



**Faculty of Engineering, including Peter Guo-hua  
Fu School of Architecture and School of Urban  
Planning (Graduate)  
Programs, Courses and University Regulations  
2023-2024**



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

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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

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## 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.

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## 5 Program Requirements

Refer to [University Regulations & Resources](#) > *Gr* 

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- i. Postdocs are subject to the responsibilities outlined at [mcgill.ca/students/srr](http://mcgill.ca/students/srr) and must abide by the policies listed at [mcgill.ca/secretariat/policies-and-regulations](http://mcgill.ca/secretariat/policies-and-regulations).
- ii. Each academic unit hosting postdocs should clearly identify postdocs' needs and the means by which they will be met by the unit.
- iii. Each academic unit should assess the availability of research supervision facilities, office space, and research funding before recruiting postdocs.
- iv. Some examples of the responsibilities of the academic unit are:
  - to verify the postdoc's eligibility period for registration;
  - to provide postdocs with departmental policy and procedures that pertain to them;
  - to facilitate the registration and appointment of postdocs;
  - to assign departmental personnel the responsibility for postdoctoral affairs in the unit;
  - to oversee and sign off on the Letter of Agreement for Postdoctoral Education;
  - to ensure that each postdoc has a supervisor, lab and/or office space, access to research operating costs and necessary equipment;
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## 8.5 Postdoctoral Research Trainees

### Eligibility

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

The category of Postdoctoral Research Trainee is for:

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

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

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

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



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

### General Conditions

- The maximum duration is three years.
- The individual must be engaged in full-time research.
- The individual must provide copies of official transcripts/diplomas.
- The individual must have the approval of a McGill professor to supervise the research and of the Unit.
- The individual must have adequate proficiency in English, but is not required to provide official proof of English competency to Enrolment Services.
- The individual must comply with regulations and procedures governing research ethics and safety and obtain the necessary training.
- The individual will be provided access to McGill libraries, email, and required training in research ethics and safety. Any other University services must

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

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

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

The **Ph.D. program** is for study beyond the professional degree in architecture. The program has been conceived to respond to the needs of graduates with some professional experience who wish to acquire more specialized knowledge in architecture. Information concerning the Ph.D. program—the duration of all programs offered, documents required of applicants, etc.—may be obtained at [mcgill.ca/architecture](http://mcgill.ca/architecture).

#### **Architectural Certification in Canada**

In Canada, all provincial associations recommend a degree from an accredited professional degree program as a prerequisite for licensure. The **CACB**, which is the sole agency authorized to accredit Canadian professional degree programs in architecture, recognizes two types of accredited degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a six-year, three-year, or two-year term of accreditation, depending on its de



**Note:** Your employer's signature is required along with the company business card. We do **not** require the Director's signature.

- Curriculum Vitae
- Applicants are required to upload unofficial transcripts from all universities previously attended (including summer term, exchange term, or study-away term). If you are recommended for admission, you will later be required to supply official transcripts. Transcripts in languages other than English or French must be accompanied by an English or French translation provided by the institution issuing the transcript or by a certified translator. Please refer to [mcgill.ca/gradapplicants/apply/prepare/checklist/documents](http://mcgill.ca/gradapplicants/apply/prepare/checklist/documents).
- A total of two (2) confidential letters of reference are required for your application: two (2) from academics **or** one (1) from an academic and one (1) from a recent employer. Once you have identified your referees (you must provide a valid institutional email address for each referee), McGill will send them an email asking for a reference in support of your application. Additionally, uploaded letters must be on university or company/business stationery and the referee must indicate their position and full contact information at the institution. Please refer to [mcgill.ca/gradapplicants/apply/prepare/checklist/documents](http://mcgill.ca/gradapplicants/apply/prepare/checklist/documents).
- Once accepted to the M.Arch. Professional program, students will benefit from faculty expertise within the School in the areas of History and Theory of Architecture; Cultural Landscape Studies; Affordable and Sustainable Housing; Computation and Fabrication; High-performance Visualization; Minimum Cost Housing; Gender, Sexuality, and Space; Design and Health; Urban Design; Landscape Urbanism; Architectural Representation; Urban Agriculture; Vernacular Architecture; Reurbanization.
- Completed Program Comparison Chart (newly updated excel file at number 7 on the school's application procedures webpage) [mcgill.ca/architecture/programs/professional/prospective-students/application-procedures](http://mcgill.ca/architecture/programs/professional/prospective-students/application-procedures).



**Note:** Not required by graduates from McGill University B.Sc.(Arch.), Université de Montréal B.Sc.(Arch), Université Laval (B.Sc.Arch.), Toronto Metropolitan University (B.Arch.Sc.), Laurentian University (B.A.S. – Bachelor of Arch. Studies), University of Waterloo (B.Arch.Studies.), University of Manitoba (B.Env.Design), Carleton University (Bachelor of Arch. Studies - Design).

- Course calendar descriptions of previous college and/or university studies must be submitted in addition to the Program Comparison Chart.



**Note:** Not required by B.Sc.(Arch.) graduates from McGill University.

- A comprehensive e-portfolio (.pdf format, max. 15 MB, due no later than December 15) that may include the following: selected work from previous design studios; examples of project work from other courses; examples of freehand drawing and sketching; examples of professional work: sketches, drawings, images of models, photographs of built work (professional work includes work carried out while employed in architects' offices, as well as personal projects; please identify the architect(s) and your own roles in each project illustrated).



**Note:** Please indicate, where applicable, if a project is an individual or group project.

#### Ph.D.

- Curriculum Vitae
- Applicants are required to upload unofficial transcripts from all universities previously attended. If you are recommended for admission you will later be required to supply official transcripts. Transcripts in languages other than English or French must be accompanied by an English or French translation provided by the institution issuing the transcript or by a certified translator. Please refer to [mcgill.ca/gradapplicants/apply/prepare/checklist/documents](http://mcgill.ca/gradapplicants/apply/prepare/checklist/documents).
- Two confidential letters of reference are required for your application. Once you have identified your referees (you must provide a valid institutional email address for each referee), McGill will send them an email asking for a reference in support of your application. Additionally, uploaded letters must be on university or company/business stationery and the referee must indicate their position and full contact information at the institution. Please refer to [mcgill.ca/gradapplicants/apply/prepare/checklist/documents](http://mcgill.ca/gradapplicants/apply/prepare/checklist/documents).
- Research proposal: a four-page research proposal, as well as a detailed explanation of why and with whom they wish to study at McGill University's Peter Guo-hua Fu School of Architecture.
- Written work: a sample of the applicant's written work, drawn from essays, papers, or other work previously submitted for academic evaluation or publication, and falling within the desired field of graduate study.
- Proof of English language proficiency: 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 [TOEFL 188.756 Tm\(submitted directly from the \)Tj0 0 1 rg0 n0 18m\(e693 67.52 237.273 oreio1 0 0 1 174.14.icants56cously attended](http://TOEFL188.756.Tm(submitted%20directly%20from%20the%20)Tj0%200%201%20rg0%20n0%2018m(e693%2067.52%20237.273%20oreio1%200%201%20174.14.icants56cously%20attended).



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

#### **12.1.4 Architecture Faculty**

##### **Director**

David Theodore

##### **Undergraduate Program Director**

Naomi Keena

##### **Graduate Program Director**

Theodora Vardouli

##### **Emeritus Professors**

Bruce Anderson, Vikram Bhatt, Derek Drummond, Alberto Pérez-Gómez, Adrian Sheppard, Radoslav Zuk

##### **Associate Professor (Post-Retirement)**

Ricardo L. Castro

**Complementary Cour**



#### Associate Professors

Allen Ehrlicher; Adam Hendricks; J. Matt Kinsella; Georgios Mitsis

#### Assistant Professors

Codruta Ignea; Sara Mahshid; Natalie Reznikov; Caroline Wagner

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## 12.3 Chemical Engineering

### 12.3.1 Location

Department of Chemical Engineering  
M.H. Wong Building  
3610 University Street  
Montreal QC H3A 0C5  
Canada  
Telephone: 514-398-4494  
Fax: 514-398-6678  
Email: [gradcoordinator.chemeng@mcgill.ca](mailto:gradcoordinator.chemeng@mcgill.ca)  
Website: [mcgill.ca/chemeng](http://mcgill.ca/chemeng)

### 12.3.2 About Chemical Engineering

The Department offers programs leading to the **Master of Engineering**, **Master of Science**, and the **Doctor of Philosophy** degrees.

