and marine systems.

Biogeochemistry

Response of the marine ecosystem to climate change and anthropogenic stresses through observations of the modern ocean, and experimental and numerical simulations of ocean biogeochemistry. Reconstructions of past climate change using sediments from lacustrine, coastal, and marine sediments. The processes controlling carbon cycling in freshwater environments, including the burial of organic matter in sediments and the production of greenhouse gases through microbial respiration. Development of new isotopic methods for tracing carbon-cycle and hydrological change in the past and present. Investigating the dynamical relationships that link climate, biogeochemical cycles, ecosystems, and humans using a combination of large datasets, simple theory, and numerical Earth system models to identify novel processes and quantitative relationships.

Economic Geology

Studies of the genesis of hydrothermal mineral deposits through a combination of field-based, experimental, and theoretical methods. Research focuses on the understanding of physico-chemical controls of mineralization, through geological mapping of deposits; experimental studies of metal solubility and speciation in hydrothermal systems; simulations of hydrothermal alteration; and theoretical studies designed to estimate conditions of alteration and ore formation. Trace-element chemistry of minerals as quantitative probes of the compositions of ore-forming fluids.

Exoplanet Climate

Using telescopes on the ground and in space to explore the surfaces and atmospheres of the diverse planets outside the Solar System: How much incident stellar flux do planets absorb? How do they move this energy through atmospheric and oceanic circulation? Which planets enjoy habitable surface conditions? Do any of them exhibit atmospheric biosignatures?

Geobiology

Understanding the role of microorganisms in biogeochemical cycles; cultivation of environmental microorganisms; applying molecular and isotopic tools to characterize microbial activity in present and past environments.

Geophysics and Climate

Applying physics to study the interactions between the solid Earth, ice, ocean, and climate systems; numerical modelling, analysis, and interpretation of paleo and modern sea-level changes; solid earth deformation and glacial isostatic adjustment; and ice in the Earth and climate systems.

Hydrogeology

Studies of pore-water flow in northern peatlands; heat transport; heat as a tracer of natural systems; groundwater modelling; coupled numerical models of pore water flow and heat transport with freeze/thaw processes; and the impact of melting tropical glaciers on water resources.

Hydrology and Ecohydrology

Studies of the storage, release, and transport of water, nutrients, and other contaminants in watersheds; combination of field, laboratory, big data science and modelling approaches; use of a complex-systems lens to identify the resistance and resilience of watersheds to climate and environmental change; implications for water management and policy in forested, agricultural, and mixed-used watersheds.

Igneous Petrology

Experimental studies of the structure, thermodynamics, and transport properties (diffusion and viscosity) of silicate melts and applications to igneous petrogenesis. The nature of the Earth's upper mantle and the processes within it which give rise to basaltic volcanism on both the Earth and the other terrestrial planets. Applications of laser ablation ICPMS; petrology, geochemistry, and tectonics of the Appalachian lithosphere.

Integrated Earth System Dynamics

Global data analysis and modelling; approaches that cut across traditional disciplinary boundaries; integration of human and natural systems; interactions between macroecology, biogeochemistry, and climate change; Earth System Economics.

Isotopic Geochemistry and Sedimentary Geology

Sedimentology, stratigraphy, and isotope geochemistry as guides to reconstructing ancient environments. Reconstruction of Proterozoic paleogeographies and the origin and evolution of Proterozoic sedimentary basins. Documenting and interpreting paleoenvironmental change during the Proterozoic. Relationships between tectonics (i.e., supercontinental break-up and assembly), seawater chemistry and ocean redox, and climate change. Calibrating the diversification of early eukaryotes and their impact on global biogeochemical cycles.

Mineralogy

Chemistry and crystallography of carbonate and a variety of rock-forming and biogenic minerals; experimental investigations of the effect of environmental factors (e.g., solution composition and temperature) on the morphology and composition of carbonate and phosphate minerals.

Seismology

Subduction earthquake nucleation and rupture propagation processes; physical mechanism of aseismic deformation transients, deep non-volcanic tremors, dynamic and static stress triggering of low-frequency earthquakes, and transients; pore-fluid pressure coupling with frictional strength and slip.

Tectonics and Structural Geology

Digital field mapping, microstructural characterization, and mineralogical analyses of deformation structure kinematics, geometry, and deformation processes; archaic orogenic processes; structural controls on ore deposit genesis; fluid flow in faults, granular flow in faults, and catastrophic structural/geochemical events in faults; earthquake mechanics and processes recorded in rocks; brittle-ductile transition structures and rheology.

Volcanology

Petrology and geochemistry of intermediate and felsic magmas; understanding physical processes and forecasting eruptions at active subduction-zone volcanoes; geochemistry of volcanic gases, their use for eruption prediction, and their impact on the atmosphere.

section 11.5.4: Master of Science (M.Sc.) Earth and Planetary Sciences (Thesis) (45 credits)

The nature of graduate research in the Department of Earth and Planetary Sciences is highly variable. As a result, students may enter the graduate program with backgrounds in earth sciences, chemistry, or physics, depending on their research interests and the supervisor with whom they wish to work. Students pursuing an M.Sc. are required to take four courses, but their major project is an M.Sc. thesis that typically results in a journal publication. Research for the thesis typically begins in the first year of residence and is completed, together with the written results, in the second year of residence.

Students graduating from the program typically proceed to a Ph.D. or work in the mineral exploration or petroleum industries. Excellent students admitted into the M.Sc. program can be fast-tracked from the M.Sc. into the Ph.D. program at the end of the first year if suitable progress has been demonstrated. Such students are required to take a minimum of 18 credits of coursework in total, and a comprehensive oral examination before the end of 18 months in the Ph.D. program.

section 11.5.5: Doctor of Philosophy (Ph.D.) Earth and Planetary Sciences

The nature of graduate research in the Department of Earth and Planetary Sciences is highly variable. As a result, students may enter the graduate program with backgrounds in earth sciences, chemistry, or physics, depending on their research interests and the supervisor with whom they wish to work. Ph.D. students typically enter with an M.Sc., in which case they are required by our regulations to take only two courses, although a supervisor may require more, depending on the suitability of the student's background. In addition to courses, Ph.D. students commence work on the thesis research project, including preparation for an oral examination on their research proposal before the end of 18 months from starting the program. Conduct of the research and preparation of the results for thesis and publication typically takes three additional years. Students entering the Ph.D. program without an M.Sc. are required to take a full year of courses before embarking on the processes described above.

Students graduating from our Ph.D. program pursue careers in universities and government-funded research institutes, and in the mineral-exploration and petroleum industries.

11.5.3 Earth and Planetary Sciences Admission Requirements and Application Procedures

11.5.3.1 Admission Requirements

Applicants should have an academic background equivalent to that of a McGill graduate in the Honours or Major programs in geology, geophysics, chemistry, biology, physics, engineering or a related degree (minimum CGPA of 3.0 out of 4.0). The Admissions Committee may modify the requirements in keeping with the field of graduate study proposed. In some cases, a Qualifying year may be required.

English Language Proficiency

For graduate applicants whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized Canadian or American (English or French) institution or from a recognized foreign institution where English is the language of instruction, documented proof of English proficiency is required prior to admission. For a list of acceptable test scores and minimum requirements, visit mcgill.ca/gradapplicants/international/proficiency.

11.5.3.2 Application Procedures

Students should first [contact potential supervisors](#) within the Department of Earth and Planetary Sciences and assess their interest in accepting new students before starting the formal application procedure. General inquiries concerning the Department should be addressed to Graduate Admissions, Department of Earth and Planetary Sciences at grad.eps@mcgill.ca. Candidates should indicate their field(s) of interest when making formal applications for admission.

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources](#) > Graduate > Graduate Admissions and Application Procedures > : [Application Procedures](#) for detailed application procedures.

11.5.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Earth and Planetary Sciences and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

11.5.4 Master of Science (M.Sc.) Earth and Planetary Sciences (Thesis) (45 credits)

Thesis Courses (33 credits)

EPSC 697 (9) Thesis Preparation 1

EPSC 698	(12)	Thesis Preparation 2
EPSC 699	(12)	Thesis Preparation 3

Complementary Courses (12 credits)

Four 3-credit 500-, 600-, or 700-level EPSC courses chosen with the approval of the supervisor or the research director and GPS.

