



**Faculty of Science, including School of Computer
Science (Graduate)
Programs, Courses and University Regulations
2016-2017**

This PDF excerpt of *Programs, Courses and University Regulations* is an archived snapshot of the web content on the date that appears in the footer of the PDF.

Archival copies are available at www.mcgill.ca/study.

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

- 1 . McGill University reserves the right to make changes to the information contained in this online publication - including correcting errors, altering fees, schedules of admission, and credit requirements, and revising or cancelling particular courses or programs - without prior notice.
- 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.
- 6 . Not all courses are offered every year and changes can be made after publication. Always check the Minerva Class Schedule link at https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched for the most up-to-date information on whether a course is offered.
- 7 . The academic publication year begins at the start of the Fall semester and extends through to the end of the Winter semester of any given year. Students who begin study at any point within this period are governed by the regulations in the publication which came into effect at the start of the Fall semester.
- 8 . Notwithstanding any other provision of the publication, it is expressly understood by all students that McGill University accepts no responsibility to provide any course of instruction, program or class, residential or other services including the normal range of academic, residential and/or other services in circumstances of utility interruptions, fire, flood, strikes, work stoppages, labour disputes, war, insurrection, the operation of law or acts of God or any other cause (whether similar or dissimilar to those enumerated) which reasonably prevent their provision.

Note: Throughout this publication, "you" refers to students newly admitted, readmitted or returning to McGill.

Publication Information

Published by

Enrolment Services

McGill University
3415 McTavish Street
Montreal, Quebec, H3A 0C8
Canada

All contents copyright © 2016 by McGill University. All rights reserved, including the right to reproduce this publication, or portions thereof, in any form.

McGill University reserves the right to make changes to the information contained in this publication - including correcting errors, altering fees, schedules of admission and credit requirements, and revising or cancelling particular courses or programs - without prior notification.

Not all courses are offered every year and changes can be made after publication. Always check the Minerva Class Schedule link at https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched for the most up-to-date information on whether a course is offered.

-
- 1 Dean's Welcome, page 9
 - 2 Graduate and Postdoctoral Studies, page 9
 - 2.1 Administrative Officers, page 9
 - 2.2 Location, page 9
 - 2.3 General Statement Concerning Higher Degrees, page 10
 - 3 Important Dates 2016–2017, page 10
 - 4 Graduate Studies at a Glance, page 10
 - 5 Program Requirements, page 10
 - 5.1 Master's Degrees, page 10
 - 5.2 Doctoral Degrees, page 11
 - 5.3 Ad Personam Programs (Thesis Option Only), page 12
 - 5.4 Coursework for Graduate Programs, Diplomas, and Certificates, page 12
 - 6 Graduate Admissions and Application Procedures, page 12
 - 7 Fellowships, Awards, and Assistantships, page 13
 - 8 Postdoctoral Research, page 13
 - 8.1 Postdocs, page 13
 - 8.2 Guidelines and Policy for Academic Units on Postdoctoral Education, page 13
 - 8.3 Vacation Policy for Graduate Students and Postdocs, page 15
 - 8.4 Leave of Absence for Health and Parental/Familial Reasons, page 15
 - 8.5 Postdoctoral Research Trainees, page 15
 - 9 Graduate Studies Guidelines and Policies, page 16
 - 10 Information on Research Policies and Guidelines, Patents, Postdocs, Associates, Trainees, page 16
 - 11 Browse Academic Units & Programs, page 16
 - 11.1 Atmospheric and Oceanic Sciences, page 17
 - 11.1.1 Location, page 17
 - 11.1.2 About Atmospheric and Oceanic Sciences, page 17
 - 11.1.3 Atmospheric and Oceanic Sciences Admission Requirements and Application Procedures, page 18
 - 11.1.3.1 Admission Requirements, page 18
 - 11.1.3.2 Application Procedures, page 18
 - 11.1.3.3 Application Deadlines, page 18
 - 11.1.4 Atmospheric and Oceanic Sciences Faculty, page 18
 - 11.1.5 Master of Science (M.Sc.); Atmospheric and Oceanic Sciences (Thesis) (45 credits) , page 19
 - 11.1.6 Master of Science (M.Sc.); Atmospheric and Oceanic Sciences (Thesis) — Environment (45 credits) , page 20
 - 11.1.7 Doctor of Philosophy (Ph.D.); Atmospheric and Oceanic Sciences , page 21
 - 11.2 Biology, page 22
 - 11.2.1 Location, page 22
 - 11.2.2 About Biology, page 22
 - 11.2.3 Biology Admission Requirements and Application Procedures, page 24
 - 11.2.3.1 Admission Requirements, page 24
 - 11.2.3.2 Application Procedures, page 24

-
- 11.2.3.3 Application Deadlines, page 25
 - 11.2.4 Biology Faculty, page 25
 - 11.2.5 Master of Science (M.Sc.); Biology (Thesis) (45 credits) , page 27
 - 11.2.6 Master of Science (M.Sc.); Biology (Thesis) — Environment (48 credits) , page 27
 - 11.2.7 Master of Science (M.Sc.); Biology (Thesis) — Neotropical Environment (48 credits) , page 27
 - 11.2.8 Master of Science (M.Sc.); Biology (Thesis) — Bioinformatics (48 credits) , page 28
 - 11.2.9 Doctor of Philosophy (Ph.D.); Biology , page 28
 - 11.2.10 Doctor of Philosophy (Ph.D.); Biology — Environment , page 29
 - 11.2.11 Doctor of Philosophy (Ph.D.); Biology — Neotropical Environment , page 29
 - 11.2.12 Doctor of Philosophy (Ph.D.); Biology — Bioinformatics , page 30
 - 11.3 Chemistry, page 30
 - 11.3.1 Location, page 30
 - 11.3.2 About Chemistry, page 30
 - 11.3.3 Chemistry Admission Requirements and Application Procedures, page 31
 - 11.3.3.1 Admission Requirements, page 31
 - 11.3.3.2 Application Procedures, page 31
 - 11.3.3.3 Application Deadlines, page 32
 - 11.3.4 Chemistry Faculty, page 32
 - 11.3.5 Master of Science (M.Sc.); Chemistry (Thesis) (45 credits) , page 33
 - 11.3.6 Doctor of Philosophy (Ph.D.); Chemistry , page 34
 - 11.4 Computer Science, page 34
 - 11.4.1 Location, page 34
 - 11.4.2 About Computer Science, page 35
 - 11.4.3 Computer Science Admission Requirements and Application Procedures, page 35
 - 11.4.3.1 Admission Requirements, page 35
 - 11.4.3.2 Application Procedures, page 36
 - 11.4.3.3 Application Deadlines, page 36
 - 11.4.4 Computer Science Faculty, page 36
 - 11.4.5 Master of Science (M.Sc.); Computer Science (Thesis) (45 credits) , page 38
 - 11.4.6 Master of Science (M.Sc.); Computer Science (Thesis) — Bioinformatics (45 credits) , page 38
 - 11.4.7 Master of Science (M.Sc.); Computer Science (Thesis) — Computational Science and Engineering (45 credits) , page 39
 - 11.4.8 Master of Science (M.Sc.); Computer Science (Non-Thesis) (45 credits) , page 40
 - 11.4.9 Doctor of Philosophy (Ph.D.); Computer Science , page 40
 - 11.4.10 Doctor of Philosophy (Ph.D.); Computer Science — Bioinformatics , page 42
 - 11.5 Earth and Planetary Sciences, page 43
 - 11.5.1 Location, page 43
 - 11.5.2 About Earth and Planetary Sciences, page 43
 - 11.5.3 Earth and Planetary Sciences Admission Requirements and Application Procedures, page 45
 - 11.5.3.1 Admission Requirements, page 45

-
- 11.5.3.2 Application Procedures, page 45
 - 11.5.3.3 Application Deadlines, page 45
 - 11.5.4 Earth and Planetary Sciences Faculty, page 45
 - 11.5.5 Master of Science (M.Sc.); Earth and Planetary Sciences (Thesis) (45 credits) , page 46
 - 11.5.6 Master of Science (M.Sc.); Earth and Planetary Sciences (Thesis) — Environment (48 credits) , page 46
 - 11.5.7 Doctor of Philosophy (Ph.D.); Earth and Planetary Sciences , page 47
 - 11.5.8 Doctor of Philosophy (Ph.D.); Earth and Planetary Sciences — Environment , page 47
 - 11.6 Geography, page 48
 - 11.6.1 Location, page 48
 - 11.6.2 About Geography, page 48
 - 11.6.3 Geography Admission Requirements and Application Procedures, page 51
 - 11.6.3.1 Admission Requirements, page 51
 - 11.6.3.2 Application Procedures, page 51
 - 11.6.3.3 Application Deadlines, page 51
 - 11.6.4 Geography Faculty, page 51
 - 11.6.5 Master of Science (M.Sc.); Geography (Thesis) (45 credits) , page 52
 - 11.6.6 Master of Science (M.Sc.); Geography (Thesis) — Environment (45 credits) , page 53
 - 11.6.7 Master of Science (M.Sc.); Geography (Thesis) — Neotropical Environment (45 credits) , page 53
 - 11.6.8 Doctor of Philosophy (Ph.D.); Geography , page 54
 - 11.6.9 Doctor of Philosophy (Ph.D.); Geography — Environment , page 54
 - 11.6.10 Doctor of Philosophy (Ph.D.); Geography — Gender and Women's Studies , page 55
 - 11.6.11 Doctor of Philosophy (Ph.D.); Geography — Neotropical Environment , page 55
 - 11.7 Mathematics and Statistics, page 56
 - 11.7.1 Location, page 56
 - 11.7.2 About Mathematics and Statistics, page 56
 - 11.7.3 Mathematics and Statistics Admission Requirements and Application Procedures, page 58
 - 11.7.3.1 Admission Requirements, page 58
 - 11.7.3.2 Application Procedures, page 58
 - 11.7.3.3 Application Deadlines, page 58
 - 11.7.4 Mathematics and Statistics Faculty, page 58
 - 11.7.5 Master of Science (M.Sc.); Mathematics and Statistics (Thesis) (45 credits) , page 61
 - 11.7.6 Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Bioinformatics (48 credits) , page 61
 - 11.7.7 Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Computational Science and Engineering (47 credits) , page 61
 - 11.7.8 Master of Science (M.Sc.); Mathematics and Statistics (Non-Thesis) (45 credits) , page 63
 - 11.7.9 Doctor of Philosophy (Ph.D.); Mathematics and Statistics , page 63
 - 11.7.10 Doctor of Philosophy (Ph.D.); Mathematics and Statistics — Bioinformatics , page 63
 - 11.8 Physics, page 64
 - 11.8.1 Location, page 64
 - 11.8.2 About Physics, page 64

-
- 11.8.3 Physics Admission Requirements and Application Procedures, page 66
 - 11.8.3.1 Admission Requirements, page 66
 - 11.8.3.2 Application Procedures, page 66
 - 11.8.3.3 Application Deadlines, page 67
 - 11.8.4 Physics Faculty, page 67
 - 11.8.5 Master of Science (M.Sc.); Physics (Thesis) (45 credits) , page 69
 - 11.8.6 Doctor of Philosophy (Ph.D.); Physics , page 69
 - 11.9 Psychology, page 70
 - 11.9.1 Location, page 70
 - 11.9.2 About Psychology, page 70
 - 11.9.3 Psychology Admission Requirements and Application Procedures, page 71
 - 11.9.3.1 Admission Requirements, page 71
 - 11.9.3.2 Application Procedures, page 71
 - 11.9.3.3 Application Deadlines, page 72
 - 11.9.4 Psychology Faculty, page 72
 - 11.9.5 Master of Science (M.Sc.); Psychology (Thesis) (45 credits) , page 74
 - 11.9.6 Doctor of Philosophy (Ph.D.); Psychology , page 74
 - 11.9.7 Doctor of Philosophy (Ph.D.); Psychology — Language Acquisition , page 75
 - 11.9.8 Doctor of Philosophy (Ph.D.); Psychology — Psychosocial Oncology , page 76
 - 11.10 Redpath Museum, page 77
 - 11.10.1 Location, page 77
 - 11.10.2 About Redpath Museum, page 77
 - 11.10.3 Redpath Museum Admission Requirements and Application Procedures, page 77
 - 11.10.3.1 Admission Requirements, page 77
 - 11.10.3.2 Application Procedures, page 77
 - 11.10.3.3 Application Deadlines, page 77
 - 11.10.4 Redpath Museum Faculty, page 77

1 Dean's Welcome

To Graduate Students and Postdoctoral Fellows:

I am extremely pleased to welcome you to McGill University. Graduate and Postdoctoral Studies (GPS) collaborates with the Faculties and other administrative and academic units to provide strategic leadership and vision for graduate teaching, supervision, and research across our over 400 graduate programs. GPS also oversees quality assurance in admissions and registration, the disbursement of graduate fellowships, support for postdoctoral fellows, and facilitates graduate degree completion, including the examination of theses. GPS has partnered with Enrolment Services to manage the admission and registration of graduate students and postdoctoral fellows and to offer streamlined services in a one-stop location at [Service Point](#).

McGill is a student-centred research institution that places singular importance upon the quality of graduate education and postdoctoral training. As Dean of Graduate and Postdoctoral Studies, I work closely with the Faculties, central administration, graduate students, professors, researchers, and postdoctoral fellows to provide a supportive, stimulating, and enriching academic environment for all graduate students and postdoctoral fellows.

McGill is one of Canada's most intensive research universities, ranked 24th by *QS World University Rankings 2015*. We recognize that these successes come not only from our outstanding faculty members, but also from the quality of our graduate students and postdoctoral fellows—a community into which we are very happy to welcome you.

I invite you to join us in advancing this heritage of excellence at McGill.

Josephine Nalbantoglu, Ph.D.
Dean, Graduate and Postdoctoral Studies

2 Graduate and Postdoctoral Studies

2.1 Administrative Officers

Administrative Officers

| | |
|---|---|
| Josephine Nalbantoglu; B.Sc., Ph.D. (McG.) | Dean (Graduate and Postdoctoral Studies) |
| Robin Beech; B.Sc.(Nott.), Ph.D.(Edin.) | Associate Dean (Graduate and Postdoctoral Studies) |
| France Bouthillier; B.Ed., C.Admin.(UQAM), M.B.S.I.(Montr.), Ph.D.(Tor.) (on sabbatical 2016–2017) | Associate Dean (Graduate and Postdoctoral Studies) |
| Patricia G. Kirkpatrick; B.A.(McG.), M.Th.(Lond.), D.Phil.(Oxf.), D.D.(MDTC) (<i>Interim</i>) | Associate Dean (Graduate and Postdoctoral Studies) |
| Jean-Jacques Lebrun; B.Sc.(La Roche-sur-Yon), M.Sc.(Rennes), Ph.D.(Paris V) | Associate Dean (Graduate and Postdoctoral Studies) |
| Elisa Pylkkanen; B.A., M.A.(McG.) | Director (Graduate and Postdoctoral Studies) |

2.2 Location

James Administration Building, Room 400
845 Sherbrooke Street West
Montreal QC H3A 0G4
Telephone: 514-398-3990
Fax: 514-398-6283
Email: servicepoint@mcgill.ca
Website: www.mcgill.ca/gps



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

2.3 General Statement Concerning Higher Degrees

Graduate and Postdoctoral Studies (GPS) oversees all programs leading to graduate diplomas, certificates, and higher degrees, with the exception of some programs in the School of Continuing Studies. It is responsible for admission policies, the supervision of graduate students' work, and for recommending to Senate those who may receive the degrees, diplomas, and certificates.

3 Important Dates 2016–2017

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

4 Graduate Studies at a Glance

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

5 Program Requirements

5.1 Master's Degrees

Residence Requirements – Master's Degrees

Refers to the number of terms (or years) students must be registered on a full-time basis to complete their program. Students are NOT permitted to graduate until they have fulfilled the residence requirement (or paid the corresponding fees) in their program.

