

## Faculty

### *Chair*

ASHUTOSH BAGCHI, PhD Carleton University, PEng; Professor

### *Associate Chair*

HUA GE, PhD Concordia University, APEG (B.C.); Associate Professor

### *Professors*

HASHEM AKBARI, PhD University of California, Berkeley  
ANDREAS K. ATHENITIS, PhD University of Waterloo, ing.; Provost's Distinction  
ZHI CHEN, PhD University of Regina, APEGS  
URSULA EICKER, PhD Heriot Watt University  
MARIA ELEKTOROWICZ, PhD Warsaw Technical University, ing.; Provost's Distinction  
KHALED GALAL, PhD McMaster University, PEng  
KINH H. HA, DEng Sir George Williams University, ing.  
FARIBORZ HAGHIGHAT, PhD University of Waterloo, PEng; Provost's Distinction  
ADEL M. HANNA, PhD Technical University of Nova Scotia, ing.; Provost's Distinction  
SAMUEL LI, PhD Norwegian Institute of Technology, APEG (B.C.)  
OSAMA MOSELHI, PhD Concordia University, ing.; Provost's Distinction  
CATHERINE MULLIGAN, PhD McGill University, ing.; Provost's Distinction  
MICHELLE NOKKEN, PhD University of Toronto, PEng; Provost's Distinction  
THEODORE STATHOPOULOS, PhD University of Western Ontario, ing.; Provost's Distinction  
MOHAMMED ZAHEERUDDIN, PhD University of Alberta, PEng  
RADU G. ZMEUREANU, PhD Concordia University, ing.

### *Distinguished Professors Emeriti*

DOREL FELDMAN, PhD University of Iasi  
RICHARD W. GUY, PhD University of Liverpool, PEng  
OSCAR A. PEKAU, PhD University of Waterloo, ing.; Provost's Distinction  
AMRUTHUR S. RAMAMURTHY, PhD Purdue University, ing.; Provost's Distinction

### *Professors Emeriti*

SABAH TOMA ALKASS, PhD Loughborough University, PEng; Provost's Distinction  
BALA ASHTAKALA, PhD University of Waterloo  
HORMOZ B. POOROOSHASB, PhD University of Cambridge

### *Associate Professors*

CIPRIAN ALECSANDRU, PhD Louisiana State University, PEng  
LUIS AMADOR, PhD University of New Brunswick, PEng  
ANJAN BHOWMICK, PhD University of Alberta, APPEGA  
LAN LIN, PhD University of Ottawa  
FUZHAN NASIRI, PhD University of Regina, APEGS  
ALI NAZEMI, PhD University of Birmingham, APEGS  
MD. SAIFUR RAHAMAN, PhD University of British Columbia  
LUCIA TIRCA, PhD Technical University of Civil Engineering, Bucharest, ing.  
LIANGZHU WANG, PhD Purdue University  
ATTILA M. ZSAKI, PhD University of Toronto, PEng

### *Assistant Professors*

CHUNJIANG AN, PhD University of Regina, APEGS  
REBECCA DZIEDZIC, PhD University of Toronto  
EMRE ERKMEN, PhD University of Ottawa, PEng  
GHAZANFARAH (FARAH) HAFEEZ, PhD University of Ottawa  
SANG HYEOK HAN, PhD University of Alberta  
BRUNO LEE, PhD Eindhoven University of Technology, PEng  
JOONHEE LEE, PhD University of Nebraska  
BIAO LI, PhD University of Calgary

MAZDAK NIK-BAKHT, PhD *University of Toronto*, PEng  
MOHAMED OUF, PhD *University of Manitoba*, PEng  
AHMED SOLIMAN, PhD *Western University*, PEng

*Senior Lecturer*

JASSIM HASSAN, PhD *University of Calgary*

*Lecturer*

SHAHIN KARIMIDORABATI, PhD *University of Waterloo*

*Affiliate Professors*

MICHAEL LACASSE, PhD *Concordia University*  
KENNETH LEE, PhD *University of Toronto*  
MOHAMED MARZOUK, PhD *Concordia University*

*Affiliate Associate Professors*

ALI BAHLOUL, PhD *Université du Havre*  
JOSÉ AGUSTIN CANDANEDO, PhD *Concordia University*  
LALEH YERUSHALMI, PhD *McGill University*  
ZHENHUA ZHU, PhD *Georgia Institute of Technology*

*Affiliate Assistant Professors*

KATHERINE D'AVIGNON, PhD *École Polytechnique de Montréal*  
SHAMEEN JAUFFUR, PhD *McGill University*  
FERESHTEH MAFAKHERI, PhD *HEC Montréal, Université de Montréal*

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

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## Location

*Sir George Williams Campus*

Engineering, Computer Science and Visual Arts Complex, Room: EV 006.139  
514-848-2424, ext. 3200  
514-848-2424, ext. 7800

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## Objectives

**Building Engineering**, as a discipline, encompasses the body of knowledge which pertains to all phases in the life-cycle of a constructed facility, namely conception, planning, design, construction, operation, and disposal.

