Ottawa-Carleton Institute for Civil Engineering

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The Institute

Director of the Institute:
A.G. Razaqpur
Associate Director of the Institute:
B.H. Fellenius

Established in 1984, the Institute combines the research strengths and resources of the Departments of Civil and Environmental Engineering at Carleton University and the Department of Civil Engineering at the University of Ottawa. Programs leading to master's and Ph.D. degrees are available through the Institute in a wide range of fields of civil engineering. Programs in water resources and environmental engineering, and in transportation engineering are centred at the University of Ottawa and Carleton University, respectively. Programs in geotechnical and structural engineering are available at both universities. Graduate students may pursue their research on either university campus, depending upon the choice of program and supervisor. Registration will be at the university to which the student's supervisor is affiliated. Requests for admission may be sent to the Director of the Institute.

Members of the Institute

The "home" department of each member is indicated by (C) for the Department of Civil and Environmental Engineering at Carleton University and (O) for the Department of Civil Engineering at the University of Ottawa.

Kazimierz Adamowski, *Hydrology, Stochastic and Statistical Analyses* (O)
John Adjeleian, *Structures, Building Design and Construction* (C), Professor Emeritus
C.M. Allen,* *Structures, Building Design and Construction* (C)
G.E. Bauer, *Geotechnical Engineering, Earth Retaining Structures, In-Situ Testing* (C)
Volker Barthel,* *Hydraulics* (O)
J.J. Beaudoin,* *Cement Chemistry, Strength of Composite Materials* (O)
J.P. Braaksma, *Transportation, Airport Planning, Traffic Engineering, Pedestrian Circulation, Terminal Design* (C)
M.S. Cheung,* *Finite Element Analysis, Bridge Engineering* (O)
R.L. Droste, *Environmental Engineering, Water and Wastewater Treatment* (O)
Erman Evgin, *Finite Elements, Soil Plasticity, Environmental Geomechanics* (O)
B.H. Fellenius, *Geotechnical Engineering, Deep Foundations* (O)
Leta Fernandez, *Environmental Engineering, Agricultural Waste Management* (O)
N.J. Gardner, *Structures, Reinforced Concrete, Earthquake Engineering, Construction Loads* (O)
V.K. Garga, *Geotechncial Engineering, Dams, Harbours, Heavy Foundations* (O)
A.O. Abd El Halim, *Transportation, Pavements and Materials, Geometric Design* (C)
G.A. Hartley, *Structural Analysis, Finite Elements, Building Frame Analysis* (C)
N.M. Holtz, *Computer-Aided Structural Engineering* (C)
J.L. Humar, *Structures, Earthquake Engineering, Computer-Aided Design* (C)
W.F. Johnson,* *Urban Transportation Planning and Management* (C)
S.J. Kennedy, *Steel Structures, Composite Structures, Material Behaviour, Experimental Methods, Computer-Aided Structural Engineering* (C)
K.J. Kennedy,* *Environmental Engineering, Waste Water Treatment* (O)
A.M. Khan, *Transportation, Systems Planning, Engineering and Management* (C)
D.T. Lau, *Structural Mechanics, Earthquake Engineering, Numerical Methods and Modelling of Structures* (C)
K.T. Law, *Geotechnical Engineering, Embankments, In-Situ Testing* (C)
R.R. Mayes,* *Engineering Management* (C)
R.M. Narbaitz, *Waste Treatment* (O)
S.S.F. Ng, *Structures, Numerical Methods, Dynamic Behaviour* (O)
A.G. Razaqpur, *Structures, Concrete, Numerical Methods* (C)
Murat Saatcioglu, *Building Structures, Reinforced Concrete, Earthquake Analysis and Design* (O)
J.J. Salinas, *Building Structures, Wood Engineering, Structural Reliability* (C)
E.J. Schiller, *Environmental Engineering, Water Supply and Irrigation* (O)
A.P.S. Selvadurai, *Geotechnical Engineering, Continuum Mechanics, Applied Mathematics* (C)
N.K. Sinha,* *Ice Mechanics* (O)
G.T. Suter, *Structural Engineering, Masonry Structures* (C)
O.J. Svec,* *Geomechanics, Pavement Materials, Numerical Methods* (C)

Hiroshi Tanaka, *Structures, Wind Engineering* (O)
D.R. Townsend, *Water Resource Engineering, Applied Hydraulics, River Engineering* (O)
E.W. Wright,* *Structures, Computer-Aided Design* (C)

Master's Degree

Admission Requirements

The normal requirement for admission to the master's program is a bachelor's degree with at least high honours standing in civil engineering or the sub-disciplines normally considered to be civil engineering. Applications to a qualifying program will also be considered from graduates of other engineering programs or honours science programs under the following conditions:

(1) Graduates from engineering or honours science programs with a mathematics content equivalent to the civil engineering program will have to take a minimum of four qualifying undergraduate civil engineering courses in their area of graduate specialty;

(2) Graduates from other science programs will have to take all the core engineering undergraduate mathematics courses in addition to the requirements specified in (1) above.