- The following master's programs have a **minimum** residence requirement of **three full-time terms**: M.Arch., M.A., M.Eng., LL.M., M.Mus. (**except** M.Mus. in Sound Recording), M.Sc., M.S.W., M.Sc.A. (**except** M.Sc.A. in Communication Sciences and Disorders).
- The following master's programs have a **minimum** residence requirement of **four full-time terms**: M.I.St.; M.Mus. in Sound Recording; M.U.P.; M.A. (60 credits – Counselling Psychology – thesis; 78 credits – Educational Psychology); M.A. Teaching and Learning – Non-Thesis; M.Sc.A. in Communication Sciences and Disorders; S.T.M., Religious Studies.
- The residence requirement for the master's program in Education (M.Ed.); Information Studies (M.I.St.); Management (M.B.A.); Religious Studies (S.T.M.); M.A. Counselling Psychology – Non-Thesis; M.A. Teaching and Learning – Non-Thesis; M.Sc. in Public Health – Non-Thesis; M.Sc.A. Nursing; M.Sc.A. Occupational Therapy; M.Sc.A. Physical Therapy; and students in part-time programs is determined on a per course basis. Residence requirements are fulfilled when students complete all course requirements in their respective programs.
- For master's programs structured as Course, Project, or Non-Thesis options where the program is pursued on a part-time basis, residence requirements are normally fulfilled when students complete all course requirements in their respective programs (minimum 45 credits or a minimum of three full-time terms) and pay the fees accordingly.

These designated periods of residence represent minimum time requirements. There is no guarantee that the work for the degree can be completed in this time. Students must register for such additional terms as are needed to complete the program.

Coursework – Master's Degrees

Program requirements are outlined in the relevant departmental sections of the Graduate and Postdoctoral Studies [eCalendar](#).

The minimum credit requirement for any thesis or non-thesis master's degree at McGill is 45 credits.

Non-thesis degrees normally specify the course program which the candidate must follow.

The department concerned will examine the student's previous training and then decide which of the available courses in the area of specialization or related fields are required to bring the candidate to the proper level for the master's degree. Due account will be taken of relevant graduate level courses passed at any recognized university or at McGill.

The candidate is required to pass, with a grade of B- or better, all those courses that have been designated by the department as forming a part of the program, including additional requirements.

Students taking courses at another university must obtain a minimum grade of B- (65%) if the course is to be credited toward their McGill degree. In the cases where only a letter grade is used, a B- is the minimum passing grade and no equivalent percentage will be considered. In the cases where only a percentage grade is used, 65% is the minimum passing grade.

As a rule, no more than one-third of the formal coursework (excluding thesis, project, stage, or internship) of a McGill master's degree can be credited with courses from another university or degree (for example, courses taken before admission to the McGill degree, or courses taken through the IUT agreement during the McGill degree, if permitted).

Normally, if courses completed elsewhere or at McGill prior to admission to the McGill master's degree were not used to complete a degree, they could be credited toward the McGill degree, keeping in mind the one-third rule as described above. These would be entered as exemptions with credit at the time of admission.

If the courses completed elsewhere or at McGill prior to admission were used to complete a degree, exemptions may be granted without credit, i.e. the exempted course(s) must be replaced by other graduate course(s) at McGill. No double counting is allowed unless, exceptionally, the department offering the Master's degree permits it and the degree has an overall credit requirement greater than 45 credits. In other words, instances where exemptions with credit may be granted will be limited to the credit amount beyond the minimum of 45 credits for a McGill master's degree. The one-third rule as described above continues to apply.

Research and Thesis – Master's Degrees

All candidates for a research degree must present a thesis based on their own research. The total number of credits allotted to the thesis in any master's program must not be less than 24. The title of the thesis and names of examiners must be forwarded on a *Nomination of Examiners and Thesis Submission* form, available at www.mcgill.ca/gps/thesis/guidelines/initial-submission, in accordance with the dates on www.mcgill.ca/importantdates, through the Chair of the department concerned at the same time that the thesis is submitted to Graduate and Postdoctoral Studies. A thesis for the master's degree, while not necessarily requiring an exhaustive review of work in the particular field of study, or a great deal of original scholarship, must show familiarity with previous work in the field and must demonstrate the ability to carry out research and to organize results, all of which must be presented in good literate style. The thesis will not normally exceed 100 pages; in some disciplines, shorter texts are preferred. Guidelines and deadlines are available at www.mcgill.ca/gps/thesis/guidelines.

Language Requirements – Master's Degrees

Many master's degree programs do not include language requirements, but candidates who intend to proceed to a doctoral degree should take note of any language requirements and are strongly advised to take the examinations in at least one language while working for the master's degree.

5.2 Doctoral Degrees

Residence Requirements – Doctoral

Refers to the numbers of terms (or years) students must be registered on a full-time basis to complete their program. Students are not permitted to graduate until they have fulfilled the residence requirement (or paid the corresponding fees) in their program.

Candidates entering Ph.D. 1 must follow a program of at least three years' residency at the University; this is a minimum requirement, and there is no guarantee that the work of the degree can be completed in this time, but students are expected to complete within the maximum specified period. Only exceptional candidates holding a bachelor's degree will be considered for direct admission to Ph.D. 1 level.

It is required that candidates spend the greater part of each summer working on their theses, and those who do not do so are unlikely to complete a satisfactory thesis in the prescribed minimum time (see [section 8.3: Vacation Policy for Graduate Students and Postdocs](#)).

A student who has obtained a master's degree at McGill University or at an approved institution in a relevant subject and is proceeding to a Ph.D. degree will, on the recommendation of the department, be admitted to Ph.D. 2; in this case, the residency requirement for the program is two years.

In the doctoral program, students must be registered on a full-time basis for one more year after completion of the residency (i.e., Ph.D. 4 year) before continuing as Additional Session students until completion of the program.



Note: The master's degree must have been awarded before initial registration in the doctoral program; otherwise, the admission level will be at Ph.D. 1 and residency will be extended to three years. Once the level of admission is approved, it will not be changed after obtaining the master's degree if the date falls after registration in the program. If a previous awarded degree is a condition of admission, it must be fulfilled before registration in another program.

As a rule, no more than one-third of the McGill program formal coursework can be credited with courses from another university.

Comprehensive Examinations – Doctoral

The majority of doctoral programs at McGill require candidates to pass a comprehensive examination or set of examinations or equivalent, such as qualifying examinations, preliminary examinations, candidacy papers, comprehensive evaluations, thesis proposals, etc. The results of this examination determine whether or not students will be permitted to continue in their programs. The methods adopted for examination and evaluation and the areas to be examined are specified by departmental regulations and approved by Graduate and Postdoctoral Studies. It is the responsibility of students to inform themselves of these details. For more information, see [University Regulations and Resources > Graduate > Guidelines and Policies > : Ph.D. Comprehensives Policy](#).

Language Requirements – Doctoral

Many graduate departments in the Faculties of Agricultural and Environmental Sciences, Education, Engineering, Management, Medicine, and Science do not require a language examination. Students should inquire in their departments if there are any such requirements, or whether any other requirements have been substituted for those relating to languages.

Graduate departments in the Faculties of Arts, Music, and Religious Studies usually require proficiency in one or two languages other than English. In all cases, **students should consult departmental regulations concerning language requirements**.

Language requirements for the Ph.D. degree are met through demonstrated reading knowledge. The usual languages are French, German, or Russian, but in particular instances another language may be necessary.

All language requirements must be fulfilled and the grades reported **before** submission of the thesis to GPS (Thesis section).

Students must contact their departments to make arrangements to take the Language Reading Proficiency Examinations. Students may, however, demonstrate competence by a pass standing in two undergraduate language courses taken at McGill (see departmental regulations).

Candidates are advised to discharge their language requirements as early in their program as possible.

Students expecting to enrol in Professional Corporations in the province of Quebec are advised to become fluent in both spoken and written French.

French language courses are available at the French Language Centre. The teaching is intensive and class sizes are kept small. While undergraduate students are given preference, graduate students who are certain they can devote sufficient time to the work may enrol.

Thesis – Doctoral

The thesis for the Ph.D. degree must display original scholarship expressed in good literate style and must be a distinct contribution to knowledge. **Formal notice of a thesis title and names of examiners must be submitted to the Thesis section of GPS on the *Nomination of Examiners and Thesis Submission* form, available at www.mcgill.ca/gps/thesis/guidelines/initial-submission, in accordance with the dates on www.mcgill.ca/importantdates, at the same time as the thesis is submitted.** The list of examiners must be approved by the Department Chair, the supervisor and the student. The Thesis section of GPS should be notified of any subsequent change of title as early as possible. Guidelines and deadlines are available at www.mcgill.ca/gps/thesis/guidelines.

Special regulations for the Ph.D. degree in particular departments are stated in the entries of those departments.

Thesis Oral Examination – Doctoral

After the thesis has been received and approved, a final oral examination is held on the subject of the thesis and subjects intimately related to it. This is conducted in the presence of a Committee of at least five members presided over by a Pro-Dean nominated by Graduate and Postdoctoral Studies. The Chair of the candidate's department and the Thesis Supervisor are regularly invited to be members of the Committee; at least one member of the Committee is appointed from outside the candidate's department. Guidelines are available at www.mcgill.ca/gps/thesis/guidelines.

5.3 Ad Personam Programs (Thesis Option Only)

In very rare circumstances, an applicant who wishes to engage in Master's (thesis option only) or Ph.D. studies of an interdisciplinary nature involving joint supervision by two departments, each of which is authorized by the Government of Quebec to offer its own graduate programs, may be admitted to an *Ad Personam* program. For more information, see www.mcgill.ca/gradapplicants/programs and contact the relevant department.

5.4 Coursework for Graduate Programs, Diplomas, and Certificates

Upper-level undergraduate courses (excluding 500-level) may not be considered for degrees, diplomas, and certificates unless they are already listed as required courses in the approved program description. If an upper-level undergraduate course (excluding 500 level) is taken by a graduate student, it must come as a recommendation from the Graduate Program Director in the department. The recommendation must state if the undergraduate course is an additional requirement for the program (must obtain B- or better) or if the course is extra to the program (will be flagged as such on the record and fees will be charged). See document at www.mcgill.ca/gps/students/registration#coursereg.

English and French language courses offered by the French Language Centre (Faculty of Arts) or the School of Continuing Studies may not be taken for coursework credits toward a graduate program.

All substitutions for coursework in graduate programs, diplomas, and certificates must be approved by GPS.

Courses taken at other institutions to be part of the requirements of a program of study must be approved by GPS before registration. Double counting is not permitted.

6 Graduate Admissions and Application Procedures

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

- Application for Admission
- Admission Requirements
- Application Procedures
- Competency in English

and other important information regarding admissions and application procedures for Graduate and Postdoctoral Studies.

7 Fellowships, Awards, and Assistantships

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

8 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 required by postdoctoral scholars during their studies at McGill and should be periodically consulted, along with other sections and related publications.

8.1 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 him/her 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.).

8.2 Guidelines and Policy for Academic Units on Postdoctoral Education

The general guidelines listed below are meant to encourage units to examine their policies and procedures to support postdoctoral education. Every unit hosting Postdocs should have explicitly stated policies and procedures for the provision of postdoctoral education as well as established means for informing Postdocs of policies, procedures, and privileges (e.g., orientation sessions, handbooks, etc.), as well as mechanisms for addressing complaints. Academic units should ensure that their policies, procedures and privileges are consistent with these guidelines and the Charter of Students' Rights. For their part, Postdocs are responsible for informing themselves of policies, procedures, and privileges.

1. Definition and Status

i. Postdoctoral status will be recognized by the University in accordance with Quebec provincial regulations. Persons may only be registered with postdoctoral status for a period of up to five years from the date they were awarded a Ph.D. or equivalent degree. Time allocated to parental or health leave is added to this period of time. Leaves for other reasons, including vacation leave, do not extend the term. Postdocs must do research under the supervision of a McGill professor, including Adjunct Professors, who is a member of McGill's academic staff qualified in the discipline in which training is being provided and with the abilities to fulfil responsibilities as a supervisor of the research and as a mentor for career development. They are expected to be engaged primarily in research with minimal teaching or other responsibilities.

2. Registration

i. Postdocs must be registered annually with the University through Enrolment Services. Initial registration will require an original or notarized copy of the Ph.D. diploma. Registration will be limited to persons who fulfil the definition above and for whom there is an assurance of appropriate funding and where the unit can provide assurance of the necessary resources to permit postdoctoral education.

ii. Upon registration, the Postdoc will be eligible for a University identity card issued by Enrolment Services.

3. Appointment, Pay, Agreement of Conditions

i. Appointments may not exceed your registration eligibility status.

ii. In order to be registered as a Postdoc, you must be assured of financial support other than from personal means during your stay at McGill University, equivalent to the minimal stipend requirement set by the University in accordance with guidelines issued by federal and provincial research granting agencies. There are no provisions for paid parental leave unless this is stipulated in the regulations of a funding agency outside the University.

iii. At the outset of a postdoctoral appointment, a written Letter of Agreement for Postdoctoral Education should be drawn up and signed by the Postdoc, the supervisor, and the department head or delegate (see template Letter of Agreement and supporting document—[Commitments of Postdoctoral Scholars and Supervisors](#)—available at www.mcgill.ca/gps/postdocs/fellows/responsibilities). This should stipulate, for example, the purpose of the postdoctoral appointment (research training and the advancement of knowledge), the duration of the fellowship/financial support, the modality of pay, the work space, travel funds, and expectations and compensation for teaching and student research supervision. Leaves from postdoctoral education must comply with the Graduate and Postdoctoral Studies Policies for Vacation, Parental/Familial, and Health Leave (see [section 8.3: Vacation Policy for Graduate Students and Postdocs](#) and [University Regulations and Resources > Graduate > Regulations > Categories of Students > : Leave of Absence Status](#)). Any breach of these conditions may result in grievance procedures or the termination of the postdoctoral appointment.

- iv. Postdocs with full responsibility for teaching a course should be compensated over and above their fellowship at the standard rate paid to lecturers by their department. This applies to all postdocs, except those for whom teaching is part of the award (e.g., Mellon grantees).
- 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. 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 in the *Handbook on Student Rights and Responsibilities* (“Green Book”), available at www.mcgill.ca/secretariat/policies/students.
- ii. Postdocs have full graduate student borrowing privileges in McGill libraries through their identity card.
- iii. As a rule, Postdocs who are Canadian citizens or who have Permanent Resident status may take courses for credit. Admission to such courses should be sought by submitting application documents directly to the appropriate program by the Postdoc. They must be admitted by the department offering the courses as Special Students. These Postdocs may only be enrolled as part-time students in non-degree granting programs. They will be charged fees for these courses.
- iv. Postdocs may be listed in the McGill directory. The Computing Centre will grant Postdocs email privileges on the same basis as graduate students upon presentation of a valid identity card.
- v. The Department of Athletics will grant Postdocs access to sports facilities upon presentation of their identity card. A fee will be charged on an annual or term basis.
- vi. Postdocs are mandatory members of the Post-Graduate Students’ Society (PGSS) and an annual association fee is automatically charged. PGSS fees are mandatory. Postdocs are permitted membership in the Faculty Club; an annual fee will be charged for this membership.
- vii. 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.
- viii. Postdocs have access to the services provided by the Ombudsperson.
- ix. 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.
- x. Access to student services and athletic services are available to the Postdoc on an opt-in basis. Fees are applicable.

5. Responsibilities

- i. Postdocs are subject to the responsibilities outlined in the *Handbook on Student Rights and Responsibilities* (“Green Book”), available at www.mcgill.ca/secretariat/policies/students.
- 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 responsibilities of the department are:
 - to verify the Postdoc’s eligibility period for registration;
 - to provide Postdocs with departmental policy and procedures that pertain to them;
 - to oversee the registration and appointment of Postdocs;
 - to assign departmental personnel (e.g., Postdoc coordinator and Graduate Program Director) the responsibility for Postdocs;
 - 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;
 - 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 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;
 - to prepare, sign, and adhere to a Letter of Agreement for Postdoctoral Education.
- vi. Some examples of responsibilities of Postdocs are:
 - to inform themselves of and adhere to the University’s policies and/or regulations for Postdocs for leaves, for research, and for student conduct as outlined in the *Handbook on Student Rights and Responsibilities* 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;
 - 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.

Approved by Senate, April 2000; revised May 2014

8.3 Vacation Policy for Graduate Students and Postdocs

Graduate students and Postdocs should normally be entitled to vacation leave equivalent to university holidays and an additional total of fifteen (15) working days in the year. Funded students and Postdocs with fellowships and research grant stipends taking additional vacation leave may have their funding reduced accordingly.

Council of FGSR April 23, 1999

8.4 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 and 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 and 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 www.mcgill.ca/gps/funding/students-postdocs/accepting-maintaining-awards under "Leave Policies: Funding Council Leave Policies for Graduate Students and Postdoctoral Fellows."

8.5 Postdoctoral Research Trainees

Eligibility

If your situation does not conform to the Government of Quebec's definition of 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—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 the degree/certification has not yet been awarded. The individual 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. The individual wishes to conduct the research stage or elective component of his/her program of study at McGill University under the supervision of a McGill professor. The individual will be engaged in full-time research with well-defined objectives, responsibilities, and methods of reporting. The application must be accompanied by a letter of permission from the 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/diploma;
- 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.

