Faculty of Engineering, including Schools of Architecture and Urban Planning (Graduate)

Programs, Courses and University Regulations

2015-2016

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

1 McGill University reserves the right to mak

Publication Information

Published by

McGill University
3415 McTavish Street
Montreal, Quebec, H3A 0C8
Canada

McGill University reserves the right to make changes to the information contained in this publication - including correcting errors, altering fees, schedules of admission and credit requirements, and revising or cancelling particular courses or programs - without prior notification.

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

11.8.3.2

1 Dean's Welcome

To Graduate Students and Postdoctoral Fellows:

I am extremely pleased to welcome you to McGill University. Graduate and Postdoctoral Studies (GPS) collaborates withStu1 the F1 0 0 1 43.522 6023.775 Tm(. Gracult(GP

All language requirements must be fulfilled and the grades reported before submission of the thesis to GPS (Thesis section).

Students must contact their departments to make arrangements to take the Language Reading Proficiency Examinations. Students may, however, demonstrate competence by a pass standing in two undergraduate language courses taken at McGill (see departmental regulations).

Candidates are advised to discharge their language requirements as early in their program as possible.

Students expecting to enrol in Professional Corporations in the province of Quebec are advised to become fluent in both spoken and written French.

French language courses are available at the French Language Centre. The teaching is intensive and class sizes are kept small. While undergraduate students are given preference, graduate students who are certain they can devote sufficient time to the work may enrol.

[illegible]

The thesis for the Ph.D. degree must display original scholarship expressed in good literate style and must be a distinct contribution to knowledge. [illegible] Nomination of Examiners and Thesis Submission [illegible] www.mcgill.ca/gps/thesis/guidelines/initial-submissi[illegible] www.mcgill.ca/importantdates[illegible]. The list of examiners must be approved by the Department Chair, the supervisor and the student. The Thesis section of GPS should be notified of any subsequent change of title as early as possible. Guidelines and deadlines are available at *www.mcgill.ca/gps/thesis/guidelines*.

Special regulations for the Ph.D. degree in particular departments are stated in the entries of those departments.

[illegible]

After the thesis has been received and approved, a final oral examination is held on the subject of the thesis and subjects intimately related to it. This is conducted in the presence of a Committee of at least five members presided over by a Pro-Dean nominated by Graduate and Postdoctoral Studies. The Chair of the candidate's department and the Thesis Supervisor are regularly invited to be members of the Committee; at least one member of the Committee is appointed from outside the candidate's department. Guidelines are available at *www.mcgill.ca/gps/thesis/guidelines*.

Ad Personam Programs (Thesis Option Only)

7 Fellowships, Awards, and Assistantships

Please refer to the eCalendar's *University Regulations and 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 required by postdoctoral scholars 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 him/her in research.

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

8.2 Guidelines and Policy for Academic Units on Postdoctoral Education

The general guidelines listed below are meant to encourage units to examine their policies and procedures to support postdoctoral education. Every unit hosting Postdocs should have explicitly stated policies and procedures for the provision of postdoctoral education as well as established means for informing Postdocs of policies, procedures, and privileges (e.g., orientation sessions, handbooks, etc.), as well as mechanisms for addressing complaints. Academic units should ensure that their policies, procedures and privileges are consistent with these guidelines and the Charter of Students' Rights. For their part, Postdocs are responsible for informing themselves of policies, procedures, and privileges.

1 Status

i. Postdoctoral status will be recognized by the University in accordance with Quebec provincial regulations. Persons may only be registered with postdoctoral status for a period of up to five years from the date they were awarded a Ph.D. or equivalent degree. Time allocated to parental or health leave is added to this period of time. Leaves for other reasons, including vacation leave, do not extend the term. Postdocs must do research under the supervision of a McGill professor, including Adjunct Professors, who is a member of McGill's academic staff qualified in the discipline in which training is being provided and with the abilities to fulfil responsibilities as a supervisor of the research and as a mentor for career development. They are expected to be engaged primarily in research with minimal teaching or other responsibilities.

2 Registration

i. Postdocs must be registered annually with the University through Enrolment Services. Initial registration will require an original or notarized copy of the Ph.D. diploma. Registration will be limited to persons who fulfil the definition above and for whom there is an assurance of appropriate funding and where the unit can provide assurance of the necessary resources to permit postdoctoral education.

ii. Upon registration, the Postdoc will be eligible for a University identity card issued by Enrolment Services.

3 Appointment, Salary, and Benefits

i. Appointments may not exceed your registration eligibility status.

ii. In order to be registered as a Postdoc, you must be assured of financial support other than from personal means during your stay at McGill University, equivalent to the minimal stipend requirement set by the University in accordance with guidelines issued by federal and provincial research granting agencies. There are no provisions for paid parental leave unless this is stipulated in the regulations of a funding agency outside the University.

iii. At the outset of a postdoctoral appointment, a written Letter of Agreement for Postdoctoral Education should be drawn up and signed by the Postdoc, the supervisor, and the department head or delegate (see template Letter of Agreement and supporting document—*Commitments of Postdoctoral Scholars and Supervisors*—available at *www.mcgill.ca/gps/postdocs/fellows/responsibilities*). This should stipulate, for example, the purpose of the postdoctoral appointment (research training and the advancement of knowledge), the duration of the fellowship/financial support, the modality of pay, the work space, travel funds, and expectations and compensation for teaching and student research supervision. Leaves from postdoctoral education must comply with the Graduate and Postdoctoral Studies Policies for Vacation, Parental/Familial, and Health Leave (see *section 8.3: Vacation Policy for Graduate Students and Postdocs* and *University Regulations and Resources* > *Graduate* > *Regulations* > *Categories of Students* > *: Leave of Absence Status*). Any breach of these conditions may result in grievance procedures or the termination of the postdoctoral appointment.

iv. Postdocs with full responsibility for teaching a course should be compensated over and above their fellowship at the standard rate paid to lecturers by their department. This applies to all postdocs, e

vii. Some examples of the responsibilities of the University are:

- to register Postdocs;
- to provide an appeal mechanism in cases of conflict;
- to provide documented policies and procedures to Postdocs;
- to provide Postdocs with the necessary information on McGill University student services.

Approved by Senate, April 2000; revised May 2014

8.3 Vacation Pay for Graduate Students and Postdocs

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

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

section 11.1.5 Master of Architecture (M.Arch.); Professional (Non-Thesis) Ð Design Studio (45 credits)

term. Complementary and elective course offerings are organized to provide flexibility in individual program design and provide opportunities for students to both explore the discipline and develop concentrations in subject areas related to research and design interests.

For further information regarding admission eligibility and requirements, please see: *www.mcgill.ca/architecture/programs/professional*.

section 11.1.6 Master of Architecture (M.Arch.); Professional (Non-Thesis) Ð Design Studio-Directed Research (60 credits)

The Design Studio Directed Research concentration is a 60-credit four-term (Fall, Winter, Summer, Fall) program that complements the regular 45-credit three-term concentration with a two-term project-based investigation divided into two parts. The first part is a supervised 12-credit individual research project that leads to a comprehensiv

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

- A comprehensive e-portfolio (pdf format, max. 15 MB, due no later than January 15) that may include the following: selected work from all 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)

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

P

M .

