Faculty of Medicine and Health Sciences (Graduate)

Programs, Cour

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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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

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 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 aw

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 fello

12.1.3 Medical Physics

12.1.3.1 Location

Medical Physics Unit, DS1-4556
McGill University Health Centre – Glen Site
Cedars Cancer Centre
1001 Décarie Boulevard
Montreal QC H4A 3J1
Telephone: 514-934-1934 ext. 44158
Fax: 514-934-8229
Email: *margery.knewstubb@mcgill.ca*
Website: *mcgill.ca/medphys*

12.1.3.2 About Medical Physics

The Medical Physics Unit is a teaching and research unit focusing on the role that physics and its related sciences play in medicine and cancer research, especially (but not exclusively) in radiation medicine; i.e., radiation oncology, medical imaging, and nuclear medicine. The Unit offers a graduate diploma and a M.Sc. in Medical Radiation Physics. Facilities are available for students to undertake a Ph.D. in Physics administered through the Department of Physics, or a Ph.D. in Biological and Biomedical Engineering administered through the Departments of Biomedical Engineering and Bioengineering, each wi91in meoginev41 TmS0 1 49PIs108p.39cipnucl52 691.144 Tm530.727in meoginev41v2 691.144 Tm534wi907.541 Tm(P8iesti.04 593.101 T5s C5337.541 Tm(P8iators).

12.1.3.3 Medical Physics Admission Requirements and Application Procedures

12.1.3.3.1 Admission Requirements

Candidates applying to the Graduate Diploma must hold a Ph.D. degree and also a B.Sc. in Physics, Physics Major, or related Physics-oriented science.

12.1.3.3.2 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. Further information regarding the application procedures is available on the *Medical Physics Unit website*.

Only complete applications will be considered.

Note: When completing the online application, the following information should be entered in the "Application" section to ensure that the application is routed to the correct department:

Under **Program choice**:
"Application type" = Degree, certificate, or diploma
"Term" = Fall 2023
"Department" = Medical Physics Unit
"Program" = Graduate Diploma (Med Radiation Physics)
"Area of study" = Medical Radiation Physics-T
"Status" = Full Time

Under **Additional Questions**:

12.1.3.4 Medical Physics Faculty

Director

Co-Directors (2022-2023): J. Kildea, I. Levesque

Co-Directors

J. Kildea, I. Levesque

Emeritus Professors

S.M. Lehnert, E.B. Podgorsak

Professors

TBA

Associate Professor

S. Enger

Assistant Professors

S. Devic, M.D.C. Evans, J. Kildea, I. Levesque, W. Parker, P. Pater, H.J. Patrocinio, E. Poon, M. Popovic, G. Stroian, P.G. Watson, N. Ybarra

Faculty Lecturers

L. Archambault, K. Asiev, H. Bekerat, T. Connell, C. Furstoss, A. Gauvin, D. Guillet, G. Hegyi, L. Liang, R. Ruo, N. Tomic

Associate Member

D. Louis Collins

Affiliate Members

S. Darvasi, R. Richardson

Adjunct Professors

F. DeBlois, I. El Naqa, C. Janicki, B. Moftah, G.B. Pike, J. Renaud, R. Richardson, A. Sarfehnia, J. Seuntjens, E. Soisson

12.1.3.5 Master of Science (M.Sc.) Medical Radiation Physics (Thesis) (45 credits)

The M.Sc. program in Medical Radiation Physics provides candidates with the knowledge required to enter into the field of medical physics. The program relies on a strong fundamental science background and enables candidates to undergo further training through a clinical residency program or to further advanced graduate studies in medical physics through a Ph.D. degree. Graduates from the program typically find employment in clinical settings, academia, industry, or governmental research and regulatory agencies. The program is accredited by the Commission for Accreditation of Medical Physics Education Programs (CAMPEP).

Thesis Courses (18 credits)

MDPH 691D1	(9)	MSc Thesis Research 2
MDPH 691D2	(9)	MSc Thesis Research 2

Required Courses (27 credits)

MDPH 601	(3)	Radiation Physics
MDPH 602	(3)	Radiotherapy Physics
MDPH 603	(2)	Laboratory Radiotherapy Physics
MDPH 607	(3)	Medical Imaging
MDPH 608	(2)	Laboratory - Diagnostic Radiology and Nuclear Medicine
MDPH 609	(2)	Radiation Biology
MDPH 610	(2)	Instrumentation and Computation in Medical Physics 2

MDPH 613	(2)	Health Physics
MDPH 614	(3)	Physics of Diagnostic Radiology
MDPH 615	(2)	Physics of Nuclear Medicine
MDPH 618	(3)	Anatomy and Physiology for Medical Physics

12.1.3.6 Graduate Diploma (Gr. Dip.) Medical Radiation Physics (30 credits)

The Graduate Diploma in Medical Radiation Physics is intended to provide candidates holding a graduate degree in a related field with the knowledge required to enter into the field of medical physics. The program relies on a strong fundamental science background. The graduate diploma program is accredited by the Commission for Accreditation of Medical Physics Education Programs (CAMPEP) only for students holding a Ph.D. degree.

Required Courses (30 credits)

* Or an equivalent course, at the 500-level or higher, as deemed appropriate by the Graduate Program Director.

MDPH 601	(3)	Radiation Physics
MDPH 602	(3)	Radiotherapy Physics
MDPH 603	(2)	Laboratory Radiotherapy Physics
MDPH 607	(3)	Medical Imaging
MDPH 608	(2)	Laboratory - Diagnostic Radiology and Nuclear Medicine
MDPH 609	(2)	Radiation Biology
MDPH 610	(2)	Instrumentation and Computation in Medical Physics 2
MDPH 613	(2)	Health Physics
MDPH 614	(3)	Physics of Diagnostic Radiology
MDPH 615	(2)	Physics of Nuclear Medicine
MDPH 618	(3)	Anatomy and Physiology for Medical Physics
PHIL 643*	(3)	Seminar: Medical Ethics

12.1.4 Medicine, Experimental

12.1.4.1 Location

Division of Experimental Medicine
Department of Medicine
1001 Decarie Boulevard
Montreal QC H4A 3J1
Canada
Telephone: 514-934-1934, ext. 34699 or 34700 or 36465
Email: *experimental.medicine@mcgill.ca*
Website: *mcgill.ca/expmed*

12.1.4.2 About Experimental Medicine

Experimental Medicine is a Division of the Department of Medicine charged with the task of providing graduate education in the Department, and enabling professors located in the research institutes of the McGill teaching hospitals and other centres to supervise graduate students. Graduate Students pursue cutting-edge medical research in a unique setting in which Ph.D. and M.D. researchers collaborate, favouring translational research into the pathogenesis and treatment of disease. The Division offers various programs, each of which has different training objectives (see below). The internationally recognized high-quality training our graduates receive is in essence what distinguishes graduates of our programs from the graduates of comparable programs in peer institutions.

section 12.1.4.5: Master of Science (M.Sc.) Experimental Medicine (Thesis) (45 credits)

Applicants for the M.Sc. in Experimental Medicine must hold either an M.D. degree, a B.Sc. degree, or the equivalent. The graduate training offered is wide-ranging and addresses experimental aspects of medicine in such diverse areas as:

- endocrinology;

section 12.1.4.5: Master of Science (M.Sc.) Experimental Medicine (Thesis) (45 credits)

- hematology;
- cardiology;
- oncology;
- gastroenterology;
- genetics;
- infectious diseases.

This thesis program may lead to careers in industry, or serve as a stepping stone to further graduate studies.

section 12.1.4.6: Master of Science (M.Sc.) Experimental Medicine (Thesis): Bioethics (45 credits)

Applicants for the M.Sc. Bioethics Option program must hold an M.D.; a Nursing degree; a Physical and Occupational Therapy degree; and/or any other professional health training degree. Students who do not fit these criteria may be considered for admission on an individual basis. The objectives of this research-stream program are to allow students to conduct innovative research in relation to a bioethical issue pertinent to health care, and to acquire a working knowledge of bioethical issues from the current viewpoint of other relevant disciplines such as law, philosophy, and religious studies.

The curriculum is composed of required courses (6 credits) offered in the Biomedical Ethics Unit, Bioethics courses (6-credit minimum) offered by the base faculty or department, and any graduate course required or accepted by a base faculty for the granting of a master's degree, for a total of 21 credits. A minimum of 45 credits is required, including the thesis. The research culminates in the preparation of a thesis.

section 12.1.4.7: Master of Science (M.Sc.) Experimental Medicine (Thesis): Digital Health Innovation (45 credits)

The M.Sc. in Experimental Medicine: Digital Health Innovation focuses on the basics of clinical epidemiology, medical artificial intelligence, clinical innovation, and applied data science, including the use and generation of digitized health and social data using specialized software. Fundamentals of current AI applications in medicine, methods to employ big data in clinical tool development, mathematical principals underpinning digital health and big data, and design thinking methodology in clinical innovation. High-volume streams of clinical and health-related data from clinical systems, wearables and social media.

section 12.1.4.8: Master of Science (M.Sc.) Experimental Medicine (Thesis): Environment (45 credits)

This program is not offered in the 2023-2024 academic year.

Applicants for the M.Sc. Environment Option must meet the requirements for the M.Sc. in Experimental Medicine as well as those set out by the Bieler School of Environment (BSE) for their graduate option. Acceptance into the option will be based on a student's academic experience and performance; availability of an BSE-accredited supervisor or co-supervisor; the proposed research; and plans for funding as articulated by the supervisor(s). The Environment Option is aimed at students who wish to use interdisciplinary approaches in their graduate research on environmental issues, and who wish to benefit from interactions that will occur as they are brought into contact with students from a wide range of disciplines through structured courses, formal seminars, and informal discussions and networking. 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.

section 12.1.4.9: Doctor of Philosophy (Ph.D.) Experimental Medicine

Applicants for the Ph.D. in Experimental Medicine must normally hold an M.Sc. degree. The one exception is the possibility of direct entry offered to candidates having demonstrated academic excellence, i.e., a CGPA of 3.5 or more out of a possible 4.0 throughout their undergraduate studies. The training is in the conduct of research in a wide range of medical specialties. The method of instruction consists of a combination of in-class and practical training, as well as exposure to international conferences and guest seminars. Success is ultimately determined by the preparation and defence of a thesis. This program may lead to research careers in industry, government, or academia.

section 12.1.4.12: Graduate Diploma (Gr. Dip.) Clinical Research (30 credits)

The objectives of this program are to give students exposure to both theoretical and practical issues relevant to the conception and conduct of a clinical research study, as well as allowing them to put these principles in practice by participating in an ongoing clinical trial. The core element of the diploma is the Practicum in Clinical Research. It is an active “clerkship” or “intern/resident-type” participation in an ongoing clinical trial and/or research program. Six 1-credit workshops will be provided by experts in the academic, industrial, and government sectors, and cover wide-ranging issues pertinent to the conduct of clinical research. The training provided qualifies students to manage and design clinical research studies in both academic and industrial settings.

12.1.4.3 Medicine, Experimental Admission Requirements and Application Procedures

12.1.4.3.1 Admission Requirements

M.Sc. or Ph.D. in Experimental Medicine

Candidates who hold only an undergraduate degree in the medical and allied sciences (B.Sc. degree or an M.D. degree), must apply to the M.Sc. program, unless they have an undergraduate CGP

12.1.4.4 Medicine, Experimental Faculty

Chair, Department of Medicine

M. Rodger

Director, Division of Experimental Medicine

A.-M. Lauzon

Associate Director, Division of Experimental Medicine

E. Fixman

Professors

M. Alaoui-Jamali; S. Ali; C. Autexier; S. Bartlett; A. Bateman; G. Batist; M. Behr; S. Bernatsky; V. Blank; J. Bourbeau; A. Cybulsky; K. Dasgupta; G. Di Battista; M. Divangahi; V. Essebag; I.G. Fantus; W. Foulkes; M. Friedrich; A. Fuks; A. Gatignol; J. Genest Jr.; D. Goltzman; S.A. Grover; L.J. Hoffer; S. Hussain; B. Jean-Claude; A.C. Karaplis; R. Kremer; S. Laporte; A. M. Lauzon; J.-J. Lebrun; S. Lehoux; C. Liang; M.S. Ludwig; S. Magder; D. Malo; A. J. Marelli; J. Martin; N. Mayo; W.H. Miller; J. Morais; A. Mouland; W.J. Muller; M. Murshed; A. Nepveu; T. Nilsson; M. Olivier; L. Panasci; K. Pantopoulos; M. Park; B.J. Petrof; L. Pilote; M.N. Pollak; S. Rabbani; D. Radzioch; J. Rauch; S. Richard; J.-P. Routy; D. Sasseville; E. Schiffrin; E. Schurr; A. Schwertani; D. Sheppard; P. Siegel; A.D. Sniderman; M.M. Stevenson; T. Takano; R. Tamblyn; M. Trifiro; C. Tsoukas; B.J. Ward; J. White; S. Wing; X.-J. Yang

Associate Professors

W. Afif; J. Afilalo; A. Alam; C. Baglole; D. Baran; N. Bernard; M. Blostein; P. Brassard; L. Chalifour; I. Colmegna; C. Costiniuk; D. Cournoyer; D. Da Costa; S. Daskalopoulou; N. Dendukuri; J.C. Engert; E. Fixman; N.S. Giannetti; B. Gilfix; S.B. Gottfried; M. Hudson; T. Jagoe; N. Johnson; M. Kaminska; M. Kokoeva; A. Kristof; P. Laneuville; T.C. Lee; S. Lemay; R. Lin; M. Lipman; J.-L. Liu; E.G. McDonald; S. Morin; M. Ndao; D. Nguyen; N. Pai; S. Pamidi; A.C. Peterson; S. Qureshi; E. Rahme; C. Rocheleau; S. Rousseau; R. Sapir-Pichhadze; M. Sebag; G. Sebastiani; C. Séguin; M. Sewitch; R. Sladek; B. M. Smith; G. Thanassoulis; E. Torban; B. Turcotte; E. Vinet; D.C. Vinh

Assistant Professors

F. Ahmad Khan; R. Aloyz; D. Assayag; I. Azuelos; A. Baass; A. Bessissow; Y. Chen; N. Dayan; J. Ding; N. Ezer; G. Fonseca; I. Fortier; C. Gao; M. Goldfarb; C. Jack; P. Lefrancois; I. Litvinov; T. Mavrakanas; F. Mercier; E. Netchiporouk; M. Paliouras; T. Peters; P. Sabatini; S. Sandal; A. Sharma

Associate Members, McGill

B. Abdulkarim; H. Abenhaim; M. Abrahamowicz; S. Ahmed; G. Altit; S. Bailey; M. Basik; M. Ben-Shoshan; M. Bertagnolli; C. Borchers; P. Brodt; D. Buckeridge; S. Burgos; F. Carnevale; I. Cestari; L. Chapuy; S. Chevalier; H. Clarke; T. Coderre; S. del Rincon; L. Diatchenko; T. Duchaine; D. Dufort; K. Eppert; M. Fabian; L. Ferri; P. Friesen; L. Garzia; V. Giguere; P. Goodyer; W. Gotlieb; C. Goudie; I. Gupta; A. Haidar; T. Hebert; M. Hunt; P. Ingelmo; N. Jabado; D. Juncker; M. Kaartinen; A. Khoutorsky; J. Kimmelman; N. King; A. Koromilas; D. Labbé; L. Lands; J. Lapointe; S. Loganathan; C. Loiselle; F. Lopes; M.E. Macdonald; S. Mahshid; C. Mandato; K. Mann; M. O. Martel; B. Mazer; L. McCaffrey; C. McCusker; C. Moraes; T. Muanza; M. Nagano; C. O'Flaherty; A. Orthwein; A. Philip; C. Piccirillo; C. Polychronakos; S. Prakash; J. Przybyl; D.F. Quail; J. Rak; C. Reinhold; S. Robbins; R. Rosa-Neto; A. Rose; G. Rouleau; A. Ryan; G. Sant'Anna; D. Senger; W. Shalish; A. Shapiro; R. Slim; J. Spicer; I. Topisirovic; M. Tremblay; J. Ursini-Siegel; J. Van Raamsdonk; P. Wintermark; M. Witcher; J.-H. Wu; S. Wurzba; N. Ybarra; M. Zawati; G. Zogopoulos

Adjunct Professors

F. Charron; E. Cohen; J.M. Di Noia; J. Drouin; J. Estall; M. Faraj; M. Ferron; N. Francis; H. Gu; Q.A. Hamid; D. Hipfner; A. Kania; M. Kmita; E. Lecuyer; M. Malleshaiah; T. Moroy; M. Oeffinger; R. Rabasa-Lhoret; E. Racine; F. Robert; N. Seidah; W.-K. Suh; H. Takahashi; M. Trudel; J. Vacher; A. Veillette

EXMD 600	(3)	Principles of Clinical Research

3 credits from the following:

EXMD 630	(3)	Developing Digital Innovations for Health Impact
EXSU 620	(3)	Surgical Innovation 1

Elective Courses (6 credits)

6 credits of courses at the 500 level or higher approved by the Director.