9 Graduate Studies Guidelines and Policies

Refer to [University Regulations and 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

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

Refer to [University Regulations and Resources](#) > *Graduate* > : [Research Policy and Guidelines, Patents, Postdocs, Associates, Trainees](#) for information on the following:

- Policy on Research Ethics
- Regulations on Research Policy
- Policy on Research Integrity
- Guidelines for Research Involving Human Subjects
- Guidelines for Research with Animal Subjects
- 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 2016–2017 session as listed. The Faculty/School reserves the right to introduce changes as may be deemed necessary or desirable at any time throughout the year.

11.1 Atmospheric and Oceanic Sciences

11.1.1 Location

Department of Atmospheric and Oceanic Sciences
 Burnside Hall
 805 Sherbrooke Street West, Room 945
 Montreal QC H3A 0B9
 Canada
 Telephone: 514-398-3764
 Fax: 514-398-6115
 Email: info.aos@mcgill.ca
 Website: www.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, mesoscale, and radar and satellite meteorology.

Some faculty members have close ties with other departments, schools, and centres, including the Chemistry, and Mathematics and Statistics Departments; the *McGill School of Environment*; *ArcticNet*; and *Quebec Ocean*. Facilities include the J. Stewart Marshall Radar 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 massive parallel machines available to us through CLUMEQ and Compute Canada, and the IBM supercomputer at Environment 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 and teaching assistantships is available for all qualified graduate students.

section 11.1.5: 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, such 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 large professor-to-student ratio, access to state-of-the-art computing, remote sensing, and atmospheric chemistry laboratory equipment. The Department also has close ties with Environment Canada's numerical weather prediction centre in Dorval, Quebec.

Most of our incoming M.Sc. students choose this (default) option. It 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 Canada as research associates or weather forecasters.

section 11.1.6: Master of Science (M.Sc.); Atmospheric and Oceanic Sciences (Thesis) — Environment (45 credits)

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. The option also provides a forum whereby graduate students bring their disciplinary perspectives together and enrich each other's learning through structured courses, formal seminars, and informal discussions and networking.

Students following the Environment option must first be accepted by the Department of Atmospheric and Oceanic Sciences, and then by the *McGill School of Environment* (MSE) before an offer of admission will be made by the University. Environment option students require either a single supervisor with a joint appointment in Atmospheric and Oceanic Sciences and the MSE, or co-supervisors, one each in Atmospheric and Oceanic Sciences and the MSE.

section 11.1.7: 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, such 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 large professor-to-student ratio, access to state-of-the-art computing, remote sensing, and atmospheric chemistry laboratory equipment. The Department also has close ties with Environment 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 Canada.

11.1.3 Atmospheric and Oceanic Sciences Admission Requirements and Application Procedures**11.1.3.1 Admission Requirements**

Applicants for 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, physics, mathematics, engineering, or equivalent.

The normal requirement for admission to the Ph.D. program is a strong background in meteorology, physical oceanography, or related disciplines such as mathematics, physics, and engineering. Many students will have an M.Sc. degree in one of these fields, although this is not a formal requirement. Students without a master's degree in atmospheric science (meteorology) or physical oceanography will enter at the Ph.D. 1 rather than the Ph.D. 2 level, and devote the first year of the program mainly to coursework.

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

11.1.3.2 Application Procedures

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

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

11.1.3.2.1 Additional Requirements

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

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

11.1.3.3 Application Deadlines

The application deadlines listed here are set by the Atmospheric and Oceanic Sciences department and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|------------------|------------------|--|
| Fall: Feb. 28 | Fall: Feb. 28 | Fall: Feb. 28 |
| Winter: Sept. 15 | Winter: Sept. 10 | Winter: Same as Canadian/International |
| Summer: N/A | Summer: N/A | Summer: N/A |

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 Atmospheric and Oceanic Sciences Faculty**Chair**

J.R. Gyakum

Emeritus Professors

J.F. Derome; B.Sc., M.Sc.(McG.), Ph.D.(Mich.), F.R.S.C.

H.G. Leighton; B.Sc., M.Sc.(McG.), Ph.D.(Alta.)

L.A. Mysak; C.M., B.Sc.(Alta.), M.Sc.(Adel.), A.M., Ph.D.(Harv.), F.R.S.C. (*Canada Steamship Lines Professor of Meteorology*)

Emeritus Professors

I. Zawadzki; B.Sc.(Buenos Aires), M.Sc., Ph.D.(McG.), F.R.S.C.

Professors

P. Ariya; B.Sc., Ph.D.(York) (*James McGill Professor*) (*joint appt. with Chemistry*)

J.R. Gyakum; B.Sc.(Penn. St.), M.Sc., Ph.D.(MIT)

M.K. Yau; S.B., S.M., Sc.D.(MIT) (*NSERC/Hydro-Québec Industrial Research Chair in Short-term Forecasting of Precipitation*)

Associate Professors

P. Bartello; B.Sc., M.Sc., Ph.D.(McG.) (*joint appt. with Mathematics*)

F. Fabry; B.Sc., M.Sc., Ph.D.(McG.) (*joint appt. with McGill School of Environment*)

P. Kollias; B.Sc., M.Sc.(Athens), Ph.D.(Miami) (*Canada Research Chair, Tier 2*)

D. Straub; B.Sc., M.Sc.(SW Louisiana), Ph.D.(Wash.)

B. Tremblay; B.Sc., M.Sc.(Car.), Ph.D.(McG.)

Assistant Professors

Y. Huang; B.Sc., M.Sc.(Peking), Ph.D.(Princ.)

D. Kirshbaum; B.Sc.(Ill.), Ph.D.(Wash.)

T. Merlis; B.Sc.(Col.), Ph.D.(Calif. Tech.)

T. Preston; B.Sc.(Tor.), M.Sc.(W. Ont.), Ph.D.(Br. Col.) (*joint appt. with Chemistry*)

A. Zuend; Ph.D.(ETH Zurich)

Adjunct Professors

A. Dastoor; Ph.D.(Indian IT)

L. Fillion; Ph.D.(McG.)

P. Gauthier; Ph.D.(McG.)

H. Lin; Ph.D.(McG.)

D. Matthews; Ph.D.(Vic., BC)

J. Palter; B.Sc., Ph.D.(Duke)

S.-W. Son; Ph.D.(Penn.)

11.1.5 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 |

Students registered in M.Sc. programs are expected to regularly attend both 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 530 | (3) | Paleoclimate Dynamics |
| ATOC 531 | (3) | Dynamics of Current Climates |
| ATOC 540 | (3) | Synoptic Meteorology 1 |
| ATOC 541 | (3) | Synoptic Meteorology 2 |
| ATOC 568 | (3) | Ocean Physics |
| ATOC 626 | (3) | Atmospheric/Oceanic Remote Sensing |
| ATOC 646 | (3) | Mesoscale Meteorology |
| 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.

11.1.6 Master of Science (M.Sc.); Atmospheric and Oceanic Sciences (Thesis) — Environment (45 credits)

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 |

Students registered in M.Sc. programs are expected to regularly attend both 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.

Required Courses (6 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 |

Complementary Courses (15 credits)

12 credits of Departmental courses chosen from the following:

| | | |
|-----------|-----|-------------------------------------|
| 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 530 | (3) | Paleoclimate Dynamics |
| ATOC 531 | (3) | Dynamics of Current Climates |
| ATOC 540 | (3) | Synoptic Meteorology 1 |
| ATOC 541 | (3) | Synoptic Meteorology 2 |
| ATOC 568 | (3) | Ocean Physics |
| ATOC 626 | (3) | Atmospheric/Oceanic Remote Sensing |
| ATOC 646 | (3) | Mesoscale Meteorology |
| CHEM 519* | (3) | Advances in Chemistry of Atmosphere |

or another course at the 500 level or higher recommended by the Department's Graduate Program Director.

* Students may select either ATOC 519 or CHEM 519.

3 credits of MSE courses 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.

11.1.7 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.

11.2 Biology

11.2.1 Location

Department of Biology
Stewart Biological Sciences Building, Room W4/8
1205 Dr. Penfield Avenue
Montreal QC H3A 1B1
Canada
Telephone: 514-398-5478
Fax: 514-398-5069
Email: ancil.gittens@mcgill.ca
Website: biology.mcgill.ca

11.2.2 About Biology

The Department offers graduate training in many areas of biology with particular strengths in the following areas:

- Molecular Biology and Genetics
- Cell and Developmental Biology
- Ecology, Biodiversity, and Conservation
- Evolution
- Neurobiology
- Bioinformatics
- Plant Biology

In addition to the regular **M.Sc.** and **Ph.D.** programs, the Biology Department offers specialized programs, known as “concentrations,” in the areas of Neotropical Environment (NEO), Bioinformatics, and Environment.

Graduate programs leading to the M.Sc. and Ph.D. degrees are offered. Both are research-intensive degrees, and the emphasis in both programs is on development of the intellectual and technical skills necessary for independent research. The main component of both degrees is a thesis presenting results of this work and the student’s original contribution to scientific knowledge. Formal coursework, usually in the form of literature-based seminar courses, is minimal and typically completed within the first year. To complement their classroom and laboratory training, students regularly attend other seminar series and journal clubs and present their own work annually in a formal seminar.

In addition to working with world-class researchers, graduate students in Biology have access to top-notch research infrastructure. The recently renovated Stewart Biology Building and the newly constructed Bellini Life Sciences Complex are equipped with state-of-the-art equipment and facilities for sophisticated imaging, robotic, and genetic techniques, to name a few. These in-house capabilities are complemented by a wide range of field research facilities, which include:

- [Gault Nature Reserve](#) at Mont St. Hilaire (Quebec);
- [Morgan Arboretum](#) (Quebec);
- [Huntsman Marine Science Centre](#) (New Brunswick);
- [Subarctic Research Station](#) (Quebec);
- [Bellairs Research Institute](#) (Barbados);
- [Smithsonian Tropical Research Institute](#) (Panama);
- Limnology research station at the [Wilder and Helen Penfield Nature Reserve](#) on Lake Memphremagog (Quebec).

These resources are also extended by affiliation with other organizations such as the Redpath Museum, the Biotechnology Research Institute of the National Research Council of Canada, the *Groupe Interuniversitaire de Recherches Océanographiques du Québec* (GIROQ), the McGill Macdonald campus, the Montreal Neurological Institute and Hospital, the Jewish General Hospital, the Montreal General Hospital, the Montreal Children's Hospital, the Royal Victoria Hospital, and the Glen site.

The Department specifies a minimum level of support for all graduate students. This amount is \$15,500 per annum plus tuition fees. The required minimum duration of support is two years for the M.Sc. program, five years for a Ph.D. student entering as Ph.D. 1 (directly from a bachelor's degree), and four years for a Ph.D. student entering as Ph.D. 2 (after having completed a master's degree).

The graduate program of each student is established and regularly evaluated by a three-member supervisory committee appointed by the Graduate Training Committee and chaired by the student’s thesis supervisor.

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

The typical graduate student in this program has a strong background knowledge in cell and molecular biology, biochemistry, organismal biology, ecology, developmental biology, and statistics, often with special strengths in the area of proposed study. Given the continuing trend toward interdisciplinary work, the program also accepts some students with a high scholastic standing who have completed a program in fields other than biology (medicine, engineering, chemistry, physics, etc.).

Alumni have gone on to pursue a wide range of careers. Many go on to pursue postdoctoral research and later assume faculty positions, while others work as researchers in industry, wildlife biologists, forensic technologists, or science policy advisers, to name a few.

section 11.2.6: Master of Science (M.Sc.); Biology (Thesis) — Environment (48 credits)

The Environment graduate concentration offers students the opportunity to pursue environment-focused graduate research in the context of a range of different fields, including Anthropology, Atmospheric and Oceanic Sciences, Biology, Bioresource Engineering, Earth and Planetary Sciences, Entomology, Epidemiology, Experimental Medicine, Geography, Law, Microbiology, Plant Science, Parasitology, Philosophy, Renewable Resources, and Sociology. Through a program consisting of research, seminars, and two courses, this concentration adds a layer of interdisciplinarity that challenges students to develop and defend their research and think in a broader context. Students graduating from the M.Sc. or Ph.D. program under the Environment concentration will therefore be able to understand and critically analyze an environmental problem from several perspectives (e.g., social, cultural, scientific, technological, ethical, economic, political, legislative) and at a local, national, regional, and/or international scale. In addition, they will be able to explore and critically assess analytic and institutional approaches for alleviating the selected environmental problem, and to effectively communicate research findings to both specialist and lay audiences. Coordinated and administered through the *McGill School of Environment* (MSE), the Environment concentration is aimed at students who wish to use interdisciplinary approaches in their graduate research on environmental issues and who wish to benefit from interactions that will occur as they interact with students from a wide range of disciplines.

section 11.2.7: Master of Science (M.Sc.); Biology (Thesis) — Neotropical Environment (48 credits)

The McGill-Smithsonian Tropical Research Institute (STRI) Neotropical Environment Option (NEO) is a research-based concentration for M.Sc. or Ph.D. students in the departments of Anthropology, Biology, Bioresource Engineering, Geography, Natural Resource Sciences, Plant Science, and Political Science at McGill University. The NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. The typical NEO student has a very strong interest in conservation because NEO courses focus on conservation issues. Students in the program have diverse backgrounds, including both Latin American and Canadian students, and must either speak Spanish or enrol in a Spanish course when they enter the program. NEO favours interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Accordingly, each student will have two co-supervisors, one from McGill and one from STRI. Students will complete their research in Latin America, and the NEO's core and complementary courses will be taught in Panama. Participation in the MSE-Panama Symposium presentation in Montreal is also required. Through this educational approach, NEO seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

section 11.2.8: Master of Science (M.Sc.); Biology (Thesis) — Bioinformatics (48 credits)

The goal of the Bioinformatics concentration is to train students to become researchers in the interdisciplinary field of Bioinformatics, which lies at the intersection of biological/medical sciences and mathematics/computer science/engineering. This work 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. The Bioinformatics graduate concentration consists of a number of interdisciplinary courses, as well as a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field. The typical entering student will be affiliated with one of about fourteen different “home” departments in three different faculties, chosen based on his/her specific field of expertise, and will therefore meet the specific requirements for that department. The student will additionally be evaluated according to requirements specific to the Bioinformatics concentration. Students in this concentration will have access to five specialized courses that are open only to students within the Bioinformatics concentration. At the M.Sc. level, students successfully completing the Bioinformatics concentration will be fluent in the concepts, language, approaches, and limitations of the field.

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

The typical graduate student in this program has a strong background knowledge in cell and molecular biology, biochemistry, organismal biology, ecology, developmental biology, and statistics, often with special strengths in the area of proposed study. Given the continuing trend toward interdisciplinary work, the program also accepts some students with a high scholastic standing who have completed a program in fields other than biology (medicine, engineering, chemistry, physics, etc.).

Alumni have gone on to pursue a wide range of careers. Many go on to pursue postdoctoral research and later assume faculty positions, while others work as researchers in industry, wildlife biologists, forensic technologists, or science policy advisers, to name a few.

section 11.2.10: Doctor of Philosophy (Ph.D.); Biology — Environment

The Environment graduate concentration offers students the opportunity to pursue environment-focused graduate research in the context of a range of different fields, including Anthropology, Atmospheric and Oceanic Sciences, Biology, Bioresource Engineering, Earth and Planetary Sciences, Entomology, Epidemiology, Experimental Medicine, Geography, Law, Microbiology, Plant Science, Parasitology, Philosophy, Renewable Resources, and Sociology. Through a program consisting of research, seminars, and two courses, this concentration adds a layer of interdisciplinarity that challenges students to develop and defend their research and think in a broader context. Students graduating from the M.Sc. or Ph.D. program under the Environment concentration

section 11.2.10: Doctor of Philosophy (Ph.D.); Biology — Environment

will therefore be able to understand and critically analyze an environmental problem from several perspectives (e.g., social, cultural, scientific, technological, ethical, economic, political, legislative) and at a local, national, regional, and/or international scale. In addition, they will be able to explore and critically assess analytic and institutional approaches for alleviating the selected environmental problem, and to effectively communicate research findings to both specialist and lay audiences.