- Curriculum Vitae
- Applicants are required to upload unofficial transcripts of 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 *www.mcgill.ca/gradapplicants/apply/ready/submit/upload* and *www.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 (Gmail, Yahoo, etc. domains cannot be accepted). Additionally, uploaded letters must be on university or company/business stationery and the referee must indicate his/her position and full contact information at the institution. Please refer to *www.mcgill.ca/gradapplicants/apply/prepare/checklist/documents*
- Statement of research interest / Post-professional M.Arch. applicants: a one-page statement of research objectives indicating the option chosen and the reasons for that choice. Applicants should include a clear description of their research interest, as well as a brief explanation of why they wish to study at McGill University's School of Architecture. **R** , Research proposal / Ph.D. applicants: a four-page research proposal, as well as a detailed explanation of why and with whom they wish to study at McGill University's School of Architecture
- A digital portfolio (PDF format) of not more than 15 MB must be submitted containing at least five examples of the applicant's work. Doctoral applicants should submit evidence of research accomplishments, which could, in some cases, replace the portfolio requirement.
- Writing sample / Post-professional M.Arch. applicants: a recent sample of the applicant's written work, on any topic (not necessarily within the desired field of graduate study) and not necessarily previously submitted for evaluation or publication. **R** , Written w

[illegible]

Martin Bressani (*Post-professional program*)

David Covo (*Professional program*)

[illegible]

Bruce Anderson; B.Arch.(McG.), M.Arch.(Harv.), F.R.A.I.C., O.A.Q.

term. Complementary and elective courses are organized to provide flexibility in individual program design and create opportunities to both explore the discipline and focus on subject areas related to research and design interests.

Required Courses (32 credits)

ARCH 550	(3)	Urban Planning and Development
ARCH 672	(6)	Architectural Design 1
ARCH 673	(6)	Architectural Design 2
ARCH 674	(3)	Professional Practice 1
ARCH 677	(9)	Architectural Design 3
ARCH 678	(3)	Advanced Construction
ARCH 680	(2)	Field Sketching

Complementary Courses

10-13 credits selected as follows:

Group A:

3-13 credits chosen from the following courses:

ARCH 523	(3)	Significant Texts and Buildings
ARCH 525	(3)	Seminar on Analysis and Theory
ARCH 531	(3)	Architectural Intentions Vitruvius - Renaissance
ARCH 532	(3)	Origins of Modern Architecture
ARCH 626	(4)	Critical Design Strategies
ARCH 684	(4)	Contemporary Theory 1
ARCH 685	(4)	Contemporary Theory 2

Group B:

0-10 credits chosen from the following courses:

ARCH 512	(3)	Architectural Modelling
ARCH 514	(4)	Community Design Workshop
ARCH 515	(3)	Sustainable Design
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 521	(3)	Structure of Cities
ARCH 526	(3)	Philosophy of Structure
ARCH 527	(3)	Civic Design
ARCH 528	(3)	History of Housing
ARCH 529	(3)	Housing Theory
	(3)	New Approaches to Architectural History

Note: Courses taken are to be used to fulfil one group only.

Elective Courses

0-3 credits

Up to 3 credits (at the 500 or 600 level) may be taken outside the School of Architecture, with the approval of an assigned faculty adviser.

11.1.6 Master of Architecture (M.Arch), Professional (Non-Thesis) – Design Studio-Directed Research (60 credits)

The Directed Research concentration is a 60-credit four-term (Fall, Winter, Summer, Fall) program that complements the regular 45-credit three-term concentration with a supervised 12-credit individual research report in the summer term. This forms the basis of the terminal design studio in the fourth (Fall) term. Each student is assigned a faculty adviser in the second term and follows a research-intensive curriculum shaped by complementary and elective courses chosen in consultation with, and approved by, the adviser.

Required Courses (48 credits)

ARCH 550	(3)	Urban Planning and Development
ARCH 626	(4)	Critical Design Strategies
ARCH 672	(6)	Architectural Design 1
ARCH 673	(6)	Architectural Design 2
ARCH 674	(3)	Professional Practice 1
ARCH 676	(12)	Directed Research Report
ARCH 678	(3)	Advanced Construction
ARCH 680	(2)	Field Sketching
ARCH 683	(9)	Directed Research Project 2

Complementary Courses

(9-12 credits)

Group A:

3-12 credits chosen from the following courses:

ARCH 523	(3)	Significant Texts and Buildings
ARCH 525	(3)	Seminar on Analysis and Theory
ARCH 531	(3)	Architectural Intentions Vitruvius - Renaissance
ARCH 532	(3)	Origins of Modern Architecture
ARCH 562	(3)	Innovative Homes and Communities
ARCH 602	(4)	Housing Seminar
ARCH 604	(4)	Urban Design Seminar
ARCH 684	(4)	Contemporary Theory 1
ARCH 685	(4)	Contemporary Theory 2

Group B:

0-9 credits chosen from the following courses:

ARCH 512	(3)	Architectural Modelling
ARCH 514	(4)	Community Design Workshop
ARCH 515	(3)	Sustainable Design
ARCH 517	(3)	Sustainable Residential Development
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 521	(3)	Structure of Cities

ARCH 525	(3)	Seminar on Analysis and Theory
ARCH 526	(3)	Philosophy of Structure
ARCH 527	(3)	Civic Design
ARCH 528	(3)	History of Housing
ARCH 529	(3)	Housing Theory
ARCH 531	(3)	Architectural Intentions Vitruvius - Renaissance
ARCH 532	(3)	Origins of Modern Architecture
ARCH 533	(3)	New Approaches to Architectural History
ARCH 535	(3)	History of Architecture in Canada
ARCH 536	(3)	Heritage Conservation
ARCH 540	(3)	Selected Topics in Architecture 1
ARCH 541	(3)	Selected Topics in Architecture 2
ARCH 562	(3)	Innovative Homes and Communities
ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar
ARCH 602	(4)	Housing Seminar
ARCH 604	(4)	Urban Design Seminar
ARCH 622	(4)	Critical Writing
ARCH 627	(4)	Research Methods for Architects
ARCH 679	(3)	Writing in Architecture
ARCH 684	(4)	Contemporary Theory 1
ARCH 685	(4)	Contemporary Theory 2
ARCH 688	(3)	Directed Research 1
ARCH 689	(3)	Directed Research 2

Note: Courses taken are to be used to fulfil one group only.

Unless otherwise indicated, the above courses are restricted to students in the professional area.

Elective Courses

(0-3 credits)

Up to 3 credits (at the 500 or 600 level) may be taken outside the School of Architecture with the approval of an assigned faculty adviser.

11.1.7 Master of Architecture (MArch), Post-professional (Non-Thesis) – Architectural History and Theory (45 credits)

The history and theory program pursues intellectual inquiries in the history of architecture, focusing upon the discipline's continually changing theoretical framework. It aims to advance knowledge and foster ethical reflections in architecture through critical historical research into the philosophical, political, cultural, and technological contexts of the discipline. The one-year, three semester program is suited to recent graduates of professional architecture programs and experienced practitioners who wish to explore the complex connections among history, theory, and design; it also provides a thorough preparation for

Required Courses (27 credits)

ARCH 622	(4)	Critical Writing
ARCH 623	(3)	Project Preparation
ARCH 651	(6)	Architectural History and Theory Seminar 1
ARCH 652	(4)	Architectural History and Theory Seminar 2
ARCH 653	(4)	Architectural History and Theory Seminar 3
ARCH 654	(6)	Architectural History and Theory Seminar 4

Elective Courses (6 credits)

Any course at the 500- or 600- level, with the approval of the School.