12.1.4.8 Master of Science (M.Sc.) Experimental Medicine (Thesis): Environment (45 credits)

** This program is currently not offered. **

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

Thesis Courses (27 credits)

EXMD 690	(3)	Master's Thesis Research 1
EXMD 693	(12)	Master's Thesis Research 4
EXMD 694	(12)	Master's Thesis Research 5

Required Course (3 credits)

ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability

Complementary Courses (15 credits)

3-6 credits from:

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

0-3 credits from:

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

or 3 credits at the 500 lev

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

EXMD 701D1	(0)	Comprehensive Oral Examination
EXMD 701D2	(0)	Comprehensive Oral Examination

Complementary Courses (12 or 18 Credits)

12 credits, at the 500 level or higher, are required for students admitted to Ph.D. 2, i.e. students entering the program with a prior Master's degree.

18 credits, at the 500 level or higher, are required for students admitted to Ph.D. 1, i.e. students entering the program with only a B.Sc. or M.D. degree. Students that fast track from the masters level should take a total of 18 credits including previous courses taken at the Masters Level in a related-field.

Course choices should be made in consultation with research supervisor(s). Courses may be taken outside the department at the 500 level or higher in medical and allied sciences *.

* Note that some seminar, current topics and readings, and conference courses may not count towards your degree. Thus, students must obtain prior approval from the Division's Student Affairs Coordinator for courses at the 500 level or higher from other Allied Health Sciences departments.

12.1.4.10 Doctor of Philosophy (Ph.D.) Experimental Medicine: Environment

** This program is currently not offered. **

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

Thesis

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

Required Courses (3 credits)

ENVR 615	(3)	Interdisciplinary Approach Environment and Sustainability
EXMD 701D1	(0)	Comprehensive Oral Examination
EXMD 701D2	(0)	Comprehensive Oral Examination

Complementary Courses (18 or 24 credits)

3-6 credits from:

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

0-3 credits from:

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

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

12 credits, at the 500 level or higher, are required for students admitted to Ph.D. 2, i.e. students entering the program with a prior Master's degree.

Or

18 credits, at the 500 level or higher, are required for students admitted to Ph.D. 1, i.e. students entering the program with only a B.Sc. or M.D. degree and who have been either admitted directly or fast-tracked to the Ph.D.

Course choices should be made in consultation with research supervisor(s). Courses may be taken outside the department at the 500 level or higher in medical and allied sciences *.

* Students must get approval from the GPD for courses at the 500 level or higher from other allied health sciences.

12.1.4.11 Graduate Certificate (Gr. Cert.) Regenerative Medicine (15 credits)

The Graduate Certificate in Regenerative Medicine focuses on biology of stem cells, their uses in diagnostic and therapeutic applications, the practicalities

12.1.5.2 About Family Medicine

The McGill Department of Family Medicine is home to an exceptional community of primary health care professionals, researchers, students, and support staff, whose mission is to contribute to the health of the population and the sustainability of the health care system in Quebec, in Canada, and internationally by:

- developing research and scholarly activity to contribute to the academic discipline;
- promoting curriculum innovation and education research;
- engaging in international and global health activities;
- developing and engaging in public policy discussions;
- training medical students, residents, and other health care professionals to become committed to primary care, contributing to accessibility, continuity, coordination, accountability, patient-centredness, and health promotion and prevention;
- promoting innovation in family medicine and primary health care delivery and practice.

We understand that research in family medicine and primary care is essential to the achievement of excellence in health care delivery, patient care, and education. Our research division is composed of Ph.D. and clinical researchers who dedicate their efforts to producing and translating knowledge that advances the discipline, practice, and teaching of family medicine and primary care while supporting the scholarly activities of clinicians and residents in the Department. We have developed unique and rigorous research programs for **M.Sc.** and **Ph.D.** students that advance academic excellence in family medicine and primary health care through patient-oriented, community-based research with innovative methodologies and participatory approaches.

section 12.1.5.5: Master of Science (M.Sc.) Family Medicine (Thesis) (45 credits)

The M.Sc. in Family Medicine is a research-oriented thesis-based graduate program in family medicine. The objective is to increase the skills of those interested in carrying out research pertinent to the practice of family medicine.

As many relevant research questions cross conventional boundaries of disciplines and research traditions, we incorporate an **interdisciplinary approach** with an emphasis on **participatory research** and **community engagement**.

This program provides training in epidemiology and statistics, as well as in qualitative, quantitative and mixed methods. Students are also oriented for knowledge synthesis, and participatory research approaches.

An emphasis is placed on the relevance of the thesis research to family practice and primary health care. Close links are maintained with the main family medicine clinical sites located around Montreal and Quebec.

section 12.1.5.6: Master of Science (M.Sc.) Family Medicine (Thesis): Bioethics (45 credits)

The objectives of this program are to allow students to conduct innovative research in relation to a bioethical issue pertinent to health care and to acquire a working knowledge of bioethical issues from the current viewpoint of other relevant disciplines such as law, philosophy, and religious studies. A minimum of 45 credits is required including the thesis. The research culminates in the preparation of a thesis.

section 12.1.5.7: Master of Science (M.Sc.) Family Medicine (Thesis): Medical Education (45 credits)

This program will have very close ties to the *Family Medicine Educational Research Group* (FMER), which is the corollary of the educational innovations in teaching and research conceived and established in the McGill Department of Family Medicine since 2005. The FMER group's ultimate goal is to advance knowledge to:

1. constantly inform family medicine curricula innovations and continuing professional development to better family physicians' clinical practice;
2. significantly contribute to the development of the family medicine education field of inquiry;
3. rigorously develop and inform medical education policy.

This research agenda of FMER is articulated into four interrelated streams:

1. family physician's professional identity formation;
2. information use and technology in the learning episodes of practicing physicians and organizational learning;
3. program evaluation of educational innovations;
4. knowledge synthesis.

section 12.1.5.8: Doctor of Philosophy (Ph.D.) Family Medicine & Primary Care

The Ph.D. program will build upon our M.Sc in Family Medicine. Research topics in the field of family medicine and primary health care cross conventional discipline boundaries and research traditions. Our training program focuses on patient-oriented, community-based research using innovative methodologies and participatory approaches. The program advances academic excellence in family medicine and primary health care.

12.1.5.3 Medicine, Family Admission Requirements and Application Procedures

12.1.5.3.1 Admission Requirements

Our program encourages the following applicants:

- Practicing family physicians
- Undergraduate university students with a strong interest in family medicine research
- Family medicine residents who are completing their residency and would like to continue with their education by completing an enhanced skills program specializing in family medicine research with the possibility of obtaining an M.Sc. degree. If interested, you may learn more about the Clinician Scholar Program *here*

What do we look for?

High academic achievement: A cumulative grade point average (CGPA) of 3.4 is required out of a possible maximum CGPA of 4.0, or a GPA of 3.6 is required in the last two years of full-time studies.

Proof of competency in oral and written English: TOEFL: International students who have not received their instruction in English, or whose mother tongue is not English, must pass the Test of English as a Foreign Language (*TOEFL*) with a minimum score of 86 on the Internet-based test (iBT), with each component score not less than 20 (internet-based test).

> **Note:** The TOEFL institution code for McGill University is 0935. For further information, please refer to the *T*

FMED 505	(3)	Epidemiology and Data Analysis in Primary Care 1
FMED 509	(3)	Epidemiology and Data Analysis in Primary Care 2
FMED 603	(1)	Foundations of Participatory Research
FMED 614	(2)	Foundations of Mixed Methods Research
FMED 616	(1)	Applied Literature Reviews
FMED 625	(3)	Qualitative Health Research

Elective Courses (8 credits)

8 credits at the 500 level or higher chosen by the student and the Department in consultation with the student's thesis supervisor(s) of which 3 credits may be chosen from another department at McGill.

FMED 504D1	(.5)	Family Medicine Research Seminars
FMED 504D2	(.5)	Family Medicine Research Seminars
FMED 511	(1)	Introduction to Art in Healthcare: Making Art Accessible
FMED 525	(3)	Foundations of Translational Science
FMED 601	(3)	Advanced Topics in Family Medicine
FMED 604	(3)	Advanced Participatory Research in Health
FMED 605	(1)	AI and Analytical Decision-Making in Healthcare
FMED 606	(1)	Operational Issues in Survey Methods in Primary Care
FMED 607	(1)	Intro to Discourse Analysis & Interpretive Health Research
FMED 608	(1)	Advanced Mixed Methods Seminar in Health Research
		F

3 credits from the following:

FMED 505	(3)	Epidemiology and Data Analysis in Primary Care 1
FMED 625	(3)	Qualitative Health Research

Elective Courses (11 credits)

11 credits, at the 500 level or higher, of coursework may be chosen from inside or outside the Department in consultation with the student's academic adviser or supervisor.

12.1.5.7 Master of Science (M.Sc.) Family Medicine (Thesis): Medical Education (45 credits)

The M.Sc. in Family Medicine; Medical Education focuses on educating future scholars in family medicine education research. The program includes teaching and learning in research methodologies while emphasizing training in educational theories and topics, with a particular attention to health professions education. The thesis must concern an educational issue related to family medicine.

Thesis Courses (24 credits)

Thesis subject should be related to medical education.

FMED 697	(12)	Master's Thesis Research 1
FMED 698	(12)	Master's Thesis Research 2

Required Courses (12 credits)

EDPE 637	(3)	Issues in Health Professions Education
FMED 505	(3)	Epidemiology and Data Analysis in Primary Care 1
FMED 610	(1)	Foundations of Family Medicine
FMED 614	(2)	Foundations of Mixed Methods Research
FMED 625	(3)	Qualitative Health Research

Complementary courses (9 credits)

3 credits from the following:

FMED 509	(3)	Epidemiology and Data Analysis in Primary Care 2
FMED 603	(1)	Foundations of Participatory Research
FMED 606	(1)	Operational Issues in Survey Methods in Primary Care
FMED 615	(1)	Applied Knowledge Translation and Exchange in Health
FMED 616	(1)	Applied Literature Reviews

6 credits from the following:

EDEC 612	(3)	Digital Media and Learning
EDEM 644	(3)	Curriculum Development and Implementation
EDEM 673	(3)	Leadership Theory in Education
EDPE 635	(3)	Theories of Learning and Instruction
EDPE 664	(3)	Expertise, Reasoning and Problem Solving
EDPE 670	(3)	Educational Assessment and Evaluation

12.1.5.8 Doctor of Philosophy (Ph.D.) Family Medicine & Primary Care

Research topics in the field of family medicine and primary health care cross conventional discipline boundaries and research traditions. Our training program focuses on patient-oriented, community-based research using innovative methodologies and participatory approaches. The program advances academic excellence in family medicine and primary health care.

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.

PhD Comprehensive Exam

PhD students are expected to demonstrate proficiency in the following topics: basic statistics, epidemiology, qualitative and mixed methods, literature synthesis, knowledge translation and participatory research approaches. If a PhD candidate does not have prior training in any of these areas and believes that he or she cannot answer questions on these topics during the comprehensive exam, additional courses will be required for the PhD student.

FMED 701	(0)	PhD Comprehensive Examination

Required Courses (9 credits)

FMED 601	(3)	Advanced Topics in Family Medicine
FMED 604	(3)	Advanced Participatory Research in Health
FMED 702*	(1)	Advanced Doctoral Primary Care Research Seminars

* Note: this slot course must be taken three times (3 cr.)

Elective Course (3 credits)

3 credits in advanced research methods, at the 600 level or higher. May be chosen from outside the Department, in consultation with the student's academic adviser or supervisor.

12.1.6 Oncology

12.1.6.1 Location

Gerald Bronfman Department of Oncology
5100 de Maisonneuve Blvd West, Suite 720
Montreal QC H4A 3T2
Website: *mcgill.ca/oncology/*

12.1.6.2 Grad. Dip. in Oncology

The Graduate Diploma in Oncology provides students the opportunity to gain exposure to the principles and practice of oncology as well as its research domains, while exploring in more detail one of four areas of focus:

- Population and Global Cancer Control
- Psychosocial Oncology/Pallative Care
- Clinical Cancer Research
- Cancer Care Services and Quality

12.1.6.3 Oncology Faculty

Chair

TBA

Professors

B. Abdulkarim, M. Alaoui-Jamali, A. Aprikian, M. Basik, G. Batist, C. Borchers, P. Brodt, L. Ferri, W. Foulkes, E. Franco, C. Freeman, A. Fuks, V. Giguère, L. Gilbert, W. Gotlieb, C. Greenwood, T. Hutchinson, A. Koromilas, A.S. Liberman, C. Loiselle, R. Margolese, S. Meterissian, W. Miller, A. Nepveu, L. Panasci, M. Park, J. Pelletier, M. Pollak, S. Richard, S. Robbins, N. Sadeghi, C. Shustik, L. Souhami, A. Spatz, M. Thirlwell, M. Tremblay, J. Ursini-Siegel, T. Vuong

Associate Pr

The course will be chosen in consultation with the student's mentor and must be approved by the Program Committee and the Graduate Program Director.

