

# DEPARTMENT OF BIORESOURCE ENGINEERING

## About the Department of Bioresource Engineering

Bioresource Engineers apply engineering science and design to biological systems, which include plants, animals, and ecosystems. They seek sustainable solutions to enhance the production and processing of food and other biomaterials as well as to preserve and regenerate the quality of soil, water, and other natural resources. The B.Eng. (Bioresource) is an accredited engineering program administered by the Faculty of Agricultural and Environmental Sciences in coordination with the Faculty of Engineering.

In addition to core engineering sciences and design skills, Bioresource Engineering students take courses dedicated to the infrastructure and processes essential to the emerging circular bioeconomy. Students learn to design, construct, operate, maintain, and innovate equipment, structures, processes, and software related to agriculture, forestry, food, environmental protection, ecological management, bioenergy, and related industries.

## Available Programs

- Bioresource Engineering Honours (B.Eng. (Bioresource))
- Bioresource Engineering Major (B.Eng. (Bioresource))
- Bioresource Engineering - Professional Agrology (B.Eng. (Bioresource))

## About Programs in Bioresource Engineering

Bioresource Engineering is a unique branch of engineering encompassing biological, agricultural, food, environmental and ecological engineering disciplines, as well as many traditional engineering fields; its focus is the application of professional engineering skills to biological systems. The fundamental basis of Bioresource Engineering is the transdisciplinary interaction between engineering science and design with biological, physical, chemical, and other natural sciences. Bioresource engineers strive to design and implement solutions for sustainability and the well-being of society while maintaining the high quality of the environment for generations to come.

The Bioresource Engineering program is accredited by the Canadian Engineering Accreditation Board, as are most B.Eng. programs offered by the Faculty of Engineering. Therefore, completing the Bachelor of Engineering (Bioresource) program fulfills academic eligibility requirements for registration as a professional engineer in any province in Canada and some international jurisdictions. The Bachelor of Engineering (Bioresource) Professional Agrology program qualifies graduates to apply for registration with the *Ordre des agronomes du Québec* and similar licensing bodies in other provinces, in addition to professional engineering licensure.

Complementary courses in the Bioresource Engineering curriculum are organized so that students can follow one of three non-restrictive

streams: Bio-Environmental Engineering, Bio-Production Engineering, and Bio-Process Engineering.

Students who follow the **Bio-Environmental Engineering** stream will learn to be responsible stewards of the environment and natural resources. This stream includes the study of soil and water quality management and conservation, organic waste treatment, urban and rural ecology, sustainability engineering, biodiversity preservation, climate change adaptation, and many other related topics.

Students who follow the **Bio-Production Engineering** stream use natural sciences and engineering skills to design systems and machines to produce crops, animals, animal products, and other types of biomass. Students learn about the design of machines and structures, different production systems and technologies, instrumentation and control, geospatial data management, precision agriculture, and emerging intelligent bio-production concepts.

Through the **Bio-Process Engineering** stream, students apply engineering principles to transform agricultural commodities and biomass into food, fiber, fuel, and biochemical products. Topics include the engineering of foods and food processes, physical properties of biological materials, post-harvest technology, fermentation and bioprocessing, managing organic residues, biotechnology, designing machinery for bioprocessing, etc.

In addition, students may choose to follow the Bioresource Engineering **Professional Agrology** as well as the Bioresource Engineering **Honors** Program. Multiple minors are also available. For details related to curriculum options and to select the most suitable stream, please refer to the departmental website.

Most Bioresource Engineering courses are taught on McGill University's Macdonald Campus. However, students spend one term on McGill University's Downtown Campus, primarily taking courses from the Faculty of Engineering. While working towards a B.Eng. (Bioresource) degree, students can also complete additional requirements for minor programs to develop expertise in other areas of study. Some minor programs that might interest Bioresource Engineering students include Agribusiness Entrepreneurship, Agricultural Production, Biomedical Engineering, Biotechnology, Computer Science, Construction Engineering and Management, Environmental Engineering, Field Studies, and Technological Entrepreneurship.

**Notes:** All required and complementary courses for B.Eng. (Bioresource) programs must be passed with a minimum grade of C. The program's total of 143 credits includes the 30 credits from the Foundation Year (U0) courses. At least 50% of the total credits must be completed at McGill University. All required courses must be taken at McGill University, with rare exceptions pre-approved by an Academic Program Advisor and the Committee on Academic Standing. The capstone design sequence (BREE490/495) must always be completed in the Department of Bioresource Engineering under the professional responsibility of an instructor licensed to practice engineering in Canada.

## Location

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