BIORESOURCE ENGINEERING

About Bioresource Engineering

The Department offers M.Sc. and Ph.D. research programs in various areas of bioresource engineering including:

- **Bio-environmental engineering**
  - ecological engineering;
  - sustainable bioresource consumption and supply chain engineering
  - hydrology and water engineering and management;
  - water resource and environmental systems engineering; and
  - soil and water ecology engineering.
- **Bio-production engineering**
  - biomass production engineering;
  - precision agriculture and sensor systems engineering;
  - smart production systems engineering; and
  - irrigation and drainage engineering.
- **Bio-process engineering**
  - post-harvest technologies engineering;
  - food process engineering;
  - food quality, safety, and security engineering;
  - food and bioprocess engineering;
  - bio-inspired multifunctional metamaterials; and
  - meta-structures engineering.

The Department has well-equipped laboratories and a full-scale design and fabrication shop for conducting research in all these areas.

The interdisciplinary nature of bioresource engineering often requires candidates for higher degrees to work in association with or attend courses given by several other departments at both the McGill University Macdonald Campus and the Downtown Campus.

Admission Requirements and Application Procedures

Admission Requirements

The general rules of Graduate and Postdoctoral Studies apply. Candidates should indicate in some detail their fields of special interest when applying for admission. An equivalent cumulative grade point average (CGPA) of 3.0/4.0 (second class–upper division) or a grade point average (GPA) of 3.2/4.0 during the last two years of full-time university study is required at the bachelor's level. High grades are expected in courses the academic unit considers to be preparatory to the graduate program. Experience after the undergraduate degree is an additional asset.

Note: Candidates for the M.Sc. (non-thesis) program in Integrated Water Resources Management are required to have a Bachelor's degree but this does not need to be an engineering degree. Non-engineering students with a demonstrated interest in water resources management are encouraged to apply. Related disciplines could include, for example, geography, international development studies, sociology, anthropology, mathematics, environmental studies, biology, natural resources management, and engineering, among others.

Note: Candidates for the M.Sc.A. (applied, non-thesis) program must meet the qualification of a professional engineer in a Canadian professional engineering association, such as the *Ordre des ingénieurs du Québec (OIQ)*, either before or during their M.Sc. Applied program.

Note: Candidates for the M.Sc.A. (applied, non-thesis) program in Environmental Engineering shall have completed an undergraduate degree in engineering.

Note: Candidates for the M.Sc.A. (applied, non-thesis) in Integrated Food and Bioprocessing shall have graduated with a Bachelor of Engineering, Bachelor of Science in Engineering or a Bachelor of Technology, and possess a strong knowledge in the following core engineering areas: fluid mechanics, heat and/or mass transfer, thermodynamics, and engineering mathematics (including statistics).

Qualifying Students

Some applicants whose academic degrees and standing entitle them to serious consideration for admission to graduate studies, but who are inadequately prepared in the subject selected may be admitted to a Qualifying program if they have met the Graduate and Postdoctoral Studies minimum CGPA of 3.0/4.0. The course(s) to be taken in a Qualifying program will be prescribed by the academic unit concerned. Qualifying students are registered in graduate studies, **but not as candidates for a degree**. Only one Qualifying year is permitted. **Successful completion of a Qualifying program does not guarantee admission to a degree program.**

Financial Aid

Graduate students pursuing **thesis-based programs** within the Faculty of Agricultural and Environmental Sciences (AES) benefit from diverse funding sources throughout their studies at McGill University. Financial support may come from a combination of guaranteed funding, prospective funding, and employment salary.

Upon admission to a **thesis-based program** in the Department of Bioresource Engineering, a student will be offered a **funding package** which will include a certain amount of guaranteed funding and may include additional prospective funding. The proposed funding arrangement will be outlined in a departmental funding letter addressed to the student, in supplement to the offer of admission from the University.

Students admitted to **non-thesis** graduate programs in the Department of Bioresource Engineering are responsible for procuring funding (e.g., scholarship or personal funds) to cover their tuition, fees, and living expenses for the duration of their program. Students should give serious consideration to financial planning before submitting an application.#You can find tuition and fee information on McGill's Student Accounts Graduate Fee Calculator or you may contact the Graduate Program Coordinator for your program of interest. Applicants may wish to consult theFund your Studies web page#for#financial aid#or#external scholarship#possibilities.

English Language Proficiency

For graduate applicants whose mother tongue is not English, and who have not completed an undergraduate or graduate degree from a recognized Canadian or American (English or French) institution or from a recognized foreign institution where English is the language of instruction, documented proof of English proficiency is required

prior to admission. For a list of acceptable test scores and minimum requirements, visit mcgill.ca/gradapplicants/international/proficiency.