Concordia has a unique undergraduate program leading to a BEng in Building Engineering designed to meet the needs of the construction industry for engineers familiar with the overall design of built facilities.

In addition to the basic engineering sciences, the program emphasizes the fundamentals of building materials, structural analysis and design, building services (acoustical, heating, lighting, air conditioning), economics, and project management. The student also has available certain electives which will be of use in the design of various phases of a building.

Students who complete all but one of their 200- and 300-level courses with a sufficiently high standing may apply through the Associate Dean, Student Academic Services to enter a combined program leading to the joint award of both a BEng and an MEng degree in Building Engineering. It is expected that those who aspire to leadership roles within the building industry will enter such a combined program. The combined program requires a further 12 months of full-time study, after which graduates will not only have obtained further grounding in the basics, but will also have specialized in one of four branches: Building Science, Building Environment, Building Structures, Construction Management. For details of the graduate component, refer to the School of Graduate Studies Calendar.

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### 71.50.1 Course Requirements (BEng in Building Engineering)

The program in Building Engineering consists of the Engineering Core, the Building Engineering Core, and one of the options listed below. The normal length of the program is 119 credits.

**Engineering Core for Building Engineering (29 credits)\***

See §71.20.5. Students in BEng (Bldg) must successfully complete BLDG 482 instead of ENGR 392.

\*Note: The Engineering Core credits for students in the Building Engineering program are reduced from 30.5 credits to 29 credits since Building Engineering students are not required to take ENGR 202 (1.5 credits) in their program.

<b>Building Engineering Core</b>		<i>Credits</i>
BCEE 231	Structured Programming and Applications for Building and Civil Engineers	3.00
BCEE 342	Structural Analysis I	3.00
BCEE 344	Structural Design of Steel and Wood Elements	3.00
BCEE 345	Structural Design of Reinforced Concrete Elements	3.00
BCEE 371*	Surveying	3.00
BCEE 451	Construction Engineering	3.00
BLDG 212	Building Engineering Drawing and Introduction to Design	3.00
BLDG 341	Building Engineering Systems	3.00
BLDG 365	Building Science	3.50
BLDG 371	Building Service Systems	3.50
BLDG 390	Building Engineering Design Project	3.50
BLDG 432	Geology and Soil Mechanics	3.50
BLDG 463	Building Envelope Design	3.00
BLDG 471	HVAC System Design	4.00
BLDG 476	Thermal Analysis of Buildings	3.00
BLDG 490	Capstone Building Engineering Design Project**	4.00
CIVI 321	Engineering Materials	3.75
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
		74.50

\*Summer course to be taken before entering second year of BEng program.

\*\*Note: Students may replace BLDG 490 with ENGR 490 if they are interested in a multidisciplinary project that requires collaboration with students from other engineering departments. In order for students to register in ENGR 490, their projects must be approved by the Department and the ENGR 490 Design Committee before the start of the fall term.

### Option Course Requirements

Students must complete a minimum of 15.5 credits from one of the following options: A or B. Option A is designed for students interested in careers in building energy efficiency, HVAC systems and indoor environment. Option B is tailored for students wishing to pursue careers in building design, building structures, and construction engineering and management.

#### 1. Option A — Building Energy and Environment

Students must complete a minimum of 15.5 credits from the Option Electives.

Option A – Electives		<i>Credits</i>
BLDG 366	Acoustics and Lighting	3.50
BLDG 465	Fire and Smoke Control in Buildings	3.00
BLDG 472	Building Energy Conservation Technologies	3.00
BLDG 473	Building Acoustics	3.00
BLDG 474	Building Illumination and Daylighting	3.00
BLDG 475	Indoor Air Quality	3.00
BLDG 477	Control Systems in Buildings	3.00
BLDG 479	Commissioning of HVAC Systems in Buildings	3.00
BLDG 483	Integrated Solar Systems: Design and Operation	3.00
BLDG 484	Diagnostics and Rehabilitation of Building Envelope	3.00
BLDG 498	Topics in Building Engineering	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00

Note: Students from Option A may choose one course from Option B electives.

#### 2. Option B — Building Structures and Construction

Students must complete a minimum of 15.5 credits from the Option Electives.

Option B – Electives		<i>Credits</i>
BCEE 343	Structural Analysis II	3.00
BCEE 455	Introduction to Structural Dynamics	3.00
BCEE 478	Project Management for Construction	3.00

BCEE 492	Construction Processes	3.00
BLDG 462	Modern Building Materials	3.00
BLDG 480	Building Information Modelling in Construction	3.00
BLDG 481	Fundamentals of Facility Management	3.00
BLDG 498	Topics in Building Engineering	3.00
CIVI 435	Foundation Design	3.00
CIVI 453	Design of Reinforced Concrete Structures	3.50
CIVI 454	Design of Steel Structures	3.50
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00

Note: Students from Option B may choose one course from Option A electives.