11.5.5 Doctor of Philosophy (Ph.D.) Earth and Planetary Sciences

Highly qualified B.Sc. graduates may be admitted directly to the Ph.D. 1 year. Students with the M.Sc. degree are normally admitted to the Ph.D. 2 year.

* Students are required to take four graduate-level courses in the Ph.D. 1 year, and two courses plus a comprehensive oral examination in the Ph.D. 2 year.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

EPSC 700	(0)	Preliminary Doctoral Examination
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Complementary Courses

Two to six courses (6 to 18 credits) approved at the 500, 600, or 700 level selected in consultation with the student's supervisor and approved by the Academic Standing Committee.

11.6 Geography

11.6.1 Location

Department of Geography
Burnside Hall
805 Sherbrooke Street West, Room 305
Montreal QC H3A 0B9
Canada
Telephone: 514-398-4111
Email: grad.geog@mcgill.ca
Website: mcgill.ca/geography

11.6.2 About Geography

The Department of Geography offers research and thesis-based graduate programs leading to a **Master of Arts (M.A.)**, a **Master of Science (M.Sc.)**, or a **Doctorate (Ph.D.)**. In its scope, our program includes the opportunity to conduct field-based studies in both the natural (i.e., biophysical) and the social sciences. Thematic areas of study include:

- Political, Urban, Economic, and Health Geography;
- Environment and Development;
- Geographic Information Systems and Remote Sensing;
- Land Surface Processes, Ecosystem Biogeochemistry, and Ecohydrology;
- Earth System Science and Global Change;
- Sustainability Science and Environmental Management.

Geography houses McGill's *Geographic Information Centre (GIC)*, maintains arctic and subarctic field stations, and has strong ties with McGill's *Bieler School of Environment*. Faculty and students conduct research in fields as diverse as climate change impacts, periglacial geomorphology, and forest resource history in regions ranging from the Arctic to Africa, Southeast Asia, and Latin America.

Being both a natural and a social science, geography provides a unique opportunity to obtain a broad interdisciplinary exposure to modes of analyzing the many environmental and situational problems of contemporary society. Because of this, a geography degree is a fantastic opportunity to obtain a career in one of a diverse range of fields. Our students have gone on to become United Nations field researchers in Laos, environmental consultants in Toronto, science teachers in the U.S., geography professors in many parts of the world, UNHCR volunteers in Malaysia, policy analysts, and physical scientists in government agencies and research councils, as well as health and social policy researchers in Montreal...the list goes on! If you're on Facebook, look for *McGill Geography Alumni* or *visit our website* to learn more about the advantages of having a geography degree from McGill!

Master's degrees in both the physical (M.Sc.) and social (M.A.) sciences are offered by Geography. The core of both programs for all students is field-based research supervised by a faculty member, culminating in a thesis. The core program consists of the thesis component, required, and complementary graduate (500- or 600-level) courses.

Geography also offers in association with other McGill departments and programs a number of M.A. and M.Sc. options that students may choose to follow. Students must pass the courses specified for their program, attend such additional courses as the Graduate Program Director and the student's thesis supervisor see fit, and submit a thesis in an appropriate area of geographical inquiry approved by the supervisor.

McGill Northern Research Stations

The Faculty of Science, in collaboration with the Department of Geography operates two *northern research field stations*. The McGill Sub-Arctic Research Station (MSARS) is located in Schefferville, in the centre of Quebec-Labrador. The McGill Arctic Research Station (MARS) is located at Expedition Fiord on Axel Heiberg Island in the High Arctic. These facilities support field research in most areas of physical geography, including glaciology, permafrost hydrology, and geomorphology in the arctic, and some areas of human geography in the subarctic. For additional information on these stations, contact the Graduate Program Coordinator at grad.geog@mcgill.ca.

Master of Arts (M.A.) Programs in Geography

Detailed program requirements for the following M.A. programs are found in [Arts](#) > [Graduate](#) > [Browse Academic Units & Programs](#) > [Geography](#).

[: Master of Arts \(M.A.\) Geography \(Thesis\) \(45 credits\)](#)

Master's degrees in both the physical (M.Sc.) and social (M.A.) sciences are offered by Geography. The core of both programs for all students is field-based research, supervised by a faculty member, culminating in a thesis. The core program consists of the thesis component, required, and complementary graduate (500- or 600-level) courses. Geography also offers a number of M.A. and M.Sc. options in association with other McGill departments and programs that students may choose to follow.

[: Master of Arts \(M.A.\) Geography \(Thesis\): Development Studies \(45 credits\)](#)

The Development Studies Option (DSO) is cross-disciplinary in scope within existing master's programs in Geography, Anthropology, History, Political Science, Economics, and Sociology. Its components include the thesis; required International Development and Geography courses; and complementary courses from the participating departments. This thesis option is open to master's students specializing in development studies. Students enter through one of the participating departments and must meet the M.A. requirements of that unit. Students will take an interdisciplinary seminar and a variety of graduate-level courses on international development issues. The M.A. thesis must be on a topic relating to development studies, approved by the DSO coordinating committee.

[: Master of Arts \(M.A.\) Geography \(Thesis\): Environment \(45 credits\)](#)

This program is currently not offered.

The Environment option is offered in association with the *Bieler School of Environment* (BSE) and is composed of a thesis component, required, and complementary Geography and Environment courses. The graduate option in Environment provides students with an appreciation for the role of science in informed decision-making in the environmental sector, and its influence on political, socio-economic, and ethical judgments. Students who have been admitted through their home department or Faculty may apply for admission to the option. Option requirements are consistent across academic units. The option is coordinated by the MSE, in partnership with participating academic units.

[: Master of Arts \(M.A.\) Geography \(Thesis\): Gender and Women's Studies \(45 credits\)](#)

This is an interdisciplinary program for Geography students wishing to focus on gender and women's studies and issues in feminist research and methods. Included within it are a thesis on gender and women's studies, required, and complementary courses from Geography and Women's Studies.

[: Master of Arts \(M.A.\) Geography \(Thesis\): Neotropical Environment \(45 credits\)](#)

The McGill-STRI Neotropical Environment Option (NEO) is a research-based option for master's or Ph.D. students offered in association with several University departments, the *Bieler School of Environment*, and the *Smithsonian Tropical Research Institute* (STRI-Panama). The option includes a thesis; required courses in Geography, Environment, and Biology; and complementary courses chosen from Geography, Agriculture Sciences, Biology, Sociology, Environment, and Political Science. NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. NEO favours interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America and NEO's core and complementary courses will be taught in Panama. NEO's educational approach seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

Master of Science (M.Sc.) Programs in Geography

Detailed program requirements for the following M.Sc. programs are found in [Science](#) > [Graduate](#) > [Browse Academic Units & Programs](#) > [Geography](#).

section 11.6.4: Master of Science (M.Sc.) Geography (Thesis) (45 credits)

Master's degrees in both the physical (M.Sc.) and social (M.A.) sciences are offered by Geography. The core of both programs for all students is field-based research, supervised by a faculty member, culminating in a thesis. The core program consists of the thesis component, required, and complementary graduate (500- or 600-level) courses. Geography also offers a number of M.A. and M.Sc. options in association with other McGill departments and programs that students may choose to follow.

section 11.6.5: Master of Science (M.Sc.) Geography (Thesis): Environment (45 credits)

****This program is currently not offered.****

The Environment option is offered in association with the *Bieler School of Environment* (BSE) and is composed of a thesis component; required Geography and Environment courses; and complementary Geography and Environment courses. The graduate option in Environment provides students with an appreciation for the role of science in informed decision-making in the environmental sector, and its influence on political, socio-economic, and ethical judgments. Students who have been admitted through their home department or Faculty may apply for admission to the option. Option requirements are consistent across academic units. The option is coordinated by the MSE, in partnership with participating academic units.

section 11.6.6: Master of Science (M.Sc.) Geography (Thesis): Neotropical Environment (45 credits)

The McGill-STRI Neotropical Environment Option (NEO) is a research-based option for master's students offered in association with several university departments, the *Bieler School of Environment*, and the *Smithsonian Tropical Research Institute* (STRI-Panama). The option includes a thesis; required courses in Geography, Environment, and Biology; and complementary courses chosen from Geography, Agriculture Sciences, Biology, Sociology, Environment, and Political Science. NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. NEO favours interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America and NEO's core and complementary courses will be taught in Panama. NEO's educational approach seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

Ph.D. Programs in Geography

: Doctor of Philosophy (Ph.D.) Geography

The doctoral degree in Geography includes the successful completion of the comprehensive examination, a thesis based on original research, and coursework chosen in collaboration with the student's supervisor and/or research committee. The main elements of the Ph.D. are the thesis and comprehensive examination, a required Methods of Geographical Research course, and a minimum of two complementary courses.

