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

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## 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 2013–2014

For all dates relating to the academic year, consult [www.mcgill.ca/importantdates](http://www.mcgill.ca/importantdates).

## 4 Graduate Studies at a Glance

### 4.1 Graduate and Postdoctoral Degrees Offered by Faculty

McGill University offers graduate and postdoctoral programs in the following units (organized by their administering home faculty):

| Faculty of Agricultural and Environmental Sciences            | Degrees Available                           |
|---|---|
| : <i>Agricultural Economics</i>                               | M.Sc.                                       |
| : <i>Animal Science</i>                                       | M.Sc., M.Sc.A., Ph.D.                       |
| : <i>Bioresource Engineering</i>                              | M.Sc., M.Sc.A., Ph.D., Graduate Certificate |
| : <i>Biotechnology</i>  | M.Sc.A., Graduate Certificate               |
| : <i>Dietetics and Human Nutrition</i>                        | M.Sc., M.Sc.A., Ph.D., Graduate Diploma     |
| : <i>Food Science and Agricultural Chemistry</i>              | M.Sc., Ph.D.                                |
| : <i>Natural Resource Sciences</i>                            | M.Sc., Ph.D.                                |
| : <i>Parasitology</i>   | M.Sc., Ph.D.                                |
| : <i>Plant Science</i>  | M.Sc., M.Sc.A., Ph.D., Graduate Certificate |
| Faculty of Arts   | Degrees Available                           |
| : <i>Anthropology</i>   | M.A., Ph.D.                                 |
| : <i>Art History</i>  | M.A., Ph.D.                                 |
| Classics – see : <i>History and Classical Studies</i>         | N/A   |
| : <i>Communication Studies</i>                                | M.A., Ph.D.                                 |
| : <i>East Asian Studies</i>                                   | M.A., Ph.D.                                 |
| : <i>Economics</i>  | M.A., Ph.D.                                 |
| : <i>English</i>  | M.A., Ph.D.                                 |
| : <i>French Language and Literature</i>                       | M.A., Ph.D.                                 |
| section 11.6: <i>Geography</i>                                | M.A., Ph.D.                                 |
| : <i>History and Classical Studies</i>                        | M.A., Ph.D.                                 |
| : <i>Institute for the Study of International Development</i> | N/A   |
| : <i>Islamic Studies</i>                                      | M.A., Ph.D.                                 |
| : <i>Jewish Studies</i>                                       | M.A.  |
| : <i>Languages, Literatures, and Cultures</i>                 | M.A., Ph.D.                                 |

|  |  |
|--|--|
| <b>Faculty of Arts</b>                           | <b>Degrees Available</b>   |
| : <i>Linguistics</i>                             | M.A., Ph.D.  |
| <i>section 11.7: Mathematics and Statistics</i>  | M.A., Ph.D.  |
| : <i>Philosophy</i>                              | M.A., Ph.D.  |
| : <i>Political Science</i>                       | M.A., Ph.D.  |
| <i>section 11.9: Psychology</i>                  | M.A., Ph.D.  |
| : <i>Quebec Studies / Études sur le Québec</i>   | N/A  |
| : <i>Social Studies of Medicine</i>              | N/A  |
| : <i>Social Work</i>                             | M.S.W., Ph.D.  |
| : <i>Sociology</i>                               | M.A., Ph.D.  |
| <b>School of Dentistry</b>                       | <b>Degrees Available</b>   |
| : <i>Dentistry</i>                               | M.Sc.  |
| <b>Desautels Faculty of Management</b>           | <b>Degrees Available</b>   |
| : <i>Desautels Faculty of Management</i>         | M.B.A., M.B.A. with Integrated B.C.L./LL.B., M.D./M.B.A., M.B.A./Japan, E.M.B.A., M.M.M., M.M., Ph.D., Graduate Certificate, Diploma |
| <b>Faculty of Education</b>                      | <b>Degrees Available</b>   |
| : <i>Educational and Counselling Psychology</i>  | M.A., M.Ed., Ph.D., Graduate Diploma   |
| : <i>Information Studies</i>                     | M.L.I.S., Ph.D., Graduate Certificate, Graduate Diploma  |
| : <i>Integrated Studies in Education</i>         | M.A., Ph.D., Graduate Certificate  |
| : <i>Kinesiology and Physical Education</i>      | M.A., M.Sc.  |
| <b>Faculty of Engineering</b>                    | <b>Degrees Available</b>   |
| : <i>Architecture</i>                            | M.Arch., Ph.D.   |
| : <i>Chemical Engineering</i>                    | M.Eng., Ph.D.  |
| : <i>Civil Engineering and Applied Mechanics</i> | M.Sc., M.Eng., Ph.D.   |
| : <i>Electrical and Computer Engineering</i>     | M.Eng., Ph.D.  |
| : <i>Mechanical Engineering</i>                  | M.Sc., M.Eng., Ph.D.   |
| : <i>Mining and Materials Engineering</i>        | M.Sc., M.Eng., Ph.D., Graduate Diploma   |
| : <i>Urban Planning</i>                          | M.U.P.   |
| <b>Faculty of Law</b>                            | <b>Degrees Available</b>   |
| : <i>Law</i>                                     | LL.M., D.C.L., Graduate Certificate  |
| <b>McGill School of Environment</b>              | <b>Degrees Available</b>   |
| : <i>Environment</i>                             | N/A  |
| <b>Faculty of Medicine</b>                       | <b>Degrees Available</b>   |
| : <i>Anatomy and Cell Biology</i>                | M.Sc., Ph.D.   |
| : <i>Biochemistry</i>                            | M.Sc., Ph.D.   |
| : <i>Bioethics</i>                               | N/A  |
| : <i>Biomedical Engineering</i>                  | M.Eng., Ph.D.  |
| : <i>Communication Sciences and Disorders</i>    | M.Sc., M.Sc.A., Ph.D.  |
| : <i>Epidemiology and Biostatistics</i>          | M.Sc., Ph.D.   |
| : <i>Human Genetics</i>                          | M.Sc., Ph.D.   |
| : <i>Medical Physics</i>                         | M.Sc.  |

**Faculty of Medicine****Degrees Available***: Medicine, Experimental*

M.Sc., Ph.D., Graduate Diploma

*: Medicine, Family (Option)*

N/A

*: Microbiology and Immunology*

M.Sc., Ph.D.