Elective Courses (6 credits)

6 credits at the 500 level or higher can be chosen from the course list above or from other courses. The courses do no necessarily have to include cancer-related content, but must have relevance to the field. The courses will be chosen in consultation with the student's mentor and must be approved by the Program Committee and the Graduate Program Director.

12.1.7 Otolaryngology – Head and Neck Surgery

12.1.7.1 Location

Department of Otolaryngology – Head and Neck Surgery
MUHC (Royal Victoria Hospital)
1001 Boul. Decarie, D05.5709
Montreal QC H4A 3J1
Canada
Telephone: 514-934-1934, ext. 36386
Website: *mcgill.ca/ent*

12.1.7.2 About Otolaryngology – Head and Neck Surgery

The Master of Science degree offered by the Department of Otolaryngology – Head and Neck Surgery provides inter-disciplinary training for clinical or basic science research in Otolaryngology. Master's programs can include research on normal function and disease of head and neck structures: otology, neuro-otology, laryngology, rhinology, oncology, surgery, auditory-vestibular sciences, middle-ear modelling, oto-toxicity, genomics, infection, thyroid disease, or genetics.

section 12.1.7.5: Master of Science (M.Sc.) Otolaryngology (Thesis) (45 credits)

The master's program is intended for those having with a strong interest in otolaryngology research (e.g., Otolaryngologists, physicians, Ph.D.s, dentists, therapists, veterinarians, medical professionals, engineering or science undergraduates, etc.). The program addresses research questions using an interdisciplinary approach, combining methodologies of both the clinical sciences and the basic sciences. The master's program is unique in Canada and rare elsewhere. Graduates of the program can better treat ear-nose-throat diseases; they are better positioned to do, and to evaluate, research in Otolaryngology. They typically obtain the most highly sought positions in their fields..

12.1.7.3 Otolaryngology Admission Requirements and Application Procedures

12.1.7.3.1 Admission Requirements

Admission to the M.Sc. program requires acceptance by a research supervisor, and the proposed program must be approved by the Department.

Applicants require a strong interest in otolaryngology research. They can be otolaryngologists, physicians, Ph.D.s, dentists, therapists, veterinarians, medical professionals, engineering, or science undergraduates, among others.

The results of the Test of English as a Foreign Language (TOEFL) (minimum of 86 on the Internet-based test—iBT) with each component score not less than 20 is required for 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).

12.1.7.3.2 Application Procedures

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

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

Prospective students should contact research supervisors individually.

12.1.7.3.2.1 Additional Requirements

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

- Curriculum Vitae
- Personal Statement
- Acceptance by a research supervisor, possibly after Departmental coordination

12.1.7.3.3 Application Dates and Deadlines

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

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

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

12.1.7.4 Otolaryngology – Head and Neck Surgery Faculty

Chair
N. Sadeghi
Graduate Program Director and Dir

OTOL 693	(6)	M.Sc. Thesis 4
OTOL 694	(12)	M.Sc. Thesis 5

Required Courses (12 credits)

When appropriate, courses OTOL 602, OTOL 612, OTOL 603, or OTOL 613 may be replaced by other Basic Science or Clinical (500, 600, or 700 level) courses of relevance to Otolaryngology, as recommended or approved by the Department.

OTOL 602	(3)	Physiology, Histopathology and Clinical Otolaryngology 1
OTOL 603	(3)	Advanced Scientific Principles - Otolaryngology 1
OTOL 612	(3)	Physiology, Histopathology and Clinical Otolaryngology 2
OTOL 613	(3)	Advanced Scientific Principles - Otolaryngology 2

Complementary Course

(3-4 credits)

EPIB 507	(3)	Biostats for Health Sciences

or equivalent.

Students aiming to acquire an interdisciplinary background will be expected to take additional elective courses, at the undergraduate level if necessary.

- Ophthalmic pathology;
- Stem cell biology;
- Pulmonary disease;
- Neurodegenerative disorders;
- Smooth muscle pathophysiology; and
- Genomic biology of cancer.

Modern techniques and equipment include light, fluorescence, and electron microscopy (both transmission and scanning), laser capture, flow cytometry, DNA, RNA, protein analysis, cell culture, advanced immunological, pharmacological, biochemical, and physiological techniques, as well as morphometry and computer-aided analysis.

section 12.1.8.5: Master of Science (M.Sc.) Pathology (Thesis) (45 credits)

Graduates can directly enter rewarding careers in research, or opt to continue with their studies and obtain a Ph.D. Some combine their research training with subsequent training in medicine, law, or business administration.

section 12.1.8.6: Doctor of Philosophy (Ph.D.) Pathology

Our graduates enter successful careers in industry, academia, government/international agencies, or clinical medicine, sometimes combining two of these options. They leave McGill with experience in leadership and communication skills in addition to being highly trained in biomedical research, and their career choices include a wide range of administrati

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

12.1.8.4 Pathology Faculty

Chair
Lili-Naz Hazrati
Director of Graduate Pr

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.

- *TOEFL* or *IELTS* certificate of proficiency in English for non-Canadian applicants whose mother tongue and language of education is not English, with a minimum score of 86 on the TOEFL Internet-based test (iBT), with each component score not less than 20, or 6.5 on the IELTS test

and

Master of Science: Psychiatry (thesis)

- A B.Sc., B.A., B.N., or M.D. degree
- Demonstration of financial support through a scholarship/award and/or by the student's supervisor

Doctor of Philosophy: Mental Health

- A M.Sc., or M.A. degree
- The student's statement of purpose for seeking a Ph.D.
- Confirmation of supervision, including confirmation of funding from the supervisor or from an external scholarship

12.1.9.3.2 Application Procedures

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

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

12.1.9.3.2.1 Additional Requirements

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

- Personal Statement – describing the specific reasons for seeking a Master of Science degree in Psychiatry
- Letters of Reference – with Applicant Evaluation checklist forms (see Department *mcgill.ca/psychiatry/education/graduate-program/prospective-students/msc-mental-health/application-steps*)
- Written Confirmation of Supervision form (see Department *mcgill.ca/psychiatry/education/graduate-program/prospective-students/msc-mental-health/application-steps*) from the proposed research supervisor

12.1.9.3.3 Application Dates and Deadlines

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

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

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

12.1.9.4 Psychiatry Faculty

Chair

G. Turecki

Director of Graduate Program

N. Mechawar

Emeritus Professors

F. Abbott, L. Annable, M.K. Birmingham, F. Engelsmann, N. Frasure-Smith, S. Gauthier, A. M. Ghadirian, C. Gianoulakis, A. Malla, J.C. Negrete, J. Paris, G. Pinard, S. Young

Professors (Post-Retirement)

J. Guzder

Professors

V. Bohbot, D. Boivin, M. Bond, J. Breitner, A. Brunet, N. Cermakian, S. El Mestikawy, F. Elgar, M.-J. Fleury, C. Flores, B. Giros, G. Gobbi, I. Gold, A. Gratton, D. Groleau, R. Gruber, L.T. Hechtman, R. Joober, S. King, L.J. Kirmayer, E. Latimer, M. Lepage, M. Leyton, M.J. Meaney, N. Mechawar, R. Mizrahi, V.N.P. Nair, L. Palaniyappan, R. Palmour, J.C. Perry, R.O. Pihl, J. Poirier, R. Quirion, M.N. Rajah, P. Rosa, C. Rousseau, L.K. Srivastava, H. Steiger, B. Thombs, G. Turecki, C.-D. Walker, S.Williams

Associate Professors (Post-Retirement)

T.B. Brown, P. Zelkowitz

Associate Professors

J. Armony, S. Beaulieu, M. Berlim, R. Biskin, M. Brandon, M.J. Brouillette, N. Casacalenda, E. Chachamovich, M. Chakra

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)

PSYT 605	(3)	History and Philosophy of Psychiatry
PSYT 606	(3)	Mental Illness: Symptoms Diagnostics and Determinants
PSYT 701	(0)	Comprehensive Exam Mental Health

Complementary Courses (3 credits)

3 credits from the following or 3 credits of 500 level or higher from another unit chosen in consultation with the student's academic advisor or supervisor:

section 12.1.10.5

12.1.10.4 Surgery, Experimental Faculty

Director

F. Mwale

Professors

J. Antoniou, A. Aprikian, A. Barkun, J. Barkun, J. Barralet Beng, P. Brodt, F. Carli, S. Chevalier, P. Chan, S. Daniel, M.M. Elhilali, S. Emil, L. Feldman, L. Ferri, G.M. Fried, P. Gordon, L. Haglund, R. Hamdy, E. Harvey, T.E. Hebert, W. Kassouf, J.M. Laberge, F. Mwale, S. Meterissian, P. Metrakos, D.S. Mulder, J.A Ouellet, A. Philip, D. Poenaru, C. Reinhold, L. Rosenberg, D. Shum-Tim, R. St. Arnaud, T. Taketo-Hosotani, S. Tanguay, M. Tanzer, C.I. Tchervenkov, J.I. Tchervenkov, R. Turcotte, A. Zini

Associate Professors

S. Antonian, G. Baldini, M. Basik, S. Bergman, G. Berry, O. Blaschuk, M. Boutros, R. Cecere, R. Chaytor, D. Deckelbaum, D. Fleiszer, S. Fraser, M. Gilardino, T. Hemmerling, K. Khwaja, K.J. Lachapelle, J. Lapointe, L. Lessard, P.A. Martineau, A. Meguerditchian, C. O'Flaherty, S. Paraskevas, P. Puligandla, T. Razek, R. Reindl, J. Sampalis, J. Spicer, T. Steffen, O. Steinmetz, A. Thomson, M. Vassiliou, D. Zukor

Assistant Professors

A. Aoude, S. Bergeron, M. Burman, L. Campeau, M. Corriveau, O. Court, A. Dragomir, N. Eliopoulos, J. Faria, J. Fiore, H. Flageole, R. Gawri, E. Girsowicz, J. Harley, O. Huk, P. Jarzem, D. Labbe, E. Lee, L. Lee, I. Litvinov, S.K. Loganathan, K. Mackenzie, J. Marcoux, E. Mitmaker, C. Mueller, M. Petropavlovskaia, D. Rosenzweig, N. Saran, K. Shaw, J. Vorstenbosch

Adjunct Professor

Louis-Nicolas Veilleux

Associate Members

J. Alfieri, A. Arnaert, M.N. Burnier, M. Cantarovich, J.P. Capolicchio, J.C. Chen, F. Cury, M. Falcao, C.E. Ferland-Legault, P. Goldberg, A. Gursahaney, S. Hussein, R. Koenekoop, S. Komarova, M. Larouche, J.J. Lebrun, P. Lefrancois, N.M. Makhoul, S. Mayrand, M. Murshed, P.H-N. Nguyen, S. Prakash, I. Prakash, J. Przybyl, L.A. Stein, M. Tabrizian, B.M. Willie

Professors of Practice

S. Arless, S. Kozlick

12.1.10.5 Master of Science (M.Sc.) Experimental Surgery (Thesis) (45 credits)

The M.Sc. in Experimental Surgery offers a graduate-level training program in experimental surgery, leading to a Master's degree. This program allows for a hands-on learning experience for students to develop skills necessary to work within multidisciplinary teams in the creation of novel, needs driven, and marketable prototypes used in development of novel surgical and medical devices. As such participants work in multidisciplinary teams. The program offers both specialized and broad-based training through the use of the most recent techniques in molecular biology

[redacted]

Complementary Courses (9 credits)

9 credits, taken from 500, 600, or 700 level courses in consultation with the Research Advisory Committee.

Depending on their individual background, students may be asked by their Research Advisory Committee to take additional courses.

6 credits, taken from 500-, 600-, or 700-level courses in consultation with the Research Advisory Committee.

Depending on their individual background, students may be asked by their Research

3 credits from the following:

EDPE 575	(3)	Statistics for Practitioners
EPIB 507	(3)	Biostats for Health Sciences
	(3)	Statistics for Surgical Research

cell biology, biomechanics, and organ failure, to surgical simulation, surgical innov

EXSU 501	(6)	Medical Technology Internship 1
EXSU 601	(3)	Knowledge Management 1
EXSU 605	(3)	Biomedical Research Innovation
EXSU 620	(3)	Surgical Innovation 1
EXSU 621	(3)	Surgical Innovation 2
EXSU 622D1	(6)	Surgery Research Project 1
EXSU 622D2	(6)	Surgery Research Project 1
EXSU 684	(3)	Signal Transduction
FMED 619	(3)	Program Management in Global Health and Primary Health Care
PHGY 518	(3)	Artificial Cells
PHGY 550	(3)	Molecular Physiology of Bone
PPHS 511	(3)	Fundamentals of Global Health
PPHS 529	(3)	Global Environmental Health and Burden of Disease

Elective Courses (9 credits)

9 credits taken from 500-, 600-, or 700-level courses at the University, which may include courses from the list above, will be taken with the approval of the director of the program/adviser.

12.1.10.12 Doctor of Philosophy (Ph.D.) Experimental Surgery

Thesis

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

Required Courses (3 credits)

EXSU 700	(0)	Comprehensive Examination

And:

3 credits from the following:

EDPE 575	(3)	Statistics for Practitioners
EPIB 507	(3)	Biostats for Health Sciences
EXSU 606	(3)	Statistics for Surgical Research

Complementary Courses (12 credits)

6 credits from the following:

EDPH 689	(3)	Teaching and Learning in Higher Education
EXMD 634	(3)	Quantitative Research Methods
EXSU 500	(3)	Artificial Intelligence in Medicine
EXSU 601	(3)	Knowledge Management 1
EXSU 602	(3)	Knowledge Management 2
EXSU 603	(3)	Surgical Education Foundations
EXSU 619	(3)	The Hospital Environment
EXSU 620	(3)	Surgical Innovation 1

EXSU 621	(3)	Surgical Innovation 2

And 6 credits at the 500 level or higher in the student's specialty, selected in consultation with the Research Supervisory Committee.

12.1.10.13 Graduate Certificate (Gr. Cert.) Surgical Innovation (15 credits)

The core of this 15-credit graduate program consists of two innovation courses (EXSU 620 and EXSU 621) delivered by McGill Department of Surgery, with some sessions offered by external partners: John Molson School of Business (lean start-up), Concordia (software design), Local Industry (Regulatory & IP), and ETS (prototyping). the first semester of the program core focuses on team building and, supported by lectures, the students embark on a needs-finding process by observing all aspect of clinical activity in their focus themes. Trainees learn basic prototyping skills, start up organization and project management, supplemented by a basic statistics course and an introduction to the current status of biomedical research innovation. This certificate provides a solid foundation

The Department offers contemporary facilities for the wide range of techniques currently employed in research. Modern methods of cell and molecular biology, immunology, and biochemistry are used in conjunction with specialized microscopy in a variety of experimental systems.

