

# GRADUATE STUDIES

# INDUSTRIAL ENGINEERING

Based on a systemic, integrated vision of industrial engineering, the Department of Mathematics and Industrial Engineering has developed a diverse selection of programs that cater both to students and to practitioners who wish to acquire the scientific and technical knowledge required by their professional activities.

## A DYNAMIC RESEARCH HUB

Industrial engineering research at Polytechnique Montréal addresses a wide range of issues and advances knowledge in several fields. The programs of study we offer train highly qualified people able to address the full complexity of technological, economic, social, organizational and environmental issues. They provide the opportunity to study within the best multidisciplinary teams in their fields.

## MULTIDISCIPLINARY RESEARCH AREAS

Our research activities span a number of disciplines, bringing together a range of expertise and making it possible to undertake decidedly multidisciplinary research work.

### Research areas

- Design and management of logistics systems, supply chains, e-logistics, operational logistics issues;
- Economics of public procurement, technological choices of public organizations;
- Ergonomics for physical and mental work, evaluation and design of workstations and machinery, occupational health and safety and industrial safety;
- Governance and management of technology projects;
- New product and service development;
- Innovation economics, innovation management; economics of science and technology;
- Internationalization of business and technology;
- Reliability, equipment maintenance, data analysis;
- Risk and resilience engineering;
- Robotics, automation, physical and computer simulation, production planning and control systems, information systems, sustainable development;

- Service engineering (logistics, transport, health);
- Sustainable development, sustainable production and circular economy.
- Technology entrepreneurship;

### Disciplines

- Economics, management, marketing;
- Industrial data valorization;
- Information systems (software, databases, process modelling);
- Life cycle assessment, ecodesign, sustainable innovation;
- Operations research (optimization, linear and non-linear programming, graph theory, meta-heuristics);
- Physical and cognitive ergonomics, product ergonomics, industrial safety;
- Probability, statistical methods and stochastic processes;
- Production technologies and systems (automation, production processes, Industry 4.0).

## FUNDING AND VARIOUS RESEARCH PARTNERSHIPS

Industrial engineering research at Polytechnique Montréal is funded by research granting agencies (NSERC, SSHRC, FRQNT, IRSST) and by various organizations and companies by means of research grants and contracts, equipment grants and graduate fellowships. Our work is the result of close collaboration with numerous public, parapublic and private organizations.

## CONSTANTLY EXPANDING RESEARCH ACTIVITIES

The Department's research activities have a total annual budget of CDN \$4 million in grants and contracts. The department brings together nearly 50 professors and faculty lecturers, close to 100 sessional lecturers and 15 research associates, and over 400 graduate students.

## IN THE SERVICE OF KNOWLEDGE

The Department of Mathematics and Industrial Engineering houses several research units that are true centres of excellence for professors, students, research associates and industry partners. These units support our research areas and make for richly interactive spaces with high scientific output. The Department is also associated with five interuniversity research centres (CEFRIO, CIRANO, CIRODD, CIRRELT and GERAD).

### RESEARCH UNITS

#### **Canada Research Chair in the Creation, Development and Commercialization of Innovation**

This Chair's work aims to improve the impact of university research on technological innovation in businesses. It studies the interactions among business clusters and networks, open innovation, and the impact of research on the creation, development and commercialization of innovations.

#### **Jarislowsky/SNC-Lavalin Research Chair in International Project Management**

This Chair identifies the best practices in project planning and management and develops new planning approaches tailored to international contexts.

#### **Research Group on Management and Globalization of Technology (MGT)**

The Research Group on Management and Globalization of Technology (MGT) unites Polytechnique professors who have expertise in social sciences and engineering. Working where management and economics intersect, they focus on key issues for organizations and businesses: technological entrepreneurship, innovation, business internationalization, risks, sustainable production and development and public policy.

#### **CRP – Risk and Performance Centre**

This research group is dedicated to integrating risk and consequences into assessments of the resilience and performance of life support networks and studying interdependencies among these networks.

#### **Group Polygistique (part of CIRRELT and IVADO)**

This group aims to be a centre for research, training, technology monitoring, knowledge transfer and the promotion of cutting-edge logistics methods and technologies for companies that produce goods and services. Many professors in Groupe Polygistique belong to the Institute for data valorization (IVADO).

#### **CIRAIG International Life Cycle Chair**

This Chair's aim is to conduct high-level interdisciplinary research addressing sustainability issues (measurement and implementation) in collaboration with its partners.

#### **Pomerleau Industrial Chair in Innovation and Construction Project Governance**

The Chair seeks to improve practices relating to project management in the construction industry, specifically matters of governance, risks and delivery modes. The adoption of innovative practices relating to new technologies is also a strong focus for this Chair.

### INTERUNIVERSITY CENTRES

Many of our researchers are active in internationally renowned research centres:

- CEFRIO – French-language centre facilitating research and innovation in organizations with information and communication technology;
- CIRANO – Centre for Interuniversity Research and Analysis of Organizations;
- CIRODD – Interdisciplinary Research Centre on Sustainable Development Operationalization;
- CIRRELT – Interuniversity Research Centre on Enterprise Networks, Logistics and Transportation;
- GERAD – Group for Research in Decision Analysis.

### INFORMATION

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