



Interfaculty Studies
Programs, Courses and University Regulations
2022-2023

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

- 1 . McGill University reserves the right to make changes to the information contained in this online publication - including correcting errors, altering fees, schedules of admission, and credit requirements, and revising or cancelling particular courses or programs - without prior notice.
- 2 . In the interpretation of academic regulations, the Senate is the final authority.
- 3 . Students are responsible for informing themselves of the University's procedures, policies and regulations, and the specific requirements associated with the degree, diploma, or certificate sought.
- 4 . All students registered at McGill University are considered to have agreed to act in accordance with the University procedures, policies and regulations.
- 5 . Although advice is readily available on request, the responsibility of selecting the appropriate courses for graduation must ultimately rest with the student.
- 6 . Not all courses are offered every year and changes can be made after publication. Always check the Minerva Class Schedule link at https://horizon.mcgill.ca/pban1/bwckschd.p_disp_dyn_sched for the most up-to-date information on whether a course is offered.
- 7 . The academic publication year begins at the start of the Fall semester and extends through to the end of the Winter semester of any given year. Students who begin study at any point within this period are governed by the regulations in the publication which came into effect at the start of the Fall semester.
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Note: Throughout this publication, "you" refers to students newly admitted, readmitted or returning to McGill.

Publication Information

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Enrolment Services

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- 1 Dean's Welcome, page 7
 - 2 Graduate and Postdoctoral Studies, page 7
 - 2.1 Administrative Officers, page 7
 - 2.2 Location, page 7
 - 2.3 Graduate and Postdoctoral Studies' Mission, page 7
 - 3 Important Dates, page 7
 - 4 Graduate Studies at a Glance, page 8
 - 5 Program Requirements, page 8
 - 6 Graduate Admissions and Application Procedures, page 8
 - 7 Fellowships, Awards, and Assistantships, page 8
 - 8 Postdoctoral Research, page 8
 - 8.1 Postdocs, page 8
 - 8.2 Guidelines and Policy for Academic Units on Postdoctoral Education, page 9
 - 8.3 Vacation Policy for Graduate Students and Postdocs, page 10
 - 8.4 Leave of Absence for Health and Parental/Familial Reasons, page 10
 - 8.5 Postdoctoral Research Trainees, page 11
 - 9 Graduate Studies Guidelines and Policies, page 11
 - 10 Graduate Student Services and Information, page 12
 - 11 Information on Research Policies and Guidelines, Patents, Postdocs, Associates, Trainees, page 12
 - 12 Browse Academic Units & Programs, page 12
 - 12.1 Biological and Biomedical Engineering, page 12
 - 12.1.1 Location, page 12
 - 12.1.2 About Biological and Biomedical Engineering, page 13
 - 12.1.3 Biological and Biomedical Engineering Admission Requirements and Application Procedures, page 13
 - 12.1.3.1 Admission Requirements, page 13
 - 12.1.3.2 Application Procedures, page 14
 - 12.1.3.3 Application Dates and Deadlines, page 14
 - 12.1.4 Biological and Biomedical Engineering Faculty, page 14
 - 12.1.5 Master of Engineering (M.Eng.) Biological and Biomedical Engineering (Thesis) (45 credits) , page 14
 - 12.1.6 Doctor of Philosophy (Ph.D.) Biological and Biomedical Engineering , page 16
 - 12.2 Neuroscience (Integrated Program), page 16
 - 12.2.1 Location, page 16
 - 12.2.2 About the Integrated Program in Neuroscience, page 16
 - 12.2.3 Neuroscience (Integrated Program) Admission Requirements and Application Procedures, page 17
 - 12.2.3.1 Admission Requirements, page 17
 - 12.2.3.2 Application Procedures, page 18
 - 12.2.3.3 Application Dates and Deadlines, page 18
 - 12.2.4 Neuroscience (Integrated Program) Faculty, page 18
 - 12.2.5 Master of Science (M.Sc.) Neuroscience (Thesis) (45 credits) , page 19
 - 12.2.6 Doctor of Philosophy (Ph.D.) Neuroscience , page 19

-
- 12.3 Quantitative Life Sciences, page 20
 - 12.3.1 Location, page 20
 - 12.3.2 About Quantitative Life Sciences, page 20
 - 12.3.3 Quantitative Life Sciences Admission Requirements and Application Procedures, page 20
 - 12.3.3.1 Admission Requirements, page 20
 - 12.3.3.2 Application Procedures, page 20
 - 12.3.3.3 Application Dates and Deadlines, page 21
 - 12.3.4 Quantitative Life Sciences Faculty, page 21
 - 12.3.5 Doctor of Philosophy (Ph.D.) Quantitative Life Sciences , page 22

1 Dean's Welcome

Welcome to Graduate and Postdoctoral Studies (GPS) at McGill. You are joining a community of world-class researchers and more than 10,000 graduate students in over 400 programs. GPS is here to support you from admissions through to graduation and beyond. McGill's approach to graduate education emphasizes skills development; we cultivate your academic and professional growth through a variety of workshops, events and experiential learning opportunities. I invite you to consult the [GPS website](#) for information on the range of resources available to graduate students at McGill.

I would like to wish you all the best in your studies at McGill. We are here to make sure that you have the best possible experience.

Josephine Nalbantoglu, Ph.D.

