

## Faculty

### *Chair*

MARTIN D. PUGH, PhD *University of Leeds*, PEng; *Professor, Provost's Distinction*

### *Associate Chair*

LYES KADEM, PhD *Université d'Aix-Marseille II/Université Laval*, ing.

### *Professors*

A.K. WAIZUDDIN AHMED, PhD *Concordia University*, PEng; *Provost's Distinction*  
RAMA B. BHAT, PhD *Indian Institute of Technology, Madras*, ing.; *Provost's Distinction*  
NADIA BHUIYAN, PhD *McGill University*, ing.  
AKIF ASIL BULGAK, PhD *University of Wisconsin-Madison*, PEng  
MING YUAN CHEN, PhD *University of Manitoba*, APEGS  
ZEZHONG CHEN, PhD *University of Victoria*, PEng  
JAVAD DARGAHI, PhD *Caledonian University (U.K.)*, PEng  
KUDRET DEMIRLI, PhD *University of Toronto*, PEng  
ALI DOLATABADI, PhD *University of Toronto*, PEng; *Provost's Distinction*  
ROBIN A.L. DREW, PhD *University of Newcastle upon Tyne*, ing.; *Provost's Distinction*  
M. NABIL ESMAIL, PhD *Moscow State University*, ing.; *Provost's Distinction*  
RAJAMOHAN GANESAN, PhD *Indian Institute of Science*, PEng  
WAHID S. GHALY, PhD *Massachusetts Institute of Technology*, ing.  
GERARD J. GOUW, PhD *Queen's University*, ing.  
IBRAHIM G. HASSAN, PhD *University of Manitoba*, PEng  
SUONG VAN HOA, PhD *University of Toronto*, ing.; *Provost's Distinction*  
MAMOUN MEDRAJ, PhD *McGill University*, PEng  
CHRISTIAN MOREAU, PhD *Université Laval*  
MUTHUKUMARAN PACKIRISAMY, PhD *Concordia University*, PEng; *Provost's Distinction*  
MARIUS PARASCHIVOIU, PhD *Massachusetts Institute of Technology*, ing.; *Provost's Distinction*  
SUBHASH RAKHEJA, PhD *Concordia University*; *Provost's Distinction*  
RAMIN SEDAGHATI, PhD *University of Victoria*, PEng; *Provost's Distinction*  
ION STIHARU, PhD *Polytechnic Institute of Bucharest*, PEng; *Provost's Distinction*  
CHUN-YI SU, PhD *South China University of Technology*  
GEORGIOS H. VATISTAS, PhD *Concordia University*; *Provost's Distinction*  
WENFANG XIE, PhD *Hong Kong Polytechnic University*, PEng  
PAULA WOOD-ADAMS, PhD *McGill University*  
YOU MIN ZHANG, PhD *Northwestern Polytechnical University*

### *Distinguished Professors Emeriti*

RICHARD M.H. CHENG, PhD *University of Birmingham*  
SUI LIN, Dring *University of Karlsruhe*  
HUGH J. MCQUEEN, PhD *University of Notre Dame*  
MOHAMED O.M. OSMAN, DrScTech, *Swiss Federal Institute of Technology*

### *Professor Emeritus*

VOJISLAV N. LATINOVIC, DEng *Concordia University*

### *Associate Professors*

ALI AKGUNDUZ, PhD *University of Illinois at Chicago*, PEng  
BRANDON W. GORDON, PhD *Massachusetts Institute of Technology*, APEGGA  
MEHDI HOJJATI, PhD *Concordia University*, PEng  
HENRY HONG, PhD *Concordia University*, ing.  
ONUR KUZGUNKAYA, PhD *University of Windsor*, PEng  
SIVAKUMAR R. NARAYANSWAMY, PhD *Nanyang Technological University*, PEng  
HOI DICK NG, PhD *McGill University*, ing.  
ROLF WÜTHRICH, DSc *École Polytechnique Fédérale de Lausanne*