11.1.8 Master of Architecture (M.Arch), Post-professional (Non-Thesis) - Cultural Mediations and Technology (45 credits)

Drawing on methods in philosophy, media studies, cultural landscapes, vernacular architecture studies, and material culture, students in this option study the ways in which we conceptualize and realize the built world. How are architectural practices mediated by their broader contexts?

This option capitalizes on the expertise of the architect-researcher to move freely between art and science and between content-based and empirical research, and to facilitate robust interdisciplinary teams of engineers, technologists, media artists, and social scientists to understand, explain, and create today's built environments.

Research Report (15 credits)

ARCH 629	(15)	Cultural Mediations and Technology Research Report

Required Courses (15 credits)

ARCH 623	(3)	Project Preparation
ARCH 627	(4)	Research Methods for Architects
ARCH 684	(4)	Contemporary Theory 1
ARCH 685	(4)	Contemporary Theory 2

Complementary Courses (15 credits)

15 credits of courses at the 500 level or higher, approved by an adviser.

11.1.9 Master of Architecture (M.Arch), Post-professional (Non-Thesis) - Urban Design and Housing (45 credits)

The Urban Design and Housing program enables students who have already completed their professional M.Arch. degree (or equivalent) to develop specialized skills for contemporary practice in housing, urban design, and the management of human settlements. The twelve-month program comprises three consecutive semesters of coursework. Intensive seminars held during the first two terms focus on contemporary theory and research methods in urban design and housing. Students take ARCH 603 Urban Design and Housing Studio as an applied synthesis of the material discussed in the two core seminars. Nine credits of complementary coursework round out the Fall and Winter terms along with ARCH 623 Project Preparation, in which students develop the strategy for a major independent project (ARCH 632 Urban Design and Housing Research Report) to be completed in the Summer term.

Research Report (15 credits)

ARCH 632	(15)	Urban Design and Housing Research Report

Required Courses (21 credits)

ARCH 602	(4)	Housing Seminar
ARCH 603	(6)	Urban Design and Housing Studio
ARCH 604	(4)	Urban Design Seminar
ARCH 623	(3)	Project Preparation

ARCH 627	(4)	Research Methods for Architects

Group A Complementary Courses (9 credits)

6-9 credits from the following:

ARCH 514	(4)	Community Design Workshop
ARCH 517	(3)	Sustainable Residential Development
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 521	(3)	Structure of Cities
ARCH 529	(3)	Housing Theory
ARCH 562	(3)	Innovative Homes and Communities
ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar

Group B Complementary Courses

0-3 credits from any courses at the 500 level or higher, approved by an adviser.

11.1.10 Doctor of Philosophy (Ph.D.); Architecture

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

ARCH 700	(0)	Dissertation Proposal
ARCH 701	(0)	Final Dissertation Proposal and Literature Review
ARCH 702	(0)	Dissertation Progress Report 1
ARCH 703	(0)	Dissertation Progress Report 2

11.2 Biological and Biomedical Engineering

11.2.1 Location

Duff Medical Building
3775 University Street, Room 316
Montreal QC H3A 2B4
Canada

Website: *www.mcgill.ca/bbme*

11.2.2 About Biological and Biomedical Engineering

Programs in biological and biomedical engineering will be offered jointly by the Faculty of Engineering and the Faculty of Medicine as of January 2016.

11.3 Chemical Engineering

11.3.1 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: *gradinfo.chemeng@mccgill.ca*
Website: *www.mcgill.ca/chemeng*

11.3.2 About Chemical Engineering

The Department offers programs leading to the [illegible] and the [illegible] degrees.

The Department's offices and research laboratories are located in the M.H. Wong Building. Collectively, 17 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.

[illegible] – 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.

[illegible] – 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;
- products such as bacteriophages for alternative treatment techniques.

[illegible] – 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;
- plasma technology to produce nanomaterials for energy conversion/storage devices.

[illegible] – 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;
- development of biosensors for pollutant detection.

Plasma – 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

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.

11.3.3.2 Application Procedure

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

See *: Application Procedures* for detailed application procedures.

11.3.3.2.1 Additional Requirements

- Reference Letter – Ph.D. applicants must submit a letter of recommendation from their master's research supervisor.

11.3.3.3 Application Deadlines

The application deadlines listed here are set by graduate departments, 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 *www.mcgill.ca/gps/contact/graduate-program*.

[illegible]	[illegible]	[illegible]
Fall: Jan. 15	Fall: Jan. 15	Fall: Jan. 15
Winter: Oct. 15	Winter: Sept. 15	Winter: Same as Canadian/International

[illegible]

P.-Luc Girard-Lauriault; B.Sc.(Montr.), Ph.D.(cole Poly ., Montr.)

Jeff Gostick; B.Eng.(Ryerson), M.A.Sc., Ph.D.(Wat.)

Corinne Hoesli; B.Sc., B.A.Sc.(Ott.), Ph.D.(Br. Col.), ing. jr.

Anne-Marie Kietzig; Dipl.Ing.(TU Berlin), Ph.D.(Br. Col.)

Jan Kopyscinski; Dipl.Ing.(BTU Cottbus), Dr.Sc.(ETH Zurich)

Christopher Moraes; B.A.Sc., Ph.D.(Tor.)

[illegible]

W.J. Murray Douglas; B.Sc.(Qu.), M.S.E., Ph.D.(Mich.)

11.3.5 Master of Engineering (M.Eng.), 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

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.

11.3.6 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

(13.CHEE 651Publish 18Jul.863, rsesr

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.

11.3.7 Master of Engineering (M.Eng.), Chemical Engineering (Non-Thesis) – Environmental Engineering (45 credits)

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)	Biological Treatment: Wastewaters
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

Enviornmental impact (3 credits)

GEOG 501	(3)	Modelling Environmental Systems

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

11.4 Civil Engineering and Applied Mechanics

11.4.1 Location

Department of Civil Engineering and Applied Mechanics
Macdonald Engineering Building, Room 492
817 Sherbrooke Street West
Montreal QC H3A 0C3
Canada

Telephone: 514-398-6858
Fax: 514-398-7361
Email: *gradinfo.civil@mcgill.ca*
Website: *www.mcgill.ca/civil*

11.4.2 About Civil Engineering and Applied Mechanics

11.4.3 Civil Engineering and Applied Mechanics Admission Requirements and Application Procedures

11.4.3.1 Admission Requirements

The general rules of Graduate and Postdoctoral Studies apply and are detailed in *: Graduate Admissions and Application Procedures*. The minimum academic standard for admission is a cumulative grade point average (CGPA) of 3.0/4.0 in a recognized program. Alternatively, an equivalent grade point average of no less than 3.2/4.0 over the last two years of the program will be accepted.

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 write either:

- the *TOEFL* (Test of English as a Foreign Language; preferably the Internet-based test (iBT)); Master's applicants must achieve an overall minimum score of 86 (or 567 on the paper-based test (PBT)) and Ph.D. applicants must achie

P 6

Ghyslaine McClure; B.Ing.(Montr.), S.M.(MIT), Ph.D.(Montr.), Eng.

Denis Mitchell; B.A.Sc., M.A.Sc., Ph.D.(Tor.), F.A.C.I., Eng. (*James McGill Professor*)

Van-Thanh-Van Nguyen; B.M.E.(Vietnam), M.C.E.(A.I.T.), D.A.Sc.(Montr.), Eng.