*: Neuroscience (Integr*

M.Sc., Ph.D.

| Degree   |                              | Prerequisites   |
|--|------------------------------|---|
| Master of Business Administration with integrated Bachelor of Civil Law / Bachelor of Laws | M.B.A. with B.C.L./LL.B.     | See : <a href="#">M.B.A. Program</a> .  |
| Master of Business Administration with Doctor of Medicine / Master of Surgery              | M.B.A. with M.D.,C.M.        | See : <a href="#">M.B.A. Program</a> .  |
| Master of Education  | M.Ed.                        | Bachelor's degree with specialization related to the subject chosen for graduate work, plus a Permanent Quebec Teaching Diploma or its equivalent for some of the above degrees. See appropriate department.  |
| Master of Engineering  | M.Eng.                       | Bachelor of Engineering or equivalent, with specialization appropriate for the subject selected for graduate study. See appropriate department.   |
| Master of Laws   | LL.M.                        | An acceptable degree in Law or equivalent qualifications. See : <a href="#">Law Admission Requirements and Application Procedures</a> .   |
| Master of Library and Information Studies  | M.L.I.S.                     | At least a bachelor's degree from a recognized university. See : <a href="#">Information Studies Admission Requirements and Application Procedures</a> .  |
| Master of Management   | M.M.                         | See : <a href="#">Master of Management Programs Admission Requirements and Application Procedures</a> .   |
| Master of Manufacturing Management   | M.M.M.                       | See : <a href="#">Master of Management Programs Admission Requirements and Application Procedures</a> .   |
| Master of Music  | M.Mus.                       | Bachelor of Music or Bachelor of Arts with concentration in the area selected for graduate study.<br><br>Applicants to the Performance program are required to pass auditions in their speciality.<br><br>See : <a href="#">Schulich School of Music</a> .  |
| Master of Sacred Theology  | S.T.M.                       | B.A. with specialization in religious studies or theology. See : <a href="#">Religious Studies Admission Requirements and Application Procedures</a> .  |
| Master of Science  | M.Sc.                        | Bachelor of Science in the subject selected for graduate work. See appropriate unit.  |
| Master of Science, Applied   | M.Sc.A.                      | A bachelor's degree in the subject selected for graduate work. See appropriate unit.  |
| Master of Social Work  | M.S.W.                       | Bachelor's degree in Social Work including courses in statistics and social science research methods. See : <a href="#">Social Work Admission Requirements and Application Procedures</a> .   |
| Master of Social Work with Bachelor of Civil Law and Bachelor of Laws                      | M.S.W. with B.C.L. and LL.B. | See : <a href="#">Social Work Admission Requirements and Application Procedures</a> .   |
| Master of Urban Planning   | M.U.P.                       | Bachelor's degree in any one of the following: Anthropology, Architecture, Economics, Civil Engineering, Geography, Law, Management, Political Science, Social Work, Sociology, or Urban Planning, with adequate knowledge of quantitative techniques. See : <a href="#">Urban Planning Admission Requirements and Application Procedures</a> . |

#### 4.2.1 Master's Degree Programs and Specializations

The following list shows all of the programs and options available for each degree at McGill.

| Program                                      | Thesis/Non-Thesis | Options  |
|--|-------------------|--|
| Master of Architecture (M.Arch) Professional | Non-Thesis        | Design Studio, Design Studio – Directed Research |

**Master of Arts (M.A.)**

|                        |   |                                     |
|------------------------|---|-------------------------------------|
| Art History            | Thesis  | N/A                                 |
| Classics               | Thesis, Non-Thesis  | N/A                                 |
| Communication Studies  | Thesis, Non-Thesis  | Gender and Women's Studies (Thesis) |
| Counselling Psychology | Non-Thesis (Professional<br>Internship), Non-Thesis (Project) | N/A                                 |
| East Asian Studies     | Thesis ( <i>Ad Hoc</i> )                                      | N/A<br>Dev                          |





### Master of Sacred Theology (S.T.M.)

A program leading to the degree of *Sanctae Theologiae Magister* (S.T.M.) is given in the Faculty of Religious Studies. This degree is primarily for those who intend to enter the ministry of the Christian Church or another religious institution, or to proceed to teaching in schools. A Master of Arts program (thesis and non-thesis) is also available.

|                   |            |     |
|-------------------|------------|-----|
| Religious Studies | Non-Thesis | N/A |
|-------------------|------------|-----|

### Master of Science (M.Sc.)

|                                 |                    |  |
|---------------------------------|--------------------|--|
| Agricultural Economics          | Thesis             | N/A  |
| Animal Science                  | Thesis             | N/A  |
| Atmospheric and Oceanic Science | Thesis             | Environment  |
| Biochemistry                    | Thesis             | Bioinformatics, Chemical Biology                                   |
| Biology                         | Thesis             | Bioinformatics, Environment, Neotropical Environment               |
| Bioresource Engineering         | Thesis, Non-Thesis | Environment, Neotropical Environment (Thesis)<br>Inte6g4ngineering |



| Degree                     |                         | Prerequisites   |
|----------------------------|-------------------------|---|
| Doctor of Music            | D.Mus.                  | M.A. in Composition (D.Mus. in Composition) or a master's degree in Performance, and professional and teaching experience (D.Mus. in Performance). See : <a href="#">Schulich School of Music</a> .   |
| Doctor of Philosophy       | Ph.D.                   | An undergraduate degree relevant to the subject chosen for graduate work. Some departments require all Ph.D. candidates to hold a master's degree in the same subject. Departments may recommend that candidates of undoubted promise should be allowed to proceed directly to the Ph.D. degree without being required to submit a master's thesis. |
| Joint Doctor of Philosophy | Ph.D.                   | Joint Ph.D.s are offered in co-operation with other universities.   |
|                            | Ph.D. ( <i>Ad Hoc</i> ) | Several departments offer the possibility of directly entering a Ph.D. program on an <i>ad hoc</i> basis, or, with the permission of the supervisor and the approval of the   |

**Doctor of Philosophy (Ph.D.)**

|                              |   |                        |
|------------------------------|---|------------------------|
| Communication Studies        | Gender and Women's Studies  | Faculty of Arts        |
| Computer Science             | Bioinformatics  | Faculty of Science     |
| Counselling Psychology       | N/A   | Faculty of Education   |
| Earth and Planetary Sciences | Environment   | Faculty of Science     |
| Economics                    | N/A   | Faculty of Arts        |
| Educational Psychology       | Human Development, Learning Sciences  | Faculty of Education   |
| Educational Studies          | Gender and Women's Studies, Language Acquisition, Mathematics and Science Education | Faculty of Education   |
| Electrical Engineering       | N/A   | Faculty of Engineering |
| English                      | N/A   | Faculty of Arts        |
|                              |   | Faculty of             |