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

2 Graduate and Postdoctoral Studies

2.1 Administrative Officers

Administrative Officers

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

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

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

Associate Dean (Graduate and Postdoctoral Studies)

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

Associate Dean (Graduate and Postdoctoral Studies)

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

Associate Dean (Graduate and Postdoctoral Studies)

2.2 Location

James Administration Building, Room 400

845 Sherbrooke Street West

Montreal QC H3A 0G4

Website: mcgill.ca/gps



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

2.3 Graduate and Postdoctoral Studies' Mission

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

3 Important Dates

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

4 Graduate Studies at a Glance

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

5 Program Requirements

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

- Master's Degrees
- Doctoral Degrees
- Coursework for Graduate Programs, Diplomas, and Certificates

6 Graduate Admissions and Application Procedures

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

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

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

7 Fellowships, Awards, and Assistantships

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

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

8.1 Postdocs

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

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

8.2 Guidelines and Policy for Academic Units on Postdoctoral Education

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

1. Definition and Status

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

2. Registration

- i. Postdocs must *register* annually with the University through Enrolment Services. Registration will be limited to postdocs who fulfil the definition above, and who meet the eligibility criteria as stipulated on the [Graduate and Postdoctoral Studies website](#).
- ii. Upon registration, postdocs will be eligible for a University identity card issued by Enrolment Services.
- iii. Leaves of absence must comply with the Graduate and Postdoctoral Studies Policies for Vacation, Parental/Familial, and Health Leave (see [section 8.3: Vacation Policy for Graduate Students and Postdocs](#) and [University Regulations & Resources](#) > Graduate > Regulations > Categories of Students > : *Leave of Absence Status*).

3. Appointment, Funding, Letter of Agreement

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

4. Privileges

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

5. Responsibilities

- i. Postdocs are subject to the responsibilities outlined at mcgill.ca/students/srr and must abide by the policies listed at mcgill.ca/secretariat/policies-and-regulations.
- ii. Each academic unit hosting postdocs should clearly identify postdocs' needs and the means by which they will be met by the unit.
- iii. Each academic unit should assess the availability of research supervision facilities, office space, and research funding before recruiting postdocs.
- iv. Some examples of the responsibilities of the academic unit are:
 - to verify the postdoc's eligibility period for registration;
 - to provide postdocs with departmental policy and procedures that pertain to them;
 - to facilitate the registration and appointment of postdocs;
 - to assign departmental personnel the responsibility for postdoctoral affairs in the unit;
 - to oversee and sign off on the Letter of Agreement for Postdoctoral Education;
 - to ensure that each postdoc has a supervisor, lab and/or office space, access to research operating costs and necessary equipment;
 - to include postdocs in departmental career and placement opportunities;
 - to refer postdocs to the appropriate University policies and personnel for the resolution of conflict that may arise between a postdoc and a supervisor.
- v. Some examples of the responsibilities of the supervisor are:
 - to uphold and transmit to their postdocs the highest professional standards of research and/or scholarship;
 - to provide research guidance;
 - to meet regularly with their postdocs;
 - to provide feedback on research submitted by the postdocs;
 - to clarify expectations regarding intellectual property rights in accordance with the University's policy;
 - to provide mentorship for career development;
 - to prepare, sign, and adhere to a Letter of Agreement for Postdoctoral Education.
- vi. Some examples of the responsibilities of postdocs are:
 - to inform themselves of and adhere to the University's policies and/or regulations for postdocs as outlined at mcgill.ca/gps/postdocs, mcgill.ca/students/srr and the Graduate and Postdoctoral Studies [University Regulations and Resources](#);
 - to submit a complete file for registration to Enrolment Services;
 - to sign and adhere to their Letter of Agreement for Postdoctoral Education;
 - to communicate regularly with their supervisor;
 - to inform their supervisor of their absences.
- vii. Some examples of the responsibilities of the University are:
 - to register postdocs;
 - to provide an appeal mechanism in cases of conflict;
 - to provide documented policies and procedures to postdocs;
 - to provide postdocs with the necessary information on McGill University student services (Postdoctoral Fellows and Scholars) and HR policies and guidelines (Postdoctoral Researchers).

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

8.3 Vacation Policy for Graduate Students and Postdocs

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

Council of FGSR April 23, 1999

8.4 Leave of Absence for Health and Parental/Familial Reasons

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

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

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

8.5 Postdoctoral Research Trainees

Eligibility

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

The category of Postdoctoral Research Trainee is for:

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

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

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

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



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

General Conditions

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

9 Graduate Studies Guidelines and Policies

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

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

10 Graduate Student Services and Information

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

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

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

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

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

12 Browse Academic Units & Programs

The programs and courses in the following sections have been approved for the 2022–2023 session as listed.

12.1 Biological and Biomedical Engineering

12.1.1 Location

Duff Medical Building
3775 University Street, Room 316
Montreal QC H3A 2B4
Canada
Website: mcgill.ca/bbme

12.1.2 About Biological and Biomedical Engineering

Biological and Biomedical Engineering (BBME) is an interfaculty graduate program administered jointly by the Departments of Bioengineering (Faculty of Engineering) and Biomedical Engineering (Faculty of Medicine and Health Sciences) at McGill. Interdisciplinary in nature, the program includes extensive research areas and broad training, with over 60 world-renowned scientists, and equips students for promising careers in industry, healthcare, academia and government. Researchers in this field unravel the molecular and physiological mechanisms of life, develop increasingly advanced technologies to transform healthcare, and reverse-engineer naturally occurring biological processes. Graduates of the BBME program are poised to play a critical role in shaping our global future.

Please consult our [website](#) for additional information.