The Department has one of the largest and best-equipped electron microscope facilities in the world. Currently in use are four modern electron microscopes which include a Tecnai F20 and a Titan Krios. Combined with some of these microscopes are computer-aided analytical equipment capable of elemental microanalysis, histomorphometry, reconstruction, and quantitation. The high-voltage microscope is particularly useful for certain analytical electron optical procedures such as electron diffraction, lattice imaging, and three-dimensional electron microscopy.

Funding

IELTS: Minimum overall band score of 6.5.

12.2.2.3.2 Application Procedures

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

See *University Regulations & Resources* > *Graduate* > *Graduate Admissions and Application Procedures* > *: Application Procedures* for detailed application procedures. Further details from the department can be found under the "Applying" tab at *mcgill.ca/anatomy/graduate*.

All applicants are advised to contact potential research supervisors before the application process since supervisor acceptance is required. Information about the research interests of faculty members can be found in our *Departmental Directory*.

Program guidelines are listed under the "Master's" and "Doctorate" tabs at *mcgill.ca/anatomy/graduate*.

12.2.2.3.2.1 Additional Requirements

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

- Agreement of a faculty member to act as Thesis Supervisor and to provide adequate financial support

12.2.2.3.3 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 Department of Anatomy and Cell Biology and may be revised at any time. Applicants must verify all deadlines and documentation requirements well in advance on the appropriate McGill departmental website; please consult the list at *mcgill.ca/gps/contact/graduate-program*.

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

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

12.2.2.4 Anatomy and Cell Biology Faculty

Chair

Chantal Autexier

Emeritus Professors

Gary C. Bennett, John J.M. Bergeron, James R. Brawer, Louis Hermo, Sandra C. Miller, Dennis G. Osmond, Hershey Warshawsky

Professors

Chantal Autexier, Samuel David, Elaine Davis, Timothy Kennedy, Nathalie Lamarche-Vane, Marc D. McKee, Peter McPherson, Carlos R. Morales, Joaquin Ortega, Barry I. Posner, Dieter Reinhardt, Alfredo Ribeiro-da-Silva, Wayne Sossin, Stefano Stifani, Hojatollah Vali, Dominique Walker

Associate Members

Pharmacology and Therapeutics: Daniel Bernard, Claudio Cuello, Jason Tanny

Physiology: Claire Brown

Surgery: Lisbet Haglund, David Labbé, Peter Metrakos

Urology: David Labbé

Adjunct Professors

Gregor Andelfinger, Philippe Campeau, Michel Cayouette, Frédéric Charron, Jean-François Côté, Daniel Cyr, Jacques Drouin, Jennifer Estall, Patrick Freud, Michael Greenwood, David Hipfner, Artur Kania, Justin Kollman, Stéphane Lefrançois, Alexei Pshezhetsky, Isabelle Rouiller, Michael Sacher, Elitza Tocheva, Javier Vargas

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

Thesis Course (24 credits)

ANAT 698	(24)	M.Sc. Thesis Research 1

Required Course (12 credits)

ANAT 601	(3)	MSc Seminar Examination
ANAT 695	(3)	Seminars in Cell Biology 1
ANAT 696	(3)	Seminars in Cell Biology 2
ANAT 697	(3)	Seminars in Cell Biology 3

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MIMM 615	(3)	Current Topics 3
NEUR 502	(3)	Basic and Clinical Aspects of Neuroimmunology

Upon consultation with the supervisor, students may select a 3-credit course outside of this list from Biomedical Science courses at the 500-600 level.

12.2.2.6 Doctor of Philosophy (Ph.D.) Cell Biology

Thesis

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

Required Courses

ANAT 690D1	(3)	Cell and Developmental Biology
ANAT 690D2	(3)	Cell and Developmental Biology
ANAT 695	(3)	Seminars in Cell Biology 1
ANAT 696	(3)	Seminars in Cell Biology 2
ANAT 697	(3)	Seminars in Cell Biology 3
ANAT 701	(0)	Ph.D. Comprehensive Examination

12.2.3 Biochemistry

12.2.3.1 Location

Department of Biochemistry
McIntyre Medical Sciences Building
3655 Promenade Sir-William-Osler
Montreal QC H3G 1Y6
Canada
Christine Laberge: Student Affairs Officer/Graduate Program Coordinator
Telephone: 514-398-2423
Email: *christine.laberge@mcgill.ca*
Website: *mcgill.ca/biochemistry*

12.2.3.2 About Biochemistry

The Department of Biochemistry offers M.Sc. and Ph.D. programs, which emphasize laboratory research. Our research interests include:

- molecular and cell biology;
-

Master's students receive a minimum stipend of $20,000 annually; doctoral students receive $22,000. The Department is committed to helping graduate students secure adequate funding for their research. All students are financially supported either by their supervisor or through fellowships or scholarships. Prospective students are urged to make every effort to secure their own funding. Applications may be made for a variety of fellowships administered by the University or by various federal, provincial, or private agencies. For more information on fellowships and awards, see the *Graduate and Postdoctoral Studies website*.

Departmental Seminars

Visiting scientists and senior doctoral students present their research findings to the Department at a regular seminar series throughout the academic year. All graduate students are required to attend the regular seminars and additional special lectures, and are encouraged to attend scientific conferences and symposia.

section 12.2.3.5: Master of Science (M.Sc.) Biochemistry (Thesis) (45 credits)

The M.Sc. in Biochemistry introduces students to laboratory-based research at an advanced level. The M.Sc. program offers core courses in advanced biochemistry topics, but focuses on laboratory research. The program provides sophisticated training in the technical as well as theoretical aspects of biochemistry, at one of the leading Biochemistry departments in Canada. The M.Sc. program is an excellent preparation for skilled positions in the biomedical sciences, in industry or the public sector, or for superior research in a Ph.D. program.

section 12.2.3.6: Master of Science (M.Sc.) Biochemistry (Thesis): Bioinformatics (45 credits)

This program is currently not offered.

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

Students successfully completing the Bioinformatics option at the M.Sc. level will be fluent in the concepts, language, approaches, and limitations of the field.

The option consists of a number of interdisciplinary courses and a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field.

section 12.2.3.7: Master of Science (M.Sc.) Biochemistry (Thesis): Chemical Biology (47 credits)

This program is currently not offered.

The Chemical Biology Thematic Group is engaged in a diverse range of research topics, which span structural biology, enzymology, nucleic acid research, signalling pathways, single molecule biophysics, and biophysical chemistry of living tissues. Among the themes that unite the research being performed in this group is the attempt to learn new chemistry and physics from biological systems. We have projects relating to pharmaceutically relevant enzymes such as those involved in drug metabolism and antibiotic resistance; development of therapeutic agents in the control of inflammation, cancer, and viral infections; the chemical biology of NO; quantification of bioenergetic markers of metabolism; self-assembly mechanisms of the HIV-1 virion capsid; liposome microarray systems to address membrane protein dynamics and recognition; studies on reactive oxygen species translocation across the aqueous/lipid membrane interface; RNAi/antisense technologies; dynamic combinatorial chemistry; protein dynamics and function; mechanistic aspects involved in cellular adhesion and transport in membrane and zeolite channels; and cutting-edge microscopes used to examine transport, motility, and reactivity in cells.

The Chemical Biology graduate option is centred on the pursuit of an original research project under the direction of one or more mentors. The program is supported by McGill University and by the Canadian Institutes of Health Research (CIHR) through its Strategic Training Initiatives program.

The program of training incorporates several important features, including a diverse curriculum and programs of seminars, workshops, and discussion groups designed to provide students with a well-rounded exposure to both the chemical and biological aspects of the discipline. The M.Sc. option provides a foundation in the concepts and approaches of Chemical Biology.

section 12.2.3.8: Doctor of Philosophy (Ph.D.) Biochemistry

The Ph.D. in Biochemistry trains students in laboratory-based research at the highest level. The Ph.D. program is streamlined to emphasize independent research, and the many areas of biochemistry studied in our Department offer a wide choice of specialties. Students gain in-depth expertise in biochemistry and the biomedical sciences, with the opportunity to carry out research projects at a world-class level and build collaborations with other leading research groups.

Graduates of the Ph.D. program are outstandingly prepared for leadership careers in the basic health sciences in industry, the public sector, or academia.

section 12.2.3.9: Doctor of Philosophy (Ph.D.) Biochemistry: Bioinformatics

This program is currently not offered.

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 analyse datasets, the application of modelling techniques, the creation of tools for manipulating Bioinformatics data, the integration of biological databases, and the use of algorithms and statistics.

section 12.2.3.9: Doctor of Philosophy (Ph.D.) Biochemistry: Bioinformatics

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 have the capability of developing an independent Bioinformatics research program.

The option consists of a number of interdisciplinary courses and a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field.

section 12.2.3.10: Doctor of Philosophy (Ph.D.) Biochemistry: Chemical Biology

This program is currently not offered.

The Chemical Biology Thematic Group is engaged in a diverse range of research topics which span structural biology, enzymology, nucleic acid research, signalling pathways, single molecule biophysics, and biophysical chemistry of living tissues. horesearch,2 1Se1 whiunitm(e tof researbeallineroinfedogy)Tj12 Tw1 0 0 1

1. Preliminary approval by the Department's Graduate Admission Committee based on the student's transcript, references, and other documents submitted with the application. The criteria for assessment at this level are the same as for the regular graduate programs of the Department.
2. Acceptance by a Bioinformatics or Chemical Biology research director. The director must propose a research project for the student that provides training in the methods and philosophy of Chemical Biology. Project proposals are assessed by the Bioinformatics or Chemical Biology Program Committee.

12.2.3.3.2 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. Information for prospective students is also available on the Department of Biochemistry's *website*.

All applicants are advised to contact potential research supervisors during or before the application process since supervisor acceptance is required. Information about the research interests of faculty members can be found at *mcgill.ca/biochemistry/research* and *mcgill.ca/biochemistry/about-us/department/faculty-members*.

12.2.3.3.2.1 Additional Requirements

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

- Curriculum Vitae
- Personal Statement
- Agreement of a faculty member to act as Thesis Supervisor and to provide adequate financial support
- Acceptance by a Bioinformatics or Chemical Biology research director

12.2.3.3.3 Application Dates and Deadlines

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

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

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

12.2.3.4 Biochemistry Faculty

Chair

Thomas Duchaine

Emeritus Professors

Nicole Beauchemin, Rhoda Blostein, Philip E. Branton, Peter E. Braun, Robert E. MacKenzie, Walter E. Mushynski, Joseph Shuster, John R. Silvius, Clifford P. Stanners, Maria Zannis-Hadjopoulos, Imed Gallouzi

Professors

Albert Berghuis, Josée Dostie, Thomas Duchaine, Kalle Gehring, Vincent Giguère, Philippe Gros, Alba Guarné, Roderick R. McInnes, William Muller, Bhushan Nagar, Alain Nepveu, Morag Park, Arnim Pause, Jerry Pelletier, Martin Schmeing, Nahum Sonenberg, Jose G. Teodoro, David Y. Thomas, Michel L. Tremblay

Associate Professors

Sidong Huang, Ian Watson

Assistant Professors

Natasha C. Chang, Katie Cockburn, Maxime Denis, Lawrence Kazak, William Pastor, Maria Vera Ugalde

Associate Members

Gary Brouhard, Marc Fabian, Robert S. Kiss, Gergely Lukacs, Luke McCaffrey, Joaquin Ortega, Janusz Rak, Stéphane Richard, Reza Salavati, Erwin Schurr, Peter Siegel, Ivan Topisirovic, Youla S. Tsantrizos, Bernard Turcotte, Josie Ursini-Siegel, Simon Wing, Xiang-Jiao Yang, Natalie Zeytun

Adjunct Professors

Jacques Drouin, Enrico Purisima, Selena Sagan, Julie St-Pierre, Martin Savageau, Robert Joseph Zamboni

12.2.3.5 Master of Science (M.Sc.) Biochemistry (Thesis) (45 credits)

Thesis Courses (36 credits)

BIOC 697	(9)	Thesis Research 1
BIOC 698	(12)	Thesis Research 2
BIOC 699	(15)	Thesis Research 3

Required Course (3 credits)

BIOC 696	(3)	Seminars in Biochemistry

Complementary Courses* (6 credits)

At least 3 credits must be chosen from the following:

BIOC 600	(3)	Advanced Strategies in Genetics and Genomics
BIOC 603	(3)	Genomics and Gene Expression
BIOC 604	(3)	Macromolecular Structure
BIOC 605	(3)	Protein Biology and Proteomics
BIOC 670	(3)	Biochemistry of Lipoproteins
EXMD 615	(3)	Essentials of Glycobiology
EXMD 635D1	(3)	Experimental/Clinical Oncology
EXMD 635D2	(3)	Experimental/Clinical Oncology

Plus additional credits, to a minimum of 6 total complementary course credits, of 500- or higher-level courses in biomedical and allied sciences.

* Complementary courses are chosen in consultation with the Research Director.

The Graduate Advisory Committee may stipulate additional coursework depending on the background of the candidate. BIOC 450 (Protein Structure and Function) and BIOC 454 (Nucleic Acids) are additional requirements for those who have not previously completed equivalent courses in their prior training.

12.2.3.6 Master of Science (M.Sc.) Biochemistry (Thesis): Bioinformatics (45 credits)

Thesis Courses (30 credits)

BIOC 694	(3)	Thesis Research 4
BIOC 698	(12)	Thesis Research 2
BIOC 699	(15)	Thesis Research 3

Required Courses (6 credits)

BIOC 696	(3)	Seminars in Biochemistry
COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar

Complementary Courses* (9 credits)

3 credits to be chosen from the following courses:

BIOC 670	(3)	Biochemistry of Lipoproteins
EXMD 615	(3)	Essentials of Glycobiology
EXMD 635D1	(3)	Experimental/Clinical Oncology
EXMD 635D2	(3)	Experimental/Clinical Oncology

Plus 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

* Complementary courses are chosen in consultation with the Research Director.

The Graduate Advisory Committee may stipulate additional coursework depending on the background of the candidate. BIOC 450 (Protein Structure and Function) and BIOC 454 (Nucleic Acids) are additional requirements for those who have not previously completed equivalent courses in their prior training.