**Doctor of Philosophy (Ph.D.)**

|                                 |  |  |
|---------------------------------|--|--|
| Physics                         | N/A  | Faculty of Science                                 |
| Physiology                      | Bioinformatics                                       | Faculty of Medicine                                |
| Plant Science                   | Bioinformatics, Environment, Neotropical Environment | Faculty of Agricultural and Environmental Sciences |
| Political Science               | Gender and Women's Studies                           | Faculty of Arts                                    |
| Psychology                      | Language Acquisition, Psychosocial Oncology          | Faculty of Arts, Faculty of Science                |
| Rehabilitation Science          | N/A  | School of Physical and Occupational Therapy        |
| Religious Studies               | Gender and Women's Studies                           | Faculty of Religious Studies                       |
| Renewable Resources             | Environment, Neotropical Environment                 | Faculty of Agricultural and Environmental Sciences |
| Russian                         | N/A  | Faculty of Arts                                    |
| School/Applied Child Psychology | N/A  | Faculty of Education                               |
| Social Work                     | N/A  | Faculty of Arts                                    |
| Sociology                       | Environment, Gender and Women's Studies              | Faculty of Arts                                    |

**Joint Doctor of Philosophy (Ph.D.)**

|             |     |                                    |
|-------------|-----|------------------------------------|
| Nursing     | N/A | McGill / Université de Montréal    |
| Management  | N/A | McGill / Concordia / H.E.C. / UQAM |
| Social Work | N/A | McGill / Université de Montréal    |

**Ad Hoc Doctor of Philosophy (Ph.D. (Ad Hoc))**

|                                    |     |                        |
|------------------------------------|-----|------------------------|
| Dentistry                          | N/A | Faculty of Dentistry   |
| East Asian Studies                 | N/A | Faculty of Arts        |
| Italian Studies                    | N/A | Faculty of Arts        |
| Jewish Studies                     | N/A | Faculty of Arts        |
| Kinesiology and Physical Education | N/A | Faculty of Education   |
| Psychiatry                         | N/A | Faculty of Medicine    |
| Urban Planning                     | N/A | Faculty of Engineering |

**4.4 Postdoctoral Research**

See [section 8: Postdoctoral Research](#) for information about postdoctoral research at McGill University.

**4.5 Graduate Diplomas and Graduate Certificates**

The graduate diplomas and graduate certificates listed below are programs of study under the academic supervision of Graduate and Postdoctoral Studies. The prerequisite for a diploma or certificate is an undergraduate degree in the same discipline.

The graduate diploma programs consist of at least two terms of full-time study or the equivalent.

**Graduate Diplomas**

|                    |  |
|--------------------|--|
| Clinical Research  | Professional Performance                   |
| Libr3duate Diplanc | Public Accountancy (Chartered Accountancy) |

### Graduate Certificates

|   |                                       |
|---|---------------------------------------|
| Assessing Driving Capabilities                                  | Educational Leadership 1              |
| Air and Space Law   | Educational Leadership 2              |
| Bioinformatics  | Library and Information Studies       |
| Bioresource Engineering (Integrated Water Resources Management) | Post-M.B.A.                           |
| Biotechnology   | Teaching English as a Second Language |
| Chronic Pain Management   | Theory in Primary Care                |
| Comparative Law   | Theory in Neonatology                 |

All graduate regulations apply to graduate diploma and graduate certificate candidates.



**Note:** The School of Continuing Studies offers graduate diplomas and graduate certificates that are not under the academic supervision of Graduate and Postdoctoral Studies. To see a list of the programs offered, refer to the School of Continuing Studies eCalendar available at [www.mcgill.ca/study](http://www.mcgill.ca/study).

## 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.L.I.S.; 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.); Library and Information Studies (M.L.I.S.); 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 *Programs, Courses and University Regulations* publication, available at [www.mcgill.ca/study](http://www.mcgill.ca/study).

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 courses passed at any recognized university.

As a rule, no more than one-third of the McGill program formal coursework (not thesis, project, stage, or internship) can be credited with courses from another university.

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

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.

If courses were not used for a degree, they could be **credited** toward a McGill degree, keeping in mind that a maximum of one-third of the coursework (not thesis, project, stage, internship, and practicum) can be credited. If an **exemption** is granted, it must be replaced by another graduate course at McGill toward the degree. No double counting is ever allowed. This regulation also applies to doctoral programs.

#### **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* form, in accordance with the dates on [www](#)



## 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* form in accordance with the dates on [www.mcgill.ca/importantdates](http://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](http://www.mcgill.ca/gps/thesis/guidelines).

Seven copies of the thesis must be provided by the candidate. Of these, two copies will be retained by the University and five copies returned to the candidate. Some departments may require one or more additional copies. The final corrected copy is submitted electronically.

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](http://www.mcgill.ca/gps/thesis/guidelines).

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## 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/apply/prepare#program](http://www.mcgill.ca/gradapplicants/apply/prepare#program) and contact the relevant department.

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## 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#courseereg](http://www.mcgill.ca/gps/students/registration#courseereg).

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 studies must be approved by GPS before registration. Double counting is not permitted.

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## 6 Graduate Admissions and Application Procedures

Website: [www.mcgill.ca/gradapplicants](http://www.mcgill.ca/gradapplicants)

Email: [servicepoint@mcgill.ca](mailto:servicepoint@mcgill.ca)



**Deadline: Admission to graduate studies at McGill is competitive; accordingly, late and/or incomplete applications are considered only as time and space permits. Meeting minimum admission standards does not guarantee admission. Admission decisions are not normally subject to appeal or reconsideration and are subject to change. To be considered for entrance fellowships, where available, applicants must verify the deadlines with individual departments.**

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### 6.1 Application for Admission

Application information and the online application form are available at [www.mcgill.ca/gradapplicants/apply](http://www.mcgill.ca/gradapplicants/apply). Applicants (with some exceptions) are required to provide the names and email addresses of two instructors familiar with their academic work and who are willing to provide letters of reference in support of the application. McGill will request the reference letters on behalf of the applicant. All applicants must themselves upload an unofficial copy of their complete academic record from each university-levvv

A handwritten signature in blue ink, located in the bottom right corner of the page.

diplomas, letters of reference, and test scores, become the property of McGill University and will not be returned to the applicant or issuing institution under any circumstance.