Research Domains

Ongoing biological and biomedical engineering research at McGill includes:

- artificial cells and organs
- bioinformatics, computational biology, and biocomputation
- biological materials and mechanics
- biomedical imaging and microscopy
- biomedical modelling
- biomedical sensors, diagnostics, and therapeutics
- biomedical signals and systems
- biomolecular and cellular engineering
- bioprocess engineering
- micro- and nano-bioengineering
- systems and synthetic biology

section 12.1.5: Master of Engineering (M.Eng.) Biological and Biomedical Engineering (Thesis) (45 credits)

The Biological and Biomedical Engineering Master's program focuses on the interdisciplinary application of methods, paradigms, technologies, and devices from engineering and the natural sciences to problems in biology, medicine, and the life sciences. With its unique multidisciplinary environment and taking advantage of research collaborations between staff in the Faculties of Medicine and Health Sciences, Science, and Engineering, BBME offers thesis-based graduate degrees (M.Eng.) that span broad themes, including: biomodelling, biosignal processing, medical imaging, nanotechnology, artificial cells and organs, probiotics, bioinformatics, orthopedics, biological materials and mechanobiology, motor proteins and the cytoskeleton, biosensors and biological therapeutics, biological networks, and computational biology. BBME's internationally-renowned staff provide frequent and stimulating interactions with physicians, scientists, and the biomedical industry. Through courses and thesis research, this program will prepare students for careers in industry, academia, hospitals, and government and provide a solid basis for Ph.D. studies. Candidates should hold a Bachelor's degree in engineering, science, or medicine with a strong emphasis on mathematics, physics, chemistry, and basic biology (physiology, cell biology, or molecular biology).

For more information please consult mcgill.ca/bbme/prospective-students/masters-program.

section 12.1.6: Doctor of Philosophy (Ph.D.) Biological and Biomedical Engineering

The Biological and Biomedical Engineering doctoral program provides students with advanced training in the interdisciplinary application of methods, paradigms, technologies, and devices from engineering and the natural sciences to problems in biology, medicine, and the life sciences. The program will focus on an area of choice while integrating quantitative concepts and engineering tools for the study of natural and life sciences and/or for patient care. As part of the Ph.D. requirement, students will integrate the scientific method, develop critical and deep thinking, and acquire advanced writing and presentation skills that will form the foundation for their future career. Under the guidance of their supervisor, students will tackle a research challenge and make original contributions to the advancement of science and engineering in an area of Biological and Biomedical Engineering. Through independent research and thesis writing, the program will prepare students for careers in academia, industry, hospitals, and government. Students who complete the program will obtain a doctor of philosophy in Biological and Biomedical Engineering. The best preparation for this program is a master's degree in BBME or a related discipline.

For more information please consult mcgill.ca/bbme/prospective-students/doctoral-program.

12.1.3 Biological and Biomedical Engineering Admission Requirements and Application Procedures

12.1.3.1 Admission Requirements

For up-to-date admission requirements, please consult mcgill.ca/bbme/prospective-students/how-apply and [University Regulations & Resources > Graduate > Graduate Admissions and Application Procedures > : Admission Requirements \(Minimum Requirements to be Considered for Admission\)](#).

12.1.3.2 Application Procedures

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

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

Please address enquiries directly to info.bbme@mcgill.ca.

12.1.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Biological and Biomedical Engineering Graduate Program and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at mcgill.ca/gps/contact/graduate-program. For additional information, please consult mcgill.ca/bbme/prospective-students/how-apply.

Application Opening Dates		Application Deadlines		
	All Applicants	Non-Canadian citizens (incl. Special, Visiting & Exchange)	Canadian citizens/Perm. residents of Canada (incl. Special, Visiting & Exchange)	Current McGill Students (any citizenship)
Fall Term:	Sept. 15	Feb. 1	Feb. 1	Feb. 1
Winter Term:	Feb. 15	Jul. 15	Sept. 1	Sept. 1
Summer Term:	N/A	N/A	N/A	N/A

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



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

12.1.4 Biological and Biomedical Engineering Faculty

Biological and Biomedical Engineering is an interfaculty program offered jointly by the Department of Bioengineering in the Faculty of Engineering and the Department of Biomedical Engineering in the Faculty of Medicine and Health Sciences.

Please refer to mcgill.ca/bbme/people for their respective faculty listings.

12.1.5 Master of Engineering (M.Eng.) Biological and Biomedical Engineering (Thesis) (45 credits)

The Biological and Biomedical Engineering (BBME) Master's program focuses on the interdisciplinary application of methods, paradigms, technologies, and devices from engineering and the natural sciences to problems in biology, medicine, and the life sciences. With its unique multidisciplinary environment, and taking advantage of research collaborations between staff in the Faculties of Medicine, Science, and Engineering, BBME offers thesis-based graduate degrees (M.Eng.) that span broad themes in biomodelling, biosignal processing, medical imaging, nanotechnology, artificial cells and organs, probiotics, bioinformatics, bioengineering, biomaterials, and orthopaedics. BBME's internationally renowned staff provide frequent and stimulating interactions with physicians, scientists, and the biomedical industry. Through courses and thesis research, this program will prepare students for careers in industry, academia, hospitals and government and provide a solid basis for Ph.D. studies. Candidates should hold a bachelor's degree in engineering, science, or medicine with a strong emphasis on mathematics, physics, chemistry, and basic physiology or cell biology.