The Department's offices and research laboratories are located in the M.H. Wong Building. Collectively, 18 members of the academic staff conduct research programs in almost all areas of modern chemical engineering, drawing upon theoretical, computational, and experimental methodologies. The Department's faculty have been well supported by government programs (e.g., [NSERC](#), [FRQNT](#), [CIHR](#), [CFI](#), and [CRC](#)) and industry through research partnerships and contracts. Our laboratories are equipped with state-of-the-art equipment, and we attract outstanding graduate students from all over the world. Our main current research areas are briefly described below.

**Advanced materials and polymers** – The Department has an internationally recognized research program in structural, functional, and biological materials, spanning synthesis, characterization, processing, and modelling activities, with strong links to academic, government, and industrial research centres. Areas include plasma processing (e.g., nanofluids, carbon nanotubes, advanced coatings) and polymeric or "soft" materials research (e.g., self-assembling or structured materials; complex fluids; liquid crystals; colloids and soft composites; and novel polymerization methods). Applications of the research are targeted toward the development of next-generation, high-density storage media, functional coatings, electronic devices, composite fluids and "smart" materials, to name but a few.

**Biomedical engineering and biotechnology** – The majority of professors in the Department are involved with biological engineering. This is a very broad research area that includes biotechnology and biomedical engineering. Biotechnology is an integrated approach of combining life sciences (e.g., biochemistry and cell biology) with process engineering, design, and scale-up principles. This is the use of biological systems or living organisms to do practical things and manufacture valuable products such as biohydrogen, drugs, therapeutics, polymers, and surfactants. Biomedical engineering combines the principles of engineering with medicine as well as life sciences and biology. Examples of this include:

- drug delivery methods;
- biomedical devices;
- cardiovascular and other biomechanics;
- biomaterials for applications such as artificial implants; and
- products such as bacteriophages for alternative treatment techniques.

**Energy** – Energy usage has increased significantly since the steam engine launched the Industrial Revolution. This is due to our ever-growing human population, increased production of consumer goods, and rising use of energy-intensive devices such as automobiles, cell phones, computers, and climate comfort units. Instability in oil production and the inevitable depletion of fossil fuels is forcing scientists to find new resources and develop new technologies to keep pace with elevating energy demands. The Chemical Engineering Department at McGill University has an extensive research effort related to energy including:

- hydrogen production from microbial conversion of waste streams and electrolysis of water;
- hydrogen storage and molecular modelling of hydrogen storage;
- hydrogen fuel cells and solid oxide fuel cells;
- methane recovery, storage, and transportation using gas hydrates;
- oil and gas flow assurance; and

- plasma technology to produce nanomaterials for energy conversion/storage devices.

**Environmental engineering** – Environmental engineering is the application of science and engineering principles to protect the environment and remediate contaminated sites. Chemical and environmental engineers develop and design processes to provide healthy air, water, and soil. They also develop green products and sustainable processes. Using their background in process engineering, environmental chemistry, earth sciences, and biology, engineers have to meet the current and future challenges in protecting, managing, and restoring the environment. Ongoing research in the area of environmental engineering in our department includes:

- the study of wastewater treatment processes;
- biodegradation of emerging pollutants;
- advanced oxidation processes;
- transport and fate of waterborne contaminants;
- production of alternative fuels;
- environmental nanotechnology for remediation of contaminated soils and waters;
- green chemistry for safer products and processes; and
- development of biosensors for pollutant detection.

**Plasma science and engineering** – Plasma is often called the fourth state of matter, being the result of raising a gas to such an energy level that it contains conducting particles such as electrons and ions. While most of the universe is in a plasma state, plasmas on Earth are relatively uncommon. Plasma science and engineering research examines the use of the plasma state to produce physical and chemical changes to matter (bulk and surfaces). Plasmas may be in non-equilibrium, a state in which the overall gas is at low temperature and only the electrons are very energetic, or in the equilibrium state, where the temperature of all constituents is essentially equal and may range from thousands to tens of thousands of degrees Kelvin (e.g., the sun's surface is in a plasma state, at a temperature of about 6,000K). Non-equilibrium plasmas are used in such applications as the deposition of coatings and functionalization of surfaces, the treatment of cells, and the treatment of harmful gases and liquids. Thermal plasmas are used in the synthesis of advanced materials such as nanoparticles, carbon nanotubes, and coatings, as well as in the treatment of toxic and persistent wastes and metallurgical processing. Both thermal and non-thermal plasmas are currently used and studied in the McGill *Catalytic and Plasma Process Engineering Laboratory*, which forms one of the founding groups of the Plasma-Québec Centre.

#### *section 12.3.5: Master of Science (M.Sc.) Chemical Engineering (Thesis) (45 credits)*

The M.Eng. in Chemical Engineering (Thesis) is a research-oriented degree that allows the candidates to refine their skills by expanding their knowledge of chemical engineering through coursework and a research thesis under the supervision of a Faculty member (professor). The M.Eng. (Thesis) program offers advanced training in not only fundamentals but also research methods and is, therefore, the more suitable option for those whose primary interest is research. Graduates of this degree either pursue a Ph.D. or work in industry.

#### *section 12.3.6: Master of Engineering (M.Eng.) Chemical Engineering (Non-Thesis) (45 credits)*

The M.Eng. in Chemical Engineering (Non-Thesis) is a course-oriented degree, which includes a short project completed under the supervision of a Faculty member (professor). Through the program, graduate students can advance their knowledge in various chemical engineering disciplines through coursework and technical training.

#### *section 12.3.7: Master of Engineering (M.Eng.) Chemical Engineering (Non-Thesis): Environmental Engineering (45 credits)*

*\*\*This program is currently not offered.\*\**

The M.Eng. in Chemical Engineering (Non-Thesis) – Environmental Engineering is a specialized version of the M.Eng. in Chemical Engineering (Non-Thesis). This inter-departmental graduate program leads to a master's degree in Environmental Engineering. The objective of the program is to train environmental professionals at an advanced level. The program is designed for individuals with an undergraduate degree in engineering. This Non-Thesis degree falls within the M.Eng. and M.Sc. programs which are offered in the Departments of Bioresource, Chemical, Civil, and Mining and Materials Engineering. The Environmental Engineering program emphasizes interdisciplinary fundamental knowledge, practical perspective and awareness of environmental issues. It is a course-oriented degree, which includes prescribed courses related to environmental engineering and a short project completed under the supervision of a Faculty member (professor). Graduate students can specialize in environmental engineering through this program offered in collaboration with the Bieler School of Environment.

#### *section 12.3.8: Doctor of Philosophy (Ph.D.) Chemical Engineering*

The Ph.D. is a research degree requiring few courses and an extensive thesis, conducted under the supervision of a Faculty member (professor), that makes a distinct contribution to knowledge. The Ph.D. program prepares candidates for a career in teaching, research, and/or development and graduates are expected to have acquired autonomy in conducting research. McGill also offers various workshops that provide general, transitional, and professional skills development opportunities, preparing candidates for various career options following the Ph.D.

## 12.3.3 Chemical Engineering Admission Requirements and Application Procedures

### 12.3.3.1 Admission Requirements

Admission to graduate studies requires a minimum CGPA of 3.0/4.0 (or equivalent) for all degrees combined, or a minimum GPA of 3.2/4.0 (or equivalent) in both the bachelor's and master's degree, over the last two years of each program. 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 achieve a minimum *TOEFL* score of 90 on the Internet-based test (iBT), with each component score not less than 20, prior to admission, or a minimum *IELTS* (International English Language Testing System) band score of 7 in order to apply.

#### M.Sc. (Thesis), M.Eng. (Non-Thesis)

Admission requires a bachelor's degree (or equivalent) in engineering or science disciplines.

#### Ph.D.

Admission requires a master's degree (or equivalent) from a recognized university. Students in the Department's M.Eng. (Thesis) program may petition to transfer to the Ph.D. program after one year without submitting the master's thesis following a formal fast-track procedure. At their request, applicants (without a master's degree) with exceptionally high Academic Standing and outstanding research potential will be considered for direct admission to the Ph.D. program.

### 12.3.3.2 Application Procedure

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

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

#### 12.3.3.2.1 Additional Requirements

- Reference Letter – Ph.D. applicants must submit two letters of recommendation, one of which should be from their master's research supervisor.

### 12.3.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Department of Chemical Engineering 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](http://mcgill.ca/gps/contact/graduate-program).

