Faculty of Engineering, including Peter Guo-hua Fu School of Architecture and School of Urban Planning (Graduate)

Programs, Courses and University Regulations

2020-2021

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

1 . McGill University reserves the right to mak

Publication Information

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

1 Dean's Welcome

To Graduate Students and Postdoctoral Fellows:

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. We take a holistic approach to graduate student success; we support not only your academic development, but also your career-planning and professional de

4 Graduate Studies at a Glance

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

5 Program Requirements

Refer to *University Regulations & Resources* > *Graduate* > *Regulations* > *: Program Requirements* for graduate program requirements for the following:

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

6 Graduate Admissions and Application Procedures

Please refer to *University Regulations & Resources* > *Graduate* > *: Graduate Admissions and Application Procedures* for information on:

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

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

7 Fellowships, Awards, and Assistantships

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

8 Postdoctoral Research

Students must inform themselves of University rules and regulations and keep abreast of any changes that may occur. The *Postdoctoral Research* section of thissec46j1 0 g/F 276.883 462.7j1 0 0 86N0 g/F 276.883 462.7j1 0 0 86565 Tm(g)de0 0l276(c)Tj1 0 0scholars will85.71 Tm ETa

8.2 Guidelines and Policy for Academic Units on Postdoctoral Education

Every unit hosting postdocs should apply institutional policies and procedures for the pro

i. Postdocs are subject to the responsibilities outlined at *www.mcgill.ca/students/srr* and must abide by the policies listed at *www.mcgill.ca/secretariat/policies-and-regulations*.

ii. Each academic unit hosting postdocs should clearly identify postdocs' needs and the means by which they will be met by the unit.

iii. Each academic unit should assess the availability of research supervision facilities, office space, and research funding before recruiting postdocs.

iv. Some examples of the responsibilities of the academic unit are:

- to verify the postdoc's eligibility period for registration;
- to provide postdocs with departmental policy and procedures that pertain to them;
- to facilitate the registration and appointment of postdocs;
- to assign departmental personnel the responsibility for postdoctoral affairs in the unit;
- to oversee and sign off on the Letter of Agreement for Postdoctoral Education;
- to ensure that each postdoc has a supervisor, lab and/or office space, access to research operating costs and necessary equipment;
- to include postdocs in departmental career and placement opportunities;
- to refer postdocs to the appropriate University policies and personnel for the resolution of conflict that may arise between a postdoc and a supervisor.

v. Some examples of the responsibilities of the supervisor are:

- to uphold and transmit to their postdocs the highest professional standards of research and/or scholarship;
- to provide research guidance;
- to meet regularly with their postdocs;
- to provide feedback on research submitted by the postdocs;
- to clarify expectations regarding intellectual property rights in accordance with the University's policy;
- to provide mentorship for career development;
- to prepare, sign, and adhere to a Letter of Agreement for Postdoctoral Education.

vi. Some examples of the responsibilities of postdocs are:

- to inform themselves of and adhere to the University's policies and/or regulations for postdocs as outlined at *www.mcgill.ca/gps/postdocs*, *www.mcgill.ca/students/srr* and the Graduate and Postdoctoral Studies *University Regulations and Resources*;
- to submit a complete file for registration to Enrolment Services;
- to sign and adhere to their Letter of Agreement for Postdoctoral Education;
- to communicate regularly with their supervisor;
- to inform their supervisor of their absences.

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

- to register postdocs;
- to provide an appeal mechanism in cases of conflict;
- to provide documented policies and procedures to postdocs;
- to provide postdocs with the necessary information on McGill University student services (Postdoctoral Fellows and Scholars) and HR policies and guidelines (Postdoctoral Researchers).

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

8.3 Vacation Policy for Graduate Students and Postdocs

Graduate students and Postdocs should normally be entitled to vacation leave equiv

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

8.5 Postdoctoral Research Trainees

Eligibility

If your situation does not conform to the Government of Quebec's definition of a Postdoctoral Fellow, you may be eligible to attend McGill as a Postdoctoral Research Trainee. While at McGill, you can perform research only (you may not re

10 Graduate Student Services and Information

Graduate students are encouraged to refer to *: Student Services and Information* for information on the following topics:

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

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

Refer to *University Regulations & Resources* > *Graduate* > *: Research Policy and Guidelines* for information on the following:

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

12 Browse Academic Units & Programs

The programs and courses in the following sections have been approved for the 2020–2021 session as listed. The Faculty/School reserves the right to introduce changes as may be deemed necessary or desirable at any time throughout the year.

12.1 Architecture

12.1.1 Location

Peter Guo-hua Fu School of Architecture
Macdonald-Harrington Building
815 Sherbrooke Street West
Montreal QC H3A 0C2
Canada
Telephone: 514-398-6700
Website: *www.mcgill.ca/architecture*

About P

A working knowledge of a language or languages relevant to the area of research is required.