Thesis Courses (30 credits)

BBME 693	(6)	Thesis Research 1
BBME 694	(6)	Thesis Research 2
BBME 695	(12)	Thesis Submission
BBME 696	(3)	Thesis Research 3
BBME 697	(3)	Thesis Research 4

Required Courses (3 credits)

BBME 600D1	(1.5)	Seminars in Biological and Biomedical Engineering
BBME 600D2	(1.5)	Seminars in Biological and Biomedical Engineering

OR

BBME 600N1	(1.5)	Seminars in Biological and Biomedical Engineering
BBME 600N2	(1.5)	Seminars in Biological and Biomedical Engineering

Complementary Courses (12 credits)

3 credits from the following quantitative courses:

BIEN 510	(3)	Engineered Nanomaterials for Biomedical Applications
BIEN 530	(3)	Imaging and Bioanalytical Instrumentation
BIEN 550	(3)	Biomolecular Devices
BIEN 560	(3)	Design of Biosensors
BIEN 570	(3)	Active Mechanics in Biology
BIEN 590	(3)	Cell Culture Engineering
BMDE 502	(3)	BME Modelling and Identification
BMDE 503	(3)	Biomedical Instrumentation
BMDE 512	(3)	Finite-Element Modelling in Biomedical Engineering
BMDE 519	(3)	Biomedical Signals and Systems
BMDE 610	(3)	Functional Neuroimaging Fusion
BMDE 660	(3)	Advanced MR Imaging and Spectroscopy of the Brain
MDPH 607	(3)	Medical Imaging

3 credits from the following:

BIEN 510	(3)	Engineered Nanomaterials for Biomedical Applications
BIEN 530	(3)	Imaging and Bioanalytical Instrumentation
BIEN 540	(3)	Information Storage and Processing in Biological Systems
BIEN 550	(3)	Biomolecular Devices
BIEN 560	(3)	Design of Biosensors
BIEN 570	(3)	Active Mechanics in Biology
BIEN 590	(3)	Cell Culture Engineering
BIEN 680	(4)	Bioprocessing of Vaccines
BMDE 501	(3)	Selected Topics in Biomedical Engineering
BMDE 502	(3)	BME Modelling and Identification
BMDE 503	(3)	Biomedical Instrumentation
BMDE 504	(3)	Biomaterials and Bioperformance
BMDE 505	(3)	Cell and Tissue Engineering
BMDE 508	(3)	Introduction to Micro and Nano-Bioengineering
BMDE 512	(3)	Finite-Element Modelling in Biomedical Engineering
BMDE 519	(3)	Biomedical Signals and Systems
BMDE 525D1	(3)	Design of Assistive Technologies: Principles and Praxis
BMDE 525D2	(3)	Design of Assistive Technologies: Principles and Praxis
BMDE 610	(3)	Functional Neuroimaging Fusion
BMDE 650	(3)	Advanced Medical Imaging

BMDE 654	(3)	Biomedical Regulatory Affairs - Medical Devices
BMDE 660	(3)	Advanced MR Imaging and Spectroscopy of the Brain
MDPH 607	(3)	Medical Imaging

6 credits at the 500-level or higher chosen from a list on the program web site <https://www.mcgill.ca/bbme/students/courses> or from other courses, at the 500 level or higher, at least 3 credits of which have both life sciences content and content from the physical sciences, engineering, or computer science, with the prior written approval of the Thesis Supervisor and the Graduate Program Director.

12.1.6 Doctor of Philosophy (Ph.D.) Biological and Biomedical Engineering

The goal of the Biological and Biomedical Engineering Ph.D. program is for students to gain advanced training in the interdisciplinary application of methods, paradigms, technologies, and devices from engineering and the natural sciences to problems in biology, medicine, and the life sciences. The program will focus in an area of choice while integrating quantitative concepts and engineering tools for the study of life sciences and/or for patient care. As part of the Ph.D. requirement, the student will integrate the scientific method, develop critical and deep thinking, and acquire advanced writing and presentation skills that will form the foundation for his/her career. Under the guidance of his/her supervisor, the student will tackle a research challenge and make original contributions to the advancement of science and engineering in an area of Biological and Biomedical Engineering. The program will prepare students for careers in academia, industry, hospitals and government. Students who complete the program will obtain a Doctor of Philosophy in Biological and Biomedical Engineering. The best preparation for this program is a Master's degree in BBME or a related discipline.

Thesis

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

BBME 701	(0)	Ph.D. Comprehensive Examination
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Students must be registered in this course at the time of the Thesis Proposal and Comprehensive Exam Meeting.

Further courses may be required by the supervisor(s) in consultation with the Graduate Program Director, depending on the educational background of individual students.

12.2 Neuroscience (Integrated Program)

12.2.1 Location

Montreal Neurological Institute, Room 141
3801 University Street
Montreal QC H3A 2B4
Website: mcgill.ca/ipn

12.2.2 About the Integrated Program in Neuroscience

Montreal is home to the largest concentration of neuroscientists in North America. Neuroscience research at McGill University is internationally renowned, and its Integrated Program in Neuroscience (IPN) provides graduate training in this outstanding research environment. With approximately 500 M.Sc. and Ph.D. students and more than 230 supervisors, the IPN is the largest interfaculty graduate program and one of the largest neuroscience graduate programs in North America.

Neuroscience training within the IPN spans the full spectrum of research fields, from cellular and molecular neuroscience to behavioural and cognitive neuroscience. In addition to laboratory research, the IPN offers an extensive range of courses, hosts an annual mcgill.ca/ipn/events/ipn-retreat, and maintains a seminar program to facilitate communication between students in different neuroscience disciplines. Neuroscience trainees from McGill have gone on to successful careers in academia and industry.

A prospective graduate student must *identify a supervisor*, selecting from one of several research streams which span the full spectrum of neuroscience research. A student with a bachelor's degree may apply to the **M.Sc.** program; it is common to transfer to the **Ph.D.** program if suitable progress is made. Students with M.Sc. degrees may apply directly to the Ph.D. program. IPN also offers a Ph.D. Rotation program each September.