: Doctor of Philosophy (Ph.D.) Geography: Environment

****This program is currently not offered.****

The Environment option consists of the thesis and comprehensive examination; required courses from Geography and Environment; and complementary courses in Environment or other fields recommended by the research committee and approved by the Environment Option Committee. The graduate option in Environment provides students with an appreciation for the role of science in informed decision-making in the environmental sector, and its influence on political, socio-economic, and ethical judgments. Students who have been admitted through their home department or faculty may apply for admission to the option. Option requirements are consistent across academic units. The option is coordinated by the *Bieler School of Environment*, in partnership with participating academic units.

: Doctor of Philosophy (Ph.D.) Geography: Gender and Women's Studies

This doctoral option is an interdisciplinary program for students who meet the degree requirements in Geography and who wish to earn 9 credits of approved coursework on gender and women's studies and issues in feminist research and methods. It includes a thesis centrally related to gender and/or women's studies; the comprehensive examination; required courses in Geography and Women's Studies; and complementary courses, one of which must pertain to gender and/or women's issues.

: Doctor of Philosophy (Ph.D.) Geography: Neotropical Environment

The McGill-STRI Neotropical Environment Option (NEO) is a research-based option for Ph.D. students offered in association with several university departments, the *Bieler School of Environment*, and the *Smithsonian Tropical Research Institute* (STRI-Panama) and includes the thesis; comprehensive examination; required courses in Geography, Environment, and Biology; and complementary courses chosen from Geography, Agriculture Sciences, Biology, Sociology, Environment, and Political Science. NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. NEO favours interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Students will complete their research in Latin America and NEO's core and complementary courses will be taught in Panama. NEO's educational approach seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

11.6.3 Geography Admission Requirements and Application Procedures

11.6.3.1 Admission Requirements

M.A. and M.Sc. Degrees

Applicants not satisfying the conditions in [University Regulations & Resources > Graduate > : Graduate Admissions and Application Procedures](#), but with primary undergraduate specialization in a cognate field, may be admitted to the M.A. or M.Sc. degree in Geography in certain circumstances. In general, applicants who have deficiencies in their preparation but are otherwise judged to be acceptable, will be required to register for a Qualifying program or to undertake additional courses.

Ph.D. Degree

Students who have completed a master's degree in Geography or a related discipline (with high standing) may be admitted at the Ph.D. 2 level.

On rare occasions, a student may be admitted to the Ph.D. degree without having first taken the master's degree. These students, who have deficiencies in their preparation but are otherwise acceptable, will be required to register for a year of coursework and/or be required to take extra courses. The normal duration of a program, including field work where required, is three years.

Normally, the Department will restrict admission to the Ph.D. program to students prepared to work in one of the fields of human or physical geography in which specialized supervision is offered. These fields, which cover a wide range of systematic areas, are listed in documents available from the Department.

English Language Proficiency

For graduate applicants whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized Canadian or American (English or French) institution or from a recognized foreign institution where English is the language of instruction, documented proof of English proficiency is required prior to admission. For a list of acceptable test scores and minimum requirements, visit mcgill.ca/gradapplicants/international/proficiency.

11.6.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources > Graduate > Graduate Admissions and Application Procedures > : Application Procedures](#) for detailed application procedures.

Further departmental application information is listed at mcgill.ca/geography/graduate.

11.6.3.2.1 Additional Requirements

The items and clarifications below are additional requirements set by this department:

- Research Proposal
- Letters of Reference – **two** references required for M.A. and M.Sc. programs; **three** references required for Ph.D. program
- Curriculum Vitae

11.6.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Geography Department and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

11.6.4 Master of Science (M.Sc.) Geography (Thesis) (45 credits)

Thesis Courses (30 credits)

GEOG 698	(6)	Thesis Proposal
GEOG 699	(24)	Thesis Research

Required Course (3 credits)

GEOG 631	(3)	Methods of Geographical Research
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Complementary Courses (12 credits)

12 credits, four 3-credit courses at the 500 level or above selected according to guidelines of the Department. GEOG 696 can count among these complementary credits for students with an appropriate background.

11.6.5 Master of Science (M.Sc.) Geography (Thesis): Environment (45 credits)

This program is currently not offered.

The Environment Option is offered in association with the Bieler School of Environment and is composed of a thesis component (24 credits), required Geography and Environment courses (9 credits) and complementary Geography and Environment (12 credits) courses.

Thesis Courses (24 credits)

GEOG 697	(18)	Thesis Research (Environment Option)
GEOG 698	(6)	Thesis Proposal

Required Courses (9 credits)

ENVR 610	(3)	Foundations of Environmental Policy
ENVR 650	(1)	Environmental Seminar 1
ENVR 651	(1)	Environmental Seminar 2
ENVR 652	(1)	Environmental Seminar 3
GEOG 631	(3)	Methods of Geographical Research

Complementary Courses (12 credits)

9 credits of courses at the 500 level or higher selected according to guidelines of the Department. GEOG 696 can count among these complementary credits for students with an appropriate background.

3 credits, one course chosen from the following:

ENVR 519	(3)	Global Environmental Politics
ENVR 544	(3)	Environmental Measurement and Modelling
ENVR 620	(3)	Environment and Health of Species
ENVR 622	(3)	Sustainable Landscapes
ENVR 630	(3)	Civilization and Environment
ENVR 680	(3)	Topics in Environment 4

or another course at the 500 level or higher recommended by the Advisory Committee and approved by the Environment Option Committee.

11.6.6 Master of Science (M.Sc.) Geography (Thesis): Neotropical Environment (45 credits)

Participation in the MSE-Panama Symposium presentation in Montreal is also required.

Thesis Courses (30 credits)

GEOG 698	(6)	Thesis Proposal
GEOG 699	(24)	Thesis Research

Required Courses (9 credits)

BIOL 640	(3)	Tropical Biology and Conservation
ENVR 610	(3)	Foundations of Environmental Policy
GEOG 631	(3)	Methods of Geographical Research

Complementary Course (3 credits)

3 credits, one Geography graduate course. GEOG 696 can count among these complementary credits for students with an appropriate background.

Elective Course (3 credits)

3 credits, at the 500 level or higher, on environmental issues to be chosen in consultation with and approval by the student’s supervisor AND the Neotropical Environment Options Director.

11.6.7 Doctor of Philosophy (Ph.D.) Geography

The doctoral degree in Geography includes the successful completion of the comprehensive examination, a thesis based on original research and coursework chosen in collaboration with the student’s supervisor and/or research committee. The main elements of the Ph.D. are the thesis and comprehensive examination, a required Methods of Geographical Research course (3 credits), and a minimum of two complementary courses (6 credits). The Ph.D. in Geography also includes several options.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

GEOG 631	(3)	Methods of Geographical Research
GEOG 700	(0)	Comprehensive Examination 1
GEOG 701	(0)	Comprehensive Examination 2
GEOG 702	(0)	Comprehensive Examination 3

Complementary Courses

Two courses at the 500, 600, or 700 level selected according to guidelines of the Department.

11.6.8 Doctor of Philosophy (Ph.D.) Geography: Environment

This program is currently not offered.