The undergraduate courses required will be specified in the Certificate of Admission.

Undergraduate civil engineering courses will not be accepted towards a graduate degree. Graduate students may still be required to take undergraduate courses for credit to fulfil the admission requirements.

No more than one half of the program credit requirements or that stipulated in the university regulations in which the student is registered, whichever is less, can be transferred at admission. At least one half of the course work must be taken at the Institute.

Program Requirements

The requirements for course work are specified in terms of credits: one hour/week for one term. The requirements for the master's degree by thesis are:

- Equivalent of eighteen course credits
- Thesis
- Participation in the civil engineering seminar series
- Successful oral defence of the thesis

The requirements for the master's degree by course work are: thirty six course credits of which a minimum of twenty four will be course credits and a minimum of six will be project credits.

Doctor of Philosophy

Admission Requirements

The normal requirement for admission into the Ph.D. program is a master's degree with thesis in civil engineering.

Program Requirements

The requirements for course work are specified in terms of credits: one credit = one hour/week for one term.

- A minimum of eighteen course credits
- Participation in the civil engineering seminar series
- Successful completion of written and oral comprehensive examinations in subject areas determined by the student's advisory committee
- Successful completion of a thesis proposal examination
- Thesis
- Successful oral defence of the thesis. The examination board for all theses will include an external examiner, and when possible, professors from both departments
- Subject to approval of his/her advisory committee, a Ph.D. student may take, or be required to take, courses in other disciplines

Students who have been permitted to transfer into the Ph.D. program from a master's program without having completed the master's degree, will require thirty course credits for the Ph.D. degree which include transfer of credits from the incompleted master's program.

Graduate Courses

In all programs, the student may choose graduate courses from either university with the approval of the adviser or the advisory committee. Graduate courses are listed below, grouped by subject area. Course descriptions may be found in the departmental section of the calendar concerned. All courses are of one term duration. The codes given in parenthesis are those used by the University of Ottawa. Courses beginning with "82" are offered at Carleton University and those beginning with "83" are offered at the University of Ottawa. Not all courses listed are necessarily given during one academic year.

Geotechnical and Soils

82.529	(CVG7100)	Case Studies in Geotechnical Engineering
82.530	(CVG7101)	Advanced Soil Mechanics I

82.531	(CVG7102)	Advanced Soil Mechanics II
82.550	(CVG7104)	Earth Retaining Structures
82.551	(CVG7105)	Foundation Engineering
82.552	(CVG7106)	In-situ Methods in Geomechanics
82.553	(CVG7107)	Numerical Methods in Geomechanics
82.554	(CVG7108)	Seepage and Water Flow Through Soils
82.580	(CVG7305) to 82.584 (CVG7309)	Special Topics in Geotechnical Engineering
83.500	(CVG5100)	Deep Foundations
83.501	(CVG5101)	Advanced Rock Mechanics
83.502	(CVG5102)	Theoretical Soil Mechanics
83.503	(CVG5103)	Dam Engineering
83.504	(CVG5104)	Soil Testing and Properties
83.505	(CVG5105)	Slope Stability
83.506	(CVG5106)	Site Improvements
83.509	(CVG5170)	Geotechnical Engineering in Cold Regions
83.512	(CVG5171)	Strength and Deformation Behaviour of Soil and Rock
83.513	(CVG5173)	Soil Dynamics
83.514	(CVG5174)	Soil Plasticity
83.515	(CVG5175)	Mathematical Modelling and Finite Element Applications in Geotechnical Engineering
83.516	(CVG5176)	Soil Structure Interaction
83.517	(CVG5177)	Offshore Geotechnique
83.518	(CVG5178)	Ice Dynamics