GENERAL

1. Students must select an Advisory Committee, in conjunction with their thesis supervisor. This committee will consist of the thesis supervisor and two (maximum three) other individuals who will participate in discussions with students about their research program.
2. All Ph.D. students are required to complete a candidacy examination before the end of Ph.D. 3. The exam serves to evaluate the students' ability to perform original scholarship and to demonstrate their suitability for a Ph.D. degree. An M.Sc. student may be eligible to transfer to the Ph.D. program without submitting a master's thesis by taking the *Transfer Seminar/Candidacy Exam*. This exam is allowed if the master's CGPA is 3.5 or higher and if the student's Advisory Committee recommends the student as an appropriate candidate for Ph.D. studies. M.Sc. students who wish to pursue a Ph.D. degree, but who have not obtained the minimum 3.5 CGPA in their M.Sc. coursework while in the IPN, must submit a master's thesis and apply for the Ph.D. level afterwards.
3. Students are required to submit a written thesis proposal (18 months after the start of the program for M.Sc. students, and at least one month prior to the candidacy exam for Ph.D. students). This document must state the research question, present the hypothesis being tested, review the relevant literature, summarize the methodology used, and present the research data to date. This proposal will then be orally presented to the student's Advisory Committee members, who will review the written proposal and communicate their recommendations to the student.
4. Students will present a formal seminar on their research work prior to writing their thesis. This presentation will be attended by the student's Advisory Committee who will report their impressions and recommendations to the student.
5. Before final thesis submission, Ph.D. students must successfully complete an oral defence, which is a final, in-depth, formal presentation of their research.
6. An annual oral informal presentation of research work accomplished will be presented to the student's Advisory Committee.
7. The Graduate Program Committee has instituted a mentorship program by which each student will be matched with a specific member of the Committee. The Program Mentor ensures that the student, the supervisor(s), and other members of the Advisory Committee are aware of and meet key milestones, in a timely manner, throughout the course of the student's graduate study.
8. All incoming students are required to take the workshops on Responsible Conduct of Research. These will be included as part of the milestones for annual progress reports.

section 12.2.5: Master of Science (M.Sc.) Neuroscience (Thesis) (45 credits)

The M.Sc. program offers opportunities to a great diversity of individual interests and backgrounds, and prepares our students for scientific careers in neuroscience and related fields. Programs leading to an M.Sc. degree require the completion of intensive academic and research training.

section 12.2.6: Doctor of Philosophy (Ph.D.) Neuroscience

The IPN offers a highly competitive Ph.D. program that prepares students for successful scientific careers in the field of neuroscience. Over half of the students registered in the neuroscience graduate program at McGill University are in the doctoral stream.

12.2.3 Neuroscience (Integrated Program) Admission Requirements and Application Procedures**12.2.3.1 Admission Requirements****General**

Applicants must hold a bachelor's degree, or its equivalent, from a recognized institution in a field related to the subject selected for graduate work, and must display an adequate background in basic sciences.

The applicant must present evidence of high academic achievement. A standing equivalent to a cumulative grade point average (CGPA) of 3.0 out of a possible 4.0 is required by Graduate and Postdoctoral Studies; however, the Integrated Program in Neuroscience (IPN) seeks applicants with a higher academic standing, and thus, requires a minimum CGPA of 3.3

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), must submit results of a *TOEFL* or *IELTS* exam with their application. Consult the Integrated Program in Neuroscience's *website* for details.

M.Sc. Degree

Bachelor's degree with adequate background in basic sciences, or an M.D.

Ph.D. Degree

Applicants must hold a graduate-level degree in a field related to neuroscience or have an M.D. degree, preferably with postgraduate training. Applicants will also be considered for admission if enrolled in the Doctor of Medicine & Master of Surgery with Ph.D. (Joint M.D.,C.M. & Ph.D.) program through the Faculty of Medicine and Health Sciences at McGill University.

Students currently registered in the Master's in Neuroscience may be permitted to transfer to the Ph.D. program without submitting a master's thesis. Applicants are expected to have attained a high scholastic standing equal to, or greater than, the minimum cumulative grade point average of 3.5 out of 4.0 in all levels of study. In exceptional circumstances, a student **may** enter the Ph.D. program directly from their undergraduate degree if a CGPA of 3.7 is attained and if the student already presents extensive research experience.

To meet incoming students' diversity of individual interests and backgrounds, a graduate program is designed for each student at the time of entry. As part of the admission process, each applicant will identify, with the participation of the prospective thesis supervisor and the Graduate Studies Committee, a research thesis topic and the coursework required to complete the training deemed necessary for the degree. These decisions become an integral part of the graduation requirements for the student.

12.2.3.2 Application Procedures

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

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

12.2.3.2.1 Additional Requirements

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

- Curriculum Vitae
- Personal Statement
- Letters of Recommendation (2)

Consult the Integrated Program in Neuroscience's [website](#) for further details

12.2.3.3 Application Dates and Deadlines

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

Application Opening Dates		Application Deadlines		
	All Applicants	Non-Canadian citizens (incl. Special, Visiting & Exchange)	Canadian citizens/Perm. residents of Canada (incl. Special, Visiting & Exchange)	Current McGill Students (any citizenship)
Fall Term:	Sept. 15	Jan. 30	June 1	June 1
Winter Term:	Feb. 15	Sept. 10	Nov. 10	Nov. 10
Summer Term:	N/A	N/A	N/A	N/A

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

12.2.4 Neuroscience (Integrated Program) Faculty

Director

R. Farivar-Mohseni

Associate Director

E. Ruthazer

Emeritus Professors

A. Aguayo; E. Andermann; S. Carbonetto; F. Cervero; B. Collier; R. Del Maestro; M. Diksic; K. Franklin; P.C. Holland; B. Jones; D. Levitin; B. Milner; M. Rasminsky; G. Tannenbaum; C. Thompson; N. White.