The Ph.D. in Geography Environment is a research program offered in collaboration with the Bieler School of Environment. As a complement to the unit's expertise, the program considers how various dimensions (scientific, social, legal, ethical) interact to define environment and sustainability issues.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (6 credits)

ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability
GEOG 631	(3)	Methods of Geographical Research
GEOG 700	(0)	Comprehensive Examination 1
GEOG 701	(0)	Comprehensive Examination 2
GEOG 702	(0)	Comprehensive Examination 3

Complementary Courses (9 credits)

3-6 credits chosen from:

ENVR 610	(3)	Foundations of Environmental Policy
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ENVR 614 (3) Mobilizing Research for Sustainability

0-3 credits chosen from:

ENVR 585 (3) Readings in Environment 2
 ENVR 630 (3) Civilization and Environment
 ENVR 680 (3) Topics in Environment 4

or 3 credits at the 500 level or higher recommended by the Advisory Committee and approved by the Environment Option Committee.

0-3 credits of Geography course at the 500 level or higher selected according to the guidelines of the Department.

11.6.9 Doctor of Philosophy (Ph.D.) Geography: Gender and Women's Studies

The graduate option in Gender and Women's Studies is an interdisciplinary program for students who meet the degree requirements in Geography who wish to earn 9 credits of approved coursework focusing on gender and women's studies, and issues in feminist research and methods. The student's doctoral thesis must be on a topic centrally relating to issues of gender and/or women's studies.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

GEOG 631 (3) Methods of Geographical Research
 GEOG 700 (0) Comprehensive Examination 1
 GEOG 701 (0) Comprehensive Examination 2
 GEOG 702 (0) Comprehensive Examination 3
 WMST 601 (3) Feminist Theories and Methods
 WMST 602 (3) Feminist Research Symposium

Complementary Courses

Two substantive courses.

One of these two courses must be taken within the Department of Geography at the 500 level or above; one of the two courses must be on gender/women's issues at the 500, 600, or 700 level.

11.6.10 Doctor of Philosophy (Ph.D.) Geography: Neotropical Environment

The Neotropical Option is offered in association with several University departments, the Bieler School of Environment, and the Smithsonian Tropical Research Institute (STRI-Panama) and includes the thesis, comprehensive examination, required courses (9 credits) in Geography, Environment and Biology, and complementary courses (3 credits) chosen from Geography, Agriculture Sciences, Biology, Sociology, Environment, and Political Science.

Participation in the MSE-Panama Symposium presentation in Montreal is also required.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

BIOL 640 (3) Tropical Biology and Conservation
 ENVR 610 (3) Foundations of Environmental Policy
 GEOG 631 (3) Methods of Geographical Research

GEOG 700	(0)	Comprehensive Examination 1
GEOG 701	(0)	Comprehensive Examination 2
GEOG 702	(0)	Comprehensive Examination 3

Elective Courses

3 credits, at the 500 level or higher, on environmental issues to be chosen in consultation with and approved by the student's supervisor AND the Neotropical Environment Options Director.

11.7 Mathematics and Statistics

11.7.1 Location

Department of Mathematics and Statistics
Burnside Hall, Room 1005
805 Sherbrooke Street West
Montreal QC H3A 0B9
Canada
Telephone: 514-398-3800
Email: grad.mathstat@mcgill.ca
Website: mcgill.ca/mathstat/

11.7.2 About Mathematics and Statistics

The Department of Mathematics and Statistics offers programs that can be focused on applied mathematics, pure mathematics, and statistics leading to master's (M.A. or M.Sc.) and Ph.D. degrees. The research areas are:

- Algebra;
- Algebraic Geometry;
- Analysis;
- Category Theory;
- Data Science;
- Discrete Mathematics;
- Differential Geometry;
- Dynamical Systems;
- Geometric Group Theory;
- Logic;
- Mathematical Biology;
- Mathematical Economics;
- Mathematical Physics;
- Mathematics of Machine Learning;
- Number Theory;
- Numerical Analysis;
- Optimization;
- Partial Differential Equations;
- Probability;
- Statistics.

In the basic master's programs, students must choose between the thesis option and the non-thesis option, which requires a project. The Ph.D. program in Mathematics and Statistics is thesis only.

The [Department's website](#) provides extensive information on the Department and its facilities, including the research activities and research interests of individual faculty members. It also provides detailed supplementary information concerning our programs, admissions, funding of graduate students, thesis requirements, advice concerning the choice of courses, etc.

Students are urged to consult the [Institut des Sciences Mathématiques \(ISM\) website](#), which coordinates intermediate and advanced-level graduate courses among Montreal and Quebec universities. A list of courses available under the ISM auspices can be obtained from the ISM website. The ISM also offers fellowships and promotes a variety of joint academic activities greatly enhancing the mathematical environment in Montreal and in the province of Quebec.

Master of Arts (M.A.) Programs in Mathematics and Statistics

Detailed program requirements for the following M.A. programs are found in [Arts](#) > [Graduate](#) > [Browse Academic Units & Programs](#) > [Mathematics and Statistics](#).

[: Master of Arts \(M.A.\) Mathematics and Statistics \(Thesis\) \(45 credits\)](#)

The Master of Arts (M.A.) in Mathematics and Statistics (Thesis) is an advanced program for students working in the areas of Applied Mathematics, Pure Mathematics, and Statistics. The thesis option requires a thesis and six approved courses.

[: Master of Arts \(M.A.\) Mathematics and Statistics \(Non-Thesis\) \(45 credits\)](#)

The Master of Arts (M.A.) in Mathematics and Statistics (Non-Thesis) is an advanced program for students working in the areas of Applied Mathematics, Pure Mathematics, and Statistics. The non-thesis option requires a project, that is a shorter work than a thesis, and eight approved courses.

Master of Science (M.Sc.) Programs in Mathematics and Statistics

Detailed program requirements for the following M.Sc. programs are found in [Science](#) > [Graduate](#) > [Browse Academic Units & Programs](#) > [Mathematics and Statistics](#).

[section 11.7.4: Master of Science \(M.Sc.\) Mathematics and Statistics \(Thesis\) \(45 credits\)](#)

The Master of Science (M.Sc.) in Mathematics and Statistics (Thesis) is an advanced program for students working in the areas of Applied Mathematics, Pure Mathematics, and Statistics. The thesis option requires a thesis and six approved courses.

[section 11.7.5: Master of Science \(M.Sc.\) Mathematics and Statistics \(Non-Thesis\) \(45 credits\)](#)

The Master of Science (M.Sc.) in Mathematics and Statistics (Non-Thesis) is an advanced program for students working in the areas of Applied Mathematics, Pure Mathematics, and Statistics. The non-thesis option requires a project, that is a shorter work than a thesis, and eight approved courses.

Ph.D. Programs in Mathematics and Statistics

[: Doctor of Philosophy \(Ph.D.\) Mathematics and Statistics](#)

The Department offers a course of studies leading to the Ph.D. degree. It differs substantially from the master's programs in that the student must write a thesis that makes an original contribution to knowledge. The thesis topic is chosen by the student in consultation with the research supervisor. The thesis must be examined and approved by an internal examiner (usually a member of the Progress Tracking Committee), an external examiner, and the Oral Examination Committee. The student must present an oral defence of the thesis before that Committee. To submit a thesis for examination, the student must first pass the Ph.D. Qualifying Examination.

11.7.3 Mathematics and Statistics Admission Requirements and Application Procedures

11.7.3.1 Admission Requirements

In addition to the general Graduate and Postdoctoral Studies requirements, the Department requirements are as follows:

Master's Degree

The normal entrance requirement for the master's programs is a Canadian honours degree or its equivalent, with high standing, in mathematics or a closely related discipline in the case of applicants intending to concentrate in statistics or applied mathematics.

Applicants wishing to concentrate in pure mathematics should have a strong background in linear algebra, abstract algebra, and real and complex analysis.

Applicants wishing to concentrate in statistics should have a strong background in linear algebra and basic real analysis. A calculus-based course in probability and one in statistics are required, as well as some knowledge of computer programming. Some knowledge of numerical analysis and optimization is desirable.

Applicants wishing to concentrate in applied mathematics should have a strong background in most of the areas of linear algebra, analysis, differential equations, discrete mathematics, and numerical analysis. Some knowledge of computer programming is also desirable.

Students whose preparation is insufficient for the program they wish to enter may, exceptionally, be admitted to a Qualifying year.

Ph.D. Degree

A master's degree with high standing is required, in addition to the requirements listed above for the master's program. Students may transfer directly from the master's program to the Ph.D. program under certain conditions. Students without a master's degree, but with exceptionally strong undergraduate training, may be admitted directly to Ph.D. 1.