James Nicell; B.A.Sc., M.A.Sc., Ph.D.(Windsor), P.Eng.; Dean, Faculty of Engineering

A. Patrick S. Selvadurai; M.S.(Stan.), D.I.C., Ph.D., D.Sc.(Nott.), F.R.S.C., F.E.I.C., F.I.M.A., F.C.S.C.E., P.Eng., C.Math. (*William Scott Professor of Civil Engineering, James McGill Professor*)

Suresh C. Shrivastava; B.Sc.(Eng.)(Vikram), M.C.E.(Del.), Sc.D.(Col.), Eng.

P 6

Andrew J. Boyd; B.Sc.Eng.(New Br.), M.A.Sc.(Tor.), Ph.D.(Br. Col.), P.Eng., F.A.C.I.

Luc E. Chouinard; B.Ing., M.Ing.(Montr.), B.C.L.(McG.), Sc.D.(MIT), Eng.

Dominic Frigon; B.Sc., M.Sc.(McG.), Ph.D.(Ill.-Urbana-Champaign), L.L.E.

Susan J. Gaskin; B.Sc.(Eng.)(Qu.), Ph.D.(Cant.), Eng.

Ronald Gehr; B.Sc.(Eng.)(Witw.), M.A.Sc., Ph.D.(Tor.), P.Eng., F.C.S.C.E.

Subhasis Ghoshal; B.C.E.(Jadavpur), M.S.(Missouri), Ph.D.(Carn. Mell), P.Eng.

Dimitrios G. Lignos; B.Sc.(Nat. Tech., Athens), M.Sc., Ph.D.(Stan.) (*William Dawson Scholar*)

Mohamed A. Meguid; B.Sc.(Cairo), M.Sc., Ph.D.(W. Ont.), P.Eng; Associate Dean, Undergraduate Education

Luis Miranda-Moreno; B.Sc., M.Eng.(Mexico), Ph.D.(Wat.)

Colin Rogers; B.A.Sc., M.A.Sc.(Wat.), Ph.D.(Syd.), P.Eng.

Yixin Shao; B.Sc., M.S.(Tongji), Ph.D.(N'western), P.Eng., F.A.C.I.; Undergraduate Program Director

P 6

Jinxia Liu; BE/ME(Tianjin), ME(Rensselaer Poly.), Ph.D.(Purd.)

P 6

Sofia Babarutsi, Richard Edwards, John Hadjinicolaou, Charles Manatakos, Paul Rodrigue, Sandro Scola, William Taylor, Marc Villeneuve

11.4.5 Master of Engineering (M.Eng.): Civil Engineering (Thesis) (45 credits)

Thesis Courses (27 credits)

CIVE 630	(3)	Thesis Research 1
CIVE 631	(3)	Thesis Research 2
CIVE 632	(3)	Thesis Research 3
CIVE 633	(6)	Thesis Research 4
CIVE 634	(6)	Thesis Research 5
CIVE 635	(6)	Thesis Research 6

Required Course

1 credit:

CIVE 662	(1)	Masters Research Seminar

Complementary Courses (17 credits)

(minimum 17 credits)

A minimum of five courses at the 500 or 600 level, with at least 8 credits at the 600 level.

11.4.6 Master of Science (M.Sc.) Civil Engineering (Thesis) (45 credits)

Thesis Courses (27 credits)

CIVE 630	(3)	Thesis Research 1
CIVE 631	(3)	Thesis Research 2
CIVE 632	(3)	Thesis Research 3
CIVE 633	(6)	Thesis Research 4
CIVE 634	(6)	Thesis Research 5
CIVE 635	(6)	Thesis Research 6

Required Course

1 credit:

CIVE 662	(1)	Masters Research Seminar

Complementary Courses (17 credits)

A minimum of five courses at the 500 or 600 level, with at least 8 credits at the 600 level.

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

Research Project

(5-15 credits)

Credit for the project may vary between 5 and 15 credits, depending on the amount of work involved. Project courses are chosen from the following:

CIVE 691	(1)	Research Project 1
CIVE 692	(2)	Research Project 2
CIVE 693	(3)	Research Project 3
CIVE 694	(4)	Research Project 4
CIVE 695	(5)	Research Project 5
CIVE 696	(6)	Research Project 6
CIVE 697	(7)	Research Project 7

Complementary Courses

(30-40 credits)

A minimum of 30 credits at the 500 or 600 level, with at least 8 credits at the 600 level.

11.4.8 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 P1 0 0 1eb4ooThesis) — En

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
PSYC 650	(3)	Advanced Statistics 1

Toxicology:

OCCH 612	(3)	Principles of Toxicology

Water pollution engineering:

CIVE 651	(4)	Theory: Water / Wastewater Treatment
CIVE 652	(4)	Biological Treatment: Wastewaters
CIVE 660	(4)	Chemical and Physical Treatment of Waters

Air pollution engineering:

MECH 534	(3)	Air Pollution Engineering

Soil and water quality management:

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

Enviornmental impact:

GEOG 501	(3)	Modelling Environmental Systems
GEOG 551	(3)	Environmental Decisions

Enviornmental policyc

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, Religious Studies, Sociology, and McGill School of Environment.

11.4.9 Doctor of Philosophy (PhD.); 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 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.

- Solid state facilities include measurement equipment for magnetic and electric properties of materials, vacuum deposition, and RF sputtering systems.
- The *Computational Electromagnetics Laboratory* provides tools for numerical analysis, visualization, interface design, and knowledge-based system development.
- There is also a well-equipped laboratory for power electronics and power systems research.

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 Montr al* (CRIM) and the University Computing Centre.

There are three other universities in Montreal: Concordia University is the other English-language university; *l'Universit de Montr al*, and its affiliated school of engineering, *l' cole P olytechnique*, is the largest francophone university; *l'Universit du Qu bec* 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-Qu bec* (IREQ) and *l'Institut national de la recherche scientifique* (INRS).

[illegible]

[illegible] 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 67.52 5eAdm u8 Tm(F

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 Applicants who have not completed a degree (undergraduate or graduate) in Canada must provide a *GRE* score on the General Aptitude Test. Applicants must achieve a combined score of at least 1100 on the verbal and quantitative sections and a minimum score of 3.5/6.0 on the analytical writing assessment section of the GRE General Test, or score at least 145/170 on the verbal section, 155/170 on the quantitative section and 3.5/6.0 on the analytical writing assessment of the GRE Revised General Test.

Minimum 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 or Computer Engineering or a closely allied field. An applicant holding a degree in another field of engineering or science will be considered b

[illegible]

Eric L. Adler; B.Sc.(Lond.), M.A.Sc.(Tor.), Ph.D.(McG.), F.I.E.E.E., Eng.

Pierre R. B langer; B.Eng.(McG.), S.M., Ph.D.(MIT), F .I.E.E.E., Eng.

Maier L. Blostein; B.Eng., M.Eng.(McG.), Ph.D.(Ill.), F.I.E.E.E., Eng.

Clifford H. Champness; M.Sc.(Lond.), Ph.D.(McG.)

Gerry W. Farnell; B.A.Sc.(Tor.), S.M.(MIT), Ph.D.(McG.), F.I.E.E.E., Eng.

Francisco D. Galiana; B.Eng.(McG.), S.M., Ph.D.(MIT), F.I.E.E.E., Eng.

Peter Kabal; B.A.Sc., M.A.Sc., Ph.D.(Tor.)

Lorne Mason; M.Eng., Ph.D.(Sask.)

