

GRADUATE STUDIES

BIOMEDICAL ENGINEERING

Biomedical engineering involves the application of engineering principles to the study, modification and control of biological systems; the design and manufacture of products used to monitor physiological functions; and the processes involved in diagnosing and treating patients.

Specialists in biomedical engineering are characterized by their thorough understanding of health issues and their mastery of engineering techniques. The health issues addressed by our researchers are among the most pressing in today's society, including cardiovascular, articular, musculoskeletal and neural diseases.

BIOMEDICAL ENGINEERING INSTITUTE

The programs offered jointly by Polytechnique Montréal and Université de Montréal promote the interdisciplinary nature of biomedical engineering. Students enrol in the institute where their supervisor is located, given that their professors are based in various departments (electrical engineering, physiology, and so on). The community of the Institute of Biomedical Engineering consists of:

- 63 full professors (32 at Polytechnique Montréal, 27 at Université de Montréal and four at École de technologie supérieure (ÉTS));
- 18 associated members and regular collaborators;
- 150 graduate students.

RESEARCH AREAS

Biomechanics

Biomechanical of the cardiovascular and musculoskeletal system, of the human body and of the movement analysis.

Biomedical instrumentation and imaging

New methods of acquiring and treating biomedical signals and images to support research, diagnosis, treatment and follow-up.

Biophotonics and biomedical nanotechnology

Nanotechnology and nanomaterials in biomedical engineering, biosensors, biomicrosystems and biophotonics.

Clinical engineering

Management, evaluation and security of medical technologies in the health-care system (nonthesis master's degree with an internship and a project at a hospital).

Electrophysiology

Bioelectrical, cardiac and muscular phenomena.

Health information science

Computing, telematic and information technologies that support the medical and administrative aspects of the health-care system.

Musculoskeletal

Biomechanical modeling of the musculoskeletal system.

Tissue engineering and biomaterials

Organic tissues, biomaterials (alloys, polymers, biomechanics, composites), implant surgery, cell implants, controlled release of medications and chemicals, medical devices and instruments.

EMPLOYMENT OPPORTUNITIES

Most of our graduates work in research and development within various sectors that include the biomedical industry, university hospital research centres, government research laboratories and academic settings. Others opt for positions managing biomedical equipment in hospitals or regional health and social service bodies. Some start their own companies in the biomedical field, while still others choose to teach.

RESEARCH FACILITIES

The research facilities and equipment are distributed over a number of locations :

Polytechnique Montréal

- Biomechanics and Mechanobiology Laboratory;
- Bioperformance Analysis and Innovation Laboratory;
- Electronic Microsystems Assembly and Encapsulation Laboratory;
- Instrumentation and Biomedical Imaging Laboratory (magnetic resonance, molecular, photoacoustic, electrical impedance and ultrasound imaging);
- Microfabrication and Laser Processes Laboratory;
- Nanorobotics Laboratory for Devices Powered by Magnetic Gradients;
- Optical Diagnosis and Biophotonics Laboratory;
- Polystim Neurotechnology Laboratory;
- Protein Biophysics Laboratory.
- SCRIBENS Laboratory.

Institut de cardiologie de Montréal

- Preclinical Imaging Laboratory.

Université de Montréal

- Biomedical Modelling Laboratory;
- Vision and Geometric Modelling Laboratory.

Hôpital Notre-Dame

- Imaging and Orthopedics Research Laboratory.

Institut de réadaptation de Montréal

- Neuromuscular Control Laboratory.

Hôpital Sacré-Coeur

- Cardiac Electrophysiology Laboratory.

Hôpital Sainte-Justine

- Scoliosis 3D Computer Laboratory (LIS3D);
- Biomechanical Modelling and Computer Assisted Surgery Laboratory.

RESEARCH CHAIRS

- Tier I Canada Research Chair in Vascular Optical Imaging (F. Lesage)
- Tier I Canada Research Chair in Medical Nanorobotics (S. Martel)
- Tier I Canada Research Chair in Orthopedic Engineering (C.E. Aubin)
- Tier II Canada Research Chair in Mechanobiology of the Pediatric Musculoskeletal System (I. Villemure)
- Tier II Canada Research Chair in Medical Imaging and Assisted Interventions (S. Kadoury)
- Tier II Canada Research Chair in Quantitative Magnetic Resonance Imaging (J. Cohen-Adad)
- École Polytechnique / UHC Ste-Justine Pediatrics Rehabilitation Engineering Chair (M. Raison)
- NSERC-Medtronic Industrial Research Chair in Spine Biomechanics (C.E. Aubin)

Research Group in Biomedical Sciences and Technologies (GRSTB)

The Research Group in Biomedical Sciences and Technologies (GRSTB) is made up of 35 regular members working primarily in the musculoskeletal and cardiovascular fields. Each member also has expertise in one or more of the following technological approaches: biomaterials, biomechanics, electrophysiology, imaging and nanotechnology, and microsystems.

For more information: groupes.polymtl.ca/grstb/indexen.php

INFORMATION

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**POLYTECHNIQUE
MONTRÉAL**

WORLD-CLASS
ENGINEERING