11.7.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources](#) > [Graduate](#) > [Graduate Admissions and Application Procedures](#) > : [Application Procedures](#) for detailed application procedures.

11.7.3.2.1 Additional Requirements

The items and clarifications below are additional requirements set by this department:

- Personal Statement – In the personal statement, the applicants should clearly explain their choice of preferred area(s) of research, as well as providing relevant information that will not be reflected on their transcripts.
- Research Proposal (optional) – If applicants have a specific research problem of interest that they want to pursue, they may discuss the details in the research proposal.
- Applicants in pure and applied mathematics should provide a GRE score report, if available.

For more details, please consult mcgill.ca/mathstat/postgraduate/prospective-students/admissions.

11.7.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Mathematics and Statistics and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

11.7.4 Master of Science (M.Sc.) Mathematics and Statistics (Thesis) (45 credits)

Thesis Courses (24 credits)

MATH 600	(6)	Master's Thesis Research 1
MATH 601	(6)	Master's Thesis Research 2
MATH 604	(6)	Master's Thesis Research 3
MATH 605	(6)	Master's Thesis Research 4

Complementary Courses (21 credits)

At least six approved graduate courses, at the 500, 600, or 700 level, of 3 or more credits each.

11.7.5 Master of Science (M.Sc.) Mathematics and Statistics (Non-Thesis) (45 credits)

Research Project (16 credits)

MATH 640	(8)	Project 1
MATH 641	(8)	Project 2

Complementary Courses (29 credits)

At least eight approved graduate courses, at the 500, 600, or 700 level, of 3 or more credits each.

11.7.6 Doctor of Philosophy (Ph.D.) Mathematics and Statistics

The Ph.D. in Mathematics and Statistics focuses on research in the mathematical or statistical sciences, including the completion of original research publishable in mainstream refereed journals.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

MATH 701 (0) Ph.D. Qualifying Examination

Complementary Courses (21 credits)

21 credits of courses at the 500 level or above, including at least 6 credits at the 600 level or above. The choice of courses to fulfill this requirement must be prior approved by the student's Advisory Committee. The Department recommends that students take complementary courses in at least three different areas of Mathematics and Statistics.

All credits of complementary courses should be taken before the end of PhD 3. In exceptional circumstances, an extension can be granted by the student's Advisory Committee.

Students who wish to take more than 8 credits of complementary courses from outside the Department should request approval from the Graduate Program Director.

11.8 Physics**11.8.1 Location**

Department of Physics
Ernest Rutherford Physics Building
3600 University Street
Montreal QC H3A 2T8
Canada
Telephone: 514-398-6485 (Graduate Information)
Fax: 514-398-8434
Email: graduate.physics@mcgill.ca
Website: physics.mcgill.ca

11.8.2 About Physics

The Department of Physics currently has a faculty of approximately 40 members, including several holders of Canada Research Chairs and many other prestigious named Chairs. Additionally, we host an impressive number of postdoctoral fellows and research associates and run one of the largest and most vibrant graduate programs in North America. Graduate student enrolment is currently approximately 200.

Faculty members in the Department of Physics are recognized internationally for their excellence. Our members have received national and international prizes and fellowships including *Les Prix Du Québec*, Steacie Prize, Sloan Fellowships, NSERC, and many others. They are also in constant demand as reviewers and referees. Students who earn advanced degrees from the Department of Physics will not only get an excellent education, they will also receive valuable guidance and network contacts to help with subsequent career steps.

The Department offers full **M.Sc.** and **Ph.D.** degree programs in a wide range of disciplines, including:

- astrophysics;
- atmospheric physics;
- bio-physics;
- condensed-matter physics;
- high-energy physics;
- laser spectroscopy;
- material physics;
- non-linear dynamics and atmospheric physics;
- nuclear physics;
- statistical physics;
- medical-radiation physics.

Although most of the teaching and research facilities are located in the Ernest Rutherford Physics Building, the Department has space and research facilities in the Wong Materials Science Centre, adjacent to the Rutherford Building. Our groups also conduct research at the [McGill University Health Centre](#) (MUHC), the [Jewish General Hospital](#), the [Montreal Neurological Institute](#) (MNI), and laboratories around the world—including [Argonne](#), [CERN](#), [FermiLab](#), [SLAC](#), [TRIUMF](#), and [KEK](#).

Departmental researchers enjoy technical support in the areas of engineering, electronics, and precision machining. The Department maintains an excellent conventional machine shop as well as the McGill Nanotools-Microfab facility. Most of the scientific computing is done with an extensive in-house network of powerful workstations and several Beowulf clusters.

Remote access to supercomputing sites in Canada and the United States is also possible including the McGill HPC super-computing facility which is a part of the nationwide network of high performance computing installations in Quebec.

The Department of Physics offers a competitive funding package for both local and international students. For more information about financial support, please physics.mcgill.ca/grads/finance.html.

Graduate students in the Department of Physics come from many different countries and cultural backgrounds, providing a stimulating cosmopolitan atmosphere in the Department. This, coupled with the unique opportunities afforded by the city of Montreal, guarantees a quality of life that is second to none among Canadian universities. For graduate admission and application information, please visit physics.mcgill.ca/grads/application.html.

Fields of Research:

High-Energy Physics

Theoretical: The McGill high energy theorists have interests in a wide range of areas within quantum field theory, string theory, quantum gravity, and cosmology. Research areas of the high-energy theory faculty include applications of quantum field theory techniques to relativistic heavy ion collisions, baryogenesis, superstring cosmology, theory of cosmological perturbations, black hole physics, supergravity, three dimensional gravity, and various topics related to the physics and mathematics of superstring theory. The high-energy theorists have close connections to the nuclear theory group, the astrophysics group, the high-energy experimentalists, and to members of the Mathematics Department.

Experimental: The experimental high-energy physics group is engaged in a number of experiments at the research frontiers of the field, both in subatomic physics and in high-energy astrophysics. These include:

- Electron-positron collisions: a group works on the BaBar experiment at [SLAC](http://slac.stanford.edu) and the Belle-2 experiment at the [KEK](http://kekb.kek.jp) laboratory in Japan, with specific interest in CKM matrix elements and physics beyond the Standard Model through studies of rare decays, and on R&D for a future International Linear Collider, with interest in calorimeter development.
- Hadron-hadron collisions: A group is involved in major contributions to the energy frontier at [CERN](http://cern.ch)'s LHC, with work on the High Level Trigger for the ATLAS experiment. Work also focuses on searches for new physics phenomena, precision physics of known Standard Model processes, development of the ATLAS experiment's trigger system, and direct contribution to the upgrade of the ATLAS detector.
- High-energy particle astrophysics: ground-based gamma-ray astronomy using the VERITAS telescope array and development of the next-generation detector.
- Underground physics: A group carries out experimental R&D with the aim of measuring, for the first time, the neutrinoless double-beta decay process with the EXO experiment.

Students at the M.Sc. and Ph.D. levels are offered a strong program of research in a challenging and rapidly advancing field. Short term master's projects are based mainly on instrumentation or data analysis conducted on campus, while Ph.D. research may involve an extended stay at one of the world's major research laboratories.

Nuclear Physics

Theoretical: Current research programs include transport equations for heavy ion collisions at intermediate energy; nuclear equation of state from heavy ion collisions; fragmentation at intermediate energy; electromagnetic probes in relativistic heavy ion collisions; effective Lagrangians for hadronic systems at finite temperature; and Quark-Gluon Plasma, QCD.

Experimental: Current research programs in experimental nuclear physics at McGill are focused on two main axes:

- The study of heavy-ion reactions at relativistic energies to determine the properties of nuclear matter at high temperatures and density. This program is being performed at the [Brookhaven National Laboratory](http://bnl.gov), and at the Large Hadron Collider facility at [CERN](http://cern.ch).
- The study of ground state properties of unstable nuclei using laser spectroscopy techniques and ion traps. This work is being carried out using the Canadian Penning trap facility at the [Argonne National Laboratory](http://argonne.gov), at the accelerator ISOLDE ([CERN](http://cern.ch)), and the ISAC facility at [TRIUMF](http://triumf.ca).