Boon-Teck Ooi; B.E.(Adel.), S.M.(MIT), Ph.D.(McG.), Eng.

Tomas J.F. Pavlasek; B.Eng., M.Eng., Ph.D.(McG.), Eng.

Nicholas C. Rumin; B.Eng., M.Sc., Ph.D.(McG.), Eng.

[illegible]

Peter E. Caines; B.A.(Oxf.), D.I.C., Ph.D.(Lond.), F.R.S.C., F.I.E.E.E., F.C.I.A.R. (*James McGill Professor and Macdonald Professor*)

Benoit Champagne; B.Eng., M.Eng.(Montr.), Ph.D.(Tor.)

Lawrence Chen; B.Eng.(McG.), M.A.Sc., Ph.D.(Tor.)

James Clark; B.Sc., Ph.D.(Br. Col.)

Frank Ferrie; B.Eng., Ph.D.(McG.)

Geza Joos; B.Sc.(C'dia), M.Eng., Ph.D.(McG.) (*CRC Chair*)

Andrew G. Kirk; B.Sc.(Brist.), Ph.D.(Lond.) (*William Dawson Scholar*)

Harry Leib; B.Sc.(Technion), Ph.D.(Tor.) (*on sabbatical 2015–2016*)

Tho Le-Ngoc; M.Eng.(McG.), Ph.D.(Ott.), F.I.E.E.E.

Martin D. Levine; B.Eng., M.Eng.(McG.), Ph.D.(Lond.), F.C.I.A.R., F.I.E.E.E., Eng.

David A. Lowther; B.Sc.(Lond.), Ph.D.(C.N.A.A.), F.C.A.E., Eng. (*James McGill Professor*)

David V. Plant; M.S., Ph.D.(Brown), F.I.E.E.E., F.O.S.A., F.E.I.C., F.C.A.E., P.Eng. (*James McGill Professor*) (*on sabbatical 2015–2016*)

Gordon Roberts; B.A.Sc.(Wat.), M.A.Sc., Ph.D.(Tor.), F.I.E.E.E., Eng. (*James McGill Professor*)

Jonathan P. Webb; B.A., Ph.D.(Cant.)

[illegible]

Tal Arbel; M.Eng., Ph.D.(McG.)

Jan Bajcsy; B.Sc.(Harv.), M.Eng., Ph.D.(Princ.)

Benoit Boulet; B.Sc.(Laval), M.Eng.(McG.), Ph.D.(Tor.) (*William Dawson Scholar*) (*Associate Dean, Research & Innovation*)

Vamsy Chodavarapu; B.Eng.(Osmania), M.S., Ph.D.(NYU)

Mark Coates; B.Eng.(Adel.), Ph.D.(Camb.)

Jeremy R. Cooperstock; A.Sc.(Br. Col.), M.Sc., Ph.D.(Tor.)

Mourad El-Gamal; B.Sc.(Cairo), M.Sc.(Nashville), Ph.D.(McG.) (*William Dawson Scholar*)

Dennis Giannacopoulos; M.Eng., Ph.D.(McG.)

Warren Gross; B.A.Sc.(Wat.), M.A.Sc., Ph.D.(Tor.)

Roni Khazaka; M.Eng., Ph.D.(Car.)

Fabrice Labeau; M.S., Ph.D.(Louvain) (*Associate Dean, Faculty Affairs*)

Steve McFee; B.Eng., Ph.D.(McG.)

Zetian Mi; B.A.Sc.(Beijing), M.Sc.(Iowa), Ph.D.(Mich.)

Hannah Michalska; B.Sc., M.Sc.(Warsaw), Ph.D.(Lond.)

Cae PRhfBT1 0 52h.:0amal: B.SH52.193 cm42.52 759.5 m569.48 759.5 l569.48 760065J5-2016 (Pu(Pu(Pu(Pu(Pu(Pu(Pu(Pu((g.48nR1 0 0 1 88.6652 4D.(T

Sam Musallam; B.Sc., M.Sc., Ph.D.(Tor.)

Milica Popovich; B.Sc.(Colo.), M.Sc., Ph.D.(N'western)

Ioannis Psaromiligkos; B.Sc.(Patras), M.Sc., Ph.D.(Buffalo)

Michael Rabbat; B.S.(Ill.), M.S.(Rice), Ph.D.(Wisc.)

Martin Rochette; B.A., M.Eng., Ph.D.(Lav

Complementary Courses

(18 credits minimum)

At least six 500-, 600-, or 700-level courses, normally with a minimum of four ECSE 500- or 600-level courses.*

* Under special circumstances, and subject to Departmental approval, students may be allowed to take more than two non-Departmental courses; a letter of recommendation from their supervisor outlining the reason for such an action is required.

Under no circumstances will more than three non-Departmental courses be permitted.

11.5.6 Master of Engineering (M.Eng.), Electrical Engineering (Thesis) – Computational Science and Engineering (47 credit

This program is under review and currently not offered.

Thesis Courses (28 credits)

ECSE 691	(4)	Thesis Research 1
ECSE 692	(4)	Thesis Research 2
ECSE 693	(4)	Thesis Research 3
ECSE 694	(4)	Thesis Research 4
ECSE 695	(4)	Thesis Research 5
ECSE 696	(4)	Thesis Research 6
ECSE 697	(4)	Thesis Research 7

Required Course (1 credit)

ECSE 670D1	(.5)	Computational Science Engineering Seminar
ECSE 670D2	(.5)	Computational Science Engineering Seminar

Complementary Courses (18 credits)

(minimum 18 credits)

Six courses at the graduate level (500 or above) are required (minimum 18 credits), with a grade of B- or better. Two courses (minimum 6 credits) from List A, and two courses (minimum 6 credits) from List B. At least two of the courses taken from Lists A and B must be from outside the Department of Electrical and Computer Engineering.

List A: Scientific Computers Courses

CIVE 602	(4)	Finite Element Analysis
COMP 522	(4)	Modelling and Simulation
COMP 540	(3)	Matrix Computations
COMP 566	(3)	Discrete Optimization 1
MATH 578	(4)	Numerical Analysis 1
MATH 579	(4)	Numerical Differential Equations

List B: Applications and Special Methods Courses

ATOC 512	(3)	Atmospheric and Oceanic Dynamics
ATOC 513	(3)	Waves and Stability
ATT	(3)	Turbulence in Atmosphere and Oceans

COMP 557	(3)	Fundamentals of Computer Graphics
COMP 558	(3)	Fundamentals of Computer Vision
COMP 567	(3)	Discrete Optimization 2
COMP 621	(4)	Program Analysis and Transformations
COMP 642	(4)	Numerical Estimation Methods
COMP 767	(4)	Advanced Topics: Applications 2
ECSE 507	(3)	Optimization and Optimal Control
ECSE 532	(3)	Computer Graphics

- bioengineering

Within these areas, specific topics of research are given in the following:

A jig

Experimental fluid mechanics and aerodynamics, aeroelasticity, and aeroacoustics; theoretical fluid mechanics; turbulence; mixing in turbulent flows; fluid flow control; fluid-structure interactions; computational fluid dynamics, multidisciplinary optimization, and computer flow visualization; heat transfer; combustion, shock wave physics, energetic materials, high-speed reacting flows, hypersonic propulsion, and alternative fuels.

e

Composite materials: structural design, analysis, manufacturing, and processing; micro/nano mechanics; MEMS/NEMS; adaptronic structures; thermomechanics, wave propagation, and computational mechanics.

b

Multibody systems, legged and wheeled vehicles, compliant mechanisms, and kinematic geometry; tethered systems, lighter-than-air craft, and underwater vehicles; spacecraft dynamics and space robotics; modelling and simulation; fluid-structure interactions, nonlinear and chaotic dynamics; dynamics of bladed assemblies.