Coordinated and administered through the *McGill School of Environment* (MSE), the Environment concentration is aimed at students who wish to use interdisciplinary approaches in their graduate research on environmental issues and who wish to benefit from interactions that will occur as they interact with students from a wide range of different disciplines. This concentration is available from a variety of faculties and departments.

section 11.2.11: Doctor of Philosophy (Ph.D.); Biology — Neotropical Environment

The McGill-Smithsonian Tropical Research Institute (STRI) Neotropical Environment Option (NEO) is a research-based concentration for M.Sc. or Ph.D. students in the departments of Anthropology, Biology, Bioresource Engineering, Geography, Natural Resource Sciences, Plant Science, and Political Science at McGill University. The NEO is aimed at students who wish to focus their graduate research on environmental issues relevant to the Neotropics and Latin American countries. The typical NEO student has a very strong interest in conservation because NEO courses focus on conservation issues. Students in the program have diverse backgrounds, including both Latin American and Canadian students, and must either speak Spanish or enrol in a Spanish course when they enter the program.

NEO favours interdisciplinary approaches to research and learning through the participation of researchers from McGill and from STRI. Accordingly, each student will have two co-supervisors, one from McGill and one from STRI. Students will complete their research in Latin America, and the NEO's core and complementary courses will be taught in Panama. Through this educational approach, NEO seeks to facilitate a broader understanding of tropical environmental issues and the development of skills relevant to working in the tropics.

section 11.2.12: Doctor of Philosophy (Ph.D.); Biology — Bioinformatics

The goal of the Bioinformatics concentration is to train students to become researchers in the interdisciplinary field of Bioinformatics, which lies at the intersection of biological/medical sciences and mathematics/computer science/engineering. This work 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.

The Bioinformatics graduate concentration consists of a number of interdisciplinary courses, as well as a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field. The typical entering student will be affiliated with one of about fourteen different “home” departments in three different faculties, chosen based on his/her specific field of expertise, and will therefore meet the specific requirements for that department. The student will additionally be evaluated according to requirements specific to the Bioinformatics concentration. Students in this concentration will have access to five specialized courses that are open only to students within the Bioinformatics concentration. At the Ph.D. level students will be fluent in the concepts, language, approaches, and limitations of the field and will also have the capability of developing an independent bioinformatics research program.

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

Applicants must have a B.Sc. in a discipline relevant to the proposed field of study with an overall cumulative grade point average (CGPA) of 3.0/4.0 or a CGPA of 3.2/4.0 for the last two full-time academic years. Graduate Record Examination (*GRE*) scores are not required, but may be submitted.

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; 550 on the paper-based test (PBT)) with each component score not less than 20, or 6.5 on *IELTS* is the minimum standard for admission. Specific programs may have additional requirements.

Admission is based on an evaluation by the Graduate Training Committee and on acceptance by a research director who can provide adequate funding for personal and research expenses. Prospective graduate students are encouraged to [contact faculty members](#) with whom they wish to study before applying.

11.2.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at www.mcgill.ca/gradapplicants/apply. All applicants should read the academic faculty and admission procedure sections on the Biology Department website before completing the application form. These guidelines contain specific information on the application process, summaries of the research areas of staff, and contact information.

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

11.2.3.2.1 Additional Requirements

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

- Acceptance by a research director who can provide adequate funding for personal and research expenses

11.2.3.3 Application Deadlines

The application deadlines listed here 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 academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|-----------------|-----------------|--|
| Fall: March 15 | Fall: Jan. 15 | Fall: Same as Canadian/International |
| Winter: Oct. 15 | Winter: Aug. 15 | Winter: Same as Canadian/International |
| Summer: N/A | Summer: N/A | Summer: N/A |

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 Secretary](#).



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

11.2.4 Biology Faculty

Chair

Gregor Fussmann

Graduate Program Director

Frédéric Guichard

Emeritus Professors

A. Howard Bussey; B.Sc., Ph.D.(Brist.), F.R.S.C.

Robert L. Carroll; B.S.(Mich.), M.A., Ph.D.(Harv.), F.R.S.C.

Ronald Chase; A.B.(Stan.), Ph.D.(MIT)

Jacob Kalf; M.S.A.(Tor.), Ph.D.(Ind.)

Donald L. Kramer; B.Sc.(Boston Coll.), Ph.D.(Br. Col.)

John B. Lewis; B.Sc., M.Sc., Ph.D.(McG.)

Barid B. Mukherjee; B.Sc., M.Sc.(Calc.), M.Sc.(BYU), Ph.D.(Utah)

Gerald S. Pollack; M.A., Ph.D.(Princ.)

Post-Retirement Professor

Gregory G. Brown; B.Sc.(Notre Dame), Ph.D.(CUNY)

Professors

Graham A.C. Bell; B.A., D.Phil.(Oxf.), F.R.S.C. (*James McGill Professor*) (on sabbatical July 1 – Dec. 31, 2016)

Lauren Chapman; B.Sc.(Alta.), Ph.D.(McG.) (*Canada Research Chair in Respiratory Ecology and Aquatic Conservation*)

Rajinder S. Dhindsa; B.Sc., M.Sc.(Punj.), Ph.D.(Wash.)

Andrew Gonzalez; B.Sc.(Nott.), Ph.D.(Imperial Coll., Lond.) (*Canada Research Chair in Biodiversity Science*)

Siegfried Hekimi; M.Sc., Ph.D.(Geneva) (*Strathcona Chair in Zoology; Robert Archibald & Catherine Louise Campbell Chair in Developmental Biology*) (on sabbatical July 1 – Dec. 31, 2016)

Paul F. Lasko; A.B.(Harv.), Ph.D.(MIT) (*James McGill Professor*) (*Associate Member in Anatomy and Cell Biology*) (*Associate Member in the Goodman Cancer Centre*)

Martin J. Lechowicz; B.A.(Mich. St.), M.S., Ph.D.(Wisc.)

Louis Lefebvre; B.Sc., M.A., Ph.D.(Montr.)

Catherine Potvin; B.Sc., M.Sc.(Montr.), Ph.D.(Duke)

Neil M. Price; B.Sc.(New Br.), Ph.D.(Br. Col.) (on sabbatical 2016–2017)

Daniel J. Schoen; B.Sc., M.Sc.(Mich.), Ph.D.(Calif.) (*Macdonald Professor of Botany*)

Associate Professors

Ehab Abouheif; M.Sc.(C'dia), Ph.D.(Duke)

Gary Brouhard; M.S.E., Ph.D.(Mich.) (*Associate Member in Physics*)

Thomas E. Bureau; B.Sc.(Calif.), Ph.D.(Texas)

Melania Cristescu; B.Sc., M.Sc.(Ovidius Univ. Constanta, Romania), Ph.D.(Guelph)

David Dankort; B.Sc., Ph.D.(McM.)

Joseph A. Dent; B.Sc.(Mich.), Ph.D.(Colo.) (*on sabbatical 2016–2017*)

Gregor Fussmann; Dipl.(Berlin), Ph.D.(Max Planck Institute)

Irene Gregory-Eaves; B.Sc.(Vic., BC), M.Sc., Ph.D.(Qu.)

Frédéric Guichard; B.Sc.(Montr.), Ph.D.(Laval)

Paul Harrison; B.Sc.(NUI), Ph.D.(Lond.)

Andrew Hendry; B.Sc.(Vic., BC), M.Sc., Ph.D.(Wash.) (*joint appt. with Redpath Museum*)

Rudiger Krahe; Dipl.(Alexander U.), Ph.D.(Humboldt)

Brian Leung; B.Sc.(Br. Col.), Ph.D.(Car.)

Nam-Sung Moon; B.Sc., Ph.D.(McG.)

Laura Nilson; B.A.(Colgate), Ph.D.(Yale)

Simon Reader; B.A.(Colgate), Ph.D.(Yale)

Richard Roy; B.Sc.(Bishop's), Ph.D.(Laval)

Frieder Schoeck; Dipl.(Erhangen), Ph.D.(Max Planck Institute)

Jacalyn Vogel; M.Sc.(E. Ill.), Ph.D.(Kansas)

Tamara Western; B.Sc.(Dal.), Ph.D.(Br. Col.) (*Associate Dean (Academic), Faculty of Science*)

Monique Zetka; B.Sc., Ph.D.(Br. Col.)

Hugo Zheng; M.Sc.(Helsinki), Ph.D.(Oxf. Brookes)

Assistant Professors

Jonathan Davies; M.Sc.(Cape Town), Ph.D.(Imperial Coll., Lond.) (*on sabbatical 2016–2017*)

Michael Hendricks; B.A.(Bowdoin), Ph.D.(Sing.)

Rodrigo Reyes Lamothe; Lic.(UNAM), M.Sc.(C'dia), D.Phil.(Oxf.)

Jon Sakata; B.A.(Cornell), Ph.D.(Texas-Austin, Institute for Neuroscience)

Alanna Watt; B.Sc.(C'dia), Ph.D.(Brandeis)

Sarah Woolley; B.Sc.(Duke), Ph.D.(Texas-Austin)

Associate Members

Anatomy and Cell Biology: Craig Mandato

Anthropology: Colin Chapman

Biochemistry: Maxime Bouchard

Centre for Research in Neuroscience: Sal Carbonetto, Yong Rao, Donald Van Meyel

Glen site: Hugh J. Clarke, Daniel Dufort, Teruko Taketo

MCH: Rima Rozen

Medical Genetics, Chair: David Rosenblatt

MNI: Kenneth Hastings

Physics: Paul Francois

Redpath Museum: Rowan Barrett, David Green, Hans Larsson, Virginie Millien, Anthony Ricciardi

Adjunct Professors*BELLUS Health Inc.:* Francesco Bellini*Centre National de la Recherche Scientifique (CNRS):* Michel Loreau*IRCM:* Frédéric Charron, David Hipfner, Artur Kania*NRC Lab:* Malcolm S. Whiteway*STRI:* Andrew Altieri, Rachel Collin, Hector Guzman, Haris Lessios, William Owen McMillan, Mark Torchin*Univ. de Montréal:* Pierre Drapeau**11.2.5 Master of Science (M.Sc.); Biology (Thesis) (45 credits)****Thesis 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)

Two 3-credit courses, or equivalent, at the 500, 600, or 700 level in Biology or other departments, and approved by the Supervisory Committee.

11.2.6 Master of Science (M.Sc.); Biology (Thesis) — Environment (48 credits)**Thesis 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 |

Required Courses (6 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 |

Complementary Courses (3 credits)

3 credits, one of the following courses:

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

11.2.7 Master of Science (M.Sc.); Biology (Thesis) — Neotropical Environment (48 credits)

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

Thesis 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 |

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.

11.2.8 Master of Science (M.Sc.); Biology (Thesis) — Bioinformatics (48 credits)**Thesis 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 |

Required Courses (3 credits)

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

Complementary Courses (6 credits)

6 credits 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 |

11.2.9 Doctor of Philosophy (Ph.D.); Biology**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 (6 credits)

Two 3-credit courses, or equivalent, at the 500, 600, or 700 level in Biology or other departments, and approved by the Supervisory Committee.

11.2.10 Doctor of Philosophy (Ph.D.); Biology — Environment

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

Complementary Course (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 graduate course at the 500, 600, or 700 level recommended by the Advisory Committee and approved by the Environment Option Committee.

11.2.11 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.

11.2.12 Doctor of Philosophy (Ph.D.); Biology — 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 (9 credits)

| | | |
|------------|-------|---------------------------------|
| BIOL 700 | (0) | Doctoral Qualifying Examination |
| BIOL 702 | (6) | Ph.D. Seminar |
| COMP 616D1 | (1.5) | Bioinformatics Seminar |
| COMP 616D2 | (1.5) | Bioinformatics Seminar |

Complementary Courses (6 credits)

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 |

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: www.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; state-of-the-art atmospheric kinetics and photochemistry; thermochemical, box, and cloud modelling; 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 that links the [Centre for Self-Assembled Chemical Structures](#), 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.

Synthesis/Catalysis

The Synthesis/Catalysis Research Activity Group is a collective to develop the state-of-art catalysts, synthetic methodologies, reaction mechanisms, and synthetic routes for organic chemicals, natural products, and materials. The following are the major research activities at McGill: **(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 speciality organic chemical and materials.

section 11.3.5: Master of Science (M.Sc.); Chemistry (Thesis) (45 credits)

Please consult the Department for more information about this program.

section 11.3.6: 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 research thesis degree programs is a minimum standing equivalent to a cumulative grade point average (CGPA) of 3.0 out of a possible 4.0 or a CGPA of 3.2/4.0 for the last two full-time academic years. Applicants from other institutions should have an academic background equivalent to that of a McGill graduate in the Chemistry Honours/Major programs. If possible, candidates should specify the field of research in which they are interested.

11.3.3.2 Application Procedures

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

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

FINANCIAL ASSISTANCE

M.Sc. and Ph.D. Degrees

Graduate students devote 12 hours per week (contact hours, plus grading of reports, etc.) during the academic session to their teaching duties. Financial assistance during the remainder of the year is provided from research funds. Scholarship holders, such as NSERC or awards of similar value, receive a tuition fee waiver.

11.3.3.2.1 Additional Requirements

- GRE – may be required for international degrees

11.3.3.3 Application Deadlines

The application deadlines listed here are set by the Chemistry Department and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|-----------------|-----------------|---------------------------|
| Fall: June 15 | Fall: April 30 | Fall: June 15 |
| Winter: Oct. 31 | Winter: Aug. 31 | Winter: Oct. 31 |
| Summer: N/A | Summer: N/A | Summer: N/A |

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 Chemistry Faculty

Chair

M.J. Damha

Director of Graduate Studies

G. Cosa

Emeritus Professors

T.H. Chan; B.Sc.(Tor.), M.A., Ph.D.(Princ.), F.C.I.C., F.R.S.C.

A. Eisenberg; B.S.(Wor. Poly.), M.A., Ph.D.(Princ.), F.C.I.C.

B.C. Eu; B.Sc.(Seoul), Ph.D.(Brown)

D.G. Gray; B.Sc.(Belf.), M.Sc., Ph.D.(Manit.), F.C.I.C.

E.D. Salin; B.Sc.(Calif.), Ph.D.(Ore.), F.C.I.C.

M.A. Whitehead; B.Sc., Ph.D., D.Sc.(Lond.), F.C.I.C.

Professors

M.P. Andrews; B.Sc., M.Sc., Ph.D.(Tor.)

P. Ariya; B.Sc., Ph.D.(York)

B.A. Arndtsen; B.A.(Car.), Ph.D.(Stan.)

K. Auclair; B.Sc.(UQAC), Ph.D.(Alta.)

D.S. Bohle; B.A.(Reed), M.Phil., Ph.D.(Auck.)

I.S. Butler; B.Sc., Ph.D.(Brist.), F.C.I.C.

G. Cosa; B.Sc.(Argentina), Ph.D.(Ott.)

M.J. Damha; B.Sc., Ph.D.(McG.), F.C.I.C.

Professors

D.N. Harpp; A.B.(Middlebury), M.A.(Wesl.), Ph.D.(N. Carolina), F.C.I.C.
 R.B. Lennox; B.Sc., M.Sc., Ph.D.(Tor.), F.C.I.C., F.R.S.C.
 C.J. Li; B.Sc.(Zhengzhou), M.S.(Chin. Acad. Sci.), Ph.D.(McG.), F.R.S.C.
 D. Perepichka; B.Sc.(Donetsk St. U, Ukraine), Ph.D.(Nat. Aca. Sci., Ukraine)
 R.D. Rogers; B.Sc, Ph.D.(Alabama)
 D.M. Ronis; B.Sc.(McG.), Ph.D.(MIT)
 B.C. Sanctuary; B.Sc., Ph.D.(Br. Col.)
 H. Sleiman; B.Sc.(A.U.B.), Ph.D.(Stan.)
 Y.S. Tsantrizos; B.Sc., M.Sc., Ph.D.(McG.)
 T.G.M. van de Ven; Kand. Doc.(Utrecht), Ph.D.(McG.)
 P. Wiseman; B.Sc.(St. FX), Ph.D.(W. Ont.)

Associate Professors

C.J. Barrett; B.Sc., M.Sc., Ph.D.(Qu.)
 A.S. Blum; B.A.(Princ.), Ph.D.(Wash.)
 T. Friš i ; B.Sc.(Zagreb), Ph.D.(Iowa)
 J.L. Gleason; B.Sc.(McG.), Ph.D.(Virg.)
 A. Kakkar; B.Sc., M.Sc.(Chan. U., India), Ph.D.(Wat.)
 P. Kambhampati; B.A.(Car. Coll.), Ph.D.(Texas)
 A. Mittermaier; B.Sc.(Guelph), Ph.D.(Tor.)
 N. Moitessier; M.Sc., Ph.D.(Nancy)
 A. Moores; B.Sc., Ph.D.(École Polytechnique, Paris)
 J.F. Power; B.Sc., Ph.D.(C'dia)
 L. Reven; B.A.(Car.), Ph.D.(Ill.)
 B. Siwick; B.A.Sc. Eng. Sci., M.Sc., Ph.D.(Tor.)

