McGill

Interfaculty Studies

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

1. McGill University reserves the right to mak

Publication Information

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

1   Dean's Welcome

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 gro

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

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 aw

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*.

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 goveo equi

- 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
-

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-bioenginering
- 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: Master of Engineering (M.Eng.) Biological and Biomedical Engineering (Non-Thesis) (45 credits)

The M.Eng. in Biological and Biomedical Engineering; Non-Thesis program focuses on the life sciences, the physical sciences, and engineering, industrial practices and processes, and data science related to areas such as biological products, biomedical devices, and medical imaging. Hands-on experience through projects carried out during internships.

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

The M.Eng. in Biological and Biomedical Engineering; Non-Thesis program focuses on the life sciences, the physical sciences, and engineering, industrial practices and processes, and data science related to areas such as biological products, biomedical devices, and medical imaging. Hands-on experience through projects carried out during internships.

Internship Courses (18 credits)

| BBME 681 | (9) | Internship 1 |
| BBME 682 | (9) | Internship 2 |

Required Courses

BBME 600D1*	(1.5)	Seminars in Biological and Biomedical Engineering
BBME 600D2*	(1.5)	Seminars in Biological and Biomedical Engineering
BBME 600N1*	(1.5)	Seminars in Biological and Biomedical Engineering
BBME 600N2*	(1.5)	Seminars in Biological and Biomedical Engineering

* Students take either BBME 600D1 and BBME 600D2 or BBME 600N1 and BBME 600N2.

Complementary Courses (24 credits)

Minimum of 12 credits must come from the core courses listed below. At least 6 credits must be chosen from the "quantitative" courses listed below:

Quantitative Core 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 520	(3)	Machine Learning for Biomedical Data
BMDE 610	(3)	Functional Neuroimaging Fusion
BMDE 660BM(0 0 1 221.91f300Dusion)e70	(3)	Advanced MR Imaging and Spectroscopy of the Brain

BMDE 505	(3)	Cell and Tissue Engineering
CHEE 512	(3)	Stem Cell Bioprocess Engineering
CHEE 651	(4)	Advanced Biochemical Engineering

BBME Courses (Quantitative):

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 520	(3)	Machine Learning for Biomedical Data
BMDE 610	(3)	Functional Neuroimaging Fusion

BBME Core (Non-Quantitative):

BIEN 535	(3)	Electron Microscopy and 3D Imaging for Biological Materials
BIEN 540	(3)	Information Storage and Processing in Biological Systems
BIEN 580	(3)	Synthetic Biology
BIEN 680	(4)	Bioprocessing of Vaccines
		Selected Topics in Biomedical 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, org

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.

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 (CGP

	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. GrodzinskA.j1 0 0 1 187h0 1 Tm(Associaon; P)Tj1a. Gold;

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 e

	Application Opening Dates		Application Deadlines	
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, Dental Medicine and Oral Health Sciences: L. Diatchenko

Biochemistry: K. Gehring

Bioengineering

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. Oh

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

vvTH 682e

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.