Information on application deadlines is available at [mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines](http://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.

Application Deadlines differ for International and Canadian (and Permanent Resident) students to allow time to obtain a visa.

## 12.3.4 Chemical Engineering Faculty

### Chair

Richard L. Leask (interim)

### Emeritus Professors

David G. Cooper; John M. Dealy; Richard J. Munz; W.J. Murray Douglas; Juan H. Vera

### Associate Professor (Post-Retirement)

Dimitrios Berk

### Professors

Sylvain Coulombe; Richard L. Leask; Milan Maric; Sasha Omanovic; Alejandro D. Rey; Phillip Servio; Nathalie Tufenkji; Viviane Yargeau

### Associate Professors

Noémie Dorval Courchesne; Corinne Hoesli; Jan Kopyscinski; Pierre-Luc Girard-Lauriault; Reghan James Hill; Anne-Marie Kietzig; Christopher Moraes

**12.3.5 Master of Science (M.Sc.) Chemical Engineering (Thesis) (45 credits)****Thesis Courses (31 credits)**

CHEE 697	(6)	Thesis Proposal
CHEE 698	(12)	Thesis Research 1
CHEE 699	(13)	Thesis Research 2

**Required Courses (4 credits)**

CHEE 681	(1)	Laboratory Safety 1
CHEE 682	(1)	Laboratory Safety 2
CHEE 687	(2)	Research Skills and Ethics

**Complementary Courses (10 credits)**

4 credits from the following:

CHEE 611	(4)	Heat and Mass Transfer
CHEE 621	(4)	Thermodynamics
CHEE 631	(4)	Foundations of Fluid Mechanics
CHEE 641	(4)	Chemical Reaction Engineering
CHEE 651	(4)	Advanced Biochemical Engineering
CHEE 662	(4)	Computational Methods
CHEE 672	(4)	Process Dynamics and Control
CHEE 688	(4)	Advanced Materials in Chemical Engineering

A minimum of 3 credits of Chemical Engineering courses at the 500, 600, or 700 level.

Any remaining complementary course credit requirements may be fulfilled by completing Chemical Engineering or other Engineering or Science courses at the 500, 600, or 700 level.

**12.3.6 Master of Engineering (M.Eng.) Chemical Engineering (Non-Thesis) (45 credits)****Research Project**

Project (design or research): 6-12 credits.

6 credits must include the following course:

CHEE 695	(6)	Project in Chemical Engineering
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**Complementary Courses**

33-39 credits (a minimum of 18 credits in Chemical Engineering) at the 500, 600, or 700 level.

9 credits must be in an area of concentration.

12 additional courses at the 500, 600, or 700 level.

**12.3.7 Master of Engineering (M.Eng.) Chemical Engineering (Non-Thesis): Environmental Engineering (45 credits)**

This program is currently not accepting applicants.

**Research Project (6 credits)**

CHEE 695 (6) Project in Chemical Engineering

**Required Courses (6 credits)**

CHEE 591 (3) Environmental Bioremediation

CIVE 615 (3) Environmental Engineering Seminar

**Complementary Courses (22 credits)**

Minimum of 22 credits

**Data analysis course: (3 credits)**

AEMA 611 (3) Experimental Designs 1

CIVE 555 (3) Environmental Data Analysis

PSYC 650 (3) Advanced Statistics 1

**Toxicology: (3 credits)**

OCCH 612 (3) Principles of Toxicology

OCCH 616 (3) Occupational Hygiene

**Water pollution engineering: (4 credits)**

CIVE 651 (4) Theory: Water / Wastewater Treatment

CIVE 652 (4) Bioprocesses for Wastewater Resource Recovery

CIVE 660 (4) Chemical and Physical Treatment of Waters

**Air pollution engineering: (3 credits)**

CHEE 592 (3) Industrial Air Pollution Control

MECH 534 (3) Air Pollution Engineering

**Soil and water quality management: (3 credits)**

BREE 533 (3) Water Quality Management

CIVE 686 (4) Site Remediation

**Environmental impact: (3 credits)**

GEOG 601 (3) Advanced Environmental Systems Modelling

or an approved 500-, 600-, or 700-level alternative.

**Environmental policy: (3 credits)**

URBP 506 (3) Environmental Policy and Planning

or an approved 500-, 600-, or 700-level alternative.

**Elective Courses (11 credits)**



CHEE 696 (6) Extended Project

or another Engineering or non-Engineering 500-, 600-, or 700-level course subject to approval.

### 12.3.8 Doctor of Philosophy (Ph.D.) Chemical Engineering

The Ph.D. in Chemical Engineering focuses on advanced materials and polymers, biomedical engineering and biotechnology, environmental engineering, energy, plasma science and artificial intelligence-assisted design and optimization. The program offers advanced training in fundamentals as well as research methods and techniques, laboratory safety and research ethics.

#### 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 (4 credits)

CHEE 681	(1)	Laboratory Safety 1
CHEE 682	(1)	Laboratory Safety 2
CHEE 687	(2)	Research Skills and Ethics
CHEE 795	(0)	Ph.D. Thesis Proposal
CHEE 796	(0)	Ph.D. Proposal Defence
CHEE 797	(0)	Ph.D. Seminar. 1
CHEE 798	(0)	Ph.D. Seminar 2

#### Complementary Courses (6-12 credits)

6-12 credits at the 500 level or higher, in consultation with the supervisor and depending on student's background. May include the following:

CHEE 611	(4)	Heat and Mass Transfer
CHEE 621	(4)	Thermodynamics
CHEE 631	(4)	Foundations of Fluid Mechanics
CHEE 641	(4)	Chemical Reaction Engineering
CHEE 651	(4)	Advanced Biochemical Engineering
CHEE 662	(4)	Computational Methods
CHEE 672	(4)	Process Dynamics and Control
CHEE 688	(4)	Advanced Materials in Chemical Engineering

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## 12.4 Civil Engineering

### 12.4.1 Location

Department of Civil Engineering  
 Macdonald Engineering Building, Room 492  
 817 Sherbrooke Street West  
 Montreal QC H3A 0C3  
 Canada  
 Telephone: 514-398-6858  
 Email: [gradinfo.civil@mcgill.ca](mailto:gradinfo.civil@mcgill.ca)  
 Website: [mcgill.ca/civil](http://mcgill.ca/civil)

## 12.4.2 About Civil Engineering

Advanced courses of instruction and laboratory facilities are available for Engineering graduate students who wish to proceed to the degrees of **M.Eng.**, **M.Sc.**, and **Ph.D.**

Graduate studies and research are at present being conducted in the fields of structures; infrastructure rehabilitation; risk engineering; fluid mechanics and hydraulics; materials engineering; soil behaviour; soil mechanics and foundations; water resources engineering; environmental engineering; and transportation engineering.

The master's degree can be pursued as a research degree (M.Sc.-Thesis) or as a coursework-based degree (M.Eng.-Non-Thesis). The thesis degree is for those who wish to undertake research while the non-thesis degree is for those who wish to have a broader and more specialized training in civil engineering.

### *section 12.4.5: Master of Science (M.Sc.) Civil Engineering (Thesis) (45 credits)*

Students obtain a deeper understanding of their area of specialty through courses selected with their supervisor. A two- to three-semester independent research project is undertaken in the field of structures; infrastructure rehabilitation; risk engineering; fluid mechanics and hydraulics; materials engineering; soil behaviour; soil mechanics and foundations; water resources engineering; environmental engineering; and transportation engineering.

### *section 12.4.6: Master of Engineering (M.Eng.) Civil Engineering (Non-Thesis): Environmental Engineering (45 credits)*

This program is offered to students with a university undergraduate degree in engineering who desire graduate education in the environmental engineering field. This option is within the context of the existing M.Eng. (non-thesis) programs currently offered in the Departments of Bioresource Engineering (Agricultural and Environmental Sciences); Chemical Engineering; Civil Engineering; and Mining and Materials Engineering. This program emphasizes interdisciplinary fundamental knowledge courses, practical applications in diverse en

### 12.4.3.3 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 Civil Engineering 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](http://mcgill.ca/gps/contact/graduate-program).

Information on application deadlines is available at [mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines](http://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.