Assistant Professors

J. P. Lumb; B.Sc.(Cornell), Ph.D.(Calif., Berk.)
 T. Preston; B.Sc.(Tor.), M.Sc.(UWS), Ph.D.(Br. Col.)
 C.J. Thibodeaux; B.Sc.(Louisiana St.), Ph.D.(Texas)

Adjunct Professors

Y. Guindon, I. Wharf, R. Zamboni

11.3.5 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 |

| | | |
|----------|------|-------------------------|
| CHEM 697 | (9) | M.Sc. Thesis Research 7 |
| CHEM 698 | (12) | M.Sc. Thesis Research 8 |

Required Courses

(5 credits)

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

Complementary Courses

(9-16 credits)

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

11.3.6 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) | Assessment |
| CHEM 701 | (0) | Comprehensive Examination 1 |
| CHEM 702 | (0) | Comprehensive Examination 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, ext. 00074
Fax: 514-398-3883
Email: grad.cs@mcgill.ca
Website: www.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. We offer several **M.Sc.** programs and a **Ph.D.** program; all include coursework and research. In the basic M.Sc. programs, students must choose between the thesis option, and the non-thesis option, which requires a project. The Ph.D. program includes an option in bioinformatics, and the thesis M.Sc. program includes options in bioinformatics and in Computational Science and Engineering. Students are normally funded by their adviser's research grants; in the case of scholarship students, this typically takes the form of a 'top-up' to the scholarship. 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, embedded and real-time systems, modelling and simulations, networks, software engineering;
- **Applications:** bioinformatics, machine learning, robotics, computer animation, graphics, and vision.

All students must consult the [graduate program website](#), where up-to-date information about the graduate programs is posted. Any questions concerning programs should be addressed to the [Graduate Program Coordinator](#).

section 11.4.5: 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 11.4.6: 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 11.4.7: Master of Science (M.Sc.); Computer Science (Thesis) — Computational Science and Engineering (45 credits)

This program option is to train graduates in state-of-the-art applications of numerical and modelling methods and computer technology to scientific and engineering problems. CSE is a rapidly growing multidisciplinary area with connections to the sciences, engineering, mathematics, and computer science.

section 11.4.8: 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 11.4.9: 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 11.4.10: 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's (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 as listed on our [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 www.mcgill.ca/gradapplicants/apply.

See [University Regulations and 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 Ph.D. program
- Statement of Purpose – required for both M.Sc. and Ph.D. programs
- [Graduate Record Examination](#) (GRE General Test) – required for degrees from outside Canada. Recommended for Ph.D. program.

11.4.3.3 Application Deadlines

The application deadlines listed here 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 academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|------------------------------|------------------------------|------------------------------|
| Fall: March 1 | Fall: March 1 | Fall: March 1 |
| Winter: Sept. 1 (Ph.D. only) | Winter: Sept. 1 (Ph.D. only) | Winter: Sept. 1 (Ph.D. only) |
| Summer: N/A | Summer: N/A | Summer: N/A |

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 www.cs.mcgill.ca/academic/graduate/admission.



Scholarship Deadlines: January 1 for applicants who wish to be considered for scholarship awards; otherwise, March 1 for admission to the Fall term.

11.4.4 Computer Science Faculty

Director

TBA

Emeritus Professors

D. Avis; B.Sc.(Wat.), Ph.D.(Stan.)

R. De Mori; Ph.D.(Politecnico Torino)

T.H. Merrett; B.Sc.(Qu.), D.Phil.(Oxf.)

M.M. Newborn; B.E.E.(Rensselaer Poly.), Ph.D.(Ohio St.), F.A.C.M.

C. Paige; B.Sc., B.Eng.(Syd.), Ph.D.(Lond.)

G.F.G. Ratzer; B.Sc.(Glas.), M.Sc.(McG.)

G.T. Toussaint; B.Sc.(Tulsa), Ph.D.(Br. Col.)

Post-Retirement

C. Tropper; B.Sc.(McG.), Ph.D.(Brooklyn Poly.)

Professors

L. Devroye; M.S.(Louvain), Ph.D.(Texas) (*James McGill Professor*)

G. Dudek; B.Sc.(Qu.), M.Sc., Ph.D.(Tor.) (*James McGill Professor*) (on sabbatical 2016–2017)

L. Hendren; B.Sc., M.Sc.(Qu.), Ph.D.(Cornell), F.R.S.C. (*Canada Research Chair*)

Professors

P. Panangaden; M.Sc.(IIT, Kanpur), M.S.(Chic.), Ph.D.(Wisc.)
 B. Reed; B.Sc., Ph.D.(McG.) (*Canada Research Chair*)
 K. Siddiqi; B.Sc.(Lafayette), M.Sc., Ph.D.(Brown) (*William Dawson Chair*)
 D. Thérien; B.Sc.(Montr.), M.Sc., Ph.D.(Wat.) (*James McGill Professor*)

Associate Professors

M. Blanchette; B.Sc., M.Sc.(Montr.), Ph.D.(Wash.)
 X.W. Chang; B.Sc., M.Sc.(Nanjing), Ph.D.(McG.)
 C. Crépeau; B.Sc., M.Sc.(Montr.), Ph.D.(MIT)
 N. Friedman; B.A.(W. Ont.), Ph.D.(Tor.)
 M.T. Hallett; B.Sc.(Qu.), Ph.D.(Vic., BC)
 H. Hatami; B.Sc.(Sharif), M.Sc., Ph.D.(Tor.)
 B. Kemme; B.Sc., M.Sc.(Erlangen-Nuremberg, Germany), Ph.D.(ETH, Zurich)
 J. Kienzle; Eng.Dip., Ph.D.(Swiss Fed. IT)
 P. Kry; B.Sc.(Wat.), M.Sc., Ph.D.(Br. Col.)
 M. Langer; B.Sc.(McG.), M.Sc.(Tor.), Ph.D.(McG.)
 X. Liu; B.Sc., M.Sc.(Tsinghua), Ph.D.(Ill.)
 M. Maheswaran; B.Sc.(U. Peradeniya), M.Sc., Ph.D.(Purdue)
 B. Pientka; B.Sc., M.Sc.(Tech. U. of Darmstadt, Germany), Ph.D.(Carn. Mell)
 J. Pineau; B.Sc.(Wat.), M.Sc., Ph.D.(Carn. Mell)
 D. Precup; B.Sc.(Tech. U. of Cluj-Napoca), M.Sc., Ph.D.(Mass.)
 M. Robillard; B.Eng.(École Poly., Montr.), M.Sc., Ph.D.(Br. Col.)
 C. Verbrugge; B.A.(Qu.), Ph.D.(McG.)
 A. Vetta; B.Sc., M.Sc.(LSE), Ph.D.(MIT)

Assistant Professors

Y. Cai; B.S.(Peking), M.S., Ph.D.(MIT)
 J. Cheung; B.Sc.(Br. Col.), M.Sc., Ph.D.(Tor.)
 D.Meger; B.Sc.(Br. Col.), M.Sc.(McG.), Ph.D.(Br. Col.)
 D. Ruths; B.Sc., M.Sc., Ph.D.(Rice)
 J. Waldispuhl; B.Sc.(Nice Sophia Antipolis), M.Sc.(Paris VII), Ph.D.(École Poly., France)

Faculty Lecturer

J. Vybihal; B.Sc., M.Sc.(McG.)

Associate Members

D.J. Levitin (*Psychology*)
 D. Schlimm (*Philosophy*)
 R. Sengupta (*Geography*)
 B.F. Shepherd (*Mathematics & Statistics*)
 T.R. Shultz (*Psychology*)
 R. Sieber (*Geography*)

Adjunct Professors

A. Baretto, P.J. Mosterman, T. Perkins, I. Rekleitis, G.O. Sabidussi, H. Vangheluwe

11.4.5 Master of Science (M.Sc.); Computer Science (Thesis) (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 Course

| | | |
|----------|-----|--------------------------|
| COMP 601 | (2) | Thesis Literature Review |
|----------|-----|--------------------------|

Complementary Courses (21 credits)

At least 21 credits of 500-, 600-, or 700-level COMP courses, including at least 12 credits of 4-credit courses.

Note: Students with an appropriate background can substitute 3 credits by COMP 696 and 4 credits by COMP 697.

11.4.6 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 |
|----------|-----|--------------------------|

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.

11.4.7 Master of Science (M.Sc.); Computer Science (Thesis) — Computational Science and Engineering (45 credits)

Thesis Courses (24 credits)

24 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

One credit selected as follows:

| | | |
|------------|------|---|
| COMP 669D1 | (.5) | Computational Science Engineering Seminar |
| COMP 669D2 | (.5) | Computational Science Engineering Seminar |

and

| | | |
|----------|-----|--------------------------|
| COMP 601 | (2) | Thesis Literature Review |
|----------|-----|--------------------------|

Complementary Courses

(minimum 20 credits)

At least 6 courses whereby at least two courses must be from List A, at least two courses from List B, and the remaining credits to be chosen from graduate (500-, 600-, or 700-level) courses in the School of Computer Science. Two complementary courses must be taken outside the School of Computer Science.

Note: Students with an appropriate background can substitute 3 credits by COMP 696 and 4 credits by COMP 697, but still need to take 6-8 credits from List A and 6-8 credits from List B.

List A: Scientific Computing Courses:

| | | |
|----------|-----|----------------------------------|
| CIVE 602 | (4) | Finite Element Analysis |
| COMP 522 | (4) | Modelling and Simulation |
| COMP 540 | (3) | Matrix Computations |
| COMP 566 | (3) | Discrete Optimization 1 |
| MATH 578 | (4) | Numerical Analysis 1 |
| MATH 579 | (4) | Numerical Differential Equations |

List B: Application and Specialized Methods Courses:

| | | |
|----------|-----|-------------------------------------|
| ATOC 512 | (3) | Atmospheric and Oceanic Dynamics |
| ATOC 513 | (3) | Waves and Stability |
| ATOC 515 | (3) | Turbulence in Atmosphere and Oceans |
| CIVE 572 | (3) | Computational Hydraulics |
| CIVE 603 | (4) | Structural Dynamics |
| COMP 557 | (3) | Fundamentals of Computer Graphics |

| | | |
|----------|-----|---|
| COMP 558 | (3) | Fundamentals of Computer Vision |
| COMP 567 | (3) | Discrete Optimization 2 |
| COMP 621 | (4) | Program Analysis and Transformations |
| COMP 642 | (4) | Numerical Estimation Methods |
| COMP 767 | (4) | Advanced Topics: Applications 2 |
| ECSE 507 | (3) | Optimization and Optimal Control |
| ECSE 532 | (3) | Computer Graphics |
| ECSE 547 | (3) | Finite Elements in Electrical Engineering |
| ECSE 549 | (3) | Expert Systems in Electrical Design |
| MATH 555 | (4) | Fluid Dynamics |
| MATH 560 | (4) | Optimization |
| MATH 761 | (4) | Advanced Topics in Applied Mathematics 1 |
| MECH 533 | (3) | Subsonic Aerodynamics |
| MECH 537 | (3) | High-Speed Aerodynamics |
| MECH 538 | (3) | Unsteady Aerodynamics |
| MECH 539 | (3) | Computational Aerodynamics |
| MECH 541 | (3) | Kinematic Synthesis |
| MECH 572 | (3) | Introduction to Robotics |
| MECH 573 | (3) | Mechanics of Robotic Systems |
| MECH 576 | (0) | |
| MECH 577 | (3) | Optimum Design |
| MECH 610 | (4) | Fundamentals of Fluid Dynamics |
| MECH 620 | (4) | Advanced Computational Aerodynamics |
| MECH 632 | (4) | Advanced Mechanics of Materials |
| MECH 642 | (4) | Advanced Dynamics |
| MECH 650 | (4) | Fundamentals of Heat Transfer |
| MECH 654 | (4) | Compt. Fluid Flow and Heat Transfer |

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

Research Project (15 credits)

15 credits selected as follows:

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

Complementary Courses (30 credits)

30 credits (nine courses), of which 12 credits must be of 4-credit courses at the 500, 600, or 700 level of COMP courses.

11.4.9 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 524 | (3) | Theoretical Foundations of Programming Languages |
| COMP 525 | (3) | Formal Verification |
| COMP 531 | (3) | Advanced Theory of Computation |
| COMP 540 | (3) | Matrix Computations |
| COMP 547 | (4) | Cryptography and Data Security |
| COMP 552 | (4) | Combinatorial Optimization |
| COMP 554 | (4) | Approximation Algorithms |
| COMP 560 | (3) | Graph Algorithms and Applications |
| COMP 561 | (4) | Computational Biology Methods and Research |
| COMP 564 | (3) | Computational Gene Regulation |
| COMP 566 | (3) | Discrete Optimization 1 |
| COMP 567 | (3) | Discrete Optimization 2 |
| COMP 598 | (3) | Topics in Computer Science 1 |
| COMP 599 | (3) | Topics in Computer Science 2 |
| COMP 610 | (4) | Information Structures 1 |
| COMP 618 | (3) | Bioinformatics: Functional Genomics |
| COMP 627 | (4) | Theoretical Programming Languages |
| COMP 642 | (4) | Numerical Estimation Methods |
| COMP 647 | (4) | Advanced Cryptography |
| COMP 649 | (4) | Quantum Cryptography |
| 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 520 | (4) | Compiler Design |
| COMP 521 | (4) | Modern Computer Games |
| COMP 522 | (4) | Modelling and Simulation |
| COMP 526 | (3) | Probabilistic Reasoning and AI |

| | | |
|----------|-----|--|
| COMP 529 | (4) | Software Architecture |
| COMP 533 | (3) | Model-Driven Software Development |
| COMP 535 | (3) | Computer Networks 1 |
| COMP 546 | (4) | Computational Perception |
| COMP 557 | (3) | Fundamentals of Computer Graphics |
| COMP 558 | (3) | Fundamentals of Computer Vision |
| COMP 575 | (3) | Fundamentals of Distributed Algorithms |
| COMP 598 | (3) | Topics in Computer Science 1 |
| COMP 599 | (3) | Topics in Computer Science 2 |
| COMP 612 | (4) | Database Programming Principles |
| 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.

11.4.10 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 |
| 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
Canada
Telephone: 514-398-6767
Fax: 514-398-4680
Email: grad.eps@mcgill.ca
Website: www.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:

- studies of the geochemistry of the mantle;
- the nature of processes concentrating metals in hydrothermal mineral deposits;
- experimental studies of 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 chemistry in the early and late Precambrian;
- mechanisms of faulting;
- the evolution of topography during orogenesis;
- wetland hydrogeology;
- interactions between the cryosphere, solid Earth, and climate systems;
- planetary-scale ocean biogeochemistry (e.g., ocean acidification) and its relationship to global warming.

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, research assistantships, 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; trace metal and environmental geochemistry in freshwater and marine systems.

Biom mineralization

Investigation of process occurring at the interface between inorganic and organic phases leading to the nucleation and growth of crystals in both natural and synthetic systems; pathogenic mineralization and calcification in mammalian cells and tissues; investigating biomarkers as signatures of ancient biological activity in terrestrial and extraterrestrial materials.

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.

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.

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.

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.

Oceanic Biogeochemistry

Response of the marine ecosystem to climate change and anthropogenic stresses through observations of the modern ocean, experimental and numerical simulations of ocean biogeochemistry, and reconstructions of past climate change using sedimentary records.

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; Archean 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.

Isotopic Geochemistry and Sedimentary Geology

Sedimentology, stratigraphy, and isotope geochemistry as guides to reconstructing ancient environments; reconstruction of paleoenvironmental change during the Neoproterozoic to early Phanerozoic; relationships between tectonics (i.e., supercontinental break-up and assembly), seawater chemistry and ocean redox, severe climatic fluctuations (including snowball Earth), and the origin and diversification of animals; recovery of the geochemical memory of large-scale Earth system processes (e.g., microbial control of the global S cycle; anthropogenic manipulation of atmospheric OH abundances); investigations of microbial biogeochemistry under an anoxic Archean atmosphere, to constrain mass fluxes in the Phanerozoic geologic sulfur cycle, and to track processes that control the pollution-cleansing oxidants (OH, O₃) in the modern atmosphere.