12.1.3.2 Application Procedures

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

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

12.1.3.2.1 Additional Requirements

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

Professional Master of Architecture:

- Summary of work experience. A minimum of 16 weeks of work experience is required. Further information and guidelines are provided at *www.mcgill.ca/architecture/programs/professional/workexperience*. Please use the following: *Work Experience Form* [.pdf]*

  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 *www.mcgill.ca/gradapplicants/apply/ready/submit/upload* and *www*

- 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 Peter Guo-hua Fu School of Architecture. Applicants to the Post-professional M.Arch. program are strongly encouraged to become familiar with the research interests of the faculty before submitting an application and may indicate a preference for an adviser. If no preference is indicated, an adviser will be assigned prior to Fall registration. **OR**, 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 Peter Guo-hua Fu 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. **OR**, Written work (*Ph.D. applicants*): 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* (Test of English as a Foreign Language) or *IELTS* (International English Language Testing Systems) Office. An institutional version of the TOEFL is not acceptable. Applications will not be considered if a TOEFL or IELTS test result is not available. For the TOEFL, a minimum overall score of 86 is required on the Internet-based test (iBT; 567 on the paper-based test (PBT)), with each component score (i.e., reading, writing, speaking, listening) not less than 20. (The TOEFL Institution Code for McGill University is 0935.) For the IELTS, a minimum overall band score of 6.5 is required. For further information, please refer to *www.mcgill.ca/gradapplicants/international/apply/proficiency*.

* *These documents are available in PDF or DOC format on the Peter Guo-hua Fu School of Architecture website.*

12.1.3.3 Application Dates and Deadlines

Application opening dates are set by Enrolment Services in consultation with Graduate and Postdoctoral Studies (GPS), while application deadlines are set by the Peter Guo-hua Fu School of Architecture 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*.

	Application Opening Dates	**Application Deadlines**			
	All Applicants	**Non-Canadian citizens**	**Canadian citizens/Perm. residents of Canada**	**Current McGill Students (any citizenship)**	**Special, Visiting & Exchange**
Fall Term:	Sept. 15	• Dec. 15 (M.Arch. Professional) • Jan. 15 (Ph.D.)	• Dec. 15 (M.Arch. Professional) • Jan. 15 (Ph.D.)	• Dec. 15 (M.Arch. Professional) • Jan. 15 (Ph.D.)	May 1 (M.Arch.(Professional) only)
Winter Term:	Feb. 15	N/A	N/A	N/A	Sept. 1 (M.Arch.(Professional) only)
Summer Term:	N/A	N/A	N/A	N/A	N/A

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

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

12.1.4 Architecture Faculty

Director

Emeritus Professors

Derek Drummond; B.Arch.(McG.), F.R.A.I.C., O.A.Q., O.A.A. (*William C. Macdonald Emeritus Professor of Architecture*)

Adrian Sheppard; B.Arch.(McG.), M.Arch.(Yale), A.A.P.P.Q., F.R.A.I.C., O.A.Q.

Radoslav Zuk; B.Arch.(McG.), M.Arch.(MIT), D.Sc.(UAA), F.R.A.I.C., O.A.Q., O.A.A.

Associate Professors (Post-Retirement)

Ricardo L. Castro; B.Arch.(Los Andes, Col.), M.Arch., M.A.(Ore.), F.R.A.I.C., R.C.A.

Robert Mellin; B.Arch., M.Sc.(Arch.)(U Penn), M.Arch.(McG.), Ph.D.(U Penn), N.L.A.A., F.R.A.I.C., R.C.A.

Pieter Sijpkes; B.Sc.(Arch), B.Arch.(McG.)

Professors

Annmarie Adams; B.A.(McG.), M.Arch., Ph.D.(Calif., Berk.), M.R.A.I.C. (*Stevenson Chair in the History and Philosophy of Science*)

Vikram Bhatt; N.Dip.Arch.(Ahmed.), M.Arch.(McG.), M.R.A.I.C.

Martin Bressani; B.Sc.(Arch.), B.Arch.(McG.), M.Sc.(Arch.)(MIT), D.E.A., Docteur(Paris IV), O.A.Q. (*William C. Macdonald Professor of Architecture*)

Avi Friedman; B.Arch.(Technion), M.Arch.(McG.), Ph.D.(Montr.), O.A.Q., I.A.A.