A **non-refundable** fee of \$102.60 paid by credit card in Canadian funds **must** accompany the online application. The fee of \$102.60 covers up to two program choices per term. Candidates for Special, Visiting, and Qualifying status must also apply online and pay the application fee. Please note that application fees are subject to change.

It is recommended that applicants submit a list of the course titles in the major subject, since transcripts often give code numbers only. **Transcripts written in a language other than English or French must be accompanied by a translation prepared by a licensed translator.** An explanation of the grading system used by the applicant's university is essential. The applicant should also indicate the major subject area in which further study is desired.

Applications and uploaded supporting documents must be submitted according to individual department specifications and deadlines; see [www.mcgill.ca/gradapplicants/programs](http://www.mcgill.ca/gradapplicants/programs). International students are advised to apply well in advance of the application deadlines as immigration procedures may be lengthy. Admission to graduate studies at McGill is highly competitive; accordingly, late and/or incomplete applications are considered only as time and space permits.

The admission decision is based on the recommendation of the graduate department, verification by the Graduate Admissions Unit in Enrolment Services, as well as final approval from Graduate and Postdoctoral Studies. In some cases, the Graduate Admissions Committee may also contribute to the final admission decision. Official letters of admission are sent to applicants electronically by Enrolment Services.

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## 6.2 Admission Requirements (Minimum Requirements to be Considered for Admission)



**Note:** The following admission requirements denote the minimum standard for applicants. Some graduate departments may require additional qualifications or a higher minimum CGPA; applicants are strongly urged to consult the department concerned regarding specific requirements.

Applicants should be graduates of a recognized university and hold a recognized bachelor's degree or its equivalent, as determined by McGill, in a subject closely related to the one selected for graduate work.

The applicant must present evidence of academic achievement: 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. High grades are expected in courses considered by the department to be preparatory to the graduate program. Some departments impose additional or higher requirements.

See [www.mcgill.ca/gradapplicants/apply/prepare/international/equivalency](http://www.mcgill.ca/gradapplicants/apply/prepare/international/equivalency) for information on grade equivalencies and de

**GRE:** Graduate Records Examination (see [section 6.4: Admission Tests](#))

**Interview:** a conversation between the applicant and a McGill representative, using a structured, standardized approach to allow for comparison and analysis of responses from all applicants interviewed; in person, via telephone, *Skype*, etc.

**Personal Statement:** an essay in which the applicant describes their reasons for applying to graduate studies and indicating qualifications, qualities, or circumstances the applicant feels to be significant; usually provides information about educational and professional goals and discusses the applicant's interest in the desired field of study.

**Portfolio:** a collection of the applicant's best work to date, selected by them, and intended to show their mastery of a given style or variety of styles; different samples of their artistic work.

**Recording:** an unedited recording (audio or video) of the applicant performing at least two contrasting pieces; minimum 20 minutes.

**Research Proposal:** a detailed description of the proposed program of research, including proposed Thesis Supervisor(s); describes the research background, significance, methodology, and references; may include expected results; may include a detailed curriculum vitae.

**TOEFL:** Test of English as a Foreign Language (see [section 6.5: Competency in English](#))

**Writing Sample:** a recent sample of the applicant's written work, on any topic (not necessarily within the desired field of graduate study) and not necessarily previously submitted for evaluation or publication.

**Written Work:** a sample of the applicant's written work, drawn from essays, papers or other work previously submitted for academic evaluation or publication, and falling within the desired field of graduate study.

## 6.4 Admission Tests

### Graduate Record Examination (GRE)

The Graduate Record Examination (GRE) (Educational Testing Service, Princeton, NJ 08540) consists of a relatively advanced test in the candidates' specialty, and a general test of their attainments in several basic fields of knowledge for which no special preparation is required or recommended. It is offered at many centres, including Montreal, several times a year; the entire examination takes about eight hours, and there is a registration fee. Refer to [www.ets.org/gre](http://www.ets.org/gre) for further information. Only some departments require applicants to write the GRE examination, but all applicants who have written either the general aptitude or the advanced test are advised to ensure that official test results are sent to McGill directly by the testing service.

This credential is of special importance in the case of applicants whose education has been interrupted, or has not led directly toward graduate study in the subject selected. In such cases, the department has the right to insist on a report from the Graduate Record Examination or some similar test. High standing in this examination will not by itself guarantee admission. The Miller Analogies Test may be used similarly. Some departments of the Faculty of Education also require the taking of various tests.

### Graduate Management Admissions Test (GMAT)

Applicants to graduate programs in Management must ensure that official results are released to McGill by the Graduate Management Admission Council (GMAC). The test is a standardized assessment offered by the GMAC to help business schools assess candidates for admission. For further information, see [www.mba.com/the-gmat](http://www.mba.com/the-gmat).

## 6.5 Competency in English

Applicants to graduate studies must demonstrate an adequate level of proficiency in English **prior to admission**, regardless of citizenship status or country of origin.

Normally, applicants meeting any one of the following conditions are NOT required to submit proof of proficiency in English:

1. Mother tongue (language first learned and still used on a daily basis) is English.
2. Has obtained (or is about to obtain) an undergraduate or graduate degree from a recognized foreign institution where English is the language of instruction.
3. Has obtained (or is about to obtain) an undergraduate or graduate degree from a recognized institution in Canada or the United States of America (anglophone or francophone).
4. Has lived and attended university, or been employed, for at least four consecutive years, in a country where English is the acknowledged primary language.

Applicants who do not meet any of the above-listed conditions must demonstrate proficiency in English using **one** of the following options:

1. TOEFL (Test of English as a Foreign Language): minimum acceptable scores are:

#### Competency in English

iBT (Internet-based test)

86 overall (no less than 20 in each of the four component scores)

PBT (paper-based test)

550

CBT (computer-based test)\*

\* The CBT is no longer being offered and CBT results are no longer considered valid, or being reported by ETS.





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## 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.

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### 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.).

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### 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*—on the web at [www.mcgill.ca/gps/postdocs/fellows/letter](http://www.mcgill.ca/gps/postdocs/fellows/letter)). 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 Gr](#)

- 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](http://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](http://www.mcgill.ca/secretariat/policies/students)

- 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*

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### **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*

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### **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 *Pro*



- 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.