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 11.5.5: 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 and a comprehensive oral examination in the Ph.D. 2 year.

section 11.5.6: Master of Science (M.Sc.); Earth and Planetary Sciences (Thesis) — Environment (48 credits)

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. The option also provides a forum whereby graduate students bring their disciplinary perspectives together and enrich each other's learning through structured courses, formal seminars, and informal discussions and networking. Students that 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 *McGill School of Environment* (MSE), in partnership with participating academic units.

section 11.5.7: 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. Aside from courses, the first year is occupied by early work on the thesis project that constitutes the bulk of the Ph.D., with preparation for an oral examination on their research proposal at the end of the first year. Conduct of the research, and preparation

section 11.5.7: Doctor of Philosophy (Ph.D.); Earth and Planetary Sciences

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.

section 11.5.8: Doctor of Philosophy (Ph.D.); Earth and Planetary Sciences — Environment

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. The option also provides a forum whereby graduate students bring their disciplinary perspectives together and enrich each other's learning through structured courses, formal seminars, and informal discussions and networking. Students that 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 *McGill School of Environment* (MSE), in partnership with participating academic units.

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 Majors program in geology, geophysics, chemistry, or physics (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.

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 www.mcgill.ca/gradapplicants/apply.

See *University Regulations and Resources* > Graduate > Graduate Admissions and Application Procedures > : *Application Procedures* for detailed application procedures.

11.5.3.3 Application Deadlines

The application deadlines listed here 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 www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|-----------------|-----------------|---------------------------|
| Fall: Feb. 1 | Fall: Feb. 1 | Fall: Feb. 1 |
| Winter: Sept. 1 | Winter: Sept. 1 | Winter: Sept. 1 |
| Summer: N/A | Summer: N/A | Summer: N/A |

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

11.5.4 Earth and Planetary Sciences Faculty**Chair**

Jeffrey McKenzie

Emeritus Professors

Jafar Arkani-Hamed; B.Eng.(Tehran), Ph.D.(MIT)

Donald Francis; B.Sc.(McG.), M.Sc.(Br. Col.), Ph.D.(MIT)

Andrew J. Hynes; B.Sc.(Tor.), Ph.D.(Cant.)

Wallace H. MacLean; B.Geol.Eng.(Colo. Sch. of Mines), M.Sc.(A.), Ph.D.(McG.)

Robert F. Martin; B.Sc.(Ott.), M.S.(Penn. St.), Ph.D.(Stan.)

Colin W. Stearn; B.Sc.(McM.), M.S., Ph.D.(Yale), F.R.S.C.

Professors

Don Baker; A.B.(Chic.), Ph.D.(Penn. St.)

Olivia G. Jensen; B.Sc., M.Sc., Ph.D.(Br. Col.)

Alfonso Mucci; B.Sc., M.Sc.(Montr.), Ph.D.(Miami)

John Stix; A.B.(Dart.), M.Sc., Ph.D.(Tor.)

A.E. (Willy) Williams-Jones; B.Sc., M.Sc.(Natal), Ph.D.(Qu.) (*William E. Logan Professor of Geology*)

Associate Professors

Galen Halverson; B.A.(Mont.), M.A., Ph.D.(Harv.) (*T.H. Clark Chair in Sedimentary and Petroleum Geology*)

Jeffrey McKenzie; B.Sc.(McG.), M.Sc., Ph.D.(Syrac.)

Jeanne Paquette; B.Sc., M.Sc.(McG.), Ph.D.(Stonybrook)

Assistant Professors

Kim Berlo; Propadeuse, Doctorandus(Utrecht), Ph.D.(Brist.)

Nicolas Cowan; B.Sc.(McG.), Ph.D.(Wash.) (*joint appt. with Physics*)

Natalya Gomez; B.Sc., M.Sc.(Tor.), Ph.D.(Harv.)

Rebecca Harrington; B.S., M.S., Ph.D.(Calif.-LA)

James Kirkpatrick; B.Sc., M.Sc.(Leeds), Ph.D.(Glas.)

Yajing Liu; B.Sc.(Peking), Ph.D.(Harv.)

Christie Rowe; A.B.(Smith), Ph.D.(Calif.-Santa Cruz) (*Robert Wares Faculty Scholar*)

Vincent van Hinsberg; Propadeuse, Doctorandus(Utrecht), Ph.D.(Brist.) (*Osisko Faculty Scholar*)

Faculty Lecturer

W. Minarik; B.A.(St. Olaf), M.Sc.(Wash.), Ph.D.(Rensselaer Poly.)

Adjunct Professors

E. Galbraith, R. Léveillé, H. Short, B. Sundby

Retired Professor

R. Hesse

11.5.5 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.

11.5.6 Master of Science (M.Sc.); Earth and Planetary Sciences (Thesis) — Environment (48 credits)**Thesis Courses (33 credits)**

| | | |
|----------|------|----------------------|
| EPSC 697 | (9) | Thesis Preparation 1 |
| EPSC 698 | (12) | Thesis Preparation 2 |
| EPSC 699 | (12) | Thesis Preparation 3 |

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 |
| EPSC 666 | (3) | Current Issues in Geosciences |

Complementary Courses (6 credits)

One 3-credit course at the 500, 600, or 700 level chosen with the approval of the supervisor or research director and GPS.

3 credits chosen from the following courses:

| | | |
|----------|-----|---|
| 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, 600, or 700 level recommended by the Advisory Committee and approved by the Environment Option Committee.

11.5.7 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 |
|----------|-----|----------------------------------|

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.

11.5.8 Doctor of Philosophy (Ph.D.); Earth and Planetary Sciences — Environment

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 (12 credits) in the Ph.D. 1 year, and two courses (6 credits) plus a comprehensive oral examination in the Ph.D. 2 year, as well as the Required Courses listed below.

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

| | | |
|----------|-----|-------------------------------------|
| 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 |
| EPSC 700 | (0) | Preliminary Doctoral Examination |

Complementary Courses

* Two to six courses (6-18 credits)

One course chosen from the following courses:

| | | |
|----------|-----|---|
| 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, 600, or 700 level recommended by the Advisory Committee with the student's supervisor and approved by the Academic Standing Committee.

One to five courses 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 705
 Montreal QC H3A 0B9
 Canada
 Telephone: 514-398-4111
 Fax: 514-398-7437
 Email: grad.geog@mcgill.ca
 Website: www.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 Hitschfield Geographic Information Centre, maintains the *McGill Arctic Research Station* (Axel Heiburg Island, Nunavut Territory) and the *McGill Sub-Arctic Research Station* (Schefferville, Quebec), and has strong ties with McGill's *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 Chair and the student's thesis supervisor see fit, and submit a thesis in an appropriate area of geographical inquiry approved by the adviser.

McGill Northern Research Stations

The *McGill Sub-Arctic Research Station* is located in Schefferville, in the centre of Quebec-Labrador. Facilities exist for research in most areas of physical and some areas of human geography in the subarctic.

McGill University also operates a *field station* at Expedition Fiord on Axel Heiberg Island in the High Arctic. Facilities are limited to a small lab, dorm building, and cookhouse. Research activities focus on the glacial and geological. For additional information on these stations, contact the Scientific Director, [Wayne Pollard](#), Department of Geography.

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 \(45 credits\)](#)

The Environment option is offered in association with the *McGill School of Environment* (MSE) 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 *McGill 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 11.6.5: 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 11.6.6: Master of Science (M.Sc.); Geography (Thesis) — Environment (45 credits)

The Environment option is offered in association with the *McGill School of Environment* (MSE) 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 11.6.7: 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 is offered in association with several university departments, the *McGill 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

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 *McGill 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 *McGill 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 and 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, they, and others 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 (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. They, and others 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, which cover a wide range of systematic areas, are listed in documents available from the Department.

11.6.3.2 Application Procedures

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

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

Further departmental application information is listed at www.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 Deadlines

The application deadlines listed here 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 academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|---------------|---------------|---------------------------|
| Fall: Jan. 31 | Fall: Jan. 31 | Fall: Jan. 31 |
| Winter: N/A | Winter: N/A | Winter: N/A |
| Summer: N/A | Summer: N/A | Summer: N/A |

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

11.6.4 Geography Faculty

Chair

N.T. Roulet

Graduate Program Director

O.T. Coomes

Post-Retirement

S.H. Olson; M.A., Ph.D.(Johns Hop.)

Professors

P.G. Brown; M.A., Ph.D.(Col.) (*cross appt. with McGill School of Environment*)

Professors

O.T. Coomes; M.A.(Tor.), Ph.D.(Wisc. Mad.)
 T.R. Moore; Ph.D.(Aberd.), F.R.S.C.
 W.H. Pollard; M.A.(Guelph), Ph.D.(Ott.)
 N.A. Ross; M.A.(Qu.), Ph.D.(McM.)
 N.T. Roulet; M.Sc.(Trent), Ph.D.(McM.) (*James McGill Professor*)
 S. Turner; M.Soc.Sc.(Waikato, N.Z.), Ph.D.(Hull)
 G.W. Wenzel; M.A.(Manit.), Ph.D.(McG.)

Associate Professors

L. Berrang Ford; M.A.(Oxf.), Ph.D.(Guelph)
 S. Breau; M.A.(Laval), Ph.D.(Calif.-LA)
 G.L. Chmura; M.Sc.(Rhode Is.), Ph.D.(Louis. St.)
 J. Ford; Ph.D.(Guelph)
 B. Forest; A.B.(Chic.), Ph.D.(Calif.-LA)
 M. Kalacska; Ph.D.(Alta.)
 M.F. Lapointe; M.Sc.(McG.), Ph.D.(Br. Col.)
 B. Lehner; Ph.D.(Frankfurt)
 T.C. Meredith; M.Sc., Dip.Cons.(Lond.), Ph.D.(Cant.)
 N. Oswin; M.A.(Dal.), Ph.D.(Br. Col.)
 R. Sengupta; M.Sc., Ph.D.(Ill.) (*joint appt. with McGill School of Environment*)
 R. Sieber; M.P.A.(W. Mich.), Ph.D.(Rutg.) (*joint appt. with McGill School of Environment*)
 I.B. Strachan; B.Sc.(Tor.), M.Sc., Ph.D.(Qu.) (*cross appt. with Natural Resource Sciences*)
 J. Unruh; M.S.(Wisc.), Ph.D.(Ariz.)

Assistant Professors

G. MacDonald; M.Sc., Ph.D.(McG.)
 K. Manaugh; Ph.D.(McG.)
 S. Moser; Ph.D.(Sing.)
 M. Riva; M.Sc., Ph.D.(Montr.) (*cross appt. with the Institute for Health and Social Policy*)
 B. Robinson; Ph.D.(Wisc. Mad.)

Adjunct Professors

D. Matthews, N. Ramankutty, J. Rhemtulla, J. Wu

11.6.5 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 |
|----------|-----|----------------------------------|

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.

11.6.6 Master of Science (M.Sc.); Geography (Thesis) — Environment (45 credits)

The Environment Option is offered in association with the McGill 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.

11.6.7 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.

11.6.8 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.

11.6.9 Doctor of Philosophy (Ph.D.); Geography — Environment

The option consists of the thesis and comprehensive examination, required courses (9 credits) from Geography and Environment and complementary courses (9 credits) in Environment or other fields recommended by the research committee and approved by the Environment Option 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

| | | |
|----------|-----|-------------------------------------|
| 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

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

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.

Comprehensives

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

11.6.10 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.

11.6.11 Doctor of Philosophy (Ph.D.); Geography — Neotropical Environment

The Neotropical Option is offered in association with several University departments, the McGill 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
Fax: 514-398-3899
Email: grad.mathstat@mcgill.ca
Website: www.math.mcgill.ca

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 degrees (**M.A.** or **M.Sc.**), with program options in Bioinformatics and in Computational Science and Engineering (CSE). The research groups are:

- Algebra Category;
- Theory and Logic;
- Geometric Group Theory;
- Algebraic Geometry;
- Discrete Mathematics;
- Mathematical Physics;
- Analysis and its Applications;
- Differential Geometry;
- Number Theory;
- Applied Mathematics;
- Differential Equations;
- Probability and Statistics.

In the basic master's programs, students must choose between the thesis option, and the non-thesis option which requires a project. The Bioinformatics and CSE options require a thesis. In addition to the Ph.D. program in Mathematics and Statistics, there is a Ph.D. option in Bioinformatics.

The Department [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 Department of Mathematics and Statistics offers programs with concentrations in applied mathematics, pure mathematics, and statistics leading to the Master's degree (M.A.). The thesis option requires a thesis and six approved courses.

: Master of Arts (M.A.); Mathematics and Statistics (Non-Thesis) (45 credits)

The Department of Mathematics and Statistics offers programs with concentrations in applied mathematics, pure mathematics, and statistics leading to the master's degree (M.A.). The non-thesis option requires a project 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 11.7.5: Master of Science (M.Sc.); Mathematics and Statistics (Thesis) (45 credits)

The Department of Mathematics and Statistics offers programs with concentrations in applied mathematics, pure mathematics, and statistics leading to the master's degree (M.Sc.). The thesis option requires a thesis and six approved courses.

section 11.7.6: Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Bioinformatics (48 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. Students successfully completing the Bioinformatics option at the M.Sc. level will be fluent in the concepts, language, approaches, and limitations of the field.

section 11.7.7: Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Computational Science and Engineering (47 credits)

CSE is a rapidly growing multidisciplinary area with connections to the sciences, engineering, mathematics, and computer science. CSE focuses on the development of problem-solving methodologies and robust tools for the solution of scientific and engineering problems. Please [visit our website](#) for more information.

section 11.7.8: Master of Science (M.Sc.); Mathematics and Statistics (Non-Thesis) (45 credits)

The Department of Mathematics and Statistics offers programs with concentrations in applied mathematics, pure mathematics, and statistics leading to the master's degree (M.Sc.). The non-thesis option requires a project 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 (normally the research supervisor), an external examiner and the Oral Examination Committee. The student must make an oral defense of the thesis before that Committee. In addition, the student has to pass comprehensive examinations.

: Doctor of Philosophy (Ph.D.); Mathematics and Statistics — 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. Students successfully completing the Bioinformatics option at the Ph.D. level will be fluent in the concepts, language, approaches, and limitations of the field and will have the capability of developing an independent bioinformatics research program.

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 www.mcgill.ca/gradapplicants/apply.

See [University Regulations and 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 research group(s) and 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 www.math.mcgill.ca/students/graduate/application.

11.7.3.3 Application Deadlines

The application deadlines listed here 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 academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|------------------|------------------|--|
| Fall: Jan. 15 | Fall: Jan. 15 | Fall: Same as Canadian/International |
| Winter: Sept. 15 | Winter: Sept. 10 | Winter: Same as Canadian/International |
| Summer: N/A | Summer: N/A | Summer: N/A |

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

11.7.4 Mathematics and Statistics Faculty

Chair

David A. Stephens

Graduate Program Director

Gantumur Tsogtgerel

Emeritus Professors

William J. Anderson; B.Eng., Ph.D.(McG.)

Michael Barr; A.B., Ph.D.(Penn.) (*Peter Redpath Emeritus Professor of Pure Mathematics*)

William G. Brown; B.A.(Tor.), M.A.(Col.), Ph.D.(Tor.)

Marta Bunge; M.A., Ph.D.(Penn.)

Ian Connell; B.Sc., M.Sc.(Manit.), Ph.D.(McG.)

Kohur N. GowriSankaran; B.A., M.A.(Madr.), Ph.D.(Bom.)

Paul Koosis; B.A., Ph.D.(Calif., Berk.)

Michael Makkai; M.A., Ph.D.(Bud.) (*Peter Redpath Professor of Pure Mathematics*)

Sherwin Maslowe; B.Sc.(Wayne St.), M.Sc., Ph.D.(Calif.)

Arak M. Mathai; M.Sc.(Kerala), M.A., Ph.D.(Tor.)

Karl Peter Russell; Vor.Dip.(Hamburg), Ph.D.(Calif.)

Georg Schmidt; B.Sc.(Natal), M.Sc.(S. Af.), Ph.D.(Stan.)

Vanamamalai Seshadri; B.Sc, M.Sc.(Madr.), Ph.D.(Okl.)

George P.H. Styan; M.A., Ph.D.(Col.)

John C. Taylor; B.Sc.(Acad.), M.A.(Qu.), Ph.D.(McM.)

Sanjo Zlobec; M.Sc.(Zagreb), Ph.D.(N'western)

Professors

Masoud Asgharian; B.Sc.(Shahid Beheshti), M.Sc., Ph.D.(McG.)