Kiel Moe; B.Arch.(Cinc.), M.Arch.(Virg.), M.Des.(Harv.) (*Gerald Sheff Chair in Architecture*)

Alberto Pérez-Gómez; Dipl.Eng.Arch.(IPN), M.A., Ph.D.(Essex), M.R.A.I.C. (*Saidye Rosner Bronfman Professor of Architectural History*)

Associate Professors

David Covo; B.Sc.(Arch.), B.Arch.(McG.), F.R.A.I.C., O.A.Q.

Michael Jemtrud; B.A., B.Sc., B.Arch.(Penn. St.), M.Arch.(McG.), M.R.A.I.C.

Nik Luka; B.A.A.(Ryerson), M.Arch.(Laval), Ph.D.(Tor.), M.C.I.P.

David Theodore; B.A., B.Sc.(Arch.), B.Arch., M.Arch.(McG.), Ph.D.(Harv.) (*Canadian Research Chair in Architecture, Health, and Computation*)

Ipek Türeli; B.Arch.(ITU, Turkey), A.A.Dipl.(A.A.), Ph.D.(Calif., Berk.) (*Canada Research Chair in Architecture and Spatial Justice*)

Assistant Professors

Salmaan Craig; B.Sc., Eng.D.(Brunel)

Theodora Vardouli; Dipl.Arch.Eng., M.Sc.(Athens), Ph.D., S.M.Arch.S.(MIT)

Professors of Practice

Howard Davies

Peter Guo-hua Fu

Julia Gersovitz

Andrew King

Adjunct Professors

Conor Sampson

Course Lecturers

Vedanta Balbahadur, Morgan Carter, Diana Cheng, Laurie Damme Gonneville, Aniel Guxholli, Tania Delage, Nancy Dunton, Tom Egli, Fabrizio Gallanti, Marc Hallé, Sybil McKenna, Hugh Pelletier, Marc-André Plourde, François Sabourin, Angela Silver, Tyler Swingle, Dustin Valen.

12.1.5 Master of Architecture (M.Arch.) Professional (Non-Thesis): Design Studio (45 credits)

This concentration is a 45-credit, three-term (Fall, Winter, and Fall) program based on a design-intensive professional curriculum and centred on the design studio. Students work in a traditional studio format for the first two terms and with individual advisers in the terminal design project course in the third (Fall) 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 551	(3)	Urban Design and Planning
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 chosen from among the following:

ARCH 514	(4)	Community Design Workshop
ARCH 515	(3)	Sustainable Design
ARCH 517	(3)	Sustainable Residential Development
ARCH 525	(3)	Seminar on Analysis and Theory
ARCH 528	(3)	History of Housing
ARCH 531	(3)	Architectural Intentions Vitruvius - Renaissance
ARCH 532	(3)	Origins of Modern Architecture
ARCH 535	(3)	History of Architecture in Canada
ARCH 536	(3)	Heritage Conservation
		Selected Topics in

ARCH 676 (12) Advanced Architectural Design

ARCH 624	(15)	History and Theory Project

Required Courses (27 credits)

ARCH 622	(4)	Research Methods for Architecture
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 Course (3 credits)

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

Master of Architecture (M.Arch.) Post-professional (Non-Thesis) Urban Design 165.67.52 548.7420 1usopr

ARCH 701	(0)	Comprehensive Examination
ARCH 711	(3)	Doctoral Proseminar 1
ARCH 712	(3)	Doctoral Proseminar 2
ARCH 721	(3)	Literature Review 1
ARCH 722	(3)	Literature Review 2
ARCH 723	(3)	Literature Review 3

Complementary Courses (9 credits)

Students must take 9 credits of courses at the 600 or 700 level, selected with the approval of the School.

Associate Professors

Allen Ehrlicher; B.Sc., B.A.(Texas-Austin), M.Sc., Ph.D.(Leipzig)

J. Matt Kinsella; B.Sc.(SXU, Chicago), M.S., Ph.D.(Purd.)

Georgios Mitsis; Dipl.(Nat. Tech., Athens), M.S.(Elect. Eng.), M.S.(Biomed. Eng.), Ph.D.(USC)

Assistant Professors

Adam Hendricks; B.S., M.S.(Virginia Tech), Ph.D.(Mich.)

Sara Mahshid; B.Sc.(IUST, Tehran), M.Sc., Ph.D.(SUT, Tehran)

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

12.3.2 About Chemical Engineering

The Department offers programs leading to the **Master of Engineering** 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 Mahuǿrld. 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 synMahsis, 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).

- 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.

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:

-

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 the complete bachelor's program, or a minimum GPA of 3.2/4.0 (or equivalent) in the last two years of full-time studies in an undergraduate 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.

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

Admission requires a bachelor's degree (or equiv

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

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

Envir

6-8 credits of Chemical Engineering courses (two courses) at the 500, 600, or 700 level.