12.2.3.7 Master of Science (M.Sc.) Biochemistry (Thesis): Chemical Biology (47 credits)

Thesis Courses (33 credits)

BIOC 695	(6)	Thesis Research 1 (Chemical - Biology)
BIOC 698	(12)	Thesis Research 2
BIOC 699	(15)	Thesis Research 3

Required Course (3 credits)

BIOC 696	(3)	Seminars in Biochemistry

Complementary Courses* (11 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

At least 3 credits from the following:

CHEM 502	(3)	Advanced Bio-Organic Chemistry
CHEM 503	(3)	Drug Discovery
PHAR 503	(3)	Drug Discovery and Development 1

and at least 3 credits from the following:

BIOC 600	(3)	Advanced Strategies in Genetics and Genomics
BIOC 603	(3)	Genomics and Gene Expression
BIOC 604	(3)	Macromolecular Structure

Plus 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

*** Complementary courses are chosen in consultation with the Research Director.

The Graduate Advisory Committee may stipulate additional coursework depending on the background of the candidate. BIOC 450 (Protein Structure and Function) and BIOC 454 (Nucleic Acids) are additional requirements for those who have not previously completed equivalent courses in their prior training.

12.2.3.10 Doctor of Philosophy (Ph.D.) Biochemistry: Chemical Biology

Thesis

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

Required Courses (7 credits)

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
BIOC 696*	(3)	Seminars in Biochemistry
BIOC 701**	(0)	Research Seminar 1
BIOC 702**	(0)	Ph.D. Thesis Proposal
BIOC 703**	(0)	Ph.D. Seminar

* Students promoted directly from the M.Sc. to the Ph.D. program, and who registered for and passed BIOC 696 at the M.Sc. level, do not register for BIOC 696 at the Ph.D. level.

** NOTE: Students DO NOT register for these courses until notified by the Student Affairs Officer.

Students must complete BIOC 701 in the third term after admission to the program, BIOC 702 in the fifth or sixth term, and BIOC 703 approximately six months prior to submission of the Ph.D. thesis.

Complementary Courses*** (9 credits)

At least 3 credits from the following:

CHEM 502	(3)	Advanced Bio-Organic Chemistry
CHEM 503	(3)	Drug Discovery
PHAR 503	(3)	Drug Discovery and Development 1

At least 3 credits from the following:

BIOC 600	(3)	Advanced Strategies in Genetics and Genomics
BIOC 603	(3)	Genomics and Gene Expression

BIOC 604	(3)	Macromolecular Structure
BIOC 605	(3)	Protein Biology and Proteomics
BIOC 670	(3)	Biochemistry of Lipoproteins
EXMD 615	(3)	Essentials of Glycobiology
EXMD 635D1	(3)	Experimental/Clinical Oncology
EXMD 635D2	(3)	Experimental/Clinical Oncology

Plus additional credits to a total of at least 9 complementary course credits from the following list:

CHEM 522	(3)	Stereochemistry
CHEM 582	(3)	Supramolecular Chemistry
CHEM 591	(3)	Bioinorganic Chemistry
CHEM 621	(5)	Reaction Mechanisms in Organic Chemistry
CHEM 629	(5)	Organic Synthesis
EXMD 510	(3)	Bioanalytical Separation Methods
EXMD 602	(3)	Techniques in Molecular Genetics
PHAR 504	(3)	Drug Discovery and Development 2
PHAR 562	(3)	Neuropharmacology
PHAR 563	(3)	Endocrine Pharmacology
PHAR 707	(3)	Topics in Pharmacology 6

*** Complementary courses are chosen in consultation with the Research Director.

The Graduate Advisory Committee may stipulate additional coursework depending on the background of the candidate. BIOC 450 (Protein Structure and Function) and BIOC 454 (Nucleic Acids) are additional requirements for those who have not previously completed equivalent courses in their prior training.

12.2.4 Biomedical Engineering

12.2.4.1 Location

Department of Biomedical Engineering
Duff Medical Building
3775 University Street, Room 316
Montreal QC H3A 2B4
Canada
Telephone: 514-398-6736
Fax: 514-398-7461
Website: *mcgill.ca/bme*

12.2.4.2 About Biomedical Engineering

Excellent laboratory facilities for basic and applied research are available in the Department and in the laboratories of associated staff located elsewhere on campus. The Department operates a network of high-performance workstations and well-equipped mechanical and electronics workshops.

Basic research in the Department concentrates on the application of quantitative engineering analysis methods to basic biomedical research problems. Currently active areas of research include:

- neuromuscular and postural control;
- muscle mechanics;
- the vestibular system;
- oculomotor control;
- the auditory system;

- joint prosthetics;
- biomaterials;
- artificial cells and organs;
- cell and tissue engineering;
- drug delivery;
- microencapsulation;
- microbiome and probiotics;
- functional food and neutraceuticals;
- medical imaging;
- microfluidics;
- nanomedicine and nanotechnology;
- bioinformatics in genomics and proteomics.

Staff members are also active in more applied research related to the development of quantitative analysis tools and instruments for biomedical research. Areas of activity here include: signal analysis, system identification, modelling, simulation and parameter estimation, image processing, pattern recognition, ultrasound, and biorobotics.

section 12.2.4.5: Master of Science, Applied (M.Sc.A.) Translational Biomedical Engineering (Non-Thesis) (45 credits)

The M.Sc.(Applied) in Translational Biomedical Engineering; Non-Thesis is a full-time specialized 13- to 16-month professional program in translation biomedical engineering. This is an intensive program that focusses on the biomedical engineering industry through a comprehensive curriculum covering essential skills and knowledge needed to translate biomedical engineering research into clinical and commercial solutions.

The program consists of three main components that are unique to the translational process in biomedical engineering, including: 1) translational course on intellectual property, regulatory affairs, quality management systems, clinical trials and reimbursement; 2) fundamental science courses in biomedical engineering; and 3) an experiential component, comprising of a closely supervised 4-month internship in the biomedical engineering industry.

None of the courses taken in the Graduate Certificate in Translational Biomedical Engineering can be credited towards the M.Sc.(Applied) once the Graduate Certificate has been awarded.

section 12.2.4.6: Graduate Certificate (Gr. Cert.) Translational Biomedical Engineering (15 credits)

This program will enable students to translate advances in biomedical engineering research to clinical and commercial solutions. Students will learn the complementary skills needed to take early-stage research results from the bench to the bedside and bridge the gap between invention and product innovation.

The graduate certificate responds to the demand from students for such training and addresses the needs of the biomedical industry for such highly qualified personnel.

For additional information, see the *Biomedical Engineering website*.

Biomedical Engineering Admission Requ7ical Engineeriel Engineeriel Engineeriel Engineeriel En.52(.)Tj/F0 8 Tf1 0 0 1 103.657 290.841

12.2.4.4 Biomedical Engineering Faculty

Chair

D. Juncker

Emeritus Professors

T.M.S. Chang; H.L. Galiana

Professors

D.L. Collins; D. Juncker; R.E. Kearney; S. Prakash; M. Tabrizian

Associate Professors

W.R.J. Funnell; D. Bzdok; A. Haidar

Assistant Professors

G. Chen; D.A. Rudko; C.L. Tardif

Faculty Lecturer

R. Wagner

Associate Members

M. Amabili; S. Baillet; C. Baker; S. Blain-Moraes; M. Chacron; X. Chai; M. Chakravarty; J. Ding; M. Driscoll; A. Ehrlicher; S. Enger; D. Guitton; A. Hendricks; C. Hoesli; Y. Iturria-Medina; A. Kamen; A. Katsarkas; J. Kildea; J. Kinsella; S. Komarova; A.-M. Lauzon; R. Leask; I. Levesque; J. Li; N. Li-Jessen; S. Lomber; G. Mitsis; L. Mongeau; R. Mongrain; C. Moraes; C. Pack; D. Pasini; W. Reisner; A. Shmuel; C. Wagner; B. Willie; Y.B. Xia

Adjunct & Affiliate Members

E. Borenstein; P.G. Charette; K. Cullen; I. El Naqa; C. Grova; D. Kroo; J.-M. Lina; L. Malic; M. Mekhail; H. Motallebzadeh; J.L. Nadeau; J. Near; P. Nguyen; G.B. Pike; A. Tremblay; T. Veres; P. Warrick

12.2.4.5 Master of Science, Applied (M.Sc.A.) Translational Biomedical Engineering (Non-Thesis) (45 credits)

The M.Sc.(Applied) in Translational Biomedical Engineering; Non-Thesis is a full-time specialized 13- to 16-month professional program in translation biomedical engineering. This is an intensive program that focusses on the biomedical engineering industry through a comprehensive curriculum covering essential skills and knowledge needed to translate biomedical engineering research into clinical and commercial solutions.

The program consists of three main components that are unique to the translational process in biomedical engineering, including: 1) translational course on intellectual property, regulatory affairs, quality management systems, clinical trials and reimbursement; 2) fundamental science courses in biomedical engineering; and 3) an experiential component, comprising of a closely supervised 4-month internship in the biomedical engineering industry.

None of the courses taken in the graduate certificate in Translational Biomedical Engineering can be credited towards the M.Sc.(Applied) once the graduate certificate has been awarded.

Required Courses (30 credits)

BMDE 653	(3)	Patents in Biomedical Engineering
BMDE 654	(3)	Biomedical Regulatory Affairs - Medical Devices
BMDE 655	(3)	Biomedical Clinical Trials - Medical Devices
BMDE 656	(3)	Medical Device Development Process
BMDE 657D1	(9)	Biomedical Engineering Industry Internship
BMDE 657D2	(9)	Biomedical Engineering Industry Internship

Complementary Courses (15 credits)

15 credits to be chosen listed from courses below, or other relevant 500-, 600- or 700-lev

BMDE 501	(3)	Selected Topics in Biomedical Engineering

Biomedical Signals and Systems

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

Medical Imaging

BIEN 530	(3)	Imaging and Bioanalytical Instrumentation
BMDE 610	(3)	Functional Neuroimaging Fusion
BMDE 650	(3)	Advanced Medical Imaging
MDPH 607	(3)	Medical Imaging

Biomaterials and Tissue Engineering

BIEN 510	(3)	Engineered Nanomaterials for Biomedical Applications
BMDE 504	(3)	Biomaterials and Bioperformance
BMDE 505	(3)	Cell and Tissue Engineering

Biosensors and Devices

BIEN 550	(3)	Biomolecular Devices
BIEN 560	(3)	Design of Biosensors
BMDE 503	(3)	Biomedical Instrumentation
BMDE 508	(3)	Introduction to Micro and Nano-Bioengineering

Translational Biomedical Engineering

BMDE 656	(3)	Medical Device Development Process

12.2.5 Human Genetics

12.2.5.1 Location

Department of Human Genetics
Strathcona Anatomy & Dentistry Building
3640 University Street, Room 2/38F
Montreal QC H3A 0C7
Canada
Telephone: 514-398-4198
Fax: 514-398-2430
Email: *dept.humangenetics@mcgill.ca*
Website: *mcgill.ca/humangenetics*

Administration

Ross MacKay – *Student Affairs Adviser*

Administration

Email: *ross.mackay@mcgill.ca*

Rimi Joshi – *Student Affairs Administrator*

Email: *grad.hg@mcgill.ca*

12.2.5.2 About Human Genetics

M.Sc. and Ph.D. Degrees in the Department of Human Genetics

The Department of Human Genetics offers a clinical master's program, M.Sc. in Genetic Counselling, as well as research training at both the M.Sc. and Ph.D. levels in Human Genetics. Both the M.Sc. and Ph.D. in Human Genetics research programs require the completion of a thesis, which is the major focus of the student's effort. A minimal amount of coursework is required, but specific course choices are flexible and vary according to the student's previous training and current research interest.

Most of the faculty members of the Human Genetics Department are located in McGill teaching hospitals, reflecting the medically learned knowledge at the core of human genetic studies.

Faculty members have a wide variety of research interests, which include:

- cancer genetics;
- cytogenetics;
- reproductive biology;
- neurogenetics;
- genomic and genetic basis of human diseases.

Detailed information regarding faculty research interests can be found on the *Department website*.

The Graduate Training Committee requires that students who have been accepted into the M.Sc. or Ph.D. in Human Genetics research graduate program have a guaranteed minimum stipend of $20,000, plus the full amount of tuition and fees. Current and detailed information regarding financial matters can be found on the *Student Funding webpage*.

Tuition Assistance Packages

A certain number of tuition assistance packages will be offered to incoming out-of-province/international students for the M.Sc. or Ph.D. in Human Genetics thesis program who have demonstrated outstanding academic achievement. Students who have a **CGPA of 3.5 out of 4.0 or above** (as converted by the McGill GPS guidelines) and who submit an online application and documents by their *respective deadline* will automatically be considered for assistance. Once applications have been received by the deadline, the Graduate Training Committee will review all eligible applications and award tuition assistance to certain top eligible candidates at the time of admission into the program.

section 12.2.5.7: Master of Science (M.Sc.) Human Genetics (Thesis): Bioethics (45 credits)

McGill University offers specialized education in bioethics to graduate students in the Faculties of Medicine and Law, the School of Religious Studies, and the Department of Philosophy. The Master's degree Specialization in Bioethics is an interdisciplinary academic program that emphasizes both the conceptual and the practical aspects of bioethics.

section 12.2.5.6: Master of Science (M.Sc.) Human Genetics (Thesis): Bioinformatics (45 credits)

This program is currently not offered.

Students successfully completing the Bioinformatics option at the M.Sc. level will be fluent in the concepts, language, approaches, and limitations of the field. 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.

Enrolment in the Bioinformatics option can only be approved after a student has been admitted into the Department. There is an agreement for the option that must be signed by the student, supervisor, and Department, and enrolment in the option is subject to space availability and other constraints that the Department cannot assess at the time of admission. For more information, please contact the Graduate Program Coordinator.

section 12.2.5.8: Master of Science (M.Sc.) Genetic Counselling (Non-Thesis) (48 credits)

The M.Sc. in Genetic Counselling program provides the academic foundation and clinical training required for the contemporary practice of genetic counselling. Genetic counsellors are health professionals who provide information and support to families who have members with birth defects or genetic disorders and to families who may be at risk for a variety of inherited conditions. Genetic counsellors investigate the problem present in the family, analyze inheritance patterns and risks of recurrence, and review available options with the family. Some counsellors also work in administrative and academic capacities, and many engage in research activities.

The curriculum includes a variety of required courses in human genetics and other departments, and 40 weeks of supervised clinical training spread over four semesters. Graduates will be eligible to sit for both the Canadian Association of Genetic Counsellors and the American Board of Genetic Counselling certification examinations. Upon completion of the M.Sc. in Genetic Counselling program, students will demonstrate competence in, or satisfactory knowledge of: principles of human genetics, including cytogenetics, biochemical, molecular, and population genetics; methods of interviewing and counselling, and the dynamics of human behaviour in relation to genetic disease; and social, legal, and ethical issues in genetics. Enrolment will be limited to four students.

section 12.2.5.9: Doctor of Philosophy (Ph.D.) Human Genetics

The Department of Human Genetics provides a unified curriculum of study in genetics. Areas of specialization include: biochemical genetics, genetics of development, animal models of human diseases, cancer genetics, molecular pathology, gene therapy, genetic dissection of complex traits, genetics of infectious and inflammatory diseases, non-Mendelian genetics, bioinformatics, behavioural genetics, neurogenetics, bioethics, and genomics. Many of our faculty hold cross-appointments in various departments (including: biochemistry, biology, cardiology, medicine, microbiology, immunology, neurology, pathology, pediatrics, pharmacology, psychiatry) within the Faculties of Science and Medicine. This enables numerous opportunities for interdisciplinary research and collaboration. The Department conducts research on all sites of the McGill University Health Centre (MUHC), the Montreal Neurological Institute and Hospital, the McGill Life Sciences Complex, the *McGill University & Genome Quebec Innovation Centre*, the Biomedical Ethics Unit, and the *Centre for Genomics and Policy*.

section 12.2.5.10: Doctor of Philosophy (Ph.D.) Human Genetics: Bioinformatics

This prgram is currently not offered.