Peter Bartello; B.Sc.(Tor.), M.Sc., Ph.D.(McG.) (*joint appt. with Atmospheric and Oceanic Sciences*)

Rustum Choksi; B.Sc.(Tor.), M.Sc., Ph.D.(Brown)

Henri Darmon; B.Sc.(McG.), Ph.D.(Harv.), F.R.S.C. (*James McGill Professor*)

Stephen W. Drury; M.A., Ph.D.(Cant.)

Christian Genest; B.Sp.Sc.(UQAC), M.Sc.(UQAM), Ph.D.(Br. Col.) (*Canada Research Chair*)

Eyal Z. Goren; B.A., M.S., Ph.D.(Hebrew)

Pengfei Guan; B.Sc.(Zhejiang), M.Sc., Ph.D.(Princ.) (*Canada Research Chair*)

Jacques C. Hurtubise; B.Sc.(Montr.), D.Phil.(Oxf.) F.R.S.C.

Dmitry Jakobson; B.Sc.(MIT), Ph.D.(Princ.) (*Peter Redpath Professor*)

Vojkan Jaksic; B.S.(Belgrade), Ph.D.(Calif. Tech.)

Niky Kamran; B.Sc., M.Sc.(Bruxelles), Ph.D.(Wat.), F.R.S.C. (*James McGill Professor*)

Charles Roth; M.Sc.(McG.), Ph.D.(Hebrew)

F. Bruce Shepherd; B.Sc.(Vic., Tor.), M.Sc., Ph.D.(Wat.) (*James McGill Professor*)

David A. Stephens; B.Sc., Ph.D.(Nott.) (*James McGill Professor*)

John A. Toth; B.Sc., M.Sc.(McM.), Ph.D.(MIT) (*William Dawson Scholar*)

Daniel T. Wise; B.A.(Yeshiva), Ph.D.(Princ.) (*James McGill Professor*)

David Wolfson; B.Sc., M.Sc.(Natal), Ph.D.(Purd.)

Jian-Ju Xu; B.Sc., M.Sc.(Beijing), M.Sc., Ph.D.(Rensselaer Poly.)

Associate Professors

Louigi Addario-Berry; B.Sc., M.Sc., Ph.D.(McG.)

Antony R. Humphries; B.A., M.A.(Camb.), Ph.D.(Bath)

Abbas Khalili; B.S., M.S.(Isfahan Univ. of Tech), Ph.D.(Wat.)

Jean-Christophe Nave; B.Sc., Ph.D.(Calif., Santa Barbara)

Associate Professors

Johanna Neslehova; B.Sc., M.Sc.(Hamburg), Ph.D.(Oldenburg)
 Sergey Norin; M.S.(Saint Petersburg St.), Ph.D.(Georgia Tech.)
 Adam Oberman; B.S.(Tor.), M.S., Ph.D.(Chic.)
 Mikael Pichot; B.Sc.(Lyon), M.S., Ph.D.(ENS Lyon)
 Russell Steele; B.S., M.S.(Carn. Mell), Ph.D.(Wash.)
 Gantumur Tsogtgerel; B.Sc.(Nat. Univ. of Mongolia), M.Sc., Ph.D.(Utrecht)
 Adrian Vetta; B.Sc., M.Sc.(LSE), Ph.D.(MIT) (*joint appt. with Computer Science*)

Assistant Professors

Linan Chen; B.S.(Tsinghua), Ph.D.(MIT)
 Piotr Przytycki; M.Sc., Ph.D.(Warsaw)
 Marcin Sabok; M.Sc., Ph.D.(Warsaw)
 Jérôme Vétois; Ph.D.(Cergy-Pontoise)
 Yi Yang; B.S.(Sichuan), M.S., Ph.D.(Minn.)

Associate Members

Xiao-Wen Chang (*Computer Science*)
 Luc P. Devroye (*Computer Science*)
 Pierre R.L. Dutilleul (*Plant Science*)
 Leon Glass (*Physiology*)
 James A. Hanley (*Epidemiology and Biostatistics*)
 Hamed Hatami (*Computer Science*)
 Lawrence Joseph (*Epidemiology and Biostatistics*)
 Anmar Khadra (*Physiology*)
 Michael Mackey (*Physiology*)
 Erica E.M. Moodie (*Epidemiology and Biostatistics*)
 Prakash Panangaden (*Computer Science*)
 Robert W. Platt (*Epidemiology and Biostatistics*)
 James O. Ramsay (*Psychology*)
 Christina Wolfson (*Epidemiology and Biostatistics*)

Adjunct Professors

Vasek Chvatal; Ph.D.(Wat.)
 Martin J. Gander; M.S.(ETH Zurich), M.S., Ph.D.(Stan.)
 Andrew Granville; B.A., CASM(Camb.), Ph.D.(Qu.)
 Adrian Iovita; B.S.(Bucharest), Ph.D.(Boston)
 Olga Kharlampovich; M.A.(Ural St.), Ph.D.(Leningrad St.), Dr.Sc.(Steklov Inst.)
 Ming Mei; B.Sc., M.Sc.(Jiangxi Normal Uni.), Ph.D.(Kanazawa)
 Alexei Miasnikov; M.Sc.(Novosibirsk), Ph.D., Dr. of Sc.(Lenin.)
 M. Ram Murty; B.Sc.(Car.), Ph.D.(MIT), F.R.S.C.
 Robert A. Seely; B.Sc.(McG.), Ph.D.(Cant.)
 Alain C. Vandal; B.Sc., M.Sc.(McG.), Ph.D.(ETH Zurich)

Faculty Lecturers

José A. Correa; M.Sc.(Wat.), Ph.D.(Car.)

Axel Hundemer; M.Sc., Ph.D.(Munich)

Armel Djivede Kelome; M.Sc.(Benin), M.Sc.(McG.), Ph.D.(Georgia Tech.)

Sidney Trudeau; Ph.D.(McG.)

11.7.5 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.

11.7.6 Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Bioinformatics (48 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 |

Required Course (3 credits)

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

Complementary Courses (21 credits)

6 credits 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 |

15 credits of approved courses at the 500 or 600 level. Additional courses may be required at the discretion of the candidate's supervisory committee.

11.7.7 Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Computational Science and Engineering (47 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 |

Required Course

(1 credit)

| | | |
|------------|------|-------------|
| MATH 669D1 | (.5) | CSE Seminar |
| MATH 669D2 | (.5) | CSE Seminar |

Complementary Courses (22 credits)

(minimum 22 credits)

Two courses from List A, two courses from List B, and the remaining credits to be chosen from graduate (500- or 600-level) courses in the Department of Mathematics and Statistics. Two complementary courses must be taken outside the Department of Mathematics and Statistics.

List A - Scientific Computing Courses:

| | | |
|----------|-----|----------------------------------|
| CIVE 602 | (4) | Finite Element Analysis |
| COMP 522 | (4) | Modelling and Simulation |
| COMP 540 | (3) | Matrix Computations |
| COMP 566 | (3) | Discrete Optimization 1 |
| MATH 578 | (4) | Numerical Analysis 1 |
| MATH 579 | (4) | Numerical Differential Equations |

List B - Applications and Specialized Methods Courses:

| | | |
|----------|-----|---|
| ATOC 512 | (3) | Atmospheric and Oceanic Dynamics |
| ATOC 513 | (3) | Waves and Stability |
| ATOC 515 | (3) | Turbulence in Atmosphere and Oceans |
| CIVE 572 | (3) | Computational Hydraulics |
| CIVE 603 | (4) | Structural Dynamics |
| COMP 557 | (3) | Fundamentals of Computer Graphics |
| COMP 558 | (3) | Fundamentals of Computer Vision |
| COMP 567 | (3) | Discrete Optimization 2 |
| COMP 621 | (4) | Program Analysis and Transformations |
| COMP 642 | (4) | Numerical Estimation Methods |
| COMP 767 | (4) | Advanced Topics: Applications 2 |
| ECSE 507 | (3) | Optimization and Optimal Control |
| ECSE 532 | (3) | Computer Graphics |
| ECSE 547 | (3) | Finite Elements in Electrical Engineering |
| ECSE 549 | (3) | Expert Systems in Electrical Design |
| MATH 555 | (4) | Fluid Dynamics |
| MATH 560 | (4) | Optimization |
| MATH 761 | (4) | Advanced Topics in Applied Mathematics 1 |
| MECH 533 | (3) | Subsonic Aerodynamics |
| MECH 537 | (3) | High-Speed Aerodynamics |

| | | |
|----------|-----|-------------------------------------|
| MECH 538 | (3) | Unsteady Aerodynamics |
| MECH 539 | (3) | Computational Aerodynamics |
| MECH 541 | (3) | Kinematic Synthesis |
| MECH 572 | (3) | Introduction to Robotics |
| MECH 573 | (3) | Mechanics of Robotic Systems |
| MECH 576 | (0) | |
| MECH 577 | (3) | Optimum Design |
| MECH 610 | (4) | Fundamentals of Fluid Dynamics |
| MECH 620 | (4) | Advanced Computational Aerodynamics |
| MECH 632 | (4) | Advanced Mechanics of Materials |
| MECH 642 | (4) | Advanced Dynamics |
| MECH 650 | (4) | Fundamentals of Heat Transfer |
| MECH 654 | (4) | Compt. Fluid Flow and Heat Transfer |

11.7.8 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.

11.7.9 Doctor of Philosophy (Ph.D.); Mathematics and Statistics

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 700 | (0) | Ph.D. Preliminary Examination Part A |
| MATH 701 | (0) | Ph.D. Preliminary Examination Part B |

Complementary Courses (21 credits)

Minimum 21 credits of approved graduate courses, with at least two courses at the 600-level or above.

11.7.10 Doctor of Philosophy (Ph.D.); Mathematics and Statistics — 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 (3 credits)

| | | |
|------------|-------|------------------------|
| COMP 616D1 | (1.5) | Bioinformatics Seminar |
|------------|-------|------------------------|

| | | |
|------------|-------|--------------------------------------|
| COMP 616D2 | (1.5) | Bioinformatics Seminar |
| MATH 700 | (0) | Ph.D. Preliminary Examination Part A |
| MATH 701 | (0) | Ph.D. Preliminary Examination Part B |

Complementary Courses (6 credits)

(3-6 credits)

The twelve one-semester complementary courses for the Ph.D. degree must include at least two from the list below, unless a student has completed the M.Sc.-level option in Bioinformatics, in which case only one course from the list below must be chosen:

| | | |
|----------|-----|-------------------------------------|
| 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 |

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: www.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. The 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 Quebec*, 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;
- 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 on McGill's lower campus. Our groups also conduct research at 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 currently guarantees financial support of \$23,200 per year for every graduate student. This minimum level of support can be supplemented by winning one of McGill's large number of in-house scholarships, worth up to \$25,000 per year. For details, see www.physics.mcgill.ca/grads/finance.html.

Graduate students in the Department of Physics come from many different countries and cultures from all over the world, 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 www.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* and the Belle-2 experiment at the *KEK* 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*'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*, and at the Large Hadron Collider facility at *CERN*.
- 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*, at the accelerator ISOLDE (*CERN*), and the ISAC facility at *TRIUMF*.

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

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 in Geophysics

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*.

section 11.8.5: 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 11.8.6: 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 (60 credits)*.

Ph.D.

The normal requirement is an M.Sc. in Physics or equivalent. 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 www.mcgill.ca/gradapplicants/apply.

See *University Regulations and Resources* > Graduate > Graduate Admissions and Application Procedures > : *Application Procedures* for detailed application procedures.

Financial Assistance

Financial assistance will be offered to students in the form of teaching and research assistantships. For new students, financial support will be offered at the time of acceptance. For more information, please visit our finance page: www.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:

- 2 Letters of Reference

- Physics CV
- Personal Statement
- Thesis Abstract or Summary – optional
- GRE – recommended but not required
- English Proficiency – see requirements at www.mcgill.ca/gradapplicants/international/apply/proficiency

11.8.3.3 Application Deadlines

The application deadlines listed here 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 www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|------------------|------------------|--|
| Fall: Jan. 15 | Fall: Jan. 15 | Fall: Jan. 15 |
| Winter: Sept. 15 | Winter: Sept. 10 | Winter: Same as Canadian/International |
| Summer: N/A | Summer: N/A | Summer: N/A |

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

11.8.4 Physics Faculty

Chair

P. Grutter

Director of Graduate Studies

B. Vachon

Emeritus Professors

J. Barrette; M.Sc., Ph.D.(Montr.)

J.E. Crawford; B.A., M.A.(Tor.), Ph.D.(McG.)

S. Das Gupta; B.Sc., M.Sc.(Calc.), Ph.D.(McM.) (*Macdonald Emeritus Professor of Physics*)

N.B. de Takacsy; B.Sc., M.Sc.(Montr.), Ph.D.(McG.)

R. Harris; B.A.(Oxf.), Ph.D.(Sus.)

C.S. Lam; B.Sc.(McG.), Ph.D.(MIT)

D.G. Stairs; B.Sc., M.Sc.(Qu.), Ph.D.(Harv.) (*Macdonald Emeritus Professor of Physics*)

J.O. Strom-Olsen; B.A., M.S., Ph.D.(Camb.)

M.J. Zuckermann; M.A., D.Phil.(Oxf.), F.R.S.C.

Post-Retirement Professors

Z. Altounian; Ph.D.(McM.)

F. Buchinger; Ph.D.(Johannes Gutenberg)

Professors

R. Brandenberger; Dip.(ETH), A.M., Ph.D.(Harv.) (*Canada Research Chair*)

A. Clerk; B.Sc.(Tor.), Ph.D.(Cornell) (*Canada Research Chair*)

J. Cline; B.S.(Harvey Mudd), M.Sc., Ph.D.(Cal. Tech.)

F. Corriveau; B.Sc.(Laval), M.Sc.(Br. Col.), Ph.D.(ETH) (*Affiliated I.P.P. Scientist*)

C. Gale; B.Sc.(Ott.), M.Sc., Ph.D.(McG.) (*James McGill Professor*)

G. Gervais; B.Sc.(Sher.), M.Sc.(McM.), Ph.D.(N'western)

M. Grant; B.Sc.(PEI), M.Sc., Ph.D.(Tor.), F.R.S.C. (*James McGill Professor*)

Professors

P. Grutter; Dip., Ph.D.(Basel), F.R.S.C. (*James McGill Professor*)
 H. Guo; B.Sc.(Sichuan), M.Sc., Ph.D.(Pitt.), F.R.S.C. (*James McGill Professor*)
 D. Hanna; B.Sc.(McG.), A.M., Ph.D.(Harv.) (*Macdonald Professor of Physics*)
 S. Jeon; B.Sc.(Seoul National), M.Sc., Ph.D.(Wash.)
 V. Kaspi; B.Sc.(McG.), M.A., Ph.D.(Princ.), F.R.S.C. (*Canada Research Chair*) (*Lorne Trottier Chair in Astrophysics and Cosmology*)
 S. Lovejoy; B.Sc.(Camb.), Ph.D.(McG.)
 N. Provas; Ph.D.(McG.) (*Canada Research Chair*)
 K. Ragan; B.Sc.(Alta.), Ph.D.(Geneva) (*Macdonald Professor of Physics*)
 D.H. Ryan; B.A., Ph.D.(Dub.)
 M. Sutton; B.Sc., M.Sc., Ph.D.(Tor.) (*James McGill Professor*) (*Rutherford Professor*)
 P. Wiseman; B.Sc.(St. FX), Ph.D.(W. Ont.) (*joint appt. with Chemistry*)

Associate Professors

B. Coish; Ph.D.(Basel)
 A. Cumming; B.A.(Camb.), Ph.D.(Calif., Berk.)
 K. Dasgupta; M.Sc., Ph.D.(TIFR)
 M. Dobbs; B.Sc.(McG.), Ph.D.(Vic., BC) (*Canada Research Chair*)
 P. Francois; Ph.D.(Paris VII)
 M. Hilke; B.Sc., M.Sc., Ph.D.(Geneva)
 A. Maloney; B.S., M.S.(Stan.), Ph.D.(Harv.) (*William Dawson Scholar*)
 W. Reisner; B.A.(Reed), Ph.D.(Princ.)
 S. Robertson; B.Sc.(Calg.), M.Sc., Ph.D.(Vic., BC) (*Affiliated I.P.P. Scientist*)
 R. Rutledge; B.Sc.(USC), Ph.D.(MIT)
 B. Siwick; B.Sc., M.Sc., Ph.D.(Tor.) (*Canada Research Chair*) (*joint appt. with Chemistry*)
 B. Vachon; B.Sc.(McG.), Ph.D.(Vic., BC)
 A. Warburton; B.Sc.(Vic., BC), M.Sc., Ph.D.(Tor.)
 T. Webb; B.Sc.(Tor.), M.Sc.(McM.), Ph.D.(Tor.)