12 credits (three courses) from the following list must be taken during the M.Eng. and/or Ph.D. program:

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

* Note: The number of credits taken will depend on how many of these courses have been taken during the M.Eng. program. Three courses from the above list must be taken during the M.Eng.and/or Ph.D. program. If not taken during the M.Eng. program, they must be taken during the Ph.D. program.

12.4 Civil Engineering and Applied Mechanics

12.4.1 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
Email: *gradinfo.civil@mcgill.ca*
Website: *www.mcgill.ca/civil*

12.4.2 About Civil Engineering and Applied Mechanics

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 and structural mechanics; infrastructure rehabilitation; risk engineering; fluid mechanics and hydraulics; materials engineering; soil behaviour; soil mechanics and foundations; water resources engineering; environmental engineering; and transportation engineering.

M.Eng. in Civil Engineering

The master's degree can be pursued as a research degree (thesis) or as a coursework-based degree (non-thesis, with or without a project). 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 Engineering (M.Eng.) 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 and structural materials; 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 Science (M.Sc.) Civil Engineering (Thesis) (45 credits)

Candidates with a bachelor's degree in a discipline other than Engineering, such as Science or Arts, may be accepted into an M.Sc. program in the Department. Such students would typically study in the fluid mechanics, water resources, environmental engineering, or transportation engineering areas, and would follow the thesis option program.

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

This is primarily a coursework degree with the possibility of a small independent research project.

section 12.4.8: 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, Metals, and Materials Engineering. This program emphasizes interdisciplinary fundamental knowledge courses, practical applications in diverse environmental contexts, and functional skills needed for solving environmental problems through a wide range of technical and non-technical courses offered by collaborating departments and faculties at the University. Candidates must possess a bachelor's degree in engineering. The Environmental Engineering option is administered by the Faculty of Engineering.

Further information may be obtained from the Program Coordinator, Department of Civil Engineering and Applied Mechanics.

section 12.4.9: Doctor of Philosophy (Ph.D.) Civil Engineering

Research can be conducted in the fields of structures and structural mechanics; infrastructure rehabilitation; risk engineering; fluid mechanics and hydraulics; materials engineering; soil behaviour; soil mechanics and foundations; water resources engineering; environmental engineering; and transportation engineering.

12.4.3 Civil Engineering and Applied Mechanics Admission Requirements and Application Procedures

12.4.3.1 Admission Requirements

The general rules of Graduate and Postdoctoral Studies apply and are detailed in *University Regulations & Resources* > *Graduate* > *: 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)); Applicants must achieve an overall minimum score of 94 (iBT; or 587 on the paper-based test (PBT)) with a minimum score of 20 for each component (i.e., Writing, Reading, Speaking, Listening); **or**
- the *IELTS* (International English Language Testing System); Applicants must achieve a minimum band score of 7 in order to apply.

Test results reach McGill approximately eight weeks after the test is taken; please note that it is the student's responsibility to make the necessary arrangements with the examining board to write the test in his/her country of residence. Full information and registration forms may be obtained by consulting the *TOEFL* or the *IELTS* websites.

Candidates must meet **both** of these requirements to be eligible to apply. Meeting minimum requirements does not guarantee admission.

The GRE is not required but is highly recommended.

12.4.3.2 Application Procedures

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

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

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 Applied Mechanics 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*.

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

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

Note:

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)	Master's (Thesis) 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.

12.4.6 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)	Master's (Thesis) 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.

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 550	(3)	Water Resources Management
CIVE 551	(3)	Environmental Transport Processes
CIVE 557	(3)	Microbiology for Environmental Engineering
CIVE 558	(3)	Biomolecular Techniques for Environmental Engineering
CIVE 561	(3)	Urban Activity, Air Pollution, and Health
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)	Design and Rating of Highway and Railway Bridges

CIVE 618	(4)	Design in Concrete 1
CIVE 622	(4)	Prestressed Concrete
CIVE 624	(4)	Durability of Structures
CIVE 625	(4)	Condition Assessment of Existing Structures
CIVE 628	(4)	Design of Wood Structures
CIVE 637	(4)	Discrete Choice Modeling in Transportation
CIVE 652	(4)	Bioprocesses for Wastewater Resource Recovery
CIVE 660	(4)	Chemical and Physical Treatment of Waters
CIVE 661	(4)	Modelling of Transportation Emissions
CIVE 663	(4)	Environmental Fate of Organic Chemicals
CIVE 683	(4)	Advanced Foundation Design
CIVE 686	(4)	Site Remediation

Pr

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)	Bioprocesses for Wastewater Resource Recovery
CIVE 660	(4)	Chemical and Physical Treatment of Waters

Air pollution engineering:

MECH 534	(3)	Air Pollution Engineering

12.5 Electrical and Computer Engineering

12.5.1 Location

Department of Electrical and Computer Engineering
McConnell Engineering Building, Room 633
3480 University Street
Montreal QC H3A 0E9
Canada
Telephone: 514-398-7344 or 514-398-1406
Email: *grad.ece@mcgill.ca*
Website: *www.mcgill.ca/ece*

12.5.2 About Electrical and Computer Engineering

The Department offers programs of graduate studies leading to a degree of **Master of Science** (thesis), **Master of Engineering** (project/non-thesis) or **Doctor of Philosophy**.