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## 9 Graduate Studies Guidelines and Policies

Refer to *Programs, Courses and University Regulations > 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

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

Refer to *Programs, Courses and University Regulations > 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

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## 11 Academic Programs

The programs and courses in the following sections have been approved for the 2013–2014 session as listed, but the Faculty/School reserves the right to introduce changes as may be deemed er

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## 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: 514 393 6464

Fax: 514 393 6464

Email: [atmos@atmos.mcgill.ca](mailto:atmos@atmos.mcgill.ca)

Web: [atmos.mcgill.ca/meteo](http://atmos.mcgill.ca/meteo)

### 11.1.2 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 disciplines such as mathematics, physics, chemistry, and biology, contributing to a broad understanding of topics relating to weather and climate. Examples include atmospheric chemistry, atmospheric dynamics, cloud and precipitation physics, dynamical meteorology, geophysical turbulence, numerical weather prediction, ocean carbon biogeochemistry, and sea ice dynamics. Research topics include synoptic, mesoscale, and radar and satellite meteorology.

Some of our programs have close ties with other departments, schools, and centres, including the Centre for Mathematics and Statistics, the Department of Chemistry, the Centre for Global Change Science, the Centre for Environmental and Climate Science (GEC3), and the Centre for the Study of the Arctic and the Quebec Ocean. Facilities include the J. Stewart McPherson Observatory, as well as state-of-the-art field and laboratory equipment for atmospheric chemistry. Graduate students have access to computer resources ranging from desktop PCs to the massive parallel machines available through CLUMEQ, Compute Canada, and the Department's computer centre at Environment Canada. In some cases, M.Sc. and Ph.D. research may have an international 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 264.7.5 Master of Science (M.Sc.); Atmosph264.7.5 Master of Science (Thesis) (45 credits)**

Our program applies mathematical, physical, and sometimes chemistry to study the atmosphere and oceans. Ideal students 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

## 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 Chair of Admissions, Department of Atmospheric and Oceanic Sciences.

### 11.1.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at [www.mcgill.ca/gradapplicants/apply](http://www.mcgill.ca/gradapplicants/apply).

See [section 6.3: 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
- GRE – required for applicants who have not studied at a Canadian university

### 11.1.3.3 Application Deadlines

| Canadian         | International    | Special/Exchange/Visiting |
|------------------|------------------|---------------------------|
| Fall: March 31   | Fall: March 31   | Fall: March 31            |
| Winter: Sept. 15 | Winter: Sept. 15 | Winter: Sept. 15          |
| Summer: N/A      | Summer: N/A      | Summer: N/A               |



**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*)

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

**Associate Professors**

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

**Assistant Professors**

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

D. Kirshbaum; Ph.D.(Wash.)

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

**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)

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

**Associate Member**

Michel Bourqui; Ph.D.(ETH Zurich)

**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 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 619* | (3) | Advanced Atmospheric Chemistry      |
| ATOC 626  | (3) | Atmospheric/Oceanic Remote Sensing  |

|           |     |                                |
|-----------|-----|--------------------------------|
| ATOC 646  | (3) | Mesoscale Meteorology          |
| CHEM 619* | (3) | Advanced Atmospheric Chemistry |

\* Students may select either ATOC 619 or CHEM 619.

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)**

Master's Thesis Literature Review



## 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; and Plant Biology. In addition to the regular M.Sc. and Ph.D. programs, the Biology Department offers specialized programs, known as “options” in certain specific areas: Neotropical Environment (NEO), Bioinformatics, Environment, and Developmental Biology.

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 the Gault Nature Reserve at Mont St. Hilaire (Quebec), the Morgan Arboretum (Quebec), the Huntsman Marine Science Centre (New Brunswick), the Subarctic Research Laboratory (Quebec), the Bellairs Research Institute (Barbados), the Smithsonian Tropical Research Institute (Panama), and the 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*

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

The goal of the Bioinformatics option 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 option 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 option. Students in this option will have access to five specialized courses that are open only to students within the Bioinformatics option. At the M.Sc. level, students successfully completing the Bioinformatics option 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.). Admission is based on an evaluation by the applicant’s potential supervisor, who is the faculty member who will provide supervision and financial support for the student’s research, and by the Biology Graduate Training Committee. Prospective graduate students are encouraged to contact faculty members with whom they wish to study before applying for admission.

Alumni hav



**section 11.2.13: Doctor of Philosophy (Ph.D.); Biology — Bioinformatics**

The goal of the Bioinformatics option 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 option 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 option. Students in this option will have access to five specialized courses that are open only to students within the Bioinformatics option. 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 550 on the paper-based TOEFL or 86 on the Internet-based test 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 staff members with whom they wish to study before applying for admission.

**11.2.3.2 Application Procedures**

McGill’s online application form for graduate program candidates is available at [www.mcgill.ca/gradapplicants/apply](http://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 [section 6.3: 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**

| 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                            |

If application materials are received after the application deadlines, review of the applicant’s file may be delayed until the following admittance period. 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**

Graham A.C. Bell

**Chair of Graduate Program**

Lauren Chapman

## **Emeritus Professors**

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

### Associate Professors

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

### Assistant Professors

Gary Brouhard; M.S.E., Ph.D.(Mich.)

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

Jonathan Davies; M.Sc.(Cape Town), Ph.D.(Imperial Coll., Lond.)

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

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

Jon Sakata; B.A.(C'Nell), Ph.D.(Texas-Austin)

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

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

Hugo Zheng; M.Sc.(Helsinki), Ph.D.(Oxf. Brookes) (*on sabbatical 2013–2014*)

### Associate Members

*Anatomy and Cell Biology*: Nathalie Lamarche-Vane, Craig Mandato

*Anthropology*: Colin Chapman

*Biochemistry*: Maxime Bouchard

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

*MCH*: Feige Kaplan, Rima Rozen

*Medical Genetics, Chair*: David Rosenblatt

*MNI*: Kenneth Hastings, Stefano Stifani

*Physics*: Paul Francois

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

*RVH*: Hugh J. Clarke, Daniel Dufort, Teruko Taketo

### Adjunct Professors

*BELLUS Health Inc.*: Francesco Bellini

*CNRS Moulis, France*: Michel Loreau

*IRCM*: Frédéric Charron, David Hipfner, Artur Kania, Marie Kmita

*NRC Lab*: Malcolm S. Whiteway

*STRI*: Eldredge Bermingham, Rachel Collin, Hector Guzman, Edward Allen Herre, Haris Lessios, William Owen McMillan, Mark

### 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<br>Foundations of Environmental Policy |
|----------|-----|--|

|          |      |                            |
|----------|------|----------------------------|
| 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.



|          |     |                                    |
|----------|-----|------------------------------------|
| BIOL 700 | (0) | Doctoral Qualifying Examination    |
| BIOL 702 | (6) | Ph.D. Seminar                      |
|          |     | Foundations of Environmental Polic |

**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:





### **Emeritus Professors**

R.H. Marchessault; B.Sc.(Montr.), Ph.D.(McG.), F.C.I.C., F.R.S.C.