Design theory and methodology, design optimization; biomimetics; machine tools and systems, manufacturing processes, and management and control; micro/nano machining; wear and comminution processes.

Biomechanics, biomaterials, blood and respiratory flows, mechanics of soft tissues, cardiovascular devices, image processing for medical diagnostics, voice production.

d

The Department offers programs of study leading to the M.Eng., M.Sc., and Ph.D. degrees in Mechanical Engineering. Both M.Eng. (Thesis) and M.Eng. (Non-Thesis) programs are offered.

There are several options for completing master's degrees that do not involve the completion of a thesis. The M.Eng. (Non-Thesis) program has more extensive course requirements and will appeal to students who desire to gain both a broad understanding of subjects within Mechanical Engineering as well as in-depth information in a specific area. Two other non-thesis master's degree options are described below.

section 11.6.5Master of Engineering (M.Eng.); Mebanical Engineering (Thesis) (45 credits)

The M.Eng. (Thesis) program requires the completion of 16 credits of technical complementary courses, a seminar course, and a thesis. The thesis involves advanced research supervised by one or more professors who are internationally known in their field. This program prepares students for either an industrial research career or further academic research at the Ph.D. level.

section 11.6.6Master of Engineering (M.Eng.); Mebanical Engineering (Thesis) Ð Computational Science and Engineering (46 credits)

For students who would like to concentrate on computational work for their research, the M.Eng. (Thesis) – Computational Science and Engineering (CSE) option is available. CSE is a rapidly growing multidisciplinary area with connections to the sciences, engineering, mathematics, and computer science. CSE focuses on the development of problem-solving methodologies and robust tools for the solution of scientific and engineering problems. In this program, students choose their complementary courses from within a list of scientific computing courses and courses that involve applications and specialized methods.

section 11.6.7Master of Engineering (M.Eng.); Mebanical Engineering (Non-Thesis) (45 credits)

Students in this program must complete four required courses in addition to 16 credits of 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 11.6.8Master 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, *cole P olytechnique*, *Universit Laval*, *Universit de Sherbr ooke*, and *cole de Technologie Sup rieur e*. Students registered at McGill are required to take two courses from two other institutions.

The aerospace industry is strongly estab44 STwitr3tio;1otec. RepearcntvTwif()Tjrong.939 164.14 Tm8s76.5/F6 8mp5 164.14 Tmt8939i.fo(at Mc is5 227.les,astron bee

section 11.6.8Master of Engineering (M.Eng.); Aerospace Engineering (Non-Thesis) (45 credits)

to be a full-time program, the M.Eng. Aerospace program may be completed on a part-time basis over a maximum of five years. By the time of completion of the program, graduates are extremely well-prepared to enter into a career in the aerospace industry.

Depending on their background, students would specialize in one of the four areas:

1. Aeronautics and Space Engineering
2. Avionics and Control
3. Aerospace Materials and Structures
4. Virtual Environment

section 11.6.9Master of Management (M.M.); Manufacturing Management (Non-Thesis) (56 credits)

This program is currently not offered

The Master in Manufacturing Management (M.M.M.) program attracts business professionals from around the world who wish to pursue a career in the effective management of global operations and supply chain. It is a professionally-oriented graduate program offered jointly through the Faculties of Engineering and Management, aimed at those candidates with engineering or science backgrounds.

In just eleven months of academic studies, M.M.M. students sharpen their expertise in supply chain and operations through an intensive program that includes:

- A challenging curriculum
-

11.6.3.2 Application Procedures

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

See *: Application Procedures* for detailed application procedures.

Please consult *www.mcgill.ca/mecheng/grad* for further details on required application documents.

11.6.3.2.1 Additional Requirements

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

- two official Referee Reports
- Personal Statement – one page
- Curriculum Vitae – please include a list of publications, if relevant
- proof of French proficiency (for Aerospace program only)

11.6.3.3 Application Deadlines

The application deadlines listed here are set by the Department of Mechanical 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 *www.mcgill.ca/gps/contact/graduate-program*.

[illegible]	[illegible]	[illegible]
Fall: Jan. 15	Fall: Jan. 15	Fall: Jan. 15
Winter: Oct. 15	Winter: Sept. 1	Winter: Oct. 15
Summer: N/A	Summer: N/A	Summer: N/A

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

11.6.4 Mechanical Engineering Faculty

P 6

Marco Amabili; M.Sc.(Ancona), Ph.D.(Bologna), F.A.S.M.E. (*Canada Research Chair*)

Jorge Angeles; B.Sc., M.Sc.(UNAM Mexico), Ph.D.(Stan.), Eng., F.A.S.M.E., F.C.S.M.E., F.C.A.E., F.R.S.C. (*James McGill Professor*)

Bantwal R. Baliga; B.Tech.(I.I.T. Kanpur), M.Sc.(Case West.), Ph.D.(Minn.)

Wagdi G. Habashi; B.Eng., M.Eng.(McG.), Ph.D.(Cornell), ing., F.A.S.M.E., F.A.I.A.A., F.C.A.E., F.R.S.C. (*NSERC; Lockheed Martin; Bell Helicopter Industrial Research Chair*)

Pascal Hubert; B.Eng., M.A.Sc.(cole Poly ., Montr.), Ph.D.(Br. Col.), ing. (*Warner Graupe Professor*)

John H.S. Lee; B.Eng.(McG.), M.Sc.(MIT), Ph.D.(McG.), ing., F.R.S.C., F.C.A.E.

Larry B. Lessard; B.Eng.(McG.), M.Sc., Ph.D.(Stan.), ing.

Arun K. Misra; B.Tech.(I.I.T., Kgp.), Ph.D.(Br. Col.), P.Eng., F.A.A.S., F.A.I.A.A., F.C.A.E. (*Thomas Workman Professor of Mechanical Engineering*)

Luc Mongeau; B.Sc., M.Sc.(cole Poly ., Montr.), Ph.D.(Penn St.), ing. (*Canada Research Chair*)

Meyer Nahon; B.Sc.(Qu.), M.Sc.(Tor.), Ph.D.(McG.), ing., A.F.A.I.A.A.

I. Sharf; B.A.Sc., Ph.D.(Tor.)

P 6

Francois Barthelat; M.Sc.(Roch.), Ph.D.(N'western)

Jeffrey M. Bergthorson; B.Sc.(Manit.), M.Sc., Ph.D.(Calif. Tech.), P.Eng.

Luca Cortelezzi; M.Sc., Ph.D.(Calif. Tech.)

David L. Frost; B.A.Sc.(Br. Col.), M.S., Ph.D.(Calif. Tech.), P.Eng.

AndreIl 0 1 7055Dgrhf; B.A.Sc., P.833 590.08 .Eng.

Allen Ehrlicher

Marwan Kanaan

Richard Klopp

Dan Nicolau

Amar Sabih

A minimum of 16 credits (500 level or above), at least 8 of which must be from within the Faculty of Engineering. Two courses (minimum 6 credits) from List A, and two courses (minimum 6 credits) from List B. At least two of the courses taken from Lists A and B must be from outside the Department of Mechanical Engineering. FACC courses will not count toward the complementary course credits.