The research interests and facilities of the Department are very extensive, involving more than 50 faculty members and 300 postgraduate students. The major activities are divided into the following groups:

- Bioelectrical Engineering;
- Telecommunications and Signal Processing;
- Systems and Control;
- Integrated Circuits and Systems;
- Nano-Electronic Devices and Materials;
- Photonic Systems;
- Computational Electromagnetics;
- Power Engineering;
- Intelligent Systems;
- Software Engineering.

The Department is equipped with state-of-the-art experimental laboratories and there are numerous multidisciplinary research projects, so students are provided with an ideal environment to develop new technologies, discover novel phenomena, and design revolutionary devices.

Research Facilities

The Department has extensive laboratory facilities for all its main research areas. In addition, McGill University often collaborates with other institutions for teaching and research.

- The laboratories for research in Robotics, Control, and Vision are in the *Centre for Intelligent Machines* (CIM).
- Telecommunications laboratories focus their work on signal processing, broadband communications, and networking; these laboratories form part of the *Centre for Advanced Systems and Communications* (SYTACom), 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* laboratory includes continuous wave and femtosecond Ti: Sapphire lasers, diode lasers, extensive optics and optomechanics, and sophisticated electronic and imaging equipment.
- 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 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, *l'École Polytechnique*, is the largest francophone university; *l'Université du Québec* has a campus in Montreal and in major tow147.3it

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'Hydr*

12.5.3.2 Application Procedures

McGill's online application form for graduate program candidates is available at *www.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 *www.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

Emeritus Professors

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.

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

Professors

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

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. (*Distinguished James McGill Pr*

Associate Professors

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

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

Assistant Professors

Nar

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

ECSE 701	(0)	Ph.D. Qualifying Examination
ECSE 702	(0)	Ph.D. Research Plan Proposal
ECSE 703	(0)	Doctoral Research Seminar

In addition to the successful completion of the required courses above, students must complete the courses prescribed by the student's Supervisory Committee.

12.6 Mechanical Engineering

12.6.1 Location

Department of Mechanical Engineering
Macdonald Engineering Building
817 Sherbrooke Street West, Room MD-270
Montreal QC H3A 0C3
Canada
Telephone: 514-398-8869 or 514-398-6281
Fax: 514-398-7365
Email: *grad.mecheng@mcgill.ca*
Website: *www.mcgill.ca/mecheng/grad*

12.6.2 About Mechanical Engineering

Mechanical engineers are traditionally concerned with the conception, design, implementation, and operation of mechanical systems. Common fields of work include aerospace, energy, manufacturing, machinery, and transportation. Due to the broad nature of the discipline, there is usually a high demand for mechanical engineers with advanced training.

The Department includes more than 30 faculty members and 200 graduate students, and is housed primarily within the recently renovated Macdonald Engineering building. The Department contains state-of-the-art experimental facilities (including a major wind tunnel facility) and has extensive computational f

Design and manufacturing

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

Dynamics and control

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.

Materials and structures

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

Vibrations, acoustics, and fluid-structure

Vibrations, acoustics, and fluid-structure interaction.

Programs Offered

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. Other non-thesis master's degree options are described below.

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

The M.Eng. (Thesis) program requires the completion 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 12.6.6: Master of Engineering (M.Eng.) Mechanical Engineering (Non-Thesis) (45 credits)

section 12.6.8: Master of Management (M.M.) Manufacturing Management (Non-Thesis) (56 credits)

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
- Extensive industrial interaction
- Innovative research projects

Additionally, students are exposed to the latest trends and developments in management and participate in professional development seminars to leverage their communication and leadership skills. After less than one year of studies, participants complete a paid work term at an industrial location. This is a unique opportunity to work on a real-world project with an M.M.M. partner company in North America.

section 12.6.9: Master of Science (M.Sc.) Mechanical Engineering (Thesis) (45 credits)

Please consult the Department for more information on this program.

section 12.6.10: Doctor of Philosophy (Ph.D.) Mechanical Engineering

In the Ph.D. program, students are required to demonstrate a significant new contribution to their field of research, as documented in an externally reviewed thesis. The research is carried out under the supervision of professors who are leaders in their field. Since research in Mechanical Engineering is often interdisciplinary in nature, it is common for Ph.D. students to have a co-supervisor in addition to their principal supervisor. Graduates from this program typically proceed to careers in research in either industrial or academic environments.