Furthermore, the Nuclear Physics Group has an active in-house research program that applies the ion trap and laser techniques to the detection of trace quantities of material and contaminants, and to ion spectroscopy.

Condensed Matter Physics and Biophysics

Theoretical: Current research programs involve the nonequilibrium, ab-initio modelling of molecular and nanoelectronic systems and devices; the study of quantum effects in interacting mesoscopic electron systems; nonequilibrium phenomena in extended systems; and applications of statistical mechanics to problems in biophysics.

Experimental: Current research programs involve:

- the study of the time evolution of non-equilibrium systems via X-ray diffraction;
- fundamental quantum properties of strongly correlated systems at temperatures very near absolute zero;
- macromolecular interactions in living cells using single-photon and two-photon imaging;
- molecular electronics and nanoelectronic systems by scanning probe microscopy;
- dynamics and mechanical properties of soft matter systems and spatial organization and dynamics in living cells;
- mechanical behaviour of very small systems by high-resolution force microscopy;
- electronic properties that emerge at the limits of miniaturization and quantum computing;

- nuclear methods to study interactions in magnetic materials that lead to exotic magnetic ordering behaviour. This includes studies of novel materials such as carbon nanotubes, graphene, unconventional superconductors, quantum dots, heterostructures, amorphous systems, and spin glasses.

Astrophysics

Research in the astrophysics group covers a wide range of topics including cosmology, galaxy formation, high-energy astrophysics, and extrasolar planets. This involves observations at all wavelengths, from gamma rays and X-rays to sub-mm, infrared, and radio, using international observatories in space and on the ground. Experimental groups at McGill are involved in development and operation of ground-based high-energy gamma-ray observatories, and cosmic microwave background experiments. Theoretical work includes studies of how astrophysics and observational cosmology can experimentally determine the most important properties of dark matter and dark energy, studies of the diverse physics of neutron stars, and extrasolar planet formation.

Nonlinear Variability and Atmospheric Physics

This group studies nonlinear dynamical processes in the atmosphere and other geophysical systems, especially those associated with turbulent, chaotic, and extremely variable behaviour. Emphasis is placed on multifractal analysis and modelling as well as the development of new theories and techniques covering wide ranges of scale in time and space. Data from a variety of in situ and remotely sensed sources are used. This includes satellite data of the Earth's atmosphere and surface as well as high-quality precipitation data from the [McGill Radar Weather Observatory](#).

Medical Radiation Physics

The Medical Physics Unit is a teaching and research unit concerned with the application of physics and related sciences in medicine, especially (but not exclusively) in radiation medicine; i.e., radiation oncology, medical imaging, and nuclear medicine. The Unit's facilities are available for students to undertake a Ph.D. in Physics administered through the Department of Physics with a research emphasis on medical physics supervised, funded, and hosted by Medical Physics Unit PIs (principal investigators).

The research interests of Unit members include various aspects of medical imaging, including:

- 3D imaging;
- the development of new imaging modalities;
- applications of imaging in radiation therapy such as radiation dosimetry and solid state;
- nuclear cardiology; and
- applications of radiation biology to therapy.

section 11.8.4: Master of Science (M.Sc.) Physics (Thesis) (45 credits)

This program provides a comprehensive introduction to the academic, research, and practical aspects of physics. The primary goal of this program is to provide students with unique opportunities to learn fundamental research techniques in experimental and/or theoretical research, and objectively synthesize information from scientific literature. Each M.Sc. student chooses their preferred major research area and research supervisor. Thesis work is available in a broad range of sub-disciplines (see [departmental website](#) for details). Students wishing to continue to our doctoral program have the option, with supervisor approval, of transferring directly to the Ph.D., waiving the M.Sc. thesis submission.

section 11.8.5: Doctor of Philosophy (Ph.D.) Physics

The doctoral program provides all the tools required for a competitive career in academic settings, as well as in industry or other fields. The multidisciplinary nature of the Department exposes students to a vast array of research interests and experimental or theoretical approaches. Graduate research activities leading to the presentation of a Ph.D. thesis involve original work, with distinct contributions to knowledge. Our graduate program offers training in a unique and multidisciplinary environment in Canada's top university and may involve an extended stay at one of the world's major research laboratories.

11.8.3 Physics Admission Requirements and Application Procedures

11.8.3.1 Admission Requirements

M.Sc.

We normally require a background that is equivalent to our : [Bachelor of Science \(B.Sc.\) - Major Physics \(63 credits\)](#).

Ph.D.

The normal requirement is an M.Sc. in Physics or equivalent, but exceptional students may be considered for direct entry to the Ph.D. program. On the recommendation of the Departmental Graduate Committee, fast-tracking from the M.Sc. program into the Ph.D. program may be granted after one year, if:

- the student has fulfilled the M.Sc. coursework requirements, or;
- the Committee determines that the student qualifies based on the student's academic record.

All students who transfer to the Ph.D. program are required to fulfil Ph.D. coursework requirements in addition to the courses taken as an M.Sc. candidate.

11.8.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See [University Regulations & Resources](#) > Graduate > Graduate Admissions and Application Procedures > : [Application Procedures](#) for detailed application procedures.

Financial Assistance

Financial assistance will be offered to all students at the time of acceptance, if applicable. For more information, please visit our finance page: physics.mcgill.ca/grads/finance.html.

11.8.3.2.1 Additional Requirements

The items and clarifications below are additional requirements set by this department:

- two letters of reference;
- Physics CV;
- personal statement;
- thesis abstract or summary – optional;
- *GRE* – recommended but not required

A list of supporting documentation required by the University can be found at mcgill.ca/gradapplicants/apply/prepare/checklist/documents. International students must also demonstrate proficiency in English. Details are available at mcgill.ca/gradapplicants/international/apply/proficiency.

11.8.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Physics and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Please note, the Ph.D. program with a research emphasis on medical physics only accepts students in Fall.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

11.8.4 Master of Science (M.Sc.) Physics (Thesis) (45 credits)

Thesis Courses (30 credits)

PHYS 690	(24)	M.Sc. Thesis
PHYS 692	(6)	Thesis Project

Complementary Courses (15 credits)

12 credits at the 500, 600, or 700 level.

3 credits at the 600 or 700 level:

Students with an appropriate background may request Departmental permission to substitute up to 6 credits chosen from the following courses:

PHYS 691	(3)	Thesis Preparation
PHYS 693	(3)	M.Sc. Research

Students must also successfully complete all the other normal requirements of Graduate and Postdoctoral Studies.

11.8.5 Doctor of Philosophy (Ph.D.) Physics

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

Candidates must successfully complete two 3-credit graduate courses at the 600 level or above; one of these courses should be in the candidate's area of specialization. If the candidate completed two or more courses at the 600 level as part of the McGill Physics M.Sc. program, then one of these courses may be used as a substitute for one of the required courses. In all cases, candidates must also pass the Ph.D. preliminary examination (PHYS 700).

PHYS 700 (0) Preliminary Ph.D. Examination

11.9 Psychology

11.9.1 Location

Department of Psychology
2001 McGill College Avenue, 7th Floor
Montreal QC H3A 1G1
Canada
Telephone: 514-398-6127/514-398-6137
Email: psychology.grad@mcgill.ca
Website: mcgill.ca/psychology

11.9.2 About Psychology

The aim of the Experimental program is to provide students with an environment in which they are free to develop skills and expertise that will serve during a professional career of teaching and research as a psychologist. Coursework and other requirements are at a minimum. Success in the program depends on the student's ability to organize unscheduled time for self-education. Continuous involvement in research planning and execution is considered a very important component of the student's activities.

The Clinical program adheres to the scientist practitioner model and as such is designed to train students for careers in university teaching or clinical research, and for service careers (working with children or adults in hospital, clinical, or educational settings). Most of our clinical graduates combine service and research roles. While there are necessarily many more course requirements than in the Experimental program, the emphasis is again on research training. There is no master's program in Clinical Psychology; the Department offers direct entry to a doctoral degree for holders of an undergraduate degree, and students are expected to complete the full program leading to a doctoral degree.

Research interests of members of the Psychology Department include:

- behavioural neuroscience;
- clinical psychology;
- cognition and cognitive neuroscience;
- developmental science;
- health psychology;
- quantitative psychology and modelling; and
- social and personality psychology.