List A - Scientific Computing Courses

CIVE 602	(4)	Finite Element Analysis
COMP 522	(4)	Modelling and Simulation
COMP 540	(3)	Matrix Computations
COMP 566	(3)	Discrete Optimization 1
MATH 578	(4)	Numerical Analysis 1
MATH 579	(4)	Numerical Differential Equations

List B - Applications and Specialized Methods Courses

ATOC 512	(3)	Atmospheric and Oceanic Dynamics
ATOC 513	(3)	Waves and Stability
ATOC 515	(3)	Turbulence in Atmosphere and Oceans
CIVE 572	(3)	Computational Hydraulics
CIVE 603	(4)	Structural Dynamics
COMP 557	(3)	Fundamentals of Computer Graphics
COMP 558	(3)	Fundamentals of Computer Vision
COMP 567	(3)	Discrete Optimization 2
COMP 621	(4)	Program Analysis and Transformations
COMP 642	(4)	Numerical Estimation Methods
COMP 767	(4)	Advanced Topics: Applications 2
ECSE 507	(3)	Optimization and Optimal Control
ECSE 532	(3)	Computer Graphics
ECSE 547	(3)	Finite Elements in Electrical Engineering
ECSE 549	(3)	Expert Systems in Electrical Design
MATH 555	(4)	Fluid Dynamics
MATH 560	(4)	Optimization
MATH 761	(4)	Advanced Topics in Applied Mathematics 1
MECH 533	(3)	Subsonic Aerodynamics
MECH 537	(3)	High-Speed Aerodynamics
MECH 538	(3)	Unsteady Aerodynamics
MECH 539	(3)	Computational Aerodynamics
MECH 541	(3)	Kinematic Synthesis
MECH 572	(3)	Introduction to Robotics
MECH 573	(3)	Mechanics of Robotic Systems
MECH 576	(3)	Geometry in Mechanics
MECH 577	(3)	Optimum Design
MECH 610	(4)	Fundamentals of Fluid Dynamics
MECH 620	(4)	Advanced Computational Aerodynamics
MECH 632	(4)	Advanced Mechanics of Materials
MECH 642	(4)	Advanced Dynamics

MECH 650	(4)	Fundamentals of Heat Transfer
MECH 654	(4)	Compt. Fluid Flow and Heat Transfer

11.6.7 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)

MECH 605	(4)	Applied Mathematics 1
MECH 610	(4)	Fundamentals of Fluid Dynamics
MECH 632	(4)	Advanced Mechanics of Materials
MECH 642	(4)	Advanced Dynamics

Complementary Courses (16 credits)

A minimum of 16 credits (500, 600, or 700 level) from the Faculty of Engineering may be selected by the student, based on interest and the choice of area of concentration. Courses at the graduate level from other faculties may also be taken, with prior approval from the student's project supervisor and the Graduate Program Director. A maximum of 3 credits of FACC courses at the 500, 600, or 700 level may be credited toward the degree.

11.6.8 Master of Engineering (M.Eng.), Aerospace Engineering (Non-Thesis) (45 credits)

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

MECH 627	(9)	Manufacturing Industrial Stage
MECH 628	(2)	Manufacturing Case Studies
MECH 629	(1)	Manufacturing Industrial Seminar
MGSC 602	(3)	Strategic Management of Operations
MGSC 603	(3)	Logistics Management
MGSC 605	(3)	Total Quality Management
MGSC 608	(3)	Data Decisions and Models
MGSC 631	(3)	Analysis: Production Operations

Complementary Courses (26 credits)

8 credits from General Business & Management Training

6 credits from General Business & Management

12 credits from Manufacturing & Supply Chain

General Business & Management Training (8 credits)

8 credits from Group A or Group B:

Group A

MGCR 651	(4)	Managing Resources
MGCR 652	(4)	Value Creation

Group B

MGCR 611	(2)	Financial Accounting
MGCR 612	(2)	Organizational Behaviour
MGCR 616	(2)	Marketing
MGCR 641	(2)	Elements of Modern Finance 1

General Business & Management

6 credits from the following:

MGSC 615	(3)	Procurement and Distribution

11.6.10 Master of Science (M.Sc.), Mechanical Engineering (Thesis) (45 credits)

Applicants who hold an undergraduate degree in a non-Engineering discipline – typically the Physical Sciences – may apply for the M.Sc. (Thesis) program, which is governed by the same regulations as the M.Eng. (Thesis) program.

Thesis Courses (28 credits)

MECH 691*	(3)	M.Eng. Thesis Literature Review
MECH 692	(4)	M.Eng. Thesis Research Proposal
MECH 693	(3)	M.Eng. Thesis Progress Report 1
MECH 694	(6)	M.Eng. Thesis Progress Report 2
MECH 695	(12)	M.Eng. Thesis

* 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.

11.6.11 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. de

Email: *barbara.hanley@mcgill.ca*
Website: *www.mcgill.ca/minmat*

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

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

11.7.2 About Mining and Materials Engineering

Graduate programs leading to the M.Eng., M.Sc., and Ph.D. research degrees are available in the areas of:

- Geomechanics;
- Mining Environments;
- Strategic Mine Planning and Optimization;
- Stochastic Modelling;
- Operations Research;
- Mineral Economics;
- Materials Handling;
- Process Metallurgy;
- Computational Thermodynamics;
- Hydrometallurgy;
- Effluent and Waste Treatment;
- Mineral Processing;
- Metal Casting and CFD Modelling;
- Surface Engineering;
- Composites;
- Ceramics;

been in the master's program for less than 12 months;

passed with the minimum CGPA of 3.6 at least three of the required master's courses, and given one seminar with a minimum grade of A-;

made good progress with their research;

11.7.3.3 Application Deadlines

The application deadlines listed here 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 *www.mcgill.ca/gps/contact/graduate-program*

MIME 673	(6)	Mining Engineering Seminar

Required Courses (12 credits)

Four 3-credit courses or the equivalent.

11.7.6 Master of Science (M.Sc.) Mining and Materials Engineering (Thesis) (45 credits)

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 Seminar (6 credits)

One of the following:

Note: MIME 672D1 and MIME 672D2 should be taken concurrently.

MIME 670	(6)	Research Seminar 1
MIME 672D1	(3)	Rock Mechanics Seminar
MIME 672D2	(3)	Rock Mechanics Seminar
MIME 673	(6)	Mining Engineering Seminar

Required Courses (12 credits)

Four 3-credit courses at the graduate level or the equivalent.

11.7.7 Master of Engineering (M.Eng.) Mining and Materials Engineering (Non-Thesis) (45 credits)

Students registered in this program specialize either in Mining Engineering or Materials Engineering.

Research Project

(6-15 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)

One of the following courses:

MIME 670	(6)	Research Seminar 1
MIME 673	(6)	Mining Engineering Seminar

Complementary Courses

(24-33 credits)

12 credits of 500-, 600-, or 700-level MIME courses.

12 to 21 credits of 500-, 600-, or 700-level courses from within or, subject to Departmental approval, outside the Department.