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

### **Professors**

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

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

D.H. Burns; B.Sc.(Puget Sound), Ph.D.(Wash.)

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

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

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.M. Ronis; B.Sc.(McG.), Ph.D.(MIT)

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

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.)

### **Associate Professors**

M.P. Andrews<sup>97.877 547.64 Tm(Acad. Sci.), Ph.D.956 416.88 TWue1 86.91;</sup>, FT

**Associate Members**

J.A. Finch (*Mining, Metals and Materials Engineering*)

P. Grütter (*Physics*)

O.A. Mamer (*University Clinic, RVH*)

R. Schirmacher (*MNI*)

**Adjunct Professors**

Y. Guindon, C. Reber, I. Wharf, C.T. Yim, 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 Master of Science (M.Sc.); Chemistry (Thesis) — Chemical Biology (45 credits)**

Not offered in 2013-2014.

**Thesis Courses (24 credits)**

(minimum 24 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 (11 credits)**

(minimum 11 credits)

2 credits, two of the following courses:

BIOC 610 (1) Seminars in Chemical Biology 1  
BIOC 611 (1) Seminars in Chemical Biology 3  
BIOC 689 (1) Seminars in Chemical Biology 2  
BIOC 690 (1) Seminars in Chemical Biology 4

Students will take at least three courses from the following list, including at least 3 credits from the first two courses listed below:

BIOC 603 (3) Genomics and Gene Expression  
BIOC 604 (3) Macromolecular Structure  
CHEM 502 (3) Advanced Bio-Organic Chemistry  
CHEM 503 (3) Drug Design and Development 1  
CHEM 504 (3) Drug Design and Development 2  
CHEM 514 (3) Biophysical Chemistry  
CHEM 522 (3) Stereochemistry  
CHEM 591 (3) Bioinorganic Chemistry  
CHEM 621 (5) Reaction Mechanisms in Organic Chemistry  
CHEM 629 (5) Organic Synthesis  
CHEM 655 (4) Advanced NMR Spectroscopy  
PHAR 503 (3) Drug Discovery and Development 1  
PHAR 504 (3) Drug Discovery and Development 2  
PHAR 562 (3) General Pharmacology 1  
PHAR 563 (3) General Pharmacology 2  
PHAR 707 (3) Topics in Pharmacology 6

The remaining credits may be graduate-level courses approved by the Department.

**11.3.7 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.

## 11.3.8 Doctor of Philosophy (Ph.D.); Chemistry — Chemical Biology

Not offered in 2013-2014.

### 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

|          |     |                                |
|----------|-----|--------------------------------|
| BIOC 610 | (1) | Seminars in Chemical Biology 1 |
| BIOC 611 | (1) | Seminars in Chemical Biology 3 |
| BIOC 689 | (1) | Seminars in Chemical Biology 2 |
| BIOC 690 | (1) | Seminars in Chemical Biology 4 |
| 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. At least three courses must be from the following list, including at least 3 credits from the first two courses listed below.

|          |     |                              |
|----------|-----|------------------------------|
| BIOC 603 | (3) | Genomics and Gene Expression |
|----------|-----|------------------------------|

|          |     |                                  |
|----------|-----|----------------------------------|
| PHAR 503 | (3) | Drug Discovery and Development 1 |
| PHAR 504 | (3) | Drug Discovery and Development 2 |
| PHAR 562 | (3) | General Pharmacology 1           |
| PHAR 563 | (3) | General Pharmacology 2           |
| PHAR 707 | (3) | Topics in Pharmacology 6         |

The remaining credits may be 500-, 600-, or 700-le



**Emeritus Professors**

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. Ratzler; B.Sc.(Glas.), M.Sc.(McG.)  
 G.T. Toussaint; B.Sc.(Tulsa), Ph.D.(Br. Col.)

**Professors**

D. Avis; B.Sc.(Wat.), Ph.D.(Stan.)  
 L. Devroye; M.S.(Louvain), Ph.D.(Texas) (*James McGill Professor*)  
 G. Dudek; B.Sc.(Qu.), M.Sc., Ph.D.(Tor.) (*James McGill Professor*)  
 L. Hendren; B.Sc., M.Sc.(Qu.), Ph.D.(C'nell), F.R.S.C. (*Canada Research Chair*)  
 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)  
 P. Hayden; B.Sc.(McG.), Ph.D.(Oxf.)  
 B. Kemme; B.Sc., M.Sc.(Univ. of Erlangen-Nuremberg, Germany), Ph.D.(ETH, Zurich)  
 J. Kienzle; Eng.Dip., Ph.D.(Swiss Fed. IT)  
 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. Tropper; B.Sc.(McG.), Ph.D.(Brooklyn Poly.)  
 C. Verbrugge; B.A.(Qu.), Ph.D.(McG.)  
 A. Vetta; B.Sc., M.Sc.(LSE), Ph.D.(MIT)

**Assistant Professors**

H. Hatami; B.Sc.(Sharif), M.Sc., Ph.D.(Tor.)  
 W. He; B.Sc.(Harbin), M.Sc.(Tsinghua), M.Eng., Ph.D.(Ill.)  
 P. Kry; B.Sc.(Wat.), M.Sc., 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)





|          |     |                                     |
|----------|-----|-------------------------------------|
| 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 | (2)  | Thesis Research 1 |
| COMP 696 | (3)  | Thesis Research 2 |
| COMP 697 | (4)  | Thesis Research 3 |
| COMP 698 | (9)  | Thesis Research 4 |
| COMP 699 | (15) | Thesis Research 5 |

##### Required Courses

One credit selected as follow:

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

##### Complementary Courses

(minimum 21 credits)

Two courses from List A, 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                         |
|          |     | Finite Elements in Electrical Engineering |

**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          |
|          |     | Model-Driven Software Dev      |

|          |     |                                     |
|----------|-----|-------------------------------------|
| 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.

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## 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](mailto:grad.eps@mcgill.ca)  
 Website: [www.mcgill.ca/eps](http://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. It 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 fixation of mercury 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, and planetary-scale ocean biogeochemistry 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, XRF, 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.

##### Hydr

Chemistry and crystallography of carbonate minerals. Experimental investigations of the effect of environmental factors (e.g., solution composition and temperature) on the morphology and composition of calcite.