12.6.3 Mechanical Engineering Admission Requirements and Application Procedures

12.6.3.1 Admission Requirements

The general rules of Graduate and Postdoctoral Studies apply. Candidates who come from other institutions are expected to have an academic background equivalent to the undergraduate curriculum in mechanical engineering at McGill or to make up any deficiencies in a Qualifying year.

Applicants to the M.Eng. (Thesis) program must hold an undergraduate degree (or equi

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

Professors

Jozsef Kövecses; M.Sc.(Miskolc), Ph.D.(Hung. Acad. Sci.), ing.

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

Associate Members
Renzo Cecere
Allen Ehrlicher
Dan Nicolau
Abdolhamid Akbarzadeh Shafaroudi

12.6.5 Master of Engineering (M.Eng.) 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 taken in the first term of the student's program.

Required Courses

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.

12.6.6 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.

12.6.7 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 from two other institutions.

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

Required Courses (9 credits)

MECH 687	(3)	Aerospace Case Studies
MECH 688	(6)	Industrial Stage

Complementary Courses (36 credits)

The other courses, depending on the area of concentration, will be chosen in consultation with an Aerospace Engineering Adviser. A maximum of 3 credits of FACC courses at the 500, 600, or 700 level may be credited toward the degree.

12.6.8 Master of Management (M.M.) Manufacturing Management (Non-Thesis) (56 credits)

This program is currently not offered.

We are in the process of revising the curriculum of the program to enhance its quality and relevance, while keeping the focus still on designing and managing global supply chains for manufacturing and service organizations.

Required Courses (30 credits)

	(3)	Computer Integrated Manufacturing

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:

ACCT 624	(3)	Management Accounting: Planning & Control
INDR 603	(3)	Industrial Relations
ORGB 625	(3)	Managing Organizational Change
ORGB 632	(3)	Managing Teams in Organizations
ORGB 633	(3)	Managerial Negotiations
ORGB 640	(3)	The Art of Leadership
ORGB 685	(3)	Cross Cultural Management

Manufacturing & Supply Chain

12 credits from:

MECH 526	(3)	Manufacturing and the Environment
MECH 528	(3)	Product Design
MECH 529	(3)	Discrete Manufacturing Systems
MGSC 578	(3)	Simulation of Management Systems
MGSC 615	(3)	Procurement and Distribution

12.6.9 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.

12.6.10 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

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*
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

12.7.2 About Mining and Materials Engineering

Mining Engineering

- Geomechanics
- Mining Environments
-

Materials Engineering

- Process Metallurgy
- Computational Thermodynamics
- Effluent and Waste Treatment
- Mineral Processing
- Metal Casting and CFD Modelling
- Surface Engineering and Coatings
- Additive Manufacturing and Powder Metallurgy
- Ceramics
- Electron Microscopy
- Automotive and Aerospace Materials
- Biomaterials
- Nanomaterials and Nanoelectronic Materials
- Multiscale Modelling of Materials
- Electronic and Solar Cell Materials
- Environmental Engineering

Research Degrees

section 12.7.5: Master of Engineering (M.Eng.) Materials Engineering (Thesis) (45 credits)

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

section 12.7.6: Master of Engineering (M.Eng.) Mining Engineering (Thesis) (45 credits)

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

section 12.7.7: Master of Science (M.Sc.) Materials Engineering (Thesis) (45 credits)

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

section 12.7.8: 1 0 0 1 6737

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

Direct Transfer from a Master's to a Ph.D. – Students enrolled in a master's program (thesis) may transfer into the Ph.D. program without obtaining a master's degree if they have:

1. an excellent academic standing for their undergraduate degree;
2. been in the master's program for less than 12 months;
3. 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-;
4. made good progress with their research;
5. obtained a strong letter of recommendation from their supervisor.

Direct Entry from B.Eng. to Ph.D.

Exceptional B.Eng. and B.Sc. graduates may be admitted direiitted direi3y Tmurses, and gi

section 12.7.11: 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 12.7.12: 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 12.7.13: Doctor of Philosophy (Ph.D.) Materials Engineering

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

section 12.7.14: Doctor of Philosophy (Ph.D.) Mining Engineering

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

section 12.7.15: 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.Eng. (Thesis)** degree is open to graduates holding the B.Eng. degree or its equivalent in Materials Engineering, Mining Engineering, or other related engineering fields.

The **M.Sc. (Thesis)** degree is open to graduates holding the 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 *www.mcgill.ca/gradapplicants/apply*.