11.7.8 Master of Engineering (M.Eng.) - Mining and Materials Engineering (Non-Thesis) - Environmental Engineering (45 credits)

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

Research Project (6 credits)

MIME 628	(6)	Mineral Engineering Project 1

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)	Biological Treatment: Wastewaters
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

Enviornmental Impact Course

One of the following courses:

GEOG 501	(3)	Modelling Environmental Systems
GEOG 551	(3)	Environmental Decisions

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

Enviornmental Poliyc Course

URBP 506	(3)	Environmental Policy and Planning

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

Elective Cseus (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 Mining and Materials Engineering is the following:

MIME 629	(6)	Mineral Engineering Project 2

11.7.9 Doctor of Phil osy (PhD.); Mi ni ng and Mat er i al s Engi nee r i ng

A candidate for this degree must pass a minimum of two courses assigned by the Department. These are selected on the basis of the student's previous academic training and research interests. The candidate is required to participate in an appropriate Research Seminar course and is expected to take a preliminary examination within the first year of his/her Ph.D. registration.

The candidate must submit an acceptable thesis based upon successfully completed research and must satisfy the examiners in an oral examination of the thesis.

Thesi s

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.

11.7.10 Gr aduat e Di pl oma i n Mi ni ng Engi nee r i ng (30 cr edi t s)

Requi r ed Cseu (6 cr edi t s)

MIME 673	(6)	Mining Engineering Seminar

Complementay Courses (24 cr edi t s)

24 credits selected in consultation with the Program Adviser.

11.8 Ur banPl ami ng

11.8.1 Locat i on

School of Urban Planning
Macdonald Harrington Building, Room 400
815 Sherbrooke Street West
Montreal QC H3A 0C2
Canada

Telephone: 514-398-4075
Fax: 514-398-8376

Email: *admissions.planning@mcgill.ca*
Website: *www.mcgill.ca/urbanplanning*

11.8.2 About Urban Planning

Urban planning is the process by which a community shapes its environment to meet its needs and realize its aspirations. Urban planning is also the profession of those who facilitate this process. While the practice of planning is as old as the cities themselves, the Urban Planning profession is only about a century old. In the late 19th and early 20th centuries, architects, landscape architects, engineers, government reformers, lawyers, public health specialists, and others joined forces to tackle the serious social and environmental problems of the industrial city. They created ne

David Farley; B.Arch.(McG.), M.Arch., M.C.P.(Harv.)

Jane Matthe

Required Internship (6 credits)

URBP 628	(6)	Practical Experience

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
ARCH 517	(3)	Sustainable Residential Development
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar
CIVE 540	(3)	Urban Transportation Planning
CIVE 561	(3)	Urban Activity, Air Pollution, and Health
GEOG 504	(3)	Industrial Restructuring - Geographic Implications
GEOG 525	(3)	Asian Cities in the 21st Century
URBP 501	(2)	Principles and Practice 1
URBP 504	(3)	Planning for Active Transportation
URBP 505	(3)	Geographic Information Systems
URBP 506	(3)	Environmental Policy and Planning
URBP 507*	(3)	Planning and Infrastructure
URBP 519*	(6)	Sustainable Development Plans
URBP 520*	(3)	Globalization: Planning and Change
URBP 530	(3)	Urban Environmental Planning
URBP 536	(2)	Current Issues in Transportation 1
URBP 537	(2)	Current Issues in Transportation 2
URBP 551	(3)	Contemporary Metropolitan Landscapes
URBP 556	(3)	Urban Economy: A Spatial Perspective
URBP 604	(3)	Urban Design Seminar 2: Advanced Topics
URBP 608	(3)	Advanced GIS Applications
URBP 619	(3)	Land Use and Transportation Planning
URBP 620	(3)	Transportation Economics
URBP 625	(2)	Principles and Practice 2
URBP 626	(2)	Principles and Practice 3
URBP 629	(3)	Cities in a Globalizing World
URBP 634*	(3)	Planning Water Resources in Barbados
URBP 651	(3)	Redesigning Suburban Space
URBP 656	(3)	Urban Innovation and Creativity

* Courses open only to students enrolled in the Barbados Field Study Semester during the fall term of their second year in the program. With this option, URBP 519 is substituted for URBP 624. Coursework must include URBP 507, URBP 520, and URBP 634. All other requirements for the M.U.P. degree apply.

Group B

0-9 credits from the following:

Students may take up to 9 credits of coursework offered at the 500 or 600 levels by any academic unit at McGill or at 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, with the approval of the School. 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.

Master of Urban Planning (80.3m1 0 0 1 80.4060 0 le

0-6 credits

Students may take up to six credits of coursework at the 500 or 600-level 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, sociolgy, 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.

11.8.7 Master of Urban Planning (MUP); Urban Planning (Non-Thesis) – Urban Design (66 credits)

This program is currently not offered.

The Urban Design concentration in the professionally-accredited M.U.P. degree enables students to specialize in this area of scholarship and professional practice in their second year of studies. Three studio courses, an internship, two intensive seminar courses, and a final Supervised Research Project in Urban Design enable students to prepare for professional practice as urban design specialists skilled in analysis and design development for existing (sub)urban landscapes and newly urbanizing contexts. This option is open to students with a professional and/or undergraduate degree in Architecture, Landscape Architecture, Environmental Design, Urban Planning, or related fields. Qualified applicants are admitted to the core M.U.P. program and then apply to be placed in the concentration at the end of their first year of study. Successful applicants must meet the admission requirements for the core M.U.P. program and also demonstrate visual acuity, spatial literacy, and skills in graphic communication during their first two terms of study.

Research Project (15 credits)

URBP 630	(3)	Supervised Research Project 1
URBP 631	(6)	Supervised Research Project 2
URBP 632	(6)	Supervised Research Project 3

Required Internship (6 credits)

URBP 628	(6)	Practical Experience

Required Courses (33 credits)

URBP 602	(3)	Issues in Urban Design
URBP 604	(3)	Urban Design Seminar 2: Advanced Topics
URBP 609	(3)	Planning Graphics
URBP 612	(3)	History and Theory of Planning
URBP 622	(6)	Planning Studio 1
URBP 623	(3)	Planning Studio 2
URBP 624	(6)	Planning Studio 3
URBP 633	(3)	Research Methods for Planners
URBP 635	(3)	Planning Law

Complementary Courses

9-12 credits from the following including at least one ARCH course and one URBP course:

ARCH 515	(3)	Sustainable Design
ARCH 520	(3)	Montreal: Urban Morphology
ARCH 521	(3)	Structure of Cities
ARCH 527	(3)	Civic Design
ARCH 561	(3)	Affordable Housing Seminar 1
ARCH 562	(3)	Innovative Homes and Communities
ARCH 566	(3)	Cultural Landscapes Seminar
URBP 504	(3)	Planning for Active Transportation
URBP 506	(3)	Environmental Policy and Planning

URBP 530	(3)	Urban Environmental Planning
URBP 616	(3)	Selected Topics 1
URBP 619	(3)	Land Use and Transportation Planning

0-3 credits can be selected from other courses at the 500 or 600 levels in any academic unit at McGill or at another university, subject to the approval of the School.

ARCH 515	(3)	Sustainable Design
ARCH 528	(3)	History of Housing
ARCH 529	(3)	Housing Theory
ARCH 550	(3)	Urban Planning and Development
URBP 501	(2)	Principles and Practice 1
URBP 505	(3)	Geographic Information Systems
URBP 530	(3)	Urban Environmental Planning
URBP 607	(3)	Reading Course: Urban Planning
URBP 617	(3)	Selected Topics 2
URBP 618	(3)	Selected Topics 3
URBP 619	(3)	Land Use and Transportation Planning
URBP 625	(2)	Principles and Practice 2
URBP 626	(2)	Principles and Practice 3
URBP 629	(3)	Cities in a Globalizing World