### *Associate Professors Emeriti*

KALMAN I. KRAKOW, MS *California Institute of Technology*  
RAFIK A. NEEMEH, PhD *McGill University*

*Assistant Professors*

IVAN CONTRERAS, PhD *Technical University of Catalonia, Spain*  
MASOUMEH KAZEMI ZANJANI, PhD *Université Laval*

*Extended Term Appointments*

JOHN CHEUNG, PhD *Cranfield University, PEng*  
ALEXANDRE PARADIS, PhD *École de Technologie Supérieure*

*Affiliate Professor*

PAUL-ÉMILE BOILEAU, PhD *Concordia University*

*Affiliate Associate Professors*

FARHAD AGHILI, PhD *McGill University*  
ALA-EDDIN AL MOUSTAFA, PhD *Université Paris XIII*  
CHANDRA ASTHANA, PhD *Indian Institute of Science*  
XINJIN CAO, PhD *University of Birmingham*  
DOMINIQUE DEROME, PhD *Concordia University*  
PIERRE GAUTHIER, PhD *Concordia University*  
ELENA KONOPLEVA, PhD *Mariupol Metallurgical Institute*  
PIERRE MARCOTTE, PhD *Virginia Polytechnic Institute and State University*  
CAMILLE-ALAIN RABBATH, PhD *McGill University*

*Affiliate Assistant Professors*

ALI BONAKDAR, PhD *Concordia University*  
MOHAMMED FAYED, PhD *Concordia University*

*For the complete list of faculty members, please consult the Department website.*

## Location

*Sir George Williams Campus*

Engineering, Computer Science and Visual Arts Complex, Room: EV 004.139  
514-848-2424, ext. 3125

## Department Objectives

The Department of Mechanical and Industrial Engineering offers three distinct undergraduate programs: BEng in **Mechanical Engineering**, BEng in **Industrial Engineering** and BEng in **Aerospace Engineering**.

Mechanical Engineering is concerned with all forms of power generation (hydro-electric, steam, internal combustion, nuclear, jet rocket, and fuel cells), the design of mechanisms and machines, transportation systems, controls and automation, vibration analysis, environmental control (heating, ventilation, and refrigeration), materials handling, and precision measurement. The Mechanical Engineering curriculum consists of a combination of core courses with a series of technical electives that allow students to obtain some specialization in a particular area of the field depending on their interests and expected future professional activity. Three options are available: Aerospace and Propulsion Engineering; Design and Manufacturing Engineering; and Systems and Mechatronics.

Industrial Engineering is concerned with the design, organization, analysis, and integration of people and industrial systems components in order to achieve or enhance effectiveness. These components include whole machines, transportation and conveyance elements, physical plant, organizational frameworks, schedules, and budgets. The Industrial Engineering curriculum is therefore designed to give students the background needed to define and solve problems related to the conception, improvement, integration, and implementation of industrial systems.

The Aerospace Engineering program is offered jointly with the Department of Electrical and Computer Engineering. The detailed description of this program can be found in §71.55.

### 71.40.1 Course Requirements (BEng in Mechanical Engineering)

The program in Mechanical Engineering consists of the Engineering Core, the Mechanical Engineering Core, and option requirements as shown below. The minimum length of the program is 120 credits.

**Engineering Core** (27 credits)

See §71.20.5.