Facilities for advanced research in a variety of fields are available within the Department itself. In addition, arrangements exist with the Departments of Psychology at the Montreal Neurological Institute and Hospital, Allan Memorial Institute, Douglas Mental Health University Institute, Jewish General Hospital, Montreal Children's Hospital, and Montreal General Hospital to permit graduate students to undertake research in a hospital setting.



Note: Many MUHC-affiliated hospitals and institutes are now located at the Glen site; further information is available on the [MUHC website](#).

For inquiries about all programs and financial aid, and for application forms, contact the [Graduate Program Administrator](#).

Ph.D. Option in Behavioural Neuroscience

Information about this option is available from the Department and at mcgill.ca/psychology/graduate/program-tracks.

Ph.D. Option in Language Acquisition (LAP)

Information about this option is available from the Department and at psych.mcgill.ca/lap.html and mcgill.ca/psychology/graduate/program-tracks/experimental/additional-program-opportunities.

: Master of Arts (M.A.) Psychology (Thesis) (45 credits)

Candidates must demonstrate a sound knowledge of modern psychological theory, of its historical development, and of the logic of statistical methods as used in psychological research. Candidates will be expected to have an understanding of the main lines of current work in areas other than their own field of specialization.

section 11.9.4: Master of Science (M.Sc.) Psychology (Thesis) (45 credits)

Candidates must demonstrate a sound knowledge of modern psychological theory, of its historical development, and of the logic of statistical methods as used in psychological research. Candidates will be expected to have an understanding of the main lines of current work in areas other than their own field of specialization.

: Doctor of Philosophy (Ph.D.) Psychology

Please contact the Department for more information about this program.

section 11.9.6: Doctor of Philosophy (Ph.D.) Psychology: Behavioural Neuroscience

The Ph.D. in Psychology: Behavioural Neuroscience program emphasizes modern, advanced theory and methodology aimed at the neurological underpinnings of behaviour in human and non-human animals. This program is intended for graduate students in any area of Psychology who wish to obtain unique, intensive training at the intersection of psychology and neuroscience, thereby enhancing their expertise, the interdisciplinary potential of their dissertation research, and enabling them to compete successfully for academic or commercial positions in either field alone, or their intersection. It requires that students complete a dissertation that addresses Behavioural Neuroscience themes.

section 11.9.7: Doctor of Philosophy (Ph.D.) Psychology: Language Acquisition

This unique interdisciplinary program focuses on the scientific exploration of language acquisition by different kinds of learners in diverse contexts. Students in the Language Acquisition program are introduced to theoretical and methodological issues on language acquisition from the perspectives of cognitive neuroscience, theoretical linguistics, psycholinguistics, education, communication sciences and disorders, and neuropsychology.

11.9.3 Psychology Admission Requirements and Application Procedures**11.9.3.1 Admission Requirements**

Admission to the graduate program depends on an evaluation of students' research interests and their aptitude for original contributions to knowledge and, if applicable, for professional contributions in the applied field.

The usual requirement for admission is an Honours or Major degree (B.A. or B.Sc.) in Psychology. This usually includes an introductory course plus twelve courses in psychology (each equivalent to three term hours). Courses in experimental psychology, the theoretical development of modern ideas in psychology, and statistical methods as applied to psychological problems (equivalent to an introductory course) are essential. Applicants' knowledge of relevant biological, physical, and social sciences is considered. Students applying to the clinical program are advised to complete 42 specific undergraduate credits in psychology as specified by the *Order of Psychologists of Quebec* (*Ordre des psychologues du Québec*).

Applicants who hold a bachelor's degree but who have not met these usual requirements should consult the Graduate Program Director to determine which (if any) courses must be completed before an application can be considered. Students with insufficient preparation for graduate work may register as Special Students (undergraduate level) in the Faculty of Arts or the Faculty of Science, and follow an appropriate course of study. Such registration requires the permission of the Department but carries no advantage with respect to a student's eventual admission to graduate studies.

Applicants should note that the deadline for many scholarships and fellowships is about four months earlier than the application deadlines and that applications for scholarships and fellowships should be submitted through their home university.

The *GRE* General Test as well as the Psychology Subject Test are not mandatory, but if you wish to take either or both, your scores can be submitted to us and will be added to your application.



Note: Official transcripts do not need to be included as part of an application; they will only be requested once applicants are formally accepted into the program.

English Language Proficiency

For graduate applicants whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized Canadian or American (English or French) institution or from a recognized foreign institution where English is the language of instruction, documented proof of English proficiency is required prior to admission. For a list of acceptable test scores and minimum requirements, visit mcgill.ca/gradapplicants/international/proficiency.

11.9.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at mcgill.ca/gradapplicants/apply.

See : [Application Procedures](#) for detailed application procedures.

11.9.3.2.1 Additional Requirements

The items and clarifications below are additional requirements set by this department:

- Three letters of reference

- Personal Statement
- Curriculum Vitae
- Application Summary Sheet

For further details about these additional requirements, consult the Department of Psychology's [website](#).

11.9.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Psychology and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program.

Information on application deadlines is available at mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines.

Admission to graduate studies is competitive; accordingly, late and/or incomplete applications are considered only as time and space permit.

11.9.4 Master of Science (M.Sc.) Psychology (Thesis) (45 credits)

Thesis Courses (27 credits)

PSYC 690	(15)	Masters Research 1
PSYC 699	(12)	Masters Research 2

Required Courses (18 credits)

PSYC 601	(6)	Master's Comprehensive
PSYC 650	(3)	Advanced Statistics 1
PSYC 651	(3)	Advanced Statistics 2
PSYC 660D1	(3)	Psychology Theory
PSYC 660D2	(3)	Psychology Theory

11.9.5 Doctor of Philosophy (Ph.D.) Psychology

All candidates for the Ph.D. degree must demonstrate broad scholarship, mastery of current theoretical issues in psychology and their historical development, and a detailed knowledge of their special field. Great emphasis is placed on the development of research skills, and the dissertation forms the major part of the evaluation at the Ph.D. level.

Ph.D. students in Clinical Psychology must fulfil similar requirements to Ph.D. students in the Experimental Program and must also take a variety of specialized courses, which include practicum and internship experiences.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Course

PSYC 701	(0)	Doctoral Comprehensive Examination
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Complementary Courses

12-24 credits

12 credits (one course per term in Year 2 and Year 3) chosen from the following list:

PSYC 712	(3)	Comparative and Physiological Psychology 3
PSYC 715	(3)	Comparative and Physiological Psychology 6
PSYC 722	(3)	Personality and Social Psychology
PSYC 723	(3)	Personality and Social Psychology

PSYC 724	(3)	Personality and Social Psychology
PSYC 725	(3)	Personality and Social Psychology
PSYC 727	(3)	Personality and Social Psychology
PSYC 728	(3)	Ethics and Professional Issues
PSYC 729	(3)	Theory of Assessment
PSYC 730	(3)	Clinical Neuroscience Methods
PSYC 732	(3)	Clinical Psychology 1
PSYC 733	(3)	Clinical Psychology 2
PSYC 734	(3)	Developmental Psychology and Language
PSYC 735	(3)	Developmental Psychology and Language
PSYC 736	(3)	Developmental Psychology and Language
PSYC 740	(3)	Perception and Cognition
PSYC 741	(3)	Perception and Cognition
PSYC 742	(3)	Perception and Cognition
PSYC 743	(3)	Perception and Cognition
PSYC 744	(3)	Perception and Cognition
PSYC 746	(3)	Quantitative and Individual Differences
PSYC 747	(3)	Quantitative and Individual Differences
PSYC 748	(3)	Quantitative and Individual Differences
PSYC 749	(3)	Quantitative and Individual Differences
PSYC 750	(3)	Applied Bayesian Statistics
PSYC 752D1	(3)	Psychotherapy and Behaviour Change
PSYC 752D2	(3)	Psychotherapy and Behaviour Change
PSYC 753	(3)	Health Psychology Seminar 1

0-12 credits from the following (students without a master's degree from McGill need to take all 12 credits):

PSYC 650	(3)	Advanced Statistics 1
PSYC 651	(3)	Advanced Statistics 2
PSYC 660D1	(3)	Psychology Theory
PSYC 660D2	(3)	Psychology Theory

Note: The Department of Psychology does not ordinarily require an examination in a foreign language however, all students planning on practicing clinical psychology in the province of Quebec will be examined based on their proficiency in French before being admitted to the professional association.