### **Oceanic Biogeochemistry**

Links between the marine ecosystem and climate through observations of the modern ocean, simulations of ocean biogeochemistry with computer models, and sedimentary records of past climate change.

### **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**

The interactions of climate and tectonics, especially in regard to the formation and degradation of orogens. Understanding the paleoclimatic and neotectonic history of Plio-Pleistocene landscape development using cosmogenic-dating techniques. Archean orogenic processes. Fluid flow in faults, granular flow in faults, and catastrophic structural/geochemical events in faults.

### **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, O<sub>3</sub>) 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 of the results, for thesis and publication, typically takes three additional years. Students entering the Ph.D. program without an M.Sc. are required to take a full year of courses before embarking on the processes described above. Students graduating from our Ph.D. program pursue careers in universities and government-funded research institutes, and in the mineral-exploration and petroleum industries.

### **11.5.3 Earth and Planetary Sciences Admission Requirements and Application Procedures**

#### **11.5.3.1 Admission Requirements**

Applicants should have an academic background equiv





### 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 six graduate-level courses in the Ph.D. 1 year, and two courses plus a comprehensive oral examination in the Ph.D. 2 year.

Note: The Ph.D. requirements for this program will be changing effective Winter 2013.

#### 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 666 | (3) | Current Issues in Geosciences |
|----------|-----|-------------------------------|

Preliminary Doctoral ,Studi5nces0((3))Tj1 0 0 1 70.49 365.824 Tm(E orain.)Tj/F0 8.3 Tf1 0 0 1 67. 1 751.207 Tm(Com

One to five courses

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.

Zero to four 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

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Website: [www.geog.mcgill.ca](http://www.geog.mcgill.ca)

### 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 Human Development; Geographic Information Systems and Remote Sensing; Land Surface Processes; Earth Systems Science; and Environmental Management. Geography houses the Hirschfeld Geographic Information Centre, maintains the McGill High Arctic Research Station (Axel Heiberg Island, Nunavut Territory) and the McGill Sub-Arctic Research Station (Schefferville, Quebec), and has strong ties with McGill's School of Environment and the Centre for Climate and Global Change Research. 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 Southeast Asia and Latin America.

#### 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.

#### Centre for Climate and Global Change Research

The Department of Geography, with the McGill Departments of Atmospheric and Oceanic Sciences, Economics, Natural Resource Sciences, and several departments from the *Université du Québec à Montréal* and *Université de Montréal*, developed a collaborative research centre that examines climate and global change. There are graduate opportunities through this centre.

For more information contact Professor Nigel Roulet, Director, Centre for Climate and Global Change, McGill University.

Being both a natural and a social science, geography provides a unique opportunity to obtain a broad 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, and policy analysts, 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 ([www.geog.mcgill.ca/other/jobsingeo.html](http://www.geog.mcgill.ca/other/jobsingeo.html)) 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 (30 credits), required (3 credits), and complementary (12 credits) 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 think fit, and submit a thesis in an appropriate area of geographical inquiry approved by the adviser.

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

Detailed program requirements for the following M.A. programs are found in the eCalendar under *Faculties & Schools > Faculty of Arts > Graduate > Academic 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 (30 credits), required (3 credits), and complementary (12 credits) 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 (30 credits); required International Development and Geography courses (6 credits); and complementary courses (9 credits) 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 of

***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 (30 credits), required (3 credits), and complementary (12 credits) 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 (24 credits); required Geography and Environment courses (9 credits); and complementary Geography and Environment courses (12 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. 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 Institutuh

Applicants not satisfying the conditions in [section 6: 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 available.

**Associate Professors**

M.F. Lapointe; M.Sc.(McG.), Ph.D.(Br. Col.)

T.C. Meredith; M.Sc., Dip.Cons.(Lond.), Ph.D.(Cant.)

|          |     |                                     |
|----------|-----|-------------------------------------|
| 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.

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## 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

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Website: [www.math.mcgill.ca](http://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; and 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 ([www.math.mcgill.ca](http://www.math.mcgill.ca)) provides extensive information on the Department and its facilities, including the research activities and the research interests of individual faculty members. It also provides detailed information, supplementary to this eCalendar, concerning our programs, admissions, funding of graduate students, thesis requirements, advice concerning the choice of courses, etc.

Statistic Tm1 43.52Me2(0 1 67.52 40es67.52 46902.52Me2(0 1 67.52 402uinf7.2)eprogram in Mathematics and Statistics, there is a Psis .053 Tw1 0 0 ose b1d91 is a P

**section 11.7.6: Master of Science (M.Sc.); Mathematics and Statistics (Thesis) — Bioinformatics (48 credits)**

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: [www.cs.mcgill.ca/prospective-students/graduate/msc\\_cse\\_option](http://www.cs.mcgill.ca/prospective-students/graduate/msc_cse_option).

**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 (16 credits) and eight approved courses of 3 or more credits each for a total of at least 29 credits.

**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](http://www.mcgill.ca/gradapplicants/apply).

See [section 6.3: 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:

- Research Proposal – in the proposal, applicants should clearly explain their choice of preferred research group(s) and specific research topics of particular interest (if any)

- Applicants in pure and applied mathematics should provide a GRE score report, if available

For more details, please consult the website at [www.math.mcgill.ca/students/graduate/application](http://www.math.mcgill.ca/students/graduate/application).

### 11.7.3.3 Application Deadlines

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



**Associate Members**Prakash Panangaden (*Computer Science*)Robert Platt (*Epidemiology and Biostatistics*)James O. Ramsay (*Psychology*)George Alexander Whitmore (*Management*)Christina Wolfson (*Epidemiology and Biostatistics*)**Adjunct Professors**

Vasek Chvatal; Ph.D.(Wat.)

Donald A. Dawson; B.Sc., M.Sc.(McG.), Ph.D.(MIT)

Martin 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)

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.

Vladimir Remeslennikov; M.Sc.(Perm, Russia), Ph.D.(Novosibirsk)

Robert A. Seely; B.Sc.(McG.), Ph.D.(Cant.)

**Faculty Lecturers**

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

H. Hahn; Ph.D.(Ill.-Urbana-Champaign)

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

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

**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 | (3) | Geometry in Mechanics                     |
| MECH 577 | (3) | Optimum Design                            |
| MECH 610 | (4) | Fundamentals of Fluid Dynamics            |
| MECH 620 | (4) | Advanced Computational Aerodynamics       |
| MECH 632 | (4) | Theory of Elasticity                      |
| 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

## 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 150.

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, and others too many to list here. 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, and 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, and TRIUMF.