Application Procedures

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

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

Additional Requirements

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

- Acceptance to all thesis research programs depends on a staff member agreeing to serve as the student's supervisor.
- International students are strongly encouraged to secure funding from their home country or international agencies.
- The GRE – not required, but highly recommended.

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

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

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

Available Programs

- Bioresource Engineering (Non-Thesis) (M.Sc.A.) (45 credits)
- Bioresource Engineering (Non-Thesis): Environment (M.Sc.A.) (45 credits)
- Bioresource Engineering (Non-Thesis): Environmental Engineering (M.Sc.A.) (45 credits)
- Bioresource Engineering (Non-Thesis): Integrated Food and Bioprocessing (M.Sc.A.) (45 credits)
- Bioresource Engineering (Non-Thesis): Integrated Water Resources Management (M.Sc.) (45 credits)
- Bioresource Engineering (Ph.D.)
- Bioresource Engineering (Thesis) (M.Sc.) (45 credits)
- Bioresource Engineering (Thesis): Environment (M.Sc.) (45 credits)
- Bioresource Engineering: Environment (Ph.D.)

Program Overview

Bioresource Engineering (Thesis) (M.Sc.)

This option for the M.Sc. degree is oriented toward individuals who intend to develop a career in bioresource engineering research. The research areas include plant and animal environments; ecological engineering (ecosystem modelling, design, management, and remediation); water resources management (hydrology, irrigation, drainage, water quality); agricultural machinery, mechatronics, and robotics; food engineering and bio-processing; post-harvest technology; waste management and protection of the environment; bio-energy; and artificial intelligence.

Master of Science (M.Sc.) Bioresource Engineering (Non-Thesis): Integrated Water Resources Management

Integrated Water Resource Management is a one-year program that provides an essential approach to the sustainable management of our natural watershed resources. The 13-credit internship is a central feature of this master's program. The degree gives students the unique opportunity to study the biophysical, environmental, legal, institutional, and socio-economic aspects of water use and management, in an integrated context. The degree is directed at practising professionals who wish to upgrade and/or focus their skill set to address water management issues.

As a graduate from this program, you will be well suited to opportunities in diverse fields of employment, such as water resources consulting, international development project management, research with governments or universities, public policy and governance development, and climate change impact assessment.

Master of Science, Applied (M.Sc.A.) Bioresource Engineering (Non-Thesis)

The non-thesis option is aimed at individuals already employed in industry or seeking to improve their skills in specific areas (soil and water, structures and environment, waste management, environment protection, post-harvest technology, food process engineering, environmental engineering) to attain a higher level of engineering qualification. Candidates must be qualified to be members of a Canadian professional engineering association such as the *Ordre des ingénieurs du Québec (OIQ)*. They must maintain contact with their academic advisor in the Department of Bioresource Engineering before registration to clarify objectives, investigate project possibilities, and plan a program of study.

Master of Science, Applied (M.Sc.A.) Bioresource Engineering (Non-Thesis): Environmental Engineering

The Environmental Engineering program emphasizes interdisciplinary fundamental knowledge, practical perspective, and awareness of environmental issues through various technical and non-technical courses offered by collaborating departments and faculties at the University.

The program's primary objective is to train environmental professionals at the advanced level. Thus, it is designed for individuals with a university undergraduate degree in engineering. Through this program, students will master specialized skills in their home disciplines and acquire a broader perspective and awareness of environmental issues.

Master of Science, Applied (M.Sc.A.) Bioresource Engineering (Non-Thesis): Integrated Food and Bioprocessing

This graduate program will provide students with tools to understand how food and agricultural production interact to better manage agricultural, food, and biomass systems for the adequate supply of wholesome food, feed, fibre, biofuel, and other bio-based material. This course-based program will present students with the skills needed to assess existing production, delivery, and quality management systems; introduce improvements; and communicate effectively with policy makers and with colleagues in multi-disciplinary teams.

The goals of this program are to provide up-to-date, world-class knowledge on techniques for adequate process design and

management of biomass production strategies for the delivery of quality food, natural fibre, biochemicals, biomaterials, and biofuels in a sustainable and environment-friendly way that benefits all. Training activities will include laboratory research and/or industrial/government internships.

Doctor of Philosophy (Ph.D.) Bioresource Engineering

This is a research-based degree and is offered in the following areas: plant and animal environments; ecological engineering (ecosystem modelling, design, management, and remediation); water resources management (hydrology, irrigation, drainage, water quality); agricultural machinery, mechatronics and robotics; food engineering and bio-processing; post-harvest technology; waste management and protection of the environment; bio-energy; and artificial intelligence.

Location

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