11.9.6 Doctor of Philosophy (Ph.D.) Psychology: Behavioural Neuroscience

The Ph.D. in Psychology; Behavioural Neuroscience program emphasizes modern, advanced theory and methodology aimed at the neurobiological underpinnings of behaviour in human and non-human animals. This program is intended for graduate students in any area of Psychology who wish to obtain unique, intensive training at the intersection of psychology and neuroscience, thereby enhancing their expertise; the interdisciplinary potential of their dissertation research, and enabling them to compete successfully for academic or commercial positions in either field alone, or their intersection. It requires that students complete a dissertation that addresses Behavioural Neuroscience themes as determined by the graduate program director.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field of Behavioural Neuroscience and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses

PSYC 701	(0)	Doctoral Comprehensive Examination
PSYC 781	(3)	Behavioural Neuroscience Special Topics
PSYC 782	(3)	Behavioural Neuroscience Advanced Seminar

Complementary Courses

6-18 credits

6 credits (one course per term in Year 2 and Year 3) chosen from relevant 700-level courses in consultation with the supervisor and graduate program director.

0-12 credits from the following (students without a master's degree from McGill need to take all 12 credits):

PSYC 650	(3)	Advanced Statistics 1
PSYC 651	(3)	Advanced Statistics 2
PSYC 660D1	(3)	Psychology Theory
PSYC 660D2	(3)	Psychology Theory

Note: The Department of Psychology does not ordinarily require an examination in a foreign language however, all students planning on practicing clinical psychology in the province of Quebec will be examined based on their proficiency in French before being admitted to the professional association.

11.9.7 Doctor of Philosophy (Ph.D.) Psychology: Language Acquisition

Students must satisfy all program requirements for the Ph.D. in Psychology. The Ph.D. thesis must be on a topic relating to language acquisition.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner. The research presented must meet current standards of the discipline; as well, the thesis must clearly demonstrate how the research advances knowledge in the field. Finally, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (6 credits)

LING 710	(2)	Language Acquisition Issues 2
PSYC 701	(0)	Doctoral Comprehensive Examination
PSYC 709	(2)	Language Acquisition Issues 1
SCSD 712	(2)	Language Acquisition Issues 4

Complementary Courses

15-32 credits

12 credits (one course per term in Year 2 and Year 3) chosen from the following list:

PSYC 712	(3)	Comparative and Physiological Psychology 3
PSYC 715	(3)	Comparative and Physiological Psychology 6
PSYC 722	(3)	Personality and Social Psychology
PSYC 723	(3)	Personality and Social Psychology
PSYC 724	(3)	Personality and Social Psychology
PSYC 725	(3)	Personality and Social Psychology
PSYC 727	(3)	Personality and Social Psychology
PSYC 728	(3)	Ethics and Professional Issues
PSYC 729	(3)	Theory of Assessment

PSYC 730	(3)	Clinical Neuroscience Methods
PSYC 732D1	(1.5)	Clinical Psychology 1
PSYC 732D2	(1.5)	Clinical Psychology 1
PSYC 733D1	(1.5)	Clinical Psychology 2
PSYC 733D2	(1.5)	Clinical Psychology 2
PSYC 734	(3)	Developmental Psychology and Language
PSYC 735	(3)	Developmental Psychology and Language
PSYC 736	(3)	Developmental Psychology and Language
PSYC 740	(3)	Perception and Cognition
PSYC 741	(3)	Perception and Cognition
PSYC 742	(3)	Perception and Cognition
PSYC 743	(3)	Perception and Cognition
PSYC 744	(3)	Perception and Cognition
PSYC 746	(3)	Quantitative and Individual Differences
PSYC 747	(3)	Quantitative and Individual Differences
PSYC 748	(3)	Quantitative and Individual Differences
PSYC 749	(3)	Quantitative and Individual Differences
PSYC 750	(3)	Applied Bayesian Statistics
PSYC 752D1	(3)	Psychotherapy and Behaviour Change
PSYC 752D2	(3)	Psychotherapy and Behaviour Change
PSYC 753	(3)	Health Psychology Seminar 1

At least 3 credits selected from the following list:

EDSL 620	(3)	Social Justice Issues in Second Language Education
EDSL 623	(3)	Second Language Learning
EDSL 624	(3)	Educational Sociolinguistics
EDSL 627	(3)	Instructed Second Language Acquisition Research
EDSL 632	(3)	Second Language Literacy Development
LING 651	(3)	Topics in Acquisition of Phonology
LING 655	(3)	Theory of L2 Acquisition
LING 751	(3)	Advanced Seminar: Experimental 1
LING 752	(3)	Advanced Seminar: Experimental 2
PSYC 545	(3)	Topics in Language Acquisition
PSYC 735	(3)	Developmental Psychology and Language
SCSD 619	(3)	Phonological Development
SCSD 632	(3)	Phonological Disorders: Children
SCSD 637	(3)	Developmental Language Disorders 1
SCSD 643	(3)	Developmental Language Disorders 2
SCSD 652	(3)	Advanced Research Seminar 1
SCSD 653	(3)	Advanced Research Seminar 2
SCSD 654	(3)	Advanced Research Seminar 3

0-2 from the following:

EDPE 713	(2)	Language Acquisition Issues 5
EDSL 711	(2)	Language Acquisition Issues 3

0-3 credits of statistics from the following list:

EDPE 676	(3)	Intermediate Statistics
EDPE 682	(3)	Univariate/Multivariate Analysis
LING 620	(3)	Experimental Linguistics: Methods
PSYC 650	(3)	Advanced Statistics 1
PSYC 651	(3)	Advanced Statistics 2

Students who have taken an equivalent course in statistics will be deemed to have satisfied this requirement for the Language Acquisition Option.

These 3 credits are only required for students who have not previously taken an equivalent course in statistics.

0-12 credits from the following (students without a McGill master's degree need to take all 12 credits):

PSYC 650	(3)	Advanced Statistics 1
PSYC 651	(3)	Advanced Statistics 2
PSYC 660D1	(3)	Psychology Theory
PSYC 660D2	(3)	Psychology Theory

Note: The Department of Psychology does not ordinarily require an examination in a foreign language however, all students planning on practicing clinical psychology in the province of Quebec will be examined based on their proficiency in French before being admitted to the professional association.

11.10 Redpath Museum

11.10.1 Location

Redpath Museum
 859 Sherbrooke Street West
 Montreal QC H3A 0C4
 Canada
 Telephone: 514-398-4086
 Email: redpath.museum@mcgill.ca
 Website: mcgill.ca/redpath

11.10.2 About Redpath Museum

The Redpath Museum is a unique interdisciplinary unit within the Faculty of Science offering graduate training in research devoted to biodiversity, ecology, conservation biology, and evolutionary biology, leading to **M.Sc.** and **Ph.D.** degrees. It is an institution with extensive collections of ancient and modern organisms, minerals, and cultural artifacts. Research and teaching are centred on collections-based study, object-oriented investigation, and fieldwork. The Museum has a unique public engagement mission with large exhibit galleries and a vibrant outreach program.

11.10.3 Redpath Museum Admission Requirements and Application Procedures

11.10.3.1 Admission Requirements

The Redpath Museum does not have its own graduate programs. All graduate students of the professors in the Redpath Museum have affiliations with either **Biology, Earth and Planetary Sciences, Anthropology, Natural Resource Sciences, or Education**. Admission requirements are subject to those home departments' regulations.

11.10.3.2 Application Procedures

Students in the Redpath Museum may enrol in McGill's Department of [section 11.2: Biology](#) or other units, including the Department of [section 11.5: Earth and Planetary Sciences](#), the Department of [Anthropology](#), the Department of [Natural Resource Sciences](#), or the [Faculty of Education](#). Anyone interested should contact the unit concerned.

11.10.3.3 Application Dates and Deadlines

For more information, please contact the Graduate Program Coordinator in the department you are interested in.