Assistant Professors

T. Brunner; Dip., Ph.D.(Munich)
 S. Caron-Huot; B.Sc.(Laval), M.Sc., Ph.D.(McGill)
 L. Childress; Ph.D.(Harv.) (*Canada Research Chair*)
 D. Cooke; Ph.D.(Alta.)
 N. Cowan; B.Sc.(McG.), Ph.D.(Wash.) (*joint appt. with Earth and Planetary Sciences*)
 D. Haggard; B.Sc.(USF), M.Sc., Ph.D.(Wash.)
 S. Leslie; Ph.D.(Calif., Berk.)
 T. Pereg-Barnea; Ph.D.(Br. Col.)
 J. Sankey; Ph.D.(Cornell) (*Canada Research Chair*)

Associate Members

M. Chacron (*Physiology*)
 S. Devic (*Oncology*)
 S. Enger (*Oncology*)
 K. Gehring (*Biochemistry*)

Associate Members

P. Kambhampati (*Chemistry*)
 A. Khadra (*Physiology*)
 J. Kildea (*Medical Physics*)
 I. Levesque (*Medical Physics*)
 M. Mackey (*Physiology*)
 Z. Mi (*Electrical and Computer Engineering*)
 J. Nadeau (*Biomedical Engineering*)
 G.B. Pike (*MNI and Biomedical Engineering*)
 D. Rassier (*Kinesiology*)
 D. Ronis (*Chemistry*)
 J. Seuntjens (*Medical Physics*)
 T. Szkopek (*Electrical and Computer Engineering*)
 F. Verhaegen (*Medical Physics*)

Adjunct Professors

G. Austing, F. Drolet, M. Dubé, I. El Naqa, P. Hayden, B. Palmieri, A. Sachrajda

11.8.5 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.

11.8.6 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
Stewart Biological Sciences Building, Room W8/6B
1205 Dr. Penfield Avenue
Montreal QC H3A 1B1
Canada
Telephone: 514-398-6124/514-398-6100
Fax: 514-398-4896
Email: gradsec@ego.psych.mcgill.ca
Website: www.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. Students are normally expected to do both master's and doctoral study.

M.A. and **M.Sc.** degrees may be awarded in Experimental Psychology, but only as a step to the **Ph.D.**—students undergo formal evaluation beginning with the submission of their master's requirements (thesis or fast-track paper) to enter Ph.D. 2.

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; students are expected to complete the full program leading to a doctoral degree.

Research interests of members of the Psychology Department include:

- animal learning;
- behavioural neuroscience;
- clinical;
- child development;
- cognitive science;
- health psychology;
- psychology of language;
- perception;
- quantitative psychology;
- social psychology;
- 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 the Montreal General Hospital, to permit graduate students to undertake research in a hospital setting. (Note that some MUHC-affiliated hospitals and institutes have moved to the new 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 Coordinator](#), Department of Psychology.

Ph.D. Option in Language Acquisition (LAP)

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

Ph.D. Option in Psychosocial Oncology (PSO)

A cross-disciplinary option in Psychosocial Oncology is offered within the existing Ph.D. program in Psychology. Information about this option is available from the Department and at www.medicine.mcgill.ca/oncology/programs/programs_psychosocialoncology.asp and www.mcgill.ca/psychology/graduate/program-tracks/clinical/additional-program-opportunities.

Arts > Graduate > Browse Academic Units & Programs > Psychology > : 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.

Science > Graduate > Browse Academic Units & Programs > Psychology > section 11.9.5: 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.

: 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.

: Doctor of Philosophy (Ph.D.); Psychology — Psychosocial Oncology

The Department of Oncology, in conjunction with the Ingram School of Nursing, the Department of Psychology and the School of Social Work, has developed the cross-disciplinary Psychosocial Oncology Option (PSOO). This option is open to doctoral students in the Ingram School of Nursing and in the Department of Psychology who are interested in broadening their knowledge of psychosocial issues in oncology.

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 majors 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.

All applicants must take the *GRE* General Test if they have studied in an English-speaking university. For those who have psychology background, it is recommended to take the Subject component of the GRE. Applicants with little or no background in psychology are not required to submit scores on the Subject component of the GRE. Canadians who have not studied in an English-speaking university are not required to submit the GRE General Test and Subject component.

11.9.3.2 Application Procedures

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

See *University Regulations and Resources > Graduate > Graduate Admissions and Application Procedures > : 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
- Graduate Record Examination (GRE) – See above for details.

11.9.3.3 Application Deadlines

The application deadlines listed here 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 academic unit's website; please consult the list at www.mcgill.ca/gps/contact/graduate-program.

| Canadian | International | Special/Exchange/Visiting |
|--------------|---------------|---------------------------|
| Fall: Dec. 1 | Fall: Dec. 1 | Fall: N/A |
| Winter: N/A | Winter: N/A | Winter: N/A |
| Summer: N/A | Summer: N/A | Summer: N/A |

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

11.9.4 Psychology Faculty

Chair

J. Lydon

Graduate Program Director

D. Titone

Emeritus Professors

F.E. Aboud; B.A.(Tor.), M.A., Ph.D.(McG.)

A.S. Bregman; M.A.(Tor.), Ph.D.(Yale)

D. Donderi; B.A., B.Sc.(Chic.), Ph.D.(Cornell)

V. Douglas; B.A.(Qu.), M.A., M.S.W., Ph.D.(Mich.)

K.B.J. Franklin; B.A., M.A.(Auck.), Ph.D.(Lond.)

F.H. Genesee; B.A.(W. Ont.), M.A., Ph.D.(McG.)

A.A.J. Marley; B.Sc.(Birm.), Ph.D.(Penn.)

R. Melzack; B.Sc., M.Sc., Ph.D.(McG.) (*E.P. Taylor Emeritus Professor of Psychology*)

P. Milner; B.Sc.(Leeds), M.Sc., Ph.D.(McG.)

Y. Oshima-Takane; B.A.(Tokyo Women's Christian Univ.), M.A.(Tokyo), Ph.D.(McG.)

J.O. Ramsay; B.Ed.(Alta.), Ph.D.(Princ.)

B. Sherwin; B.A., M.A., Ph.D.(C'dia) (*Canada Research Chair in Hormones, Brain and Cognition*)

Y. Takane; B.L., M.A.(Tokyo), Ph.D.(N. Carolina)

N. White; B.A.(McG.), M.A., Ph.D.(Pitt.)

Professors

M. Baldwin; B.A.(Tor.), M.A., Ph.D.(Wat.)

I.M. Binik; B.A.(NYU), M.A., Ph.D.(Penn.)

B. Ditto; B.S.(Iowa), Ph.D.(Ind.)

B. Knauper; D.Phil.(Mannheim)

R. Koestner; B.A., Ph.D.(Roch.)

D.J. Levitin; A.B.(Stan.), M.S., Ph.D.(Ore.) (*James McGill Professor*)

J. Lydon; B.A.(Notre Dame), M.A., Ph.D.(Wat.)

J. Mogil; B.Sc.(Tor.), Ph.D.(Calif.-LA) (*E.P. Taylor Professor of Psychology*) (*Canada Research Chair in Genetics of Pain*)

Professors

D.S. Moskowitz; B.S.(Kirkland), M.A., Ph.D.(Conn.)
 K. Nader; B.Sc., Ph.D.(Tor.) (*James McGill Professor*)
 D.J. Ostry; B.A.Sc., M.A.Sc., Ph.D.(Tor.)
 C. Palmer; B.Sc.(Mich.), M.Sc.(Rutg.), Ph.D.(Cornell) (*Canada Research Chair in Cognitive Neuropsychology Performance*)
 M. Petrides; B.Sc., M.Sc.(Lond.), Ph.D.(Cant.)
 R.O. Pihl; B.A.(Lawrence), Ph.D.(Ariz.)
 T.R. Shultz; B.A.(Minn.), Ph.D.(Yale)
 D.M. Taylor; M.A., Ph.D.(W. Ont.)
 D. Titone; B.A.(NYU), M.A., Ph.D.(SUNY, Binghamton)
 D.C. Zuroff; B.A.(Harv.), M.A., Ph.D.(Conn.)

Associate Professors

E.S. Balaban; B.A.(Mich. St.), Ph.D.(Rockefeller)
 H. Hwang; B.A.(Chung-Ang), Ph.D.(McG.)
 G. O'Driscoll; B.A.(Welles.), Ph.D.(Harv.) (*William Dawson Scholar*)
 K. Onishi; B.A.(Brown), M.A., Ph.D.(Ill.)

Assistant Professors

R. Bagot; B.Sc.(S. Wales), Ph.D.(McG.)
 J. Bartz; B.A.(C'ria), M.A., Ph.D.(McG.)
 J. Britt; B.A.(Colo.), Ph.D.(Balt.)
 M. Dirks; B.A.(McM.), M.S., M.Phil., Ph.D.(Yale)
 F. Gu; B.Sc.(Sing.), M.Sc., Ph.D.(Kansas)
 O. Hardt; B.Sc., M.Sc.(Trier), Ph.D.(Ariz.)
 L. Human; B.A., M.A., Ph.D.(Br. Col.)
 R. Otto; B.Sc.(Calif.), Ph.D.(Texas)
 J. Ristic; B.A., M.A., Ph.D.(Br. Col.) (*William Dawson Scholar*)
 M. Roy; B.Sc., Ph.D.(Montr.)
 S. Sheldon; B.Sc.(Alta.), M.A., Ph.D.(Tor.)
 D. Vachon; B.Sc.(Tor.), M.Sc., Ph.D.(Purd.)
 A. Weinberg; B.A.(Wesl.), M.A., Ph.D.,(Stony Brook)

Lecturer

P. Carvajal

Associate Members

Anesthesia: T. Coderre
Douglas Mental Health University Institute Research Centre: S. King, N. Rajah, H. Steiger
Jewish General Hospital: B Thombs, P. Zolkowitz
McGill Vision Research Centre: C. Baker, R. Hess, F.A.A. Kingdom, K. Mullen
Montreal Neurological Institute and Hospital: J. Armony, A. Dagher, L.K. Fellows, D. Guitton, M. Jones-Gotman, M. Lepage, B. Milner, E. Ruthazer, W. Sossin, V. Sziklas, R. Zatorre
Schulich School of Music: S. MacAdams
Psychiatry: D. Dunkley, F. Elgar, M. Leyton, J. Pruessner, A. Raz

Adjunct Professors

M. Bruck, Y. Chudasama, P. Delisle, J. Gradinger, S. Harnad, Z. Pleszewski, A.G. Ryder, M. Sullivan, H.-T. Yu, P. Zelazo

Part-Time Appointments

J. LeGallais, J. Russell, M. Sinai

Professional CAS

R. Amsel, *Associate Professor*

I. Bradley; B.Sc., M.Sc.(Tor.), Ph.D.(Wat.), (*Part-time Assistant Professor*)

L. Koski, *Assistant Professor*

Z. Rosberger; B.Sc.(McG.), M.A., Ph.D.(C' dia), (*Part-time Associate Professor*)

S. Stotland, *Assistant Professor*

11.9.5 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 |

11.9.6 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 (6 credits)

| | | |
|----------|-----|------------------------------------|
| PSYC 701 | (6) | Doctoral Comprehensive Examination |
|----------|-----|------------------------------------|

One graduate seminar each term during Year 2 and Year 3 chosen from seminar courses PSYC 710 to PSYC 758.

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

Note: If the student has a non-McGill master's degree then the following courses are also required:

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

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, approved by the LAP 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 (14 credits)

| | | |
|----------|-----|------------------------------------|
| EDSL 711 | (2) | Language Acquisition Issues 3 |
| LING 710 | (2) | Language Acquisition Issues 2 |
| PSYC 701 | (6) | Doctoral Comprehensive Examination |
| PSYC 709 | (2) | Language Acquisition Issues 1 |
| SCSD 712 | (2) | Language Acquisition Issues 4 |

One graduate seminar each term during Year 2 and Year 3 chosen from seminar courses PSYC 710 to PSYC 758.

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

Note: If the student has a non-McGill master's degree then the following courses are also required:

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

Complementary Courses (9 credits)

One graduate-level course in statistics, such as:

| | | |
|----------|-----|----------------------------------|
| EDPE 676 | (3) | Intermediate Statistics |
| EDPE 682 | (3) | Univariate/Multivariate Analysis |
| PSYC 650 | (3) | Advanced Statistics 1 |
| PSYC 651 | (3) | Advanced Statistics 2 |

Students who have taken an equivalent course in statistics, or are currently taking an equivalent course as part of their Ph.D. program requirements, will be deemed to have satisfied this requirement for the Language Acquisition Option.

Two courses selected from the following list, at least one course must be outside the Department of Psychology:

| | | |
|----------|-----|--|
| EDSL 620 | (3) | Critical Issues in Second Language Education |
| EDSL 623 | (3) | Second Language Learning |

| | | |
|----------|-----|--|
| EDSL 624 | (3) | Educational Sociolinguistics |
| EDSL 627 | (3) | Classroom-Centred Second Language Research |
| EDSL 629 | (3) | Second Language Assessment |
| EDSL 632 | (3) | Second Language Literacy Development |
| LING 555 | (3) | Language Acquisition 2 |
| LING 590 | (3) | Language Acquisition and Breakdown |
| LING 651 | (3) | Topics in Acquisition of Phonology |
| LING 655 | (3) | Theory of L2 Acquisition |
| PSYC 734 | (3) | Developmental Psychology and Language |
| PSYC 736 | (3) | Developmental Psychology and Language |
| SCSD 619 | (3) | Phonological Development |
| SCSD 632 | (3) | Phonological Disorders: Children |
| SCSD 633 | (3) | Language Development |
| 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 |

11.9.8 Doctor of Philosophy (Ph.D.); Psychology — Psychosocial Oncology

The Ph.D. thesis topic must be germane to psychosocial oncology and approved by the PSO coordinating 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 (12 credits)

| | | |
|----------|-----|------------------------------------|
| NUR2 705 | (3) | Palliative Care |
| NUR2 783 | (3) | Psychosocial Oncology Research |
| PSYC 701 | (6) | Doctoral Comprehensive Examination |

One graduate seminar each term during Year 2 and Year 3 chosen from seminar courses PSYC 710 to PSYC 758.

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

Note: If the student has a non-McGill master's then the following courses are also required:

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

Complementary Course (3 credits)

One of the following courses:

| | | |
|----------|-----|---|
| PSYC 507 | (3) | Emotions, Stress, and Illness |
| PSYC 753 | (3) | Health Psychology Seminar 1 |
| SWRK 609 | (3) | Understanding Social Care |
| SWRK 668 | (3) | Living with Illness, Loss and Bereavement |

11.10 Redpath Museum

11.10.1 Location

Redpath Museum
 859 Sherbrooke Street West
 Montreal QC H3A 0C4
 Canada
 Telephone: 514-398-4086
 Fax: 514-398-3185
 Email: redpath.museum@mcgill.ca
 Website: www.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 Deadlines

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

11.10.4 Redpath Museum Faculty

Director

Hans C.E. Larsson

Emeritus Professor

Robert L. Carroll; B.Sc.(Mich.), Ph.D.(Harv.), F.R.S.C., F.L.S.

Professors

David M. Green; B.Sc.(Br. Col.), M.Sc., Ph.D.(Guelph), F.L.S.

Andrew Hendry; B.Sc.(Vic., BC), M.Sc., Ph.D.(Wash.) (*joint appt. with Biology*)

Associate Professors

Hans C.E. Larsson; B.Sc.(McG.), Ph.D.(Chic.)

Anthony Ricciardi; B.Sc.(Agr.), M.Sc., Ph.D.(McG.) (*joint appt. with McGill School of Environment*)

Virginie Millien; Maîtrise(Paris VI), DEA, Ph.D.(Montpellier II)

Assistant Professor

Rowan Barrett; B.Sc.(Guelph), M.Sc.(McG.), Ph.D.(Br. Col.) (*CRC Tier 2 Chair in Biodiversity Science*)

Associate Members

Biology: Graham A.C. Bell, Lauren Chapman

Chemistry: David N. Harpp (*Tomlinson Chair in University Science Teaching*)

Earth & Planetary Sciences: Jeanne Paquette

McGill School of Environment: Colin Chapman

Adjunct Professors

Robert Holmes, Henry M. Reiswig, Michael Woloch