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

## 12.4.4 Civil Engineering Faculty

### Chair

Mohamed A. Meguid

### Associate Chair (Student Affairs)

Jinxia Liu

### Emeritus Professors

M. Saeed Mirza, Ghyslaine McClure, Denis Mitchell, Yixin Shao, Suresh C. Shrivastava

### Professors

Vincent H. Chu, Luc E. Chouinard, Susan J. Gaskin, Subhasis Ghoshal, Mohamed A. Meguid, Van-Thanh-Van Nguyen, James Nicell, Colin Rogers,

#### 12.4.6 Master of Engineering (M.Eng.) Civil Engineering (Non-Thesis): Environmental Engineering (45 credits)

The program consists of a minimum of 45 credits, of which, depending on the student's home department, a minimum of 5 and a maximum of 15 may be allotted to the research project. The balance of 30 to 40 credits is earned by coursework. The Department also allows students to complete the program using a minimum of 45 credits of coursework only.

The Environmental Engineering option is administered by the Faculty of Engineering. Further information may be obtained from the Program Coordinator, Department of Civil Engineering.

##### Research Project

(0 or 5-15 credits)

The program may include a project or, with Departmental approval, may be completed with courses only.

##### Required Courses (6 credits)

CHEE 591	(3)	Environmental Bioremediation
CIVE 615	(3)	Environmental Engineering Seminar

##### Complementary Courses

(24-39 credits)

a minimum of 22 credits chosen from the following:

##### Data analysis:

AEMA 611	(3)	Experimental Designs 1
CIVE 555	(3)	Environmental Data Analysis
	(3)	Advanced Statistics 1

URBP 506 (3) Environmental Policy and Planning

### Elective Courses

Also, 0-15 credits of graduate courses from an approved list of courses from the Faculties of Engineering, Agricultural and Environmental Sciences, Law, Management; Departments of Atmospheric and Oceanic Sciences, Biology, Chemistry, Earth and Planetary Sciences, Economics, Epidemiology and Biostatistics, Geography, Occupational Health, Political Science, School of Religious Studies, Sociology, and Bieler School of Environment.

### 12.4.7 Master of Engineering (M.Eng.) Civil Engineering (Non-Thesis) (45 credits)

The MEng Non-Thesis program aims to provide a more professional orientation to graduate students. The main features of this degree program are:

A minimum of 15 credits selected from a list of research oriented courses

A maximum of 30 credits with emphasis on expertise (specialty area) for professional practice.

#### Research Seminar (3 credits)

CIVE 664 (3) MEng (Non-thesis) Research Seminar

#### List A: Research Courses

(12-42) credits

A minimum of 12 credits from research courses, from one of the research streams: 1) Infrastructure, 2) Environmental/Hydraulics-Water Resources, and 3) Transportation.

#### Infrastructure Stream

CIVE 512 (3) Advanced Civil Engineering Materials  
CIVE 602 (4) Finite Element Analysis  
CIVE 603 (4) Structural Dynamics  
CIVE 609 (4) Risk Engineering  
CIVE 623 (4) Durability of Construction Materials

#### Environmental/Hydraulics-Water Resources

CIVE 555 (3) Environmental Data Analysis  
CIVE 572 (3) Computational Hydraulics  
CIVE 584 (3) Mechanics of Groundwater Flow  
CIVE 651 (4) Theory: Water / Wastewater Treatment  
CIVE 677 (4) Water-Energy Sustainability

#### Transportation

CIVE 540 (3) Urban Transportation Planning  
CIVE 542 (3) Transportation Network Analysis  
CIVE 560 (3) Transportation Safety and Design  
CIVE 609 (4) Risk Engineering

#### List B: Other Complementary Courses from the Department

0-30 credits

Courses from List A that are not used to fulfill the 15 credits requirement of Research Courses can be used also as complementary courses.

CIVE 520 (3) Groundwater Hydrology

CIVE 521	(3)	Nanomaterials and the Aquatic Environment
CIVE 527	(3)	Renovation and Preservation: Infrastructure
CIVE 528	(3)	Design of Wood Structures
CIVE 550	(3)	Water Resources Management
CIVE 557	(3)	Microbiology for Environmental Engineering
CIVE 561	(3)	Greenhouse Gas Emissions
CIVE 573	(3)	Hydraulic Structures
CIVE 574	(3)	Fluid Mechanics of Water Pollution
CIVE 577	(3)	River Engineering
CIVE 604	(4)	Theory of Plates and Shells
CIVE 605	(4)	Stability of Structures
CIVE 607	(4)	Advanced Design in Steel
CIVE 612	(4)	Earthquake-Resistant Design
CIVE 614	(4)	Composites for Construction
CIVE 615	(3)	Environmental Engineering Seminar
CIVE 616	(4)	Nonlinear Structural Analysis for Buildings
CIVE 617	(4)	Bridge Engineering
CIVE 618	(4)	Design in Concrete 1
CIVE 622	(4)	Prestressed Concrete
CIVE 625	(4)	Condition Assessment of Existing Structures
CIVE 628	(4)	Advanced Design of Wood Buildings
CIVE 637	(4)	Discrete Choice Modeling in Transportation
CIVE 652	(4)	Bioprocesses for Wastewater Resource Recovery

Chemical (CIVE 622)Biology for0 0 0 1 221.12 379.72 Tm(CIVE 652)Tj124 Tmyg(HydrauliInfra033E 652)Tj Tm(rans

#### **12.4.8 Doctor of Philosophy (Ph.D.) Civil Engineering**

##### **Thesis**

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with pre

- The *Centre for Intelligent Machines* (CIM) is an interdisciplinary research group focused on intelligent systems. Its laboratories include research in the domains of robotics, systems and control, computer vision, medical imaging, computer graphics, and machine learning.
- Telecommunications laboratories focus their work on signal processing, broadband communications, and networking; these laboratories form part of the *Centre for Systems, Technologies and Applications for Radiofrequency and Communications* (STARaCOM), a McGill University Research Centre devoted to fostering innovation in the area of communications systems and technologies via advanced research and training of highly qualified personnel.
- The *Integrated Microsystems Laboratory* (iML) supports research in FPGAs, MEMS, micro- and nano-systems, VLSI architectures for digital communications and signal processing, mixed signal, RF, and microwave integrated circuits and components, simulation of integrated circuits and microsystems, integrated antennas, design for testability, reconfigurable computing, high-speed circuits, and packaging.
- Antenna and microwave research, and optical fibre and integrated optics research are carried out in a fully equipped facility.
- The *Photonics Systems* Group includes experimental laboratories with high-speed test and measurement equipment and optoelectronics; tunable, high power, and pulsed lasers; extensive optics and optomechanics supporting research in telecommunications for advance probing stations; signal processing, nonlinear optics, RF photonics, optical processors for computing and AI, and biosensing.
- Molecular beam epitaxy infrastructure. This infrastructure can grow wafer-scale group-III nitride epilayers and nanostructures for both photonic/optoelectronic and electronic devices.
- The *Computational Electromagnetics Laboratory* provides tools for numerical analysis, visualization, interface design, and knowledge-based system development.
- For the microwave characterization research, one section of the laboratory hosts dielectric measurement probe in for the low- to high-gigahertz range.
- Additionally, access to a complete range of commercial multi-physics simulation, design, and optimization software is available. The lab also has experimental facilities for the characterization of magnetic and small dynamometer for electrical machine measurements.
- There is also a well-equipped laboratory for power electronics and power systems research (<http://www.power.ece.mcgill.ca/>).
- Computing infrastructure for software engineering research is also available.

The Department has extensive computer facilities. Most research machines are networked, providing access to a vast array of hardware. In addition, McGill University is linked to the *Centre de recherche informatique de Montréal* (CRIM) and the University Computing Centre.

There are three other universities in Montreal: Concordia University is the other English-language university; *l'Université de Montréal*, and its affiliated school of engineering, *Polytechnique Montréal*, is the largest francophone university; *l'Université du Québec* has a campus in Montreal and in major towns throughout the province.

The proximity of these schools to McGill University ensures that a rich array of courses is available to suit individual needs. McGill also collaborates on research projects with many organizations such as *l'Institut de recherche d'Hydro-Québec* (IREQ) and *l'Institut national de la recherche scientifique* (INRS).

### Financial Support

**Graduate Assistantships:** The Department awards several graduate assistantships to qualified full-time graduate students. These are normally funded from research grants or contracts awarded to individual faculty members. In return, the graduate assistant is expected to perform research-related tasks assigned by the professor from whose grant the assistantship is paid. A good part, but not necessarily all, of this work can be used for preparing a thesis. There is no special application form for graduate assistantships; all applicants who indicate a need for support on their application forms will be considered.