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 CLUMEQ 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 \$21,400 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](http://www.physics.mcgill.ca/grads/finance.html).

Graduate students in the Department of Ph

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, and 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 V**

### 11.8.3.2.1 Additional Requirements

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

- GRE – recommended but not required

### 11.8.3.3 Application Deadlines

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

### 11.8.4 Physics Faculty

#### Chair

C. Gale

#### Director of Graduate Studies

S. Jeon

#### Emeritus Professors

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

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**Professors**

N. Provatas; Ph.D.(McG.)  
 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*)  
 P. Wiseman; B.Sc.(St. FX), Ph.D.(W. Ont.) (*joint appt. with Chemistry*)

**Associate Professors**

A. Clerk; B.Sc.(Tor.), Ph.D.(C' nell) (*Canada Research Chair*)  
 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*)  
 G. Gervais; B.Sc.(Sher.), M.Sc.(McM.), Ph.D.(N'western)  
 M. Hilke; B.Sc., M.Sc., Ph.D.(Geneva)  
 G. Holder; B.Sc., M.Sc.(Qu.), Ph.D.(Chic.) (*Canada Research Chair*)  
 A. Maloney; B.S., M.S.(Stan.), Ph.D.(Harv.) (*William Dawson Scholar*)  
 S. Robertson; B.Sc.(Calg.), M.Sc., Ph.D.(Vic., BC)  
 R. Rutledge; B.Sc.(USC), Ph.D.(MIT)  
 B. Vachon; B.Sc.(McG.), Ph.D.(Vic., BC) (*Canada Research Chair*)  
 A. Warburton; B.Sc.(Vic., BC), M.Sc., Ph.D.(Tor.)

**Assistant Professors**

L. Childress; Ph.D.(Harv.)  
 B. Coish; Ph.D.(Basel)  
 D. Cooke; Ph.D.(Alta.)  
 P. Francois; Ph.D.(Paris VII)  
 S. Leslie; Ph.D.(Calif., Berk.)  
 T. Pereg-Barnea; Ph.D.(Br. Col.)  
 W. Reisner; B.A.(Reed), Ph.D.(Princ.)  
 J. Sankey; Ph.D.(C' nell)  
 B. Siwick; B.Sc., M.Sc., Ph.D.(Tor.) (*Canada Research Chair*) (*joint appt. with Chemistry*)  
 J. Walcher; Dip., Ph.D.(ETH) (*joint appt. with Mathematics*)  
 T. Webb; B.Sc.(Tor.), M.Sc.(McM.), Ph.D.(Tor.)

**Lecturer**

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

**Associate Members**

G. Brouhard (*Biology*)  
 M. Chacron (*Physiology*)  
 K. Gehring (*Biochemistry*)  
 P. Hayden (*Computer Science*)  
 P. Kambhampati (*Chemistry*)  
 A. Khadra (*Physiology*)  
 M. Mackey (*Physiology*)

### Associate Members

Z. Mi (*Electrical and Computer Engineering*)

J. Nadeau (*Biomedical Engineering*)

E. Podgorsak (*Medical Physics*)

D. Rassier (*Kinesiology*)

D. Ronis (*Chemistry*)

J. Seuntjens (*Medical Physics*)

T. Szkopek (*Electrical and Computer Engineering*)

F. Verhaegen (*Medical Physics*)

### Adjunct Professors

G. Austing, R. Bennewitz, F. Drolet, M. Grisaru, O. Hernandez, L. Piché, A. Sachrajda, J. Vinals

## 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:

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**11.9 Psychology****11.9.1 Location**

Department of Psychology  
Stewart Biological Sciences Building, Room



***: 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

**Emeritus Professors**

A.S. Bregman; M.A.(Tor.), Ph.D.(Yale)  
 D. Donderi; B.A., B.Sc.(Chic.), Ph.D.(C'nell)  
 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.)  
 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.)  
 Y. Takane; B.L., M.A.(Tokyo), Ph.D.(N. Carolina)  
 N. White; B.A.(McG.), M.A., Ph.D.(Pitt.)

**Professors**

F.E. Aboud; B.A.(Tor.), M.A., Ph.D.(McG.)  
 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.)  
 F.H. Genesee; B.A.(W. Ont.), M.A., Ph.D.(McG.)  
 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*)  
 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.(C'nell) (*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.)  
 B. Sherwin; B.A., M.A., Ph.D.(C' dia) (*Canada Research Chair in Hormones, Brain and Cognition*)  
 T.R. Shultz; B.A.(Minn.), Ph.D.(Yale)  
 M. Sullivan; B.A.(McG.), M.A., Ph.D.(C' dia) (*Canada Research Chair in Behavioral Health*)  
 D.M. Taylor; M.A., Ph.D.(W. Ont.)  
 D.C. Zuroff; B.A.(Harv.), M.A., Ph.D.(Conn.)

**Associate Professors**

A.G. Baker; B.A.(Br. Col.), M.A., Ph.D.(Dal.)  
 E.S. Balaban; B.A.(Mich. St.), Ph.D.(Rockefeller)  
 Y. Chudasama; B.Sc., Ph.D.(Cardiff)  
 H. Hwang; B.A.(Chung-Ang), Ph.D.(McG.)  
 B. Knauper; Dr. phil.(Germany, Mannheim)  
 M.J. Mendelson; B.Sc.(McG.), A.M., Ph.D.(Harv.)  
 G. O'Driscoll; B.A.(Welles.), Ph.D.(Harv.) (*William Dawson Scholar*)  
 K. Onishi; B.A.(Brown), M.A., Ph.D.(Ill.)

### Associate Professors

M. Pompeiana; M.D., Ph.D.(Pisa)

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

D. Titone; B.A.(NYU), M.A., Ph.D.(SUNY, Binghamton) (*Canada Research Chair in Cognitive Neuroscience of Language and Memory*)

### Assistant Professors

J. Bartz; B.A.(C' dia), M.A., Ph.D.(McG.)

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

M. Dirks; B.A.(McM.), M.S., M.Phil., Ph.D.(Yale)

J. Ristic; B.A., M.A., Ph.D.(Br. Col.) (*William Dawson Scholar*)

H.-T. Yu; B.S.(Taiwan), M.S., M.A., Ph.D.(Ill.-Urbana-Champaign)

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### 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         |
| EDSL 664 | (3) | Second Language Research Methods             |
| 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<br>Living with Illness, Loss and Bereavement |

### **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 program. All graduate students of the professors in the Redpath Museum have home departments in 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**