**Mechanical Engineering Core**

*Credits*

ENGR 242	Statics	3.00
ENGR 243	Dynamics	3.00
ENGR 244	Mechanics of Materials	3.75

ENGR 251	Thermodynamics I	3.00
ENGR 311	Transform Calculus and Partial Differential Equations	3.00
ENGR 361	Fluid Mechanics I	3.00
MECH 211	Mechanical Engineering Drawing	3.50
MECH 215	Programming for Mechanical and Industrial Engineers	3.50
MECH 221	Materials Science	3.00
MECH 311	Manufacturing Processes	3.75
MECH 313	Machine Drawing and Design	3.00
MECH 321	Properties and Failure of Materials	3.50
MECH 343	Theory of Machines	3.50
MECH 344	Machine Element Design	3.00
MECH 351	Thermodynamics II	3.50
MECH 352	Heat Transfer I	3.50
MECH 361	Fluid Mechanics II	3.50
MECH 368	Electronics for Mechanical Engineers	3.50
MECH 370	Modelling, Simulation and Control Systems	3.50
MECH 371	Analysis and Design of Control Systems	3.75
MECH 375	Mechanical Vibrations	3.50
MECH 390	Mechanical Engineering Design Project	3.00
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		73.25

### Option Requirements

Students in the Mechanical Engineering program must complete at least 19.75 elective credits from within one of options A, B, or C. Prior to registration for elective courses, students indicate their choice of option on a form available from the Department, which must be submitted to the Chair's office for approval *prior to March 30*. With permission of the Department, students may take one technical elective course from another option. Students work in the area of their option within their MECH 490 project.

#### 1. Option A — Aerospace and Propulsion

Students must complete the following compulsory courses from the Option Core and at least 12.75 credits from the Option Electives.

Option A Core		Credits
AERO 464	Aerodynamics	3.00
MECH 490A	Capstone Mechanical Engineering Design Project	4.00
Option A Electives		Credits
AERO 417	Standards, Regulations and Certification	3.00
AERO 431	Principles of Aeroelasticity	3.00
AERO 462	Turbomachinery and Propulsion	3.00
AERO 465	Gas Turbine Design	3.50
AERO 480	Flight Control Systems	3.50
AERO 482	Avionic Navigation Systems	3.00
AERO 483	Integration of Avionics Systems	3.00
AERO 485	Introduction to Space Systems	3.00
AERO 486	Aircraft Stress Analysis	3.00
AERO 487	Design of Aircraft Structures	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00
MECH 452	Heat Transfer II	3.50
MECH 453	Heating, Ventilation and Air Conditioning Systems	3.00
MECH 460	Finite Element Analysis	3.75
MECH 461	Gas Dynamics	3.50
MECH 498	Topics in Mechanical Engineering	3.00

#### 2. Option B — Design and Manufacturing

Students must complete the following compulsory courses from the Option Core and at least 12.25 credits from the Option Electives.

Option B Core		Credits
MECH 412	Computer-Aided Mechanical Design	3.50
MECH 490B	Capstone Mechanical Engineering Design Project	4.00
Option B Electives		Credits
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00
INDU 372	Quality Control and Reliability	3.00

INDU 410	Safety Engineering	3.50
INDU 411	Computer Integrated Manufacturing	3.50
INDU 440	Product Design and Development	3.00
MECH 411	Instrumentation and Measurements	3.50
MECH 414	Computer Numerically Controlled Machining	3.50
MECH 415	Advanced Programming for Mechanical and Industrial Engineers	3.00
MECH 421	Mechanical Shaping of Metals and Plastics	3.50
MECH 422	Mechanical Behaviour of Polymer Composite Materials	3.00
MECH 423	Casting, Welding, Heat Treating, and Non-Destructive Testing	3.50
MECH 424	MEMS — Design and Fabrication	3.50
MECH 425	Manufacturing of Composites	3.50
MECH 426	Stress and Failure Analysis of Machinery	3.00
MECH 460	Finite Element Analysis	3.75
MECH 498	Topics in Mechanical Engineering	3.00

### 3. Option C — Systems and Mechatronics

Students must complete the following compulsory course from the Option Core and at least 15.75 credits from the Option Electives.