See *University Re*

Associate Professors

Showan Nazhat; B.Eng., M.Sc., Ph.D.(Lond.), P.Eng.

Sidney Omelon; B.Eng., M.Eng., Ph.D.(McG.), Eng.

Mihriban Pekguleryuz; B.Sc., M.Eng.(Flor.), Ph.D.(McG.), Eng.

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 Engineering (M.Eng.) Mining Engineering (Thesis) (45 credits)

** NEW PROGRAM **

The M.Eng. in Mining Engineering (Thesis) is a research-oriented degree that focuses on skills and knowledge of mining engineering through coursework and a research thesis under the supervision of a Faculty member (professor). Specific 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. Graduates of this degree either pursue a Ph.D. or work in industry. The M.Eng. (Thesis) degree is open to graduates holding the B.Eng. degree or its equivalent in Mining Engineering or other related engineering 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 Course (6 credits)

MIME 601	(0)	Engineering Laboratory Practice

6 credits from the following:

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

* Note: Students must register for MIME 672D1 and MIME 672D2 in consecutive terms.

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 Science (M.Sc.) Materials Engineering (Thesis) (45 credits)

** NEW PROGRAM **

The M.Sc. in Materials Engineering (Thesis) is a research-oriented program that focuses on research skills and knowledge of materials engineering through coursew

MIME 672D2*	(3)	Rock Mechanics Seminar
MIME 673	(6)	Mining Engineering Seminar

* Note: Students must register for MIME 672D1 and MIME 672D2 in consecutive terms.

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.

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

** NEW PROGRAM **

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.

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

** NEW PROGRAM **

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

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

4 credits from the following:

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

3 credits from the following:

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

Soil and Water Quality Management Course

3-4 credits from the following:

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

Environmental Impact Course

3 credits from the following:

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

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

Environmental Policy Course

3 credits from the following:

URBP 506	(3)	Environmental Policy and Planning

or 3 credits approved at the 500-, 600-, or 700-level alternative.

Elective Courses (11 credits)

(minimum 10 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

12.7.13 Doctor of Philosophy (Ph.D.) Materials Engineering

** NEW PROGRAM **

Candidates for this degree must complete a minimum of two lecture courses assigned by the Department,

selected on the basis of previous academic training and research interests. Candidates must also pass a safety training course, participate in an appropriate Research Seminar course, and take a preliminary examination within their first year of Ph.D. study.

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

Thesis

A thesis for the doctoral degree must constitute original scholarship and must be a distinct contribution to knowledge. It must show familiarity with previous work in the field and must demonstrate ability to plan and carry out research, organize results, and defend the approach and conclusions in a scholarly manner.

The research presented must meet current standards of the discipline; as well, the thesis must be written in compliance with norms for academic and scholarly expression and for publication in the public domain.

Required Courses (9 credits)

MIME 601	(0)	Engineering Laboratory Practice
MIME 701	(0)	Ph.D. Thesis Research Proposal
MIME 703	(0)	Ph.D. Comprehensive Exam
MIME 710D1	(1.5)	Ph.D. Foundation Course
MIME 710D2	(1.5)	Ph.D. Foundation Course
MIME 771	(6)	Research Seminar 2

Complementary Courses (6 credits)

6 credits of courses at the 500 level or higher

12.8 Urban Planning

12.8.1 Location

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*

12.8.2 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 new techniques and institutions to improve living conditions and decision-making processes, with an eye to improving cities in terms of health, safety, efficiency, equity, beauty, identity, etc. Today, people who enter the profession come from diverse backgrounds as well, including the design professions, engineering and applied sciences, environmental and social studies, and other fields. Their challenge is to reinvent tools and procedures to meet new challenges in making cities socially, economically and environmentally sustainable. A key feature of planning education is learning to view issues in a multidisciplinary way, to manage processes of collaboration and of conflict, and to generate equitable and efficient solutions to complex problems of urban development.

McGill University was the first institution in Canada to offer a full-time planning program starting in 1947. In 1972, the School of Urban Planning was created as a separate academic unit within the Faculty of Engineering. It shares a heritage building with the School of Architecture, right on the main open space of McGill's Downtown campus. The primary objective of the **Master of Urban Planning** program is to educate professional urban planners for leadership in the public, private, and not-for-profit sectors. We rely in large part on project-based learning. The program also puts great emphasis on students doing policy-relevant research.

The School's teaching and research activities pertain primarily to community planning; environmental policy and planning; international development planning; land-use planning and regulation; transportation and infrastructure planning; and urban development and urban design. These activities, which are conducted for the purpose of promoting better decision-making and improving human environments, often take place in partnership with other McGill departments (notably Architecture, Civil Engineering, Geography, and Law) and with units at other institutions in Montreal, across Canada, and abroad. The School uses Montreal and its region as its main teaching laboratory.