Professors

J. Antel; D. Arnold; M. Avoli; S. Baillet; C. Baker; S. Baum; C. Benkelfat; D. Bernard; A. Bernasconi; V. Bohbot; D. Boivin; P. Boksa; C. Bourque; D. Bowie; B. Brais; J.C.S. Breitner; A. Brunet; N. Cermakian; M.J. Chacron; P. Clarke; T. Coderre; D.L. Collins; E. Cooper; C. Cuello; K. Cullen; S. Daniel; S. David; L. Diatchenko; J. Doyon; H. Durham; S. El Mestikawy; A. Evans; L. Fellows; C. Flores; E. Fon; A. Fournier; S.G. Gauthier; B. Giros; I. Gold; J. Gotman; A. Gratton; J. Grodzinsky; D. Guitton; D. Haegert; E. Hamel; K. Hastings; R.T. Hepple; R. Hess; R. Joobert; D. Juncker; T. Kennedy; S. King; F. Kingdom; P. Lachapelle; N. Lamarche; M. Lepage; L. Levin; M.F. Levin; M. Leyton; G. Luheshi; D. Maysinger; H.M. McBride; A. McKinney; P.S. McPherson; M.J. Meaney; T.E. Milner; J.S. Mogil; K. Mullen; G. Multhaup; K. Murai; K. Nader; J. Nalbantoglu; J. Orłowski; D.J. Ostry; C. Pack; C. Palmer; K. Pantopoulos; M. Pell; M. Petrides; G. Plourde; J. Poirier; A. Ptito; N. Rajah; Y. Rao; A. Ribeiro-da-Silva; G. Rouleau; E. Ruthazer; A. Sadikot; H.U. Saragovi; H. Schipper; G. Sebire; P. Seguela; M. Shevell; E. Shoubridge; T. Shultz; N. Sonenberg; W. Sossin; L. Srivastava; K. Steinhauer; S. Stifani; M. Sullivan; A. Thiel; G. Turecki; D. Van Meyel; C.-D. Walker; S. Williams; C. Wolfson; R.J. Zatorre.

Associate Professors

cP. Archambault; J. Armony; S. Beaulieu; B. Bedell; G. Bernard; A. Bertone; M. Blanchette; D. Bzdok; M. Cayouette; F. Charron; B. Chen; J.-F. Cloutier; E. Cook; A. Dagher; B. Debruille; C. Ernst; B. Frauscher; G. Gobbi; R. Gruber; P. Haghighi; M. Kaminska; A. Kania; D. Klein; M. Kokoeva; N. Ladbon-Bernasconi; A. Lamontagne; N. Mechawar; J. Mendola; G. Mitsis; A. Nadig; M. Oskoui; H. Paudel; A. Peterson; K. Petrecca; J. B. Poline; R.

Associate Professors

Postuma; D. Ragsdale; A. Raz; A. Reader; J. Renaud; J. Rochford; P. Rosa-Neto; J.T. Sakata; A. Shmuel; P.J. Sjoström; N. Spreng; D. Stellwagen; L. Stone; K.-F. Storch; A. Velly; M. Vollrath; A. Watt; P. Wintermark; T.P. Wong; S.C. Woolley; L. Xiong; J. Zhang.

Assistant Professors

G. Armstrong; N. Auclair Oullet; R. Bagot; M. Berlim; B. Bernhardt; S. Blain-Moraes; M-H. Boudrias; M. Brandon; J.P. Britt; M. Brossard-Racine; X. Chai; M. Chakravarty; E. de Villers-Sidani; R. Diaz; S. Ducharme; T. Durcan; M. Elsabbagh; R. Farivar; C. Ferland-Legault; Z. Gan-Or; L. Garzia; B. Gentile; L. Healy; A. Hendricks; W-H. Huang; P. Huot; Y. Iturria-Medina; A. Jahani-Asl; S. Karama; J. Karamchandani; A. Khadra; A. Khoutorsky; E. Kobayashi; L. Koski; A. Kostikov; A. Krishnaswamy; G. Leonard; J. Marcoux; M. O. Martel; A. Milnerwood; B. Mistic; L. Münter; S. Narayanan; J. Near; T. Nguyen; T. Ohyama; C. Paquette; P. Pelufo Silveira; A. Peyrache; M. Prager-Khoutorsky; M. Roig; M. Roy; D. Rudko; J. Shah; R. Sharif; M. Sharp; D. Sinclair; M. Srouf; J. A. Stratton; T. Stroh; A. Suvrathan; V. Sziklas; H. Takahashi; C. Tardif; S. Trenholm; J. Van Raamsdonk; S. Villeneuve; T.Y. Zhang; Y. Zhou.

Lecturer

TBA

Adjunct Professors

E. Racine; S. Harnad; M. Jones-Gotman; O. Overbury.

12.2.5 Master of Science (M.Sc.) Neuroscience (Thesis) (45 credits)**Required Courses (36 credits)**

NEUR 696	(6)	Master's Thesis Research
NEUR 697	(9)	Master's Thesis Proposal
NEUR 698	(9)	Master's Seminar Presentation
NEUR 699	(12)	Master's Thesis Submission
NEUR 705	(0)	Responsible Research Conduct

Complementary Courses (9 credits)

3 credits from the following:

NEUR 630	(3)	Principles of Neuroscience 1
NEUR 631	(3)	Principles of Neuroscience 2

And 6 credits in other courses at the 500 level or higher that are relevant to the program.