## Objectives

**Civil Engineering** is concerned with the creation of systems of constructed facilities which play an important role in sound economic growth of society. It is also concerned with the development of technologies to combat pollution of air, water, and soil. Civil engineers are responsible for the design of foundations and superstructures of common structures such as buildings, bridges, dams, tunnels, wharves, as well as many unusual structures such as rocket installations, containment vessels for nuclear reactors, supports for radio telescopes, frameworks for aircraft. In addition, they are concerned with the engineering aspects of water resources; transportation facilities; planning metropolitan areas, and conducting and managing their public facilities. In dealing with environmental problems, civil engineers perform vital functions such as monitoring and controlling air, water, and soil quality, assessing the impact of technological changes on the environment, and developing innovative waste reduction technologies.

## 71.50.2 Course Requirements (BEng in Civil Engineering)

The program in Civil Engineering consists of the Engineering Core, the Civil Engineering Core, and one of the options listed below. The normal length of the program is 119 credits.

### Engineering Core (30.5 credits)

Civil Engineering Core		Credits
BCEE 231	Structured Programming and Applications for Building and Civil Engineers	3.00
BCEE 342	Structural Analysis I	3.00
BCEE 343	Structural Analysis II	3.00
BCEE 344	Structural Design of Steel and Wood Elements	3.00
BCEE 345	Structural Design of Reinforced Concrete Elements	3.00
BCEE 371*	Surveying	3.00
BCEE 451	Construction Engineering	3.00
CIVI 212	Civil Engineering Drawing and Introduction to Design	3.00
CIVI 231	Geology for Civil Engineers	3.00
CIVI 321	Engineering Materials	3.75
CIVI 341	Civil Engineering Systems	3.00
CIVI 361	Introduction to Environmental Engineering	3.50
CIVI 372	Transportation Engineering	3.00
CIVI 381	Hydraulics	3.50
CIVI 390	Civil Engineering Design Project	3.50
CIVI 432	Soil Mechanics	3.50
CIVI 490	Capstone Civil Engineering Design Project**	4.00
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
		73.50

\*Summer course to be taken before entering second year of BEng program.

\*\*Note: Students may replace CIVI 490 with ENGR 490 if they are interested in a multidisciplinary project that requires collaboration with students from other engineering departments. In order for students to register in ENGR 490, their projects must be approved by the Department and the ENGR 490 Design Committee before the start of the fall term.

### Option Course Requirements

Students must complete a minimum of 15 credits from one of the following options: A, B or C. Option A is designed for students interested in careers in structural, geotechnical, and transportation engineering. Option B is tailored for students wishing to pursue careers in environmental engineering. Option C is designed for students interested in construction engineering and management.

Option A – Civil Infrastructure		<i>Credits</i>
BCEE 452	Fundamentals of Finite Element Analysis of Structures	3.00
BCEE 455	Introduction to Structural Dynamics	3.00
CIVI 435	Foundation Design	3.00
CIVI 437*	Advanced Geotechnical Engineering	3.00
CIVI 453	Design of Reinforced Concrete Structures	3.50
CIVI 454	Design of Steel Structures	3.50
CIVI 471	Highway and Pavement Design	3.00
CIVI 474*	Transportation Planning and Design	3.00
CIVI 498	Topics in Civil Engineering	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00

Note: Students may choose one course marked with \* from Option B or C.

Option B – Environmental		<i>Credits</i>
CIVI 382*	Water Resources Engineering	3.50
CIVI 464*	Environmental Impact Assessment	3.00
CIVI 465	Water Pollution and Control	3.50
CIVI 466	Engineering Aspects of Chemical and Biological Processes	3.00
CIVI 467*	Air Pollution and Emission Control	3.00
CIVI 468	Waste Management	3.00
CIVI 469*	Geo-Environmental Engineering	3.50
CIVI 483*	Hydrology	3.00
CIVI 484*	Hydraulic Engineering	3.50
CIVI 498	Topics in Civil Engineering	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00

Note: Students may choose one course marked with \* from Option A or C.

Option C – Construction Engineering and Management (CEM)		<i>Credits</i>
BCEE 464	Project Cost Estimating	3.00
BCEE 465	Construction Planning and Control	3.00
BCEE 466	Simulations and Design of Construction Operations	3.00
BCEE 478*	Project Management for Construction	3.00
BCEE 491	Labour and Industrial Relations in Construction	3.00
BCEE 492	Construction Processes	3.00
BCEE 493	Legal Issues in Construction	3.00
CIVI 440*	Computer Applications in Civil Engineering Practice	3.00
CIVI 498	Topics in Civil Engineering	3.00
ENGR 411	Special Technical Report	1.00
ENGR 412	Honours Research Project	3.00

Note: Students may choose one course marked with \* from Option A or B.