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 have the capability of developing an independent Bioinformatics research program. 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.

Enrolment in the Bioinformatics option can only be approved after a student has been admitted into the Department. There is an agreent in the option is subj

- Bachelor's or medical degree – minimum cumulative grade point average (CGPA) of 3.2 out of 4.0, or 3.4 out of 4.0 in the last two full-time academic years;
- Recent (within the past five years) university-level courses in molecular/cell biology, biochemistry, advanced genetics (preferably human), statistics, and a minimum of two courses in psychology;
- Some experience (either paid or volunteer) working with adults in a counselling or advisory capacity, ideally in a crisis setting.

For detailed information, visit the *Genetic Counselling Program website*.

M.Sc. and Ph.D. in Human Genetics

Prerequisites:

- B.Sc. – minimum CGPA of 3.2 out of 4.0;
- A minimum of 6 credits in cellular and molecular biology or biochemistry, 3 credits in mathematics or statistics, and 3 credits in genetics.

Admission is based on acceptance by a *research supervisor*, confirmed *funding* for the duration of the academic program, and an *online application* evaluated by the Graduate Training Committee.

Prospective graduate students should complete the online application and indicate the name of the secured research supervisor.

For detailed information, visit the *Human Genetics program website*.

Language Requirements

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 a *TOEFL* or *IETLS* test score to McGill University. For TOEFL, a minimum score of 100 on the Internet-based test (iBT) is required, with each component scoring 20 or higher. On the IELTS the minimum standard for consideration is 7.

> **Note:** TOEFL scores must be sent electronically by the testing agency to McGill University using our institution code of 0935. Scanned copies of results or hard copies sent in the mail will not be entered as received in your application. IELTS scores also must be submitted electronically by the test centre to McGill University

Associate Professors

A. Ao, G. Bourque, N. Braverman, K. Dewar, R. Hernandez, Y. Joly, J. Majewski, P. Moffatt, R. Nadon, I. Ragoussis, L. Russell, A. Ryan, R. Sladek, R. Slim, Y. Yamanaka

12.2.5.6 Master of Science (M.Sc.) Human Genetics (Thesis): Bioinformatics (45 credits)

** This program is currently not offered. **

Thesis Courses (33 credits)

HGEN 680	(9)	M.Sc. Thesis Research 1
HGEN 681	(12)	M.Sc. Thesis Research 2
HGEN 682	(12)	M.Sc. Thesis Research 3

Required Courses (6 credits)

COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar
HGEN 692	(3)	Human Genetics

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

Note: The Graduate Advisory Committee may stipulate additional coursework at the 500, 600, or 700 level depending on the background of the candidate.

12.2.5.7 Master of Science (M.Sc.) Human Genetics (Thesis): Bioethics (45 credits)

Thesis Courses (30 credits)

30 credits selected as follows:

	(12)	M.Sc. Thesis Research 2

12.2.5.8 Master of Science (M.Sc.) Genetic Counselling (Non-Thesis) (48 credits)

Required Courses (48 credits)

HGEN 600D1	(3)	Genetic Counselling Practicum
HGEN 600D2	(3)	Genetic Counselling Practicum
HGEN 601	(3)	Genetic Counselling Principles
HGEN 610D1	(3)	Genetic Counselling: Independent Studies
HGEN 610D2	(3)	Genetic Counselling: Independent Studies
HGEN 617	(3)	Principles of Medical Genetics
HGEN 620	(3)	Introductory Field Work Rotations 1
HGEN 621	(6)	Introductory Field Work Rotations 2
HGEN 630D1	(6)	Advanced Field Work Rotations
HGEN 630D2	(6)	Advanced Field Work Rotations
HGEN 640	(3)	Second Year Practicum 1
HGEN 641	(3)	Second Year Practicum 2
IPEA 503	(0)	Managing Interprofessional Conflict
PATH 653	(3)	Reading and Conference

12.2.5.9 Doctor of Philosophy (Ph.D.) Human Genetics

Candidates entering Ph.D. 1 must complete at least three years of full-time resident study (six terms). The normal and expected duration of the Ph.D. program is four to five years. A student who has obtained a master's degree at McGill in a related field, or at an approved institution elsewhere, and is proceeding in the same subject toward a Ph.D. degree may, upon the recommendation of the Graduate Training Committee, enter at the Ph.D. 2 level.

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to kno

HGEN 699	(3)	Advanced Readings in Genetics 4

Students are restricted to taking the following course.

HGEN 670	(3)	Advances in Human Genetics 1

Note: The Graduate Advisory Committee may stipulate additional coursework depending on the background of the candidate.

12.2.5.10 Doctor of Philosophy (Ph.D.) Human Genetics: Bioinformatics

** This program is currently not offered. **

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)

COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar
HGEN 692	(3)	Human Genetics
HGEN 701	(0)	Ph.D. Comprehensive Examination

Complementary Courses (6 credits)

* Two courses 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

* Note: Students who enter in Ph.D. 1 will need to take an additional 6 credits of complementary courses chosen from the departmental offerings listed for the Ph.D. in Human Genetics and/or from among 500-, 600-, or 700-level courses in the Faculties of Medicine or Science.

12.2.6 Microbiology and Immunology

12.2.6.1 Location

Department of Microbiology and Immunology
Duff Medical Building, Room 511
3775 University Street
Montreal QC H3A 2B4
Canada
Telephone: 514-398-3061
Fax: 514-398-7052
Email: *grad.microimm@mcgill.ca*
Website: *mcgill.ca/microimm*

12.2.6.2 About Microbiology and Immunology

The Department offers graduate programs leading to the degrees of **M.Sc.** and **Ph.D.**. Each program is tailored to fit the needs and backgrounds of individual students. The graduate program is designed to offer students state-of-the-art training, concentrating on four key areas of research:

- cellular and molecular immunology;

- microbial physiology and genetics;
- molecular biology of viruses;
- medical microbiology.

Basic research discoveries in microbiology may lead to improved drug design and vaccine development to treat and prevent diseases. The Department has many notable facilities and resources, including a cell sorter, ultra centrifuges, confocal microscope, real-time PCR facilities, cryostat for immunocytochemistry, and facilities for radio-isotope studies and infectious diseases. We foster close ties with McGill's teaching hospitals and research centres to promote multidisciplinary research.

section 12.2.6.5: Master of Science (M.Sc.) Microbiology and Immunology (Thesis) (45 credits)

The primary goal of this program is to provide students with unique opportunities to learn experimental designs and fundamental research techniques, and objectively synthesize information from scientific literature. These tools enable the students to focus on major research topics offered by the Department: molecular microbiology, mycology, microbial physiology, virology, genetics, immunology, drug design, and aspects of host–parasite relationships. Each M.Sc. student chooses their preferred major research area and research supervisor. Following an interview, the student is presented with a research topic and offered a studentship (amounts vary). Each student must register for our graduate courses (two seminars, two reading and conference courses). If pertinent to the student's research program, the research adviser may advise the student to take additional courses.

Most of our students, after one year, are proficient researchers, and some first authors of a research publication. M.Sc. students may fast-track to the Ph.D. program after three terms of residency. The remaining students advance their microbiology background by opting to enter into medicine, epidemiology, biotechnology, or pharmaceutical disciplines.

section 12.2.6.6: Doctor of Philosophy (Ph.D.) Microbiology and Immunology

The primary goal of the Ph.D. program is to create a self-propelled researcher, proficient in experimental designs and advanced methodologies applicable to the varied and rapidly changing disciplines in microbiology and immunology. Close research supervision and bi-weekly laboratory sessions impart the requisite research discipline and objective assessment of acquired or published research data.

A Ph.D. student, if promoted from our M.Sc. program, without submitting the thesis, is required to register for one additional graduate seminar and one additional reading and conference course, but the bulk of their time is devoted to research. Other requirements include a yearly presentation of the accumulated research data to the Ph.D. supervisory committee, successfully clearing the Ph.D. comprehensive examination, two years after registration into the Ph.D. program, and finally submission of a thesis. The research theme must be original, and the acquired data and hypothesis must be defended orally by the student. Each student receives a stipend for the entire duration and a minimum six-semester residency is required for the completion of the program.

12.2.6.3 Microbiology and Immunology Admission Requirements and Application Procedures

12.2.6.3.1 Admission Requirements

Master's

Candidates are required to hold a B.Sc. degree in microbiology and immunology, biology, biochemistry, or another related discipline; those with the M.D., D.D.S., or D.V.M. degrees are also eligible to apply. The minimum cumulative grade point average (CGPA) for acceptance into the program is 3.2 out of 4.0.

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 documented proof of competency in oral and written English. Before acceptance, appropriate exam results must be submitted directly from the *T*

- Personal Statement
- CV

12.2.6.3.3 Application Dates and Deadlines

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

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

Online applications and all required documents must be submitted prior to the application deadline.

12.2.6.4 Microbiology and Immunology Faculty

Chair

Samantha Gruenheid

Emeritus Professors

N. Acheson, M. Baines, J.W. Coulton

Professors

J. Archambault, A. Berghuis, S. Gruenheid, G.J. Matlashewski, M. Olivier, C. Piccirillo, D. Sheppard, M. Stevenson

Associate Professors

Email: *gradstudies.pharmacology@mcgill.ca*
Website: *mcgill.ca/pharma*

12.2.7.2 About Pharmacology and Therapeutics

The Department of Pharmacology and Therapeutics offers training leading to **M.Sc.** (Thesis) and **Ph.D.** degrees.

Pharmacology is a multidisciplinary science that deals with all aspects of drugs and their interactions with living organisms. Thus, pharmacologists study the physical and chemical properties of drugs, their biochemical and physiological effects, mechanisms of action, pharmacokinetics, and therapeutic and other uses. The Department offers broad exposure and training in both basic and clinical research in a range of areas of specialty, including:

- neuropharmacology;
- reproductive pharmacology;
- endocrine pharmacology;
- receptor pharmacology;
- cardiovascular pharmacology;
- cancer;
- developmental pharmacology;
- autonomic pharmacology;
- clinical pharmacology;
- biochemical pharmacology;
- molecular biology;
- toxicology.

The present 51 full and affiliate members of the Department have research laboratories located in the McIntyre Medical Sciences Building and in a variety of hospitals, institutes, and industry including the Douglas Hospital Research Centre, Allan Memorial Institute, Montreal Children's Hospital, Montreal General Hospital, Montreal Heart Institute, Lady Davis Research Institute, Pfizer Canada, and MUHC Research Institute. The participation of researchers from both industry and government ensures the relevance of the Department's applications-oriented training programs.

12.2.7.3 Pharmacology and Therapeutics Admission Requirements and Application Procedures

12.2.7.3.1 Admission Requirements

Candidates are required to hold a B.Sc. degree in a discipline relevant to the proposed field of study; those with the M.D., D.D.S., or D.V.M. degrees are also eligible to apply. A background in the health sciences is recommended, but programs in biology, chemistry, mathematics, and physical sciences may be acceptable.

Admission is based on a student's academic record, letters of assessment, and—whenever possible—interviews with staff members. Students are required to take the Graduate Record Examination Aptitude Test (*GRE*) and the Test of English as a Foreign Language (*TOEFL*) or the equivalent, except as follows: in accordance with McGill policy, only those whose mother tongue is English, who graduated from a recognized Canadian institution (anglophone or francophone), or who completed an undergraduate or graduate degree at a recognized foreign institution where English is the language of instruction are exempt from providing proof of competency in English.

Inquiries relating to all aspects of graduate study should be directed to the *Graduate Coordinator*, Department of Pharmacology and Therapeutics, as early as possible in each academic year.

12.2.7.3.2 Application Procedures

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

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

12.2.7.3.2.1 Additional Requirements

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

- Curriculum Vitae
- Personal Statement
- GRE – required for degrees from outside Canada and the United States

12.2.7.3.3 Application Dates and Deadlines

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

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

Please refer to our *website* for complete deadlines.

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

12.2.7.4 Pharmacology and Therapeutics Faculty

Chair

K. Mann

Graduate Program Director

T. Hébert

Emeritus Professors

R. Capek, H.H. Zingg, D. Maysinger

Professors

D. Bernard, D. Bowie, P.B.S. Clarke, A.C. Cuello, B.F. Hales, T. Hébert, A. McKinney, G. Multhaup, A. Ribeiro-da-Silva, B. Robaire, H. Saragovi, M. Szyf, J. Trasler

Associate Professors

B. Castagner, L. Münter, J. Tanny, J.F. Trempe

Assistant Professors

M. McKeague, A. Thanabalasuriar

Associate Members

C. Baglole, S. Laporte, N. Luedtke, , S. Nattel, C. O'Flaherty, S. Rousseau, E. Zorychta, M Basik, M. Pollak

Adjunct Professors

B. Allen, S. Chemtob, , G. FitzHarris, J. S. Joyal, F. Le Boeuf, T. Sanderson, L. Stone

Affiliate Members

M. Boucher, L. Breton, L. Garolalo, J. Gillard, J. Mancini, K. Meerovitch, C. Wright, T. Cohen

12.2.7.5 Master of Science (M.Sc.) Pharmacology (Thesis) (45 credits)

Complementary Courses (3 credits)

3 credits from the following:

PHAR 702	(3)	Topics in Pharmacology 1
PHAR 703	(3)	Topics in Pharmacology 2
PHAR 704	(3)	Topics in Pharmacology 3
PHAR 705	(3)	Topics in Pharmacology 4
PHAR 706	(3)	Topics in Pharmacology 5
PHAR 707	(3)	Topics in Pharmacology 6

or the equivalent, upon approval by the Graduate Training Committee (GTC.)

12.2.7.9 Graduate Certificate (Gr. Cert.) Biomedical Science Translational Research (15 credits)

The Graduate Certificate in Biomedical Science Translational Research is an introduction to relevant clinical aspects of translating scientific discovery as a means of bridging the gap between research and application in clinical settings, while promoting future collaboration among scientists, clinicians and clinician-scientists while promoting future collaboration. The program includes clinical mentorship.