<b>Option C Core</b>		<i>Credits</i>
MECH 490C	Capstone Mechanical Engineering Design Project	4.00

<b>Option C Electives</b>		<i>Credits</i>
AERO 480	Flight Control Systems	3.50
AERO 482	Avionic Navigation Systems	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00
ENGR 472	Robot Manipulators	3.50
MECH 411	Instrumentation and Measurements	3.50
MECH 415	Advanced Programming for Mechanical and Industrial Engineers	3.00
MECH 444	Guided Vehicle Systems	3.00
MECH 447	Fundamentals of Vehicle System Design	3.50
MECH 448	Vehicle Dynamics	3.00
MECH 454	Vehicular Internal Combustion Engines	3.00
MECH 463	Fluid Power Control	3.50
MECH 471	Microcontrollers for Mechatronics	3.50
MECH 472	Mechatronics and Automation	3.50
MECH 473	Control System Design	3.50
MECH 474	Mechatronics	3.75
MECH 498	Topics in Mechanical Engineering	3.00

## 71.40.2 Course Requirements (BEng in Industrial Engineering)

The program in Industrial Engineering consists of the Engineering Core, the Industrial Engineering Core, and elective credits as shown below. The minimum length of the program is 120 credits.

### Engineering Core (27 credits)

See §71.20.5.

<b>Industrial Engineering Core</b>		<i>Credits</i>
ENGR 244	Mechanics of Materials	3.75
ENGR 245	Mechanical Analysis	3.00
ENGR 251	Thermodynamics I	3.00
ENGR 311	Transform Calculus and Partial Differential Equations	3.00
INDU 211	Introduction to Production and Manufacturing Systems	3.00
INDU 311	Simulation of Industrial Systems	3.50
INDU 320	Production Engineering	3.00
INDU 321	Lean Manufacturing	3.00
INDU 323	Operations Research I	3.00
INDU 324	Operations Research II	3.00
INDU 330	Engineering Management	3.00
INDU 371	Stochastic Models in Industrial Engineering	3.00
INDU 372	Quality Control and Reliability	3.00
INDU 411	Computer Integrated Manufacturing	3.50

INDU 412	Human Factors Engineering	3.50
INDU 421	Facilities Design and Material Handling Systems	3.50
INDU 423	Inventory Control	3.50
INDU 490	Capstone Industrial Engineering Design Project	4.00
MECH 211	Mechanical Engineering Drawing	3.50
MECH 215	Programming for Mechanical and Industrial Engineers	3.50
MECH 221	Materials Science	3.00
MECH 311	Manufacturing Processes	3.75
MECH 313	Machine Drawing and Design	3.00
		75.00

### Electives

Students must complete a minimum of 18 credits from the following courses, including at least three INDU courses and with no more than two of the courses marked \*.

		<i>Credits</i>
BSTA 478*	Data Mining Techniques	3.00
BTM 430*	Enterprise Resource Planning and Information Technology Integration	3.00
BTM 480*	Project Management	3.00
ENGR 361	Fluid Mechanics I	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00
INDU 410	Safety Engineering	3.50
INDU 440	Product Design and Development	3.00
INDU 441	Introduction to Six Sigma	3.00
INDU 442	Logistics Network Models	3.00
INDU 466	Decision Models in Service Sector	3.00
INDU 475	Advanced Concepts in Quality Improvement	3.00
INDU 498	Topics in Industrial Engineering	3.00
MANA 300*	Entrepreneurship: Launching Your Business	3.00
MECH 321	Properties and Failure of Materials	3.50
MECH 352	Heat Transfer I	3.50
MECH 361	Fluid Mechanics II	3.50
MECH 370	Modelling, Simulation and Control Systems	3.50
MECH 371	Analysis and Design of Control Systems	3.75
MECH 412	Computer-Aided Mechanical Design	3.50
MECH 415	Advanced Programming for Mechanical and Industrial Engineers	3.00
MECH 421	Mechanical Shaping of Metals and Plastics	3.50
MECH 423	Casting, Welding, Heat Treating and Non-Destructive Testing	3.50
MECH 425	Manufacturing of Composites	3.50

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