Upon recommendation, depending upon their particular background and needs, students may be requested to take additional selected courses at the 500 level or higher.

Note: All M.Sc.-level students must register for a minimum of 12 credits per term during the first three terms of their master's program.

12.2.6 Doctor of Philosophy (Ph.D.) Neuroscience

Students with an M.Sc. degree continuing in this Department will receive credit exemptions for graduate coursework accomplished (including NEUR 630 or NEUR 631). It may be recommended that they take specialty courses related to their field of study in neuroscience. Students with an M.Sc. degree from another program will be required to take NEUR 630 and NEUR 631 and/or other courses listed under the M.Sc. degree depending upon their background and field of study.

Students with an M.D. degree proceeding directly into a Ph.D. program will be required to take NEUR 630 and NEUR 631. They will also be required to take 6 credits of graduate-level courses.

Thesis

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

Required Courses (6 credits)

NEUR 630	(3)	Principles of Neuroscience 1
NEUR 631	(3)	Principles of Neuroscience 2
NEUR 700	(0)	Doctoral Candidacy Examination
NEUR 705	(0)	Responsible Research Conduct

Complementary Courses (6 credits)

6 credits at the 500, 600, or 700 level, approved by the graduate program adviser.

12.3 Quantitative Life Sciences

12.3.1 Location

Telephone: 514-398-4826

Email: coordinator.qls@mcgill.ca

Website: mcgill.ca/qls

12.3.2 About Quantitative Life Sciences

Quantitative Life Sciences is the broad application of mathematical, computational, and other quantitative methods to study biological systems at all scales—from single molecules to the environment. It is part of a rapidly expanding field that includes such specializations as systems biology, bioinformatics, biophysics, medical informatics, computational biology, computational pharmacology, computational neuroscience, and mathematical biology.

section 12.3.5: Doctor of Philosophy (Ph.D.) Quantitative Life Sciences

Please refer to the [QLS website](#) for further details.

12.3.3 Quantitative Life Sciences Admission Requirements and Application Procedures

12.3.3.1 Admission Requirements

General

Applicants are expected to hold an undergraduate degree in one of the following areas (or equivalent): biology, chemistry, physiology, genetics, engineering, computer science, mathematics, statistics, physics, or chemistry.

Applicants must have a strong quantitative background. Such a background may be obtained by having at least the equivalent of a minor in computer science, mathematics, statistics, physics, chemistry, or engineering.

Applicants who do not have a formal education in life sciences need to have a demonstrated interest for that field, for example in the form of an undergraduate research project or the completion of life-science courses.

Applicants are expected to have attained a high scholastic standing equal to, or greater than, the minimum Cumulative Grade Point Average of 3.3 (out of 4.0 at McGill University) in **all** levels of study.

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), must submit results of the *TOEFL* exam with their application and have a minimum score of 86 on the Internet-based test (iBT) with each component score not less than 20. Further information on English proficiency requirements is available at mcgill.ca/gradapplicants/international/proficiency.

12.3.3.2 Application Procedures

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

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

12.3.3.2.1 Additional Requirements

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

- Curriculum Vitae
- Personal Statement

- Research Statement
- Two reference letters
- Copy of official transcripts

12.3.3.3 Application Dates and Deadlines

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

	Application Opening Dates		Application Deadlines	
	All Applicants	Non-Canadian citizens (incl. Special, Visiting & Exchange)	Canadian citizens/Perm. residents of Canada (incl. Special, Visiting & Exchange)	Current McGill Students (any citizenship)
Fall Term:	Sept. 15	Jan. 15	Jan. 15	Jan. 15
Winter Term:	N/A	N/A	N/A	N/A
Summer Term:	N/A	N/A	N/A	N/A

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

12.3.4 Quantitative Life Sciences Faculty

Director

C. Greenwood

Professors

Anesthesia, Dentistry: L. Diatchenko

Biochemistry: K. Gehring

Bioengineering: Y. Xia

Biology: G. Fussman, F. Guichard, D. Schoen

Biomedical Engineering: D. Juncker

Chemistry: P. Wiseman

Computer Science: K. Siddiqi

Epidemiology, Biostatistics and Occupational Health: C. Greenwood

Human Genetics: M. Lathrop

Mathematics and Statistics: D. Stephens

Neurology and Neurosurgery: S. Baillet, A. Evans, L. Levin, K. Murai, E. Ruthazer

Ophthalmology & Visual Sciences: C. Baker, L. Levin

Pharmacology and Therapeutics: D. Bowie

Physics: P. Grutter, P. Wiseman

Physiology: L. Glass, H. Hwang

Associate Professors

Anatomy and Cell Biology: C. Brown

Bieler School of Environment: B. Leung

Biology: G. Brouhard, P. Harrison, B. Leung, B. Richards, J. Vogel

Biomedical Engineering: D. Bzdok

Chemistry: N. Moitessier

Associate Professors

Computer Science: M. Blanchette, J. Pineau, J. Waldispühl

Dentistry: S. Komarova

Epidemiology, Biostatistics and Occupational Health: A. Benedetti, E. Moodie, A. Schmidt

Experimental Medicine: R. Sladek

Human Genetics: G. Bourque, K. Dewar, J. Majewski, R. Nadon, T. Pastinen, R. Sladek