**Teaching Assistantships:** Graduate students, with the approval of their supervisors, may also undertake teaching assistantships for additional remuneration. These are awarded at the beginning of the term. The Department can make no prior commitments.

Graduate students can also receive 728.56 Tm(e for Intin f5 lues 86 1 215arc3-arc4, s525.82 Tmgpns; 311ues 86 1 215or from(e)Tolvreseat,3 .08 TearcP 0 1 Guo-hua F



### section 12.5.7: Doctor of Philosophy (Ph.D.) Electrical Engineering

The Ph.D. degree recognizes a significant novel research contribution that is described in an externally examined thesis. Students who are admitted to this program normally have a master's degree. Research is conducted under the supervision of a faculty member. The Department provides an excellent environment for conducting research, with supervision by internationally renowned researchers and access to state-of-the-art experimental facilities. Graduates from the program most commonly pursue research and teaching careers in academia or research careers in industrial labs.

## 12.5.3 Electrical and Computer Engineering Admission Requirements and Application Procedures

### 12.5.3.1 Admission Requirements

**English Proficiency Requirement:** 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 English. Accepted English language tests and minimum test score requirements can be found on our [website](#). Official results must be received before the application deadlines.

**GRE:** Submission of *GRE* (General Aptitude Test) scores is not mandatory. Applicants who have written the GRE are welcome to submit their scores for consideration.

#### Master's Degree (Admission Requirements)

The applicant must be the graduate of a recognized university and hold a bachelor's degree or its equivalent, as determined by McGill, in Electrical, Computer, or Software Engineering or a closely related field. An applicant holding a degree in another field of engineering or science will be considered but a Qualifying year may be required to make up any deficiencies. The applicant must have a high academic achievement: a standing equivalent to a **cumulative grade point average (CGPA) of 3.0 out of 4.0, or a GPA of 3.2 out of 4.0 for the last two full-time academic years or equivalent**. Satisfaction of these general requirements does not guarantee admission. Admission to graduate studies is limited and acceptance is highly competitive.

#### Ph.D. Degree (Admission Requirements)

In addition to satisfying the requirements for the Master's program, candidates must hold a suitable master's degree from a recognized university. The applicant must have a high academic achievement: a standing equivalent to a cumulative grade point average (CGPA) of 3.0 out of 4.0. Satisfaction of these general requirements does not guarantee admission. Admission to graduate studies is limited and acceptance is highly competitive.

### 12.5.3.2 Application Procedures

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

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

The Department accepts most of its graduate students for September; the chance of acceptance for January is significantly lower.

#### 12.5.3.2.1 Additional Requirements

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

- Area of Research and Applicant Profile Form – available at [mcgill.ca/ece/admissions/graduate/apply](http://mcgill.ca/ece/admissions/graduate/apply);
- *GRE* – the General Aptitude Test is optional.

### 12.5.3.3 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 Electrical and Computer Engineering 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](http://mcgill.ca/gps/contact/graduate-program).

Application Opening Dates		Application Deadlines		
	All Applicants	Non-Canadian citizens (Incl. Special, Visiting, and Exchange)	Canadian Citizens/Perm. Residents of Canada (Incl. Special, Visiting, and Exchange)	Current McGill Students (Any Citizenship)
<b>Fall Term:</b>	Sept. 15	Dec. 15	Dec. 15	Dec. 15
<b>Winter Term:</b>	Feb. 15	Aug. 1	Oct. 15	Oct. 15
<b>Summer Term:</b>	N/A	N/A	N/A	N/A

#### 12.5.4 Electrical and Computer Engineering Faculty

##### **Chair**

Warren Gross

##### **Associate Chair, Academic**

Ioannis Psaromiligkos

##### **Associate Chair, Undergraduate Programs**

François Bouffard

##### **Associate Chair, Graduate Programs**

Benoit Champagne

##### **Associate Chair, Operations**

Dennis Giannacopoulos

##### **Emeritus Professors**

Pierre R. Bélanger; Maier L. Blostein; Frank Ferrie; Peter Kabal; Martin D. Levine; Boon-Teck Ooi; Tomas J.F. P

ECSE 694	(4)	Thesis Research 4
ECSE 695	(4)	Thesis Research 5
ECSE 696	(4)	Thesis Research 6
ECSE 697	(4)	Thesis Research 7

Students who choose the thesis option must register for all 27 credits during the three terms of residency.

**Complementary Courses (18 credits)**

18 credits of 500-, 600-, or 700-level courses, of which no more than 6 credits may be outside the Department.\*

\* Non-departmental courses require Departmental approval. Students may be allowed to take more than 6 credits of non-Departmental courses; a letter of recommendation from their supervisor outlining the reason for such an action is required.

**12.5.6 Master of Engineering (M.Eng.) Electrical Engineering (Non-Thesis) (45 credits)**

The Master of Engineering in Electrical Engineering; Non-Thesis program is a professional course-based program of 45 credits. The program provides a solid background in electrical and computer engineering, both in terms of breadth across the entire field and depth in the area of specialty. The program structure allows students to complete the program in three semesters. A part-time program is possible.

**Complementary Courses (45 credits)**

Full-time students must complete the program in three years.

45 credits of 500- or 600- courses, of which no more than 16 credits may be outside the Department.

Students may not take



***section 12.6.5: Master of Engineering (M.Eng.) Mechanical Engineering (Non-Thesis) (45 credits)***

Students in this program must complete required courses in addition to several complementary courses and a seminar course. They also complete a project that is less involved than a thesis, and may involve a limited research project or a technical or design study. Graduates of this program are well-prepared for carrying out research and development in industry and may also proceed to further research at the Ph.D. level.

***section 12.6.6: Master of Engineering (M.Eng.) Aerospace Engineering (Non-Thesis) (45 credits)***

The M.Eng. Aerospace degree is offered to students who wish to specialize in the general area of aerospace engineering. This degree is given in conjunction with Concordia University, *Polytechnique Montréal*, the *Université Laval*, the *Université de Sherbrooke*, and the *École de Technologie Supérieure*. Students registered at McGill are required to take two courses from two other institutions.

The aerospace industry is strongly established in Quebec. Representatives of the aerospace industry therefore requested that measures be taken to provide for qualified scientists in aerospace. Fi

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## 12.6.5 Master of Engineering (M.Eng.) Mechanical Engineering (Non-Thesis) (45 credits)

### Research Project (13 credits)

MECH 603	(9)	M. Eng. Project 1
MECH 604	(3)	M. Eng. Project 2
MECH 609	(1)	Seminar

Note: Industrial liaison is encouraged in these courses taken near the end of the program.

### Required Courses (16 credits)

(4)	Applied Mathematics 1
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\* Note: MECH 691 must be completed in the first term of the student's program.

### Required Course

1 credit:

MECH 609                      (1)                      Seminar

### Complementary Courses (16 credits)

A minimum of 16 credits (500, 600, or 700 level) from the Faculty of Engineering or Faculty of Science, at least 8 of which must be from within the Faculty of Engineering. FACC courses will not count toward the complementary course credits.

## 12.6.8 Doctor of Philosophy (Ph.D.) Mechanical Engineering

Candidates normally register for the M.Eng. degree in the first instance. However, in exceptional cases where the research work is proceeding very satisfactorily, or where the equivalent of the M.Eng. degree has been completed at another university, candidates may be permitted to proceed directly to the Ph.D. degree without submitting a master's thesis as long as they have satisfied the course requirements for the M.Eng. degree.

### 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

MECH 700	(0)	Ph.D. Literature Review
MECH 701	(0)	Ph.D. Thesis Proposal
MECH 702	(0)	Ph.D. Comprehensive Preliminary Oral Examination

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## 12.7 Mining and Materials Engineering

### 12.7.1 Location

Department of Mining and Materials Engineering  
M.H. Wong Building  
3610 University Street  
Montreal QC H3A 0C5  
Canada  
Email: [barbara.hanley@mcgill.ca](mailto:barbara.hanley@mcgill.ca)  
Website: [mcgill.ca/minmat](http://mcgill.ca/minmat)

Mining Engineering  
Telephone: 514-398-2215  
Fax: 514-398-7099

Materials Engineering  
Telephone: 514-398-4383  
Fax: 514-398-4492

### 12.7.2 About Mining and Materials Engineering

#### Mining Engineering

- Geomechanics
- Mining Environments
- Strategic Mine Planning and Optimization



- Stochastic Modelling

***section 12.7.8: Master of Engineering (M.Eng.) Materials Engineering (Non-Thesis): Environmental Engineering (45 credits)***

Please consult the Department for more information about the M.Eng. Materials Engineering (Non-Thesis) program.