McGill's School of Urban Planning has a strong track record of contributing to the community and to the profession. It works with civil society as well as with government, at home and abroad, to understand urban challenges and to formulate policies and plans to meet them.

Master of Urban Planning (M.U.P.) Program

The Master of Urban Planning (M.U.P.) program is a two-year course of study that attracts students from Quebec, Canada, the U.S., and overseas. It is recognized by the *Ordre des urbanistes du Québec* (OUQ) and the *Canadian Institute of Planners* (CIP). Graduates may become full members of the OUQ and other provincial planning associations by completing their respective internship and examination requirements.

The M.U.P. program was designed with a strong emphasis on project-based learning, in particular through practical work done in teams in three planning studios. Approximately half of the curriculum is devoted to required courses that teach basic knowledge and skills in urban planning; the other half enables students to select courses or research projects that match their particular interests. Students participate actively in professors' research programs or define their individual research objectives, sometimes with their own research funding from major agencies (e.g., *SSHRC*, *NSERC*, *FRQSC*, *FRQNT*).

The core program provides a general education in spatial planning in its functional, environmental, and social dimensions. Formal specializations are available

Research Project (15 credits)

The M.U.P.; Non-Thesis requires two years of study including a three-month internship with a member of a recognized planning association.

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

Required Courses (27 credits)

URBP 609	(1)	Planning Graphics 1
URBP 610	(1)	Planning Graphics 2
URBP 611	(1)	Planning Graphics 3
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 635	(3)	Planning Law
URBP 641	(1)	Reading the Urban Landscape
URBP 642	(1)	Introduction to Planning Data
URBP 643	(1)	Introduction to Geographic Information Systems

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)	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 507*	(3)	Planning and Infrastructure
URBP 514	(4)	Community Design Workshop

URBP 519*	(6)	Sustainable Development Plans
URBP 520*	(3)	Globalization: Planning and Change
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 551	(3)	Urban Design and Planning
URBP 553	(3)	Urban Governance
URBP 555	(3)	Real Estate and Planning
URBP 556	(3)	Urban Economy: A Spatial Perspective
URBP 604	(3)	Urban Design Seminar
URBP 608	(3)	Advanced GIS Applications
URBP 616	(3)	Selected Topics 1
URBP 617	(3)	Selected Topics 2
URBP 618	(3)	Selected Topics 3
URBP 619	(4)	Land Use and Transport Planning
URBP 620	(4)	Transport 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 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
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.

12.8.6 Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis): Transportation Planning (66 credits)

The Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis); Transportation Planning option enables students to specialize in this field as part of their course of study for the Master of Urban Planning degree (M.U.P.). Studio courses, an internship, and a final project involve real-life applications and research.

Research Pr

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.

12.8.7 Master of Urban Planning (M.U.P.) Urban Planning (Non-Thesis): Urban Development and Urban Design (66 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.

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 (30 credits)

URBP 551	(3)	Urban Design and Planning
URBP 609	(1)	Planning Graphics 1
URBP 610	(1)	Planning Graphics 2
URBP 611	(1)	Planning Graphics 3
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 635	(3)	Planning Law
URBP 641	(1)	Reading the Urban Landscape
URBP 642	(1)	Introduction to Planning Data
URBP 643	(1)	Introduction to Geographic Information Systems

Complementary Courses (15 credits)

A minimum of 9 credits are selected from Group A; the remaining credits can be selected from Group A or Group B as indicated below.

Group A (9-12 credits)

At least 9 credits (three courses) from the following:

URBP 553	(3)	Urban Governance
URBP 555	(3)	Real Estate and Planning
URBP 557	(3)	The City in History
		Urban Design Seminar

ARCH 515	(3)	Sustainable Design
ARCH 517	(3)	Sustainable Residential Development
ARCH 521	(3)	Structure of Cities
ARCH 564	(3)	Design for Development
ARCH 566	(3)	Cultural Landscapes Seminar
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 506	(3)	Environmental Policy and Planning
URBP 514	(4)	Community Design Workshop
URBP 530	(3)	Urban Infrastructure and Services in International Context
URBP 541	(1)	Selected Topics in Planning
URBP 542	(1)	Selected Topics in Visual Analysis
URBP 543	(3)	Special Topics
URBP 556	(3)	Urban Economy: A Spatial Perspective
URBP 616	(3)	Selected Topics 1
URBP 617	(3)	Selected Topics 2
URBP 618	(3)	Selected Topics 3
URBP 619	(4)	Land Use and Transport Planning
URBP 620	(4)	Transport Economics
URBP 625	(2)	Principles and Practice 2
URBP 626	(2)	Principles and Practice 3