Mathematics and Statistics: L. Addario-Berry, T. Humphries

Medicine: A. Benedetti

Microbiology and Immunology: J. Shapiro

Neurology and Neurosurgery: C. Pack, J.B. Poline

Physics: P. Francois

Physiology: C. Brown, G. Bub, M. Chacron, M. Chacron, T. Humphries, A. Khadra, S. Krishna, U. Stochaj

Assistant Professors

Anatomy and Cell Biology: M. Strauss, J. Vargas

Anesthesia: A. Grant

Animal Science: J. Xia

Biochemistry: U.D. Akavia, M. Vera Ugalde, I. Watson

Bioengineering: N. Reznikov

Biology: A. Hayer, T. Ohyama, L. Pollock, R. Reyes, S. Weber

Biomedical Engineering: N. Li-Jessen

Computer Science: Y. Li

Diagnostic Radiology: S. Bhatnagar

Electrical and Computer Engineering: A. Emad

Epidemiology, Biostatistics and Occupational Health: S. Bhatnagar, P. Saha Chaudhuri

Human Genetics: S. Gravel, C. Kleinman, H. Najafadabi

Institute of Parasitology: J. Xia

Mathematics and Statistics: Y. Yang

Medicine: J. Ding, G. Fonseca

Neurology and Neurosurgery: Y. Iturria Medina, B. Mistic

Ophthalmology & Visual Sciences: A. Baldwin, R. Farivar, A. Reynaud

Otolaryngology: N. Li-Jessen

Physics: S. Leslie

Physiology: P. Bashivan, A. Krishnaswamy, J. Mandl

Psychiatry: X. Meng

12.3.5 Doctor of Philosophy (Ph.D.) Quantitative Life Sciences**Required Courses (6 credits)**

QLSC 600D1	(3)	Foundations of Quantitative Life Sciences
QLSC 600D2	(3)	Foundations of Quantitative Life Sciences
QLSC 601D1	(0)	Quantitative Life Sciences Seminars 1
QLSC 601D2	(0)	Quantitative Life Sciences Seminars 1

QLSC 602D1	(0)	Quantitative Life Sciences Seminars 2
QLSC 602D2	(0)	Quantitative Life Sciences Seminars 2
QLSC 603D1	(0)	Quantitative Life Sciences Seminars 3
QLSC 603D2	(0)	Quantitative Life Sciences Seminars 3
QLSC 701	(0)	Ph.D. Comprehensive Exam

Complementary Courses

9-11 credits

Students will be required to take one or two courses from each of the Quantitative and Life Science Blocks for a total of three, stream-specific courses.

Biophysics Stream

Quantitative

BIEN 530	(3)	Imaging and Bioanalytical Instrumentation
BMDE 512	(3)	Finite-Element Modelling in Biomedical Engineering
BMDE 519	(3)	Biomedical Signals and Systems
CHEM 514	(3)	Biophysical Chemistry
CHEM 520	(3)	Methods in Chemical Biology
COMP 551	(4)	Applied Machine Learning
MATH 682	(4)	Statistical Inference
PHYS 519	(3)	Advanced Biophysics
PHYS 559	(3)	Advanced Statistical Mechanics
QLSC 611	(3)	Directed Readings

Life Sciences

BIOC 605	(3)	Protein Biology and Proteomics
BIOL 551	(3)	Principles of Cellular Control
PHGY 518	(3)	Artificial Cells
PHGY 520	(3)	Ion Channels
QLSC 611	(3)	Directed Readings

Computational and Statistical Molecular Biology Stream

Quantitative

BIOS 601	(4)	Epidemiology: Introduction and Statistical Models
BMDE 502	(3)	BME Modelling and Identification
COMP 551	(4)	Applied Machine Learning
COMP 561	(4)	Computational Biology Methods and Research
COMP 598	(3)	Topics in Computer Science 1
HGEN 677	(3)	Statistical Concepts in Genetic and Genomic Analysis
MATH 523	(4)	Generalized Linear Models
MATH 533	(4)	Regression and Analysis of Variance
MATH 680	(4)	Computation Intensive Statistics
MATH 682	(4)	Statistical Inference
QLSC 611	(3)	Directed Readings

Life Sciences

BIOC 603	(3)	Genomics and Gene Expression
BIOL 551	(3)	Principles of Cellular Control
EXMD 602	(3)	Techniques in Molecular Genetics
HGEN 661	(3)	Population Genetics
HGEN 692	(3)	Human Genetics
PHAR 503	(3)	Drug Discovery and Development 1
PHAR 505	(3)	Structural Pharmacology
QLSC 611	(3)	Directed Readings

Ecosystems Stream

Quantitative

ENVB 506	(3)	Quantitative Methods: Ecology
MATH 523	(4)	Generalized Linear Models
MATH 525	(4)	Sampling Theory and Applications
MATH 533	(4)	Regression and Analysis of Variance
MATH 537	(4)	Honours Mathematical Models in Biology
MATH 547	(4)	Stochastic Processes
MATH 556	(4)	Mathematical Statistics 1
MATH 682	(4)	Statistical Inference
QLSC 611	(3)	Directed Readings

Life Sciences

BIOL 509	(3)	Methods in Molecular Ecology
BIOL 510	(3)	Advances in Community Ecology
BIOL 540*	(3)	Ecology of Species Invasions
BIOL 594	(3)	Advanced Evolutionary Ecology
ENVR 540*	(3)	Ecology of Species Invasions
QLSC 611	(3)	Directed Readings

* Students either choose BIOL 540 or ENVR 540 but not both.