Required Courses (12 credits)

FMED 525	(3)	Foundations of Translational Science
PHAR 522D1	(3)	Fundamentals of Disease Therapy
PHAR 522D2	(3)	Fundamentals of Disease Therapy
PHAR 524	(3)	Clinical Mentorship

Complementary Courses (3 credits)

3 credits from:

BMDE 655	(3)	Biomedical Clinical Trials - Medical Devices
EPIB 507	(3)	Biostats for Health Sciences
EXMD 617	(1)	Workshop in Clinical Trials 1
EXMD 618	(1)	Workshop in Clinical Trials 2
EXMD 619	(1)	Workshop in Clinical Trials 3
EXMD 620	(1)	Clinical Trials and Research 1
EXMD 633	(3)	Clinical Aspects of Research in Respiratory Diseases
EXMD 640	(3)	Experimental Medicine Topic 1
PHAR 508	(3)	Drug Discovery and Development 3
PPHS 529	(3)	Global Environmental Health and Burden of Disease

12.2.8 Physiology

12.2.8.1 Location

Department of Physiology
McIntyre Medical Sciences Building
3655 Promenade Sir-William-Osler
Montreal QC H3G 1Y6 Canada
Telephone: 514-398-4343
Website: *mcgill.ca/physiology*

12.2.8.2 About Physiology

The Physiology Department offers training leading to **M.Sc.** and **Ph.D.** degrees. The scope of the ongoing research, and close connections with the McGill teaching hospitals, offer excellent opportunities for collaborations with hospital-based scientists. Research in the Department covers a broad range of topics from systems neuroscience to molecular and cellular biology. Interests include studies of nuclear and membrane receptors, transporters, channels, and signal transduction pathways, to the broader integration of physiological systems (cardiovascular, respiratory, renal, endocrine, immune, and central nervous systems) using an array of molecular and cellular approaches as well as quantitative techniques in data collection, analysis, and mathematical modelling by computational means.

All graduate students in Physiology receive financial support. Any faculty or associate member who agrees to supervise a graduate student who does not hold a fellowship is financially responsible for that student. Students are encouraged to apply for a fellowship; further information is available at *mcgill.ca/physiology/graduate-studies/financial-other-assistance*.

section 12.2.8.5: Master of Science (M.Sc.) Physiology (Thesis) (45 credits)

The M.Sc. program is intended for students from an academic background wishing to pursue careers in academia, industry, or medicine. The multidisciplinary nature of the Department exposes students to a vast array of research interests and experimental approaches. Thesis work is available in a broad range of disciplines from molecular and cellular to systems physiology covering multiple organ systems. Students wishing to continue to the doctoral program have the option of transferring to the Ph.D., and waiving the M.Sc. thesis submission.

section 12.2.8.6: Master of Science (M.Sc.) Physiology (Thesis): Bioinformatics (45 credits)

This program is currently not offered.

The intention of the Bioinformatics option is to train M.Sc. 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 of bioinformatics data, the integration of biological databases, and the use of algorithms and statistics. Students successfully completing the Bioinformatics option will be fluent in the concepts, language, approaches, and limitations of the field. The option consists of a number of interdisciplinary courses and a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field.

section 12.2.8.7: Master of Science (M.Sc.) Physiology (Thesis): Chemical Biology (45 credits)

This program is currently not offered.

The Chemical Biology option is designed to expose students to aspects of drug design and development, as well as their application to the study of physiological and pathophysiological processes. In addition to thesis work with appropriate mentors, students will participate in lectures, seminar courses, and thematic workshops, all of which are designed to familiarize students with the current state of the field. This interdisciplinary approach will develop researchers interested in academic careers or in the pharmaceutical and biotechnology industries.

section 12.2.8.8: Doctor of Philosophy (Ph.D.) Physiology

The doctoral program is intended for students from a strong academic background wishing to pursue research-intensive careers in academia, industry, or medicine. The multidisciplinary nature of the Department exposes students to a vast array of research interests and experimental approaches. Thesis work provides in-depth training in a broad range of disciplines from molecular and cellular to systems physiology covering multiple organ systems.

section 12.2.8.9: Doctor of Philosophy (Ph.D.) Physiology: Bioinformatics

This program is currently not offered.

The intention of the Bioinformatics option is to train Ph.D. 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 of bioinformatics data, the integration of biological databases, and the use of algorithms and statistics. Students successfully completing the Bioinformatics option will be fluent in concepts, language, approaches, and limitations of the field. The option consists of a number of interdisciplinary courses and a seminar designed to bring students from many backgrounds together and to provide a thorough overview of research in this field.

section 12.2.8.10: Doctor of Philosophy (Ph.D.) Physiology: Chemical Biology

This program is currently not offered.

The Chemical Biology option is designed to expose students to aspects of drug design and development, as well as their application to the study of physiological and pathophysiological processes. In addition to thesis work with appropriate mentors, students will participate in lectures, seminar courses, and thematic workshops—all of which are designed to familiarize students with the current state of the field. This interdisciplinary approach will develop researchers interested in academic careers or in the pharmaceutical and biotechnology industries.

12.2.8.3 Physiology Admission Requirements and Application Procedures

12.2.8.3.1 Admission Requirements

Admission to the graduate program is based on an evaluation by the Graduate Student Admissions and Advisory Committee (GSAAC), and on being accepted by a research supervisor. Final acceptance is contingent upon approval of the recommendation of the applicant by Enrolment Services, from whom official notification will be received.

Candidates for the M.Sc. degree must hold a B.Sc. degree or its equivalent. Candidates who have completed an M.Sc. may be admitted directly to the Ph.D. program. M.Sc. students interested in a Ph.D. may fast track to the Ph.D. program after 12–18 months. The M.Sc. thesis requirement is then waived. Candidates with exceptional academic records may be considered to proceed directly to the Ph.D. degree from the B.Sc. degree.

A minimum CGPA of 3.2 out of 4.0 or a GPA of 3.4 in the last two years is required for an application to be considered.

The *GRE* General Test is no longer required.

Language Requirements

Test of English as a Foreign Language (*TOEFL*): minimum score of 86 on the Internet-based test with each component score not less than 20 OR IELTS (International English Language Testing System) with an overall band of 6.5 or greater. Only those whose mother tongue is English, who graduated from a North American institution (anglophone or francophone) or who completed an undergraduate or graduate de

Professors

Maurice Chacron, Monroe W. Cohen, Ellis J. Cooper, Phil Gold, John Hanrahan, David Goltzman, Steve Lomber, Gergely Lukacs, Sheldon Magder, John Orlowski, Alvin Shrier, John White

Associate Professors

Claire Brown, Gil Bub, Erik Cook, Mladen Glavinovic, Michael Guevara, Suresh Krishna, Anmar Khadra, Reza Sharif-Naeini, Ursula Stochaj

Associate Professor (Part-Time)

Nicole Bernard

Assistant Professors

Pouya Bashivan, Arjun Krishnaswamy, Judith Mandl, Anastasia Nijnik, Masha Prager-Khoutorsky, Daniela Quail, Melissa Vollrath

Associate Members

Anaesthesia: Steven Backman

Biomedical Engineering: Satya Prakash

Mathematics: Anthony Humphries

Medicine: Volker Blank, Mark Blostein, Andrey Cybulsky, Anne-Marie Lauzon, James Martin, Shafaat Rabbani, Simon Rousseau, Benjamin M. Smith, Mary Stevenson, Tomoko Takano, Elena Torban, Simon Wing

Microbiology and Immunology: Jörg Fritz

Neurology and Neurosurgery: Jack Antel, Daniel Guitton, Christopher Pack, Ed Ruthazer, Amir Shmuel, Jesper Sjöström, Jo Anne Stratton

Ophthalmology: Curtis Baker

Pharmacology and Therapeutics: Daniel Bernard, Derek Bowie, Terence Hebert

Psychiatry: Nicolas Cermakian

Research in Neuroscience: Charles Bourque

Adjunct Professors

M. Craig, K. Cullen, P. Haghighi, J. Martinez-Trujillo

Faculty Lecturer

Céline Aguer

12.2.8.5 Master of Science (M.Sc.) Physiology (Thesis) (45 credits)

Thesis Courses (27 credits)

PHGY 621	(12)	Thesis 1
PHGY 622	(12)	Thesis 2
PHGY 623	(3)	M.Sc. Final Seminar

Required Courses (12 credits)

PHGY 601	(1)	M.Sc. Proposal Seminar
PHGY 602	(2)	Literature Search and Research Proposal
PHGY 604	(0)	Responsible Conduct in Research
PHGY 607	(3)	Laboratory Research 1
PHGY 608	(3)	Laboratory Research 2
PHGY 620	(3)	Progress in Research

Elective Courses (6 credits)

Students must select 6 approved credits in Physiology or Science at the 500 level or above.

12.2.8.6 Master of Science (M.Sc.) Physiology (Thesis): Bioinformatics (45 credits)

** This program is currently not offered. **

Thesis Courses (27 credits)

PHGY 621	(12)	Thesis 1
PHGY 622	(12)	Thesis 2
PHGY 623	(3)	M.Sc. Final Seminar

Required Courses (12 credits)

COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar
PHGY 601	(1)	M.Sc. Proposal Seminar
PHGY 602	(2)	Literature Search and Research Proposal

PHGY 608	(3)	Laboratory Research 2
PHGY 620	(3)	Progress in Research

Complementary Courses (6 credits)

3 credits from the following Chemical Biology seminars:

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

3 credits from the following:

CHEM 502	(3)	Advanced Bio-Organic Chemistry
CHEM 503	(3)	Drug Discovery
PHAR 503	(3)	Drug Discovery and Development 1

12.2.8.8 Doctor of Philosophy (Ph.D.) Physiology

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

Required Courses (11 credits)

COMP 616D1	(1.5)	Bioinformatics Seminar
COMP 616D2	(1.5)	Bioinformatics Seminar
PHGY 604	(0)	Responsible Conduct in Research
PHGY 701	(0)	Ph.D. Comprehensive Examination
PHGY 703	(1)	Ph.D. Progress Seminar 1
PHGY 704	(1)	Ph.D. Progress Seminar 2
PHGY 720	(1)	Ph.D. Seminar Course 1
PHGY 721	(1)	Ph.D. Seminar Course 2
PHGY 722	(1)	Ph.D. Seminar Course 3
PHGY 723	(1)	Ph.D. Seminar Course 4
PHGY 724	(1)	Ph.D. Seminar Course 5
PHGY 725	(1)	Ph.D. Seminar Course 6

Complementary Courses (6 credits)

6 credits to be chosen from the following courses:

BINF 621	(3)	Bioinformatics: Molecular Biology
BMDE 652	(3)	Bioinformatics: Proteomics
BTEC 555	(3)	Structural Bioinformatics
COMP 618	(3)	Bioinformatics: Functional Genomics

12.2.8.10 Doctor of Philosophy (Ph.D.) Physiology: Chemical Biology

** This program is currently not offered. **

The Graduate Option in Chemical Biology is centered on the pursuit of an original research project under the direction of one or more program mentors.

PHGY 722	(1)	Ph.D. Seminar Course 3
PHGY 723	(1)	Ph.D. Seminar Course 4
PHGY 724	(1)	Ph.D. Seminar Course 5

Complementary Courses (6 credits)

6 credits from the following:

CHEM 502	(3)	Advanced Bio-Organic Chemistry
CHEM 503	(3)	Drug Discovery
PHAR 503	(3)	Drug Discovery and Development 1

12.3 Communication Sciences and Disorders

12.3.1 Location

School of Communication Sciences and Disorders
2001 McGill College Avenue, Suite 800
Montreal QC H3A 1G1
Canada
Telephone: 514-398-4137
Fax: 514-398-8123
Email: *scsd@mcgill.ca*
Website: *mcgill.ca/scsd*

12.3.2 About Communication Sciences and Disorders

The School provides both professional and research training in communication sciences and disorders at the graduate level through its **M.Sc. (Applied)**, **M.Sc.**, and **Ph.D.** degrees. We were the first department in Canada to provide both clinical and research degrees. Our M.Sc.A. program aims to educate the next generation of well-prepared and innovative speech-language pathology professionals by providing enriched classroom training, clinical laboratory activities that enhance the transition from theory to practice, and outstanding clinical practicum experiences. Our research degrees are designed to develop leading researchers and scholars, who will go on to train future investigators in the field of communication sciences and disorders and who, through their research, will advance our understanding of the processes of human communication and its breakdown.

Our applied and research degrees may lead to employment in healthcare or educational facilities, academic settings, or private industry.

Interdisciplinary interactions are at the core of our research training approach, which includes preparation to conduct both fundamental and clinically applied investigations. Our professors have collaborative ties with many departments and institutes at McGill, including:

- psychology
- linguistics
- neuroscience
- otolaryngology
- biomedical engineering
- Montreal Neurological Institute and Hospital
- other Montreal universities

They also maintain national and international collaborations. Students can access this rich collaborative network via the *McGill Centre for Research on Brain, Language and Music*, a world-class interdisciplinary research centre established by the School. The multilingual context in which we reside provides a unique environment for language research.

The School offers:

- a professional degree in Communication Sciences and Disorders at the M.Sc. (Applied) level with specialization in Speech Language Pathology
- two research degrees: an M.Sc. (Research) and a Ph.D. in Communication Sciences and Disorders

Requirements for Licensure

The majority of provinces in Canada and certain states in the U.S. require that those intending to practise as speech-language pathologists within their borders comply with special provincial or state licensing regulations. Graduates wishing to practise in the province of Quebec must be members of the *Ordre des*

Orthophonistes et Audiologistes du Québec (OOAQ) in order to call themselves speech-language pathologists. Further information is available from the OOAQ at:

630 Sherbrooke St. W., bureau 800

- Brief personal statement
- Curriculum Vitae
- Two reference letters (one professional and one academic)

M.Sc. (Thesis) and Ph.D.

- Personal statement
-

12.3.5 Master of Science (M.Sc.) Communication Sciences and Disorders (Thesis) (45 credits)

Thesis Courses (24 credits)

SCSD 671	(12)	M.Sc. Thesis 1
SCSD 672	(12)	M.Sc. Thesis 2

Complementary Courses (21 credits)

6-21 credits chosen from:

SCSD 675	(12)	Special Topics 1
SCSD 676	(9)	Special Topics 2
SCSD 677	(6)	Special Topics 3
SCSD 678	(3)	Special Topics 4

0-15 credits chosen from:

SCSD 673	(12)	M.Sc. Thesis 3
SCSD 674	(3)	M.Sc. Thesis 4

or courses in other departments, as arranged with the student's thesis supervisor.

Master of Science,

12.3.8 Doctor of Philosophy (Ph.D.) Communication Sciences and Disorders: 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.

For details go to: www.psych.mcgill.ca/lap.html.

Students who have completed a Master's degree with research thesis in Communication Sciences and Disorders or a related area are admitted at level PhD 2. High-caliber students who have not completed a research thesis at the Master's level can enter the Qualifying Year Program (admitted at level PhD 1), which includes extra requirements (coursework and a research project) at the onset of the program.

Thesis

A thesis for the doctoral de

12.4.2.3.3 Application Dates and Deadlines

Deadlines coincide with those of the chosen base discipline. 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*.