***section 12.7.9: Master of Engineering (M.Eng.) Mining Engineering (Non-Thesis) (45 credits)***

Please consult the Department for more information about the M.Eng. Mining Engineering (Project) program.

***section 12.7.10: Master of Engineering (M.Eng.) Mining Engineering (Non-Thesis): Environmental Engineering (45 credits)***

Please consult the Department for more information about the M.Eng. Mining Engineering (Non-Thesis) program.

***section 12.7.11: Doctor of Philosophy (Ph.D.) Materials Engineering***

Please consult the Department for more information about the Ph.D.

***section 12.7.12: Doctor of Philosophy (Ph.D.) Mining Engineering***

Please consult the Department for more information about the Ph.D.

***section 12.7.13: Graduate Diploma (Gr. Dip.) Mining Engineering (30 credits)***

This program normally requires one academic year of full-time study to complete. Candidates are required to take an integrated group of courses based on their academic background.

## **12.7.3 Mining and Materials Engineering Admission Requirements and Application Procedures**

### **12.7.3.1 Admission Requirements**

The **Graduate Diploma in Mining Engineering** is open to graduates with suitable academic standing in any branch of engineering or science. It is designed to provide a sound technical mining engineering background to candidates intending to work in the minerals industry.

The **M.Sc. (Thesis)** degree is open to graduates holding the B.Eng. degree or its equivalent in Materials Engineering, Mining Engineering or other related engineering fields.; or B.Sc. degree in Chemistry, Materials Science, Physics, Geology, or related fields.

The **Master of Engineering (Project) (Materials option)** is primarily designed to train people with appropriate engineering or scientific backgrounds to allow them to work effectively in the metals and materials industries. Industrial experience is favourably viewed for entrance into the program, but is not considered a necessity.

The **Master of Engineering (Project) (Mining option)** is primarily designed for graduates from mining engineering programs who have received adequate academic training in modern mining technology, mineral economics, computer programming, and probabilities and statistics. Students without this academic training must complete a Qualifying term. Industrial experience is favourably viewed for entrance into the program, but is not considered a necessity.

The Master of Engineering (Project) (Environmental Engineering option) is also offered.

**Ph.D.** degree applicants may either be “directly transferred” from the M.Eng. or M.Sc. program (see below) or hold an acceptable master's degree in Materials Engineering, Mining Engineering, or other related fields, or under exceptional circumstances may be admitted directly from the bachelor's degree. In the latter case they are admitted to Ph.D. 1 as opposed to those holding a master's degree, who are admitted to Ph.D. 2.

### **12.7.3.2 Application Procedures**

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

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

### **12.7.3.3 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 Mining and Materials Engineering 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](http://mcgill.ca/gps/contact/graduate-program).

Information on application deadlines is available at [mcgill.ca/gradapplicants/how-apply/application-steps/application-deadlines](http://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.

#### 12.7.4 Mining and Materials Engineering Faculty

##### Department Chair

Richard Chromik

##### Associate Chair, Materials Engineering

Jun Song

##### Associate Chair and Graduate Program Director

Mathieu Brochu

##### Graduate Program Coordinator

Barbara Hanley

##### Emeritus Professors

James A. Finch; John E. Gruzleski; John J. Jonas; Gordon W. Smith

##### Professors

Marta Cerruti; Richard Chromik; George P. Demopoulos; Roussos Dimitrakopoulos; Raynald Gauvin; Roderick I.L. Guthrie; Faramarz (Ferri) P. Hassani; Hani S. Mitri; Mihriban Pegguleryuz; Stephen Yue

##### Associate Professors

Kirk Bevan; Mathieu Brochu; Mustafa Kumral; Showan Nazhat; Sidney Omelon; Nathaniel Quitoriano; Agus Pulung Sasmito; Jun Song; Kristian Waters

##### Assistant Professor

Jinhyuk Lee; Alessandro Navarra; Philippe Ouzilleau

##### Adjunct Professors

Behnam Ashrafi; Salim Brahim; Michel Gamache; Alice Jarry; Luis Javier Montiel Petro; Amina Lamghari; Priti Wanjara; Karim Zaghib

##### Senior Faculty Lecturer

Florence Paray

##### Faculty Lecturer

Shahe Shnorhokian (*Mining*)

##### Co-op Program Liaison Officers

Genevieve Snider (*Materials*); Lisa Thiess (*Mining*)

#### 12.7.5 Master of Science (M.Sc.) Materials Engineering (Thesis) (45 credits)

The M.Sc. in Materials Engineering (Thesis) is a research-oriented program that focuses on research skills and knowledge of materials engineering through coursework and a research thesis under the supervision of a Faculty member (professor). Emphasis is placed on research methods, as well as fundamentals. As such, the program is the more suitable option for those whose primary interest is research. The M.Sc. (Thesis) is for candidates with a Bachelor's degree in Engineering or from a discipline relevant to materials engineering.

##### Thesis Courses (27 credits)

MIME 690	(6)	Thesis Research 1
MIME 691	(3)	Thesis Research 2
MIME 692	(6)	Thesis Research 3
MIME 693	(3)	Thesis Research 4
MIME 694	(6)	Thesis Research 5
MIME 695	(3)	Thesis Research 6

**Required Courses (9 credits)**

MIME 601	(0)	Engineering Laboratory Practice
MIME 610D1	(1.5)	Master's Foundation Course
MIME 610D2	(1.5)	Master's Foundation Course
MIME 670	(6)	Research Seminar 1

**Complementary Courses (9 credits)**

9 credits at the 500-level or higher selected from within and/or outside the Department in consultation with the student's supervisor and/or Advisory Committee.

**12.7.6 Master of Science (M.Sc.) Mining Engineering (Thesis) (45 credits)**

The M.Sc. in Mining Engineering focuses on both fundamental and applied research. A two- to three-semester independent research project, leading to a thesis, is undertaken in any research area of mining science, engineering or technology, as well as closely related fields.

**Thesis Courses (27 credits)**

MIME 690	(6)	Thesis Research 1
MIME 691	(3)	Thesis Research 2
MIME 692	(6)	Thesis Research 3
MIME 693	(3)	Thesis Research 4
MIME 694	(6)	Thesis Research 5
MIME 695	(3)	Thesis Research 6

**Required Courses (6 credits)**

MIME 601	(0)	Engineering Laboratory Practice
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6 credits from:

MIME 673	(6)	Mining Engineering Seminar
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**Complementary Courses (12 credits)**

12 credits at the 500-level or higher selected from within and/or outside the Department in consultation with the student's supervisor and/or Advisory Committee.

**12.7.7 Master of Engineering (M.Eng.) Materials Engineering (Non-Thesis) (45 credits)**

The Master of Engineering in Materials Engineering: Non-Thesis program is primarily designed to train people with appropriate engineering or scientific background to allow them to work effectively in the materials industries.

**Research Project (15 credits)**

MIME 680	(6)	Materials Engineering Project 1
MIME 681	(6)	Materials Engineering Project 2
MIME 682	(3)	Materials Engineering Project 3

**Required Courses (6 credits)**

MIME 601	(0)	Engineering Laboratory Practice
MIME 670	(6)	Research Seminar 1

**Complementary Courses (24 credits)**

12 credits of MIME courses at the 500 level or higher.

12 credits of courses at the 500 level or higher from within and/or outside the Department in consultation with the Program Adviser.

**12.7.8 Master of Engineering (M.Eng.) Materials Engineering (Non-Thesis): Environmental Engineering (45 credits)**

This interdepartmental graduate option leads to a Master of Engineering (M.Eng.) Materials Engineering: Non-Thesis-Environmental Engineering. The objective of the option is to train environmental professionals at an advanced level. The program is designed for individuals with an undergraduate degree in engineering. The Environmental Engineering option emphasizes interdisciplinary fundamental knowledge, practical perspectives, and awareness of environmental issues through a wide range of technical and non-technical courses offered by collaborating departments and faculties at the University. Students are strongly encouraged to consult with the Graduate Program Director prior to enrolling in the program.