Note: Applications for W

- chronic diseases;
- reproductive and perinatal epidemiology;
- genetic epidemiology;
- global health;
- causal inference; and
- many cross-disciplinary activities.

Associate Members

Psychiatry: S.N. Iyer, E. Latimer, A. Malla, X. Meng, J. Shah, B. Thombs

Sociology: S. Clark

Surgery: A. Andalib, D. Deckelbaum, S. Dumitra, F-H. (L) Lee, A. N. Merguerditchian

Lecturers

J.P. Courteau, C. Fuller, M. Kafka, C. K

- reproductive and perinatal epidemiology;
- genetic epidemiology;
- global health;
- causal inference; and
- many cross-disciplinary activities.

Faculty members may have funding available for students through their research grants. We provide rich research environments at five university-affiliated hospitals, public health agencies, and university research centres. Graduates pursue careers in academia, clinical settings, government agencies, NGOs, and industry.

section 12.4.3.4.3: Master of Science (M.Sc.) Epidemiology (Thesis) (45 credits)

Applicants to the M.Sc. program should preferably hold a bachelor's degree in the natural sciences (e.g., chemistry, microbiology, human genetics), quantitative sciences (e.g., computer science, statistics), or social sciences (e.g., sociology, psychology, economics, geography), or hold a degree in one of the health professional sciences (e.g., medicine, nursing, social work, nutrition). Applicants must have an interest in health research, along with strong conceptual, analytic, and quantitative skills (e.g., differential and integral calculus, statistics) at the undergraduate level.

The program leading to a master's degree is designed to provide training in both theory and practice in the selected discipline. Courses require intellectual and academic rigour, and the program provides students with an opportunity to synthesize the training in the form of a thesis. Students will study the foundations and principles of epidemiology and applied biostatistics, in order to design, conduct, and analyze clinical, population-based, environmental, pharmaco-epidemiological, policy, and methodological health-related research. Graduates of the program often go on to do doctoral work or become research associates in public, private, and academic settings. McGill graduates are kno

timeline. Over and above the core Ph.D. training, students in the Global Health Option will undertake global health-dedicated coursework and their thesis will be of relevance to global health. This additional global health training will provide students with insight into the major global health challenges of today's world. This area of study, research, and practice prioritizes improving health and achieving equity in health for all people worldwide. McGill and its affiliated hospitals have close to 200 researchers involved in global health w

Complete details on the Epidemiology programs are a

Required Courses (36 Credits)

Students exempted from any of the courses listed below must replace them with additional complementary course credits.

EPIB 601	(4)	Fundamentals of Epidemiology
EPIB 603	(4)	Intermediate Epidemiology
EPIB 605	(1)	Critical Appraisal in Epidemiology
EPIB 607	(4)	Inferential Statistics
EPIB 613	(1)	Introduction to Statistical Software
EPIB 621	(4)	Data Analysis in Health Sciences
		FEPIB 621

Stream 1: Epidemiology

9 credits from:

EPIB 628	(3)	Measurement in Epidemiology
EPIB 629	(3)	Knowledge Synthesis
EPIB 637	(3)	Advanced Modeling: Survival and Other Multivariable Data
EPIB 638	(3)	Mathematical Modeling of Infectious Diseases
EPIB 648	(3)	Methods in Social Epidemiology

Stream 2: Global Health

3 credits in:

PPHS 613	(3)	The Practice of Global Health

6 credits from:

EPIB 681	(3)	Global Health: Epidemiological Research
PPHS 511	(3)	Fundamentals of Global Health
PPHS 525	(3)	Health Care Systems in Comparative Perspective
PPHS 529	(3)	Global Environmental Health and Burden of Disease
PPHS 614	(3)	Knowledge Translation and Public Health Leadership
PPHS 615	(3)	Introduction to Infectious Disease Epidemiology
PPHS 618	(3)	Program Planning and Evaluation in Public Health

Stream 3: Population Dynj1 0 0 1 165.864 557.88u/F0o949 638.819.14 0 0 Iedits from:PP3redits in:942 editin Social Epidemiology942 edit1 0

6 credits from:

PPHS 527	(3)	Economics for Health Services Research and Policy
PPHS 528	(3)	Economic Evaluation of Health Programs
PPHS 614	(3)	Knowledge Translation and Public Health Leadership

Stream 5: Infectious Disease

3 credits in:

PPHS 615	(3)	Introduction to Infectious Disease Epidemiology

6 credits from:

EPIB 638	(3)	Mathematical Modeling of Infectious Diseases
PPHS 527	(3)	Economics for Health Services Research and Policy
PPHS 528	(3)	Economic Evaluation of Health Programs
PPHS 615	(3)	Introduction to Infectious Disease Epidemiology
PPHS 618	(3)	Program Planning and Evaluation in Public Health
PPHS 624	(3)	Public Health Ethics and Policy

Stream 6: Environmental Health

9 credits from:

EPIB 684	(3)	Principles of Environmental Health Sciences 1
EPIB 685	(3)	Principles of Environmental Health Sciences 2
PPHS 529	(3)	Global Environmental Health and Burden of Disease

Or other courses, at the 500-level or higher, selected with the Academic Adviser.

Elective Courses (6-15 Credits)

6-15 credits of coursework, at the 500 level or higher. Students may choose to focus on more advanced methods in epidemiology, biostatistics, geography, or substantive areas such as environmental or occupational health, or to select a variety of courses that will deepen their general knowledge of the disciplines that influence population and public health.

Courses will be selected with and approved by the Program's Academic Adviser.

12.4.3.4.7 Doctor of Philosophy (Ph.D.) Epidemiology

Epidemiology is the study and analysis of the patterns and causes of disease in human populations. It forms the core discipline of public health by identifying excess illness and by gaining the etiologic understanding to intervene toward the improvement of population health. The PhD program in epidemiology at McGill trains scientists and health professionals to design and conduct studies, analyze health data and effectively communicate scientific results, and to gain novel insights into the causes and prevention of diseases at the population level. Epidemiologic work at the doctoral level involves a thorough integration of biological knowledge of pathogenesis, statistical knowledge of quantitative analysis and causal inference, and sociological knowledge to place these insights in the context of dynamic and interconnected human populations. Major areas of strength at McGill include epidemiologic methods, clinical epidemiology, infectious diseases, social epidemiology, pharmacoepidemiology, public and population health, global health, environmental epidemiology, chronic diseases and aging, and perinatal epidemiology.

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 (16 credits)

EPIB 701	(0)	Ph.D. Comprehensive Examination

EPIB 702	(0)	Ph.D. Proposal
EPIB 703	(2)	Principles of Study Design
EPIB 704	(4)	Doctoral Level Epidemiologic Methods 1
EPIB 705	(4)	Doctoral Level Epidemiologic Methods 2
EPIB 706	(3)	Doctoral Seminar in Epidemiology
EPIB 707	(3)	Research Design in Health Sciences

Complementary Courses (9 credits)

9 credits of coursework, at the 500 level or higher, with a minimum of 3 credits in biostatistics and 6 credits in epidemiology and/or substantive topic (normally related to the thesis topic). Courses must be chosen in consultation with the student's supervisor and/or the degree program's director or adviser.

12.4.3.4.8 Doctor of Philosophy (Ph.D.) Epidemiology: Global Health

This option will provide enhanced training in global health to graduate students registered in the Ph.D. in Epidemiology; Global Health degree program at McGill. Students will become familiar with topics of global health relevance and incorporate this into their core coursework and thesis research. The thesis must be relevant to global health and approved by the Global Health Coordinating Committee. Contextualizing the core training students receive in epidemiology and in their respective substantive discipline within the global health research domain will enhance their academic experience. Graduates of this option will be prepared to pursue further training in global health or to undertake a variety of career opportunities in global health in Canada or internationally.

Required Courses (22 credits)

EPIB 681	(3)	Global Health: Epidemiological Research
EPIB 701	(0)	Ph.D. Comprehensive Examination
EPIB 702	(0)	Ph.D. Proposal
EPIB 703	(2)	Principles of Study Design
EPIB 704	(4)	Doctoral Level Epidemiologic Methods 1
EPIB 705	(4)	Doctoral Level Epidemiologic Methods 2
EPIB 706	(3)	Doctoral Seminar in Epidemiology
EPIB 707	(3)	Research Design in Health Sciences
PPHS 511	(3)	Fundamentals of Global Health

Complementary Courses (9 credits)

6 credits of coursework at the 500 level or higher, with a minimum of 3 credits in biostatistics, and 3 credits in epidemiology. Courses must be chosen in consultation with the student's supervisor and/or the degree program's director or adviser.

3 credits of coursework at the 500 level or higher from this list, or any other course approved by the Global Health Option Committee that have not been taken to satisfy other program requirements.

GEOG 503	(3)	Advanced Topics in Health Geography
NUTR 501	(3)	Nutrition in Developing Countries
PPHS 525	(3)	Health Care Systems in Comparative Perspective
PPHS 527	(3)	Economics for Health Services Research and Policy
PPHS 529	(3)	Global Environmental Health and Burden of Disease
SOCI 513	(3)	Social Aspects HIV/AIDS in Africa
SOCI 519	(3)	Gender and Globalization
SOCI 545	(3)	Sociology of Population

12.4.3.4.9 Doctor of Philosophy (Ph.D.) Epidemiology: Pharmacoepidemiology

This program provides in-depth training for graduate students on pharmacoepidemiologic methods and the application of these methods to study the population effects (benefits and harm) of pharmaceutical products. Students will acquire the skills to become independent investigators and conduct original research in pharmacoepidemiology. Career opportunities for graduates are multiple and include work in industry, government, or academia. Students will be required

to participate in the Pharmacoepidemiology Journal Club. Research topics must be related to pharmacoepidemiology and approved by the program coordinating committee.

ECON 634	(3)	Economic Development 3
ECON 641	(3)	Labour Economics
ECON 734	(3)	Economic Development 4
ECON 741	(3)	Advanced Labour Economics
ECON 742	(3)	Empirical Microeconomics
ECON 744	(3)	Health Economics
EPIB 648	(3)	Methods in Social Epidemiology
EPIB 681	(3)	Global Health: Epidemiological Research
PPHS 525	(3)	Health Care Systems in Comparative Perspective
PPHS 528	(3)	Economic Evaluation of Health Programs
PPHS 529	(3)	Global Environmental Health and Burden of Disease
PPHS 615	(3)	Introduction to Infectious Disease Epidemiology
SOCI 502	(3)	Sociology of Fertility
SOCI 512	(3)	Ethnicity and Public Policy
SOCI 513	(3)	Social Aspects HIV/AIDS in Africa
SOCI 520	(3)	Migration and Immigrant Groups
SOCI 525	(3)	Health Care Systems in Comparative Perspective
SOCI 535	(3)	Sociology of the Family
SOCI 588	(3)	Biosociology/Biodemography

Courses must be chosen in consultation with the student's supervisor and/or the degree program's director or adviser.

12.4.3.5 Biostatistics

Biostatistics involves the development and application of statistical methods to scientific research in areas such as medicine, epidemiology, public health, occupational and environmental health, genetics, and ecology. Biostatisticians play key roles in designing studies—from helping to formulate the questions that can be answered by data collection to the decisions on how best to collect the data—and in analyzing the resulting data. Our biostatistics faculty work in close collaboration with epidemiologists, clinicians, public health specialists, basic scientists, and other health researchers. They also develop new statistical methods for such data. Students will take courses, and may conduct research on topics such as:

- generalized linear models;
- longitudinal data;
- mathematical statistics;
- causal inference;
- statistical methods for epidemiology; and
- survival analysis.

The Department of Epidemiology, Biostatistics, and Occupational Health has one of the largest concentrations of Ph.D.-level statisticians in health sciences in any Canadian university. Faculty members may have funding available for students through their research grants. We provide rich research environments at five university-affiliated hospitals, public health agencies, and university research centres. Graduates pursue careers in academia, clinical settings, government agencies, NGOs, and industry.

section 12.4.3.5.2

section 12.4.3.5.4: Doctor of Philosophy (Ph.D.) Biostatistics

Applicants should hold a master’s degree in statistics or biostatistics. Previous coursework in calculus, linear algebra, real analysis, and mathematical statistics is essential. Exposure to data analysis is an asset. Ph.D. students typically work on development of statistical methods, and can specialize in statistical methods for epidemiology, generalized linear models, Bayesian methods, survival analysis, longitudinal data, causal inference, or other topics. Skills in data analysis, statistical consulting, and report writing are emphasized. Ph.D. graduates typically work as faculty in univ

12.4.3.5.3 Master of Science (M.Sc.) Biostatistics (Non-Thesis) (48 credits)

Training in statistical theory and methods, applied data analysis, scientific collaboration, communication, and report writing by coursework and project.

Research Project (6 credits)

BIOS 630	(6)	Research Project/Practicum in Biostatistics

Required Courses (24 credits)

Students exempted from any of the courses listed below must replace them with additional complementary course credits.

BIOS 601	(4)	Epidemiology: Introduction and Statistical Models
BIOS 602	(4)	Epidemiology: Regression Models
MATH 523	(4)	Generalized Linear Models
MATH 533	(4)	Regression and Analysis of Variance
MATH 556	(4)	Mathematical Statistics 1
MATH 557	(4)	Mathematical Statistics 2

Complementary Courses (18 credits)

18 credits of coursework, at the 500 level or higher, chosen in consultation with the student's academic adviser or supervisor.

12.4.3.5.4 Doctor of Philosophy (Ph.D.) Biostatistics

Students will study theoretical and applied statistics and related fields; the program will train them to become independent scientists able to develop and apply statistical methods in medicine and biology and make original contributions to the theoretical and scientific foundations of statistics in these disciplines. Graduates will be prepared to develop new statistical methods as needed and apply new and existing methods in a range of collaborative projects. Graduates will be able to communicate methods and results to collaborators and other audiences, and teach biostatistics to biostatistics students, students in related fields, and professionals in academic and other settings.

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 kno

6 credits (chosen and approved in consultation with the student's academic adviser), at the 500 level or higher, in related fields (e.g., epidemiology, social sciences, biomedical sciences).

12.4.4 Occupational Health

12.4.4.1 Location

Department of Epidemiology, Biostatistics and Occupational Health
2001 McGill College, Suite 1200
Montreal QC H3A 1G1
Canada
Telephone: 514-398-6258
Email: *graduate.eboh@mcgill.ca*
Website: *mcgill.ca/epi-biostat-occh*

12.4.4.2 About Occupational Health

The Department offers two graduate degree programs: a **Master's** (M.Sc.A.) and **Doctorate** (Ph.D.) in Occupational Health sciences. The master's program is available on campus or in distance education format. Special Student status is encouraged for students who wish to take only specific courses from our

12.4.4.3.2 Application Procedures

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

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

Applications are considered for Fall term only. Applications for Winter/Summer term admission will not be considered, see *mcgill.ca/epi-biostat-occh/education/grad/occh/admission-application-0*