**Research Project (6 credits)**

MIME 680	(6)	Materials Engineering Project 1
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**Required Courses (6 credits)**

CHEE 591	(3)	Environmental Bioremediation
CIVE 615	(3)	Environmental Engineering Seminar

**Complementary Courses (22 credits)**

(minimum 22 credits)

**Data Analysis Course**

One of the following courses:

AEMA 611	(3)	Experimental Designs 1
CIVE 555	(3)	Environmental Data Analysis
PSYC 650	(3)	Advanced Statistics 1

**Toxicology Course**

One of the following courses:

OCCH 612	(3)	Principles of Toxicology
OCCH 616	(3)	Occupational Hygiene

**Water Pollution Engineering Course**

One of the following courses:

CIVE 651	(4)	Theory: Water / Wastewater Treatment
CIVE 652	(4)	Bioprocesses for Wastewater Resource Recovery
CIVE 660	(4)	Chemical and Physical Treatment of Waters

**Air Pollution Engineering Course**

One of the following courses:

CHEE 592	(3)	Industrial Air Pollution Control
MECH 534	(3)	Air Pollution Engineering

**Soil and Water Quality Management Course**

One of the following courses:

BREE 533	(3)	Water Quality Management
CIVE 686	(4)	Site Remediation

#### **Environmental Impact Course**

One of the following courses:

GEOG 601	(3)	Advanced Environmental Systems Modelling
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or an approved 500-, 600-, or 700-level alternative.

#### **Environmental Policy Course**

URBP 506	(3)	Environmental Policy and Planning
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or an approved 500-, 600-, or 700-level alternative.

#### **Elective Courses (11 credits)**

(minimum 11 credits)

Another project course and/or Engineering or non-Engineering 500-, 600-, or 700-level course subject to approval of the Department.

The relevant Project course in Materials Engineering is the following:

MIME 681	(6)	Materials Engineering Project 2
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### **12.7.9 Master of Engineering (M.Eng.) Mining Engineering (Non-Thesis) (45 credits)**

The Master of Engineering in Mining: Non-Thesis program is primarily designed for graduates from mining engineering programs who have received adequate academic training in modern mining technology, mineral economics, computer programming, and probabilities and statistics.

#### **Research Project (15 credits)**

MIME 628	(6)	Mineral Engineering Project 1
MIME 629	(6)	Mineral Engineering Project 2
MIME 634	(3)	Mineral Engineering Project 3

#### **Required Courses (6 credits)**

MIME 601	(0)	Engineering Laboratory Practice
MIME 673	(6)	Mining Engineering Seminar

#### **Complementary (24 credits)**

12 credits of MIME courses at the 500 level or higher.

12 credits of courses at the 500 level or higher from within and/or outside the Department in consultation with the Program Adviser.

### **12.7.10 Master of Engineering (M.Eng.) Mining Engineering (Non-Thesis): Environmental Engineering (45 credits)**

Students are strongly encouraged to consult with the Graduate Program Director prior to enrolling in the program.

#### **Research Project (6 credits)**

MIME 628	(6)	Mineral Engineering Project 1
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#### **Required Courses (6 credits)**

CHEE 591

(3)

Environmental Bioremediation

(3)

Environmental Engineering Seminar

**Elective Courses (10-11 credits)**

Another project course and/or Engineering or non-Engineering 500-, 600-, or 700-level course subject to approval of the Department.

The relevant Project course in Mining Engineering is the following:

MIME 629                      (6)                      Mineral Engineering Project 2

**12.7.11 Doctor of Philosophy (Ph.D.) Materials Engineering**

Candidates for this degree must complete a minimum of two lecture courses assigned by the Department, selected on the basis of previous academic



### 12.7.13 Graduate Diploma (Gr. Dip.) Mining Engineering (30 credits)

#### Required Course (6 credits)

MIME 601	(0)	Engineering Laboratory Practice
MIME 673	(6)	Mining Engineering Seminar

#### Complementary Courses (24 credits)

24 credits of courses at the 500 level or higher selected from within and/or outside the department in consultation with the Program Adviser.

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## 12.8 Trottier Institute for Sustainability in Engineering and Design

### 12.8.1 Location

TISED  
Lorne M. Trottier Building, Room 2054  
3630 University Street  
Montreal, QC, H3A 2B3  
Email: [tised@mcgill.ca](mailto:tised@mcgill.ca)  
Website: [mcgill.ca/tised](http://mcgill.ca/tised)

### 12.8.2 About TISED

Established in 2012 through a gift from the Trottier Family Foundation, TISED supports research and offers courses on sustainability in engineering and design at the Faculty of Engineering, and informs and educates decision-makers and the public about sustainability issues.

TISED's membership comprises tenured and tenure-track professors from across six departments and two schools at the Faculty of Engineering who conduct research related to TISED's research themes:

- sustainable industrial processes and manufacturing;
- renewable energy and energy efficiency;
- sustainable infrastructure and urban development; and
- climate change adaptation and resilience.

#### *section 12.8.4: Master of Engineering (M.Eng.) Sustainability in Engineering and Design (Non-Thesis) (45 credits)*

TISED offers an M.Eng. in Sustainability in Engineering and Design with a broad sustainability training in an interdisciplinary environment. The program—open to students with an undergraduate degree in engineering, urban planning, or architecture—offers advanced training in fundamental and contemporary concepts of sustainability and equips students with specific skills to understand and address critical sustainability challenges in the practice of engineering, architecture, and urban planning.

The interdisciplinary format of the program allows students to learn to integrate non-engineering disciplines and systems-based approaches, such as industrial ecology and life-cycle assessment, into their engineering and design solutions. Program graduates will understand the broad ramifications of sustainability and its interplay with engineering and design and be able to implement sustainable engineering and design solutions within the context of broader sustainability theory for their future employers in industry, government, or academia.

prograt.

- TOEFL (Test of English as a Foreign Language; Applicants must achieve an overall minimum score of 94 on the internet-based test (iBT) with a minimum score of 20 for each component (i.e.,

MECH 534	(3)	Air Pollution Engineering
MECH 560	(3)	Eco-design and Product Life Cycle Assessment
MIME 511	(3)	Advanced Subsurface Ventilation and Air Conditioning
MIME 588	(3)	Reliability Analysis of Mining Systems
URBP 506	(3)	Environmental Policy and Planning

\* Students can tak

CIVE 550	(3)	Water Resources Management
ECSE 507	(3)	Optimization and Optimal Control
MECH 535	(3)	Turbomachinery and Propulsion
MECH 559	(3)	Engineering Systems Optimization
MIME 556	(3)	Sustainable Materials Processing
SEAD 600	(9)	Sustainability Research 1
SEAD 602	(3)	Sustainability Research 2
URBP 619	(4)	Land Use and Transport Planning

NOTE: \* Students must find a supervisor from a McGill engineering, urban planning or architecture program before registering for SEAD 600 and SEAD 602, subject to approval

***section 12.9.6: Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis) (60 credits)***

The core program provides a general education in spatial planning in its functional, environmental, and social dimensions. Formal specializations are available in Transportation Planning and Urban Development & Urban Design. Further information concerning these concentrations is available at [mcgill.ca/urbanplanning/programs](http://mcgill.ca/urbanplanning/programs). In all cases, electives, the summer internship, and the Supervised Research Project allow for individual concentration on a particular topic.

***section 12.9.7: Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis): Transportation Planning (60 credits)***

The Transportation Planning concentration enables students to specialize in this field as part of their course of study for the M.U.P. degree. A number of core courses and electives, the summer internship, and the Supervised Research Project must be devoted to the acquisition of skills (including in quantitative analysis) necessary to work as a transportation planner. Admission into the concentration is based on a competitive selection process at the end of the first year of study in the M.U.P. program.

***section 12.9.8: Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis): Urban Development and Urban Design (60 credits)***



**12.9.5 Master of Science (M.Sc.) Urban Planning, Policy and Design (Thesis) (45 credits)**

The M.Sc. in Urban Planning, Policy and Design (Thesis) is centred on an independent research thesis. Original research on an urban issue of interest with implications for planning, policy or design will be conducted. The program focuses on critical skills in research, analysis and interpretation that are applicable in both academia and practice.

**Required Courses (27 credits)**

URBP 606D1	(3)	Research Seminar
URBP 606D2	(3)	Research Seminar
URBP 612	(3)	History and Theory of Planning
URBP 690	(18)	Thesis Submission

**Complementary Courses (12 credits)**

3 credits selected from the following research methods courses:

URBP 505	(3)	Geographic Information Systems
URBP 608	(3)	Advanced GIS Applications
URBP 633	(3)	Research Methods for Planners
URBP 640	(1)	Introduction to Planning Statistics
URBP 641	(1)	Reading the Urban Landscape
URBP 642	(1)	Introduction to Planning Data
URBP 643	(1)	Selected Geographic Information Systems Applications
URBP 644	(1)	Multivariate Statistics
URBP 645	(1)	Social Research Methods 1
URBP 646	(1)	Social Research Methods 2
URBP 647	(1)	Selected Methods in Planning 1
URBP 648	(1)	Selected Methods in Planning 2

Note: Students may also take research methods courses at the 500 or 600 level in other academic units at McGill or another Montreal university, subject to the approval of the School.

9 credits selected from among the 500 or 600 level URBP courses offered by the School.

**Elective Courses (6 credits)**

6 credits offered at the 500 or 600 level by any academic units at McGill or at another Montreal university, with the approval of the School, if they are related to one or more subject areas in the field of planning.

Choices usually include courses in urban geography, sociology, anthropology, law, politics, and environmental science. Students must confirm with the Thesis Supervisor prior to registration that the selected course(s) can be counted toward the M.Sc. program.

**12.9.6 Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis) (60 credits)**

The M.U.P. requires two years of study and research including a three-month summer internship in a professional setting. Upon completion of the program, graduates are expected to have acquired basic planning skills, a broad understanding of urban issues, and specialized knowledge in a field of their own choice.

\*\* Students interested in the Barbados Field Study semester option should contact the department on its availability \*\*

**Required Courses (42 credits)**

URBP 609	(1)	Visual Communication 1
URBP 610	(1)	Visual Communication 2

URBP 611	(1)	Data Visualization for Planning
URBP 612	(3)	History and Theory of Planning
URBP 622	(6)	Planning Studio 1
URBP 623	(6)	Planning Studio 2
URBP 624	(6)	Planning Studio 3
URBP 628	(0)	Practical Experience
URBP 630	(3)	Supervised Research Project 1
URBP 631	(3)	Supervised Research Project 2
URBP 632	(6)	Supervised Research Project 3
URBP 635	(3)	Planning Law
URBP 640	(1)	Introduction to Planning Statistics
URBP 641	(1)	Reading the Urban Landscape
URBP 642	(1)	Introduction to Planning Data

### Complementary Courses (18 credits)

Students are encouraged to complete at least one course in each of the four areas of design, environment, housing, and transportation.

#### Group A

9-18 credits from the following:

ARCH 515	(3)	Sustainable Design
CIVE 540	(3)	Urban Transportation Planning
CIVE 561	(3)	Greenhouse Gas Emissions
GEOG 504	(3)	Advanced Economic Geography
GEOG 525	(3)	Asian Cities in the 21st Century
URBP 501	(2)	Principles and Practice 1
URBP 503	(3)	Public Transport: Planning and Operations
URBP 504	(3)	Planning for Active Transportation
URBP 505	(3)	Geographic Information Systems
URBP 506	(3)	Environmental Policy and Planning
URBP 514	(3)	Community Design Workshop
URBP 530	(3)	Urban Infrastructure and Services in International Context
URBP 536	(2)	Current Issues in Transportation 1
URBP 537	(2)	Current Issues in Transportation 2
URBP 541	(1)	Selected Topics in Planning
URBP 542	(1)	Selected Topics in Visual Analysis
URBP 543	(3)	Special Topics
URBP 553	(3)	Urban Governance
URBP 555	(3)	Real Estate and Planning
URBP 556	(3)	Urban Economy: A Spatial Perspective
URBP 557	(3)	Rethinking Zoning
URBP 604	(3)	Urban Design Seminar
URBP 607	(3)	Reading Course: Urban Planning
URBP 608	(3)	Advanced GIS Applications





URBP 640	(1)	Introduction to Planning Statistics
URBP 641	(1)	Reading the Urban Landscape
URBP 642	(1)	Introduction to Planning Data

### Complementary Courses (11 credits)

#### Group A

5-11 credits from the following:

CIVE 540	(3)	Urban Transportation Planning
CIVE 561	(3)	Greenhouse Gas Emissions
CIVE 637	(4)	Discrete Choice Modeling in Transportation
CIVE 661	(4)	Modelling of Transportation Emissions
URBP 503	(3)	Public Transport: Planning and Operations
URBP 504	(3)	Planning for Active Transportation
URBP 506	(3)	Environmental Policy and Planning
URBP 536	(2)	Current Issues in Transportation 1
URBP 537	(2)	Current Issues in Transportation 2
URBP 608	(3)	Advanced GIS Applications
URBP 620	(4)	Transport Economics
URBP 643	(1)	Selected Geographic Information Systems Applications

#### Group B

0-6 credits

0-6 credits of coursework at the 500 or 600 level offered by any offered by any academic unit at McGill or another Montreal university, with the approval of the School, if they help students to develop an in-depth knowledge of one or more subject areas in the field of planning. Choices usually include courses in real-estate analysis, urban geography, sociology, anthropology, law, politics, and environmental science. Students must confirm prior to registration that the selected course(s) can be counted toward the M.U.P. degree.

### 12.9.8 Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis): Urban Development and Urban Design (60 credits)

The concentration in Urban Development and Urban Design aims to produce graduates who are skilled in analysis and design for development in existing (sub)urban landscapes and urbanizing contexts, whether in North America or elsewhere. A series of courses on urban design, real estate, the politics of development, and urban governance enhance the core curriculum of the professionally-accredited M.U.P. program. Additional courses address innovative approaches to urban development, contemporary urban form, community-based design, globalization and development, and the adaptive redesign of suburban contexts, in addition to enduring topics such as housing, public space, cultural landscapes, and environmental planning. Students seeking to specialize in Urban Development and Urban Design apply at the end of their first year of study; admission into the concentration is based on performance in the first year of study and demonstration of spatial literacy, numeric competency, skills in graphic communication, and understanding of complex development processes.

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URBP 644	(1)	Multivariate Statistics
URBP 645	(1)	Social Research Methods 1
URBP 646	(1)	Social Research Methods 2
URBP 647	(1)	Selected Methods in Planning 1
URBP 648	(1)	Selected Methods in Planning 2
URBP 649	(1)	Visual and Spatial Methods

Students may also take courses at the 500 or 600 level in any academic unit at McGill or at another Montreal university, subject to the approval of the School.

### 12.9.9 Doctor of Philosophy (Ph.D.) Urban Planning, Policy and Design

The Doctor of Philosophy in Urban Planning, Policy and Design aims to prepare students for interdisciplinary research and teaching on the management of urban development as well as for leadership in the design and evaluation of urban policies and plans for cities in North America and the world. The program will focus on five identified areas of urban planning (land use planning and urban design; environmental planning; transportation planning; international development planning; real estate and economic development). Students are expected to spend the first two years of study taking courses, preparing for their comprehensive examination and writing their dissertation proposal. The remaining two (or more) years are spent conducting research and writing a thesis.

#### Required Courses (9 credits)

Every student must take courses worth at least 18 credits. Only one reading course can be included in this minimum requirement. The Advisory Committee may raise the requirement up to 24 credits (up to 36 credits for students entering as Ph.D. 1) in order to meet the specific needs of the student. With approval of their committee, students may elect to take a larger number of courses than is required, but in no case will the number of credits exceed thirty unless the student enters the program in Ph.D.1.

URBP 612	(3)	History and Theory of Planning
URBP 701	(0)	Doctoral Comprehensive Examination
URBP 703	(3)	Doctoral Research Seminar 1
URBP 704	(3)	Doctoral Research Seminar 2
URBP 709	(0)	Doctoral Research Proposal

#### Complementary Courses (6 credits)

3 credits in advanced research methods at the 600 level or higher. It may be taken in any academic unit at McGill or another university, subject to the approval of the Graduate Program or School Director.

3 credits in advanced theory at the 600 level or higher. It may be taken at McGill or at another university and must be approved by the Graduate Program or School Director.

#### Elective Courses (3 credits)

Minimum 3 credits at the 500 level or higher, or more if the Advisory Committee so decides.

These credits may be taken in any academic unit at McGill or at another university, subject to the approval of the Advisory Committee.

The Advisory Committee may require that the number of electives be increased to improve the student's preparation in certain areas. Other courses, at the 500 level or higher, may be added with the approval of the Advisory Committee. In general, students will be asked to limit their elective coursework to 9 credits. In no case will they be allowed to take more than 15 credits in elective courses.

Up to two reading courses may be tak