Structural Engineering

82.511	(CVG7120)	Introductory Elasticity
82.512	(CVG7121)	Advanced Elasticity
82.513	(CVG7122)	Finite Element Methods in Stress Analysis
82.514	(CVG7123)	Earthquake Engineering and Analysis
82.515	(CVG7124)	Advanced Finite Element Analysis in Structural Mechanics
82.516	(CVG7137)	Dynamics of Structures
82.520	(CVG7138)	Engineered Masonry Behaviour and Design
82.522	(CVG7139)	Behaviour and Design of Steel Structures
82.523	(CVG7125)	Theory of Structural Stability
82.524	(CVG7126)	Behaviour and Design of Structural Steel Members
82.525	(CVG7127)	Behaviour of Elastic Structures
82.526	(CVG7128)	Prestressed Concrete
82.527	(CVG7129)	Advanced Structural Design
82.528	(CVG7130)	Advanced Reinforced Concrete
82.560	(CVG7131)	Project Management
82.561	(CVG7140)	Statistics, Probabilities and Decision-Making Applications in Civil Engineering
82.562	(CVG7141)	Advanced Methods in Computer-Aided Design
82.563	(CVG7132)	Computer-Aided Design of Building Structures
82.564	(CVG7142)	Engineering Management
82.565	(CVG7143)	Design of Steel Bridges
82.566	(CVG7144)	Design of Concrete Bridges
82.575	(CVG7300) to 82.579 (CVG7304)	Special Topics in Structural Engineering
83.521	(CVG5142)	Advanced Structural Dynamics
83.522	(CVG5143)	Advanced Structural Steel Design
83.523	(CVG5145)	Theory of Elasticity
83.524	(CVG5147)	Theory of Plates and Shells
83.526	(CVG5150)	Advanced Concrete Technology
83.527	(CVG5151)	Flow Induced Vibration
83.528	(CVG5152)	Steel Bridges
83.529	(CVG5153)	Wind Engineering
83.530	(CVG5144)	Advanced Reinforced Concrete Design
83.531	(CVG5156)	Finite Element Methods I
83.532	(CVG5146)	Numerical Methods of Structural Analysis
83.533	(CVG5157)	Finite Element Methods II
83.535	(CVG5148)	Prestressed Concrete Design
83.536	(CVG5155)	Earthquake Engineering
83.537	(CVG5158)	Elements of Bridge Engineering

Transportation

82.533	(CVG7160)	Pavements and Materials
82.534	(CVG7150)	Intercity Transportation, Planning and Management
82.535	(CVG7151)	Traffic Engineering
82.536	(CVG7152)	Highway Materials

82.537	(CVG7153)	Urban Transportation, Planning and Management
82.538	(CVT7154)	Geometric Design
82.539	(CVG7155)	Transportation Supply
82.541	(CVG7156)	Transportation Economics and Policy
82.542	(CVG7159)	Transportation Terminals
82.543	(CVG7158)	Airport Planning
82.585	(CVG7310) to 82.589 (CVG7314)	Special Topics in Transportation Planning and Technology

Water Resources

83.550	(CVG5110)	Hydraulics of Open Channels
83.551	(CVG5111)	Hydraulic Structures
83.552	(CVG5114)	Hydraulics and Porous Media
83.553	(CVG5115)	Advanced Fluid Mechanics
83.556	(CVG5120)	Water Resources Systems
83.558	(CVG5122)	Groundwater and Seepage
83.559	(CVG5123)	Advanced Topics in Hydrology
83.561	(CVG5125)	Statistical Methods in Hydrology
83.562	(CVG5126)	Stochastic Hydrology
83.563	(CVG5127)	Hydrologic Systems Analysis
83.564	(CVG5128)	Water Resources Planning and Policy
83.566	(CVG5131)	River Engineering
83.567	(CVG5140)	Irrigation and Drainage
83.568	(CVG5135)	Water Supply and Sanitation in Developing Countries
83.582	(CVG5118)	Theory and Operation of Hydraulic Models
83.583	(CVG5119)	Computational Hydraulics

Environmental

83.590	(CVG5130)	Wastewater Treatment Process Design
83.591	(CVG5132)	Unit Operations of Water Treatment
83.593	(CVG5139)	Environmental Assessment of Civil Engineering Projects
83.596	(CVG5133)	Solid Waste Disposal
83.597	(CVG5134)	Chemical Analysis for Environmental Engineering

Directed Studies

82.596 and 82.597		Engineering Directed Studies
83.570	(CVG6108) and 83.571 (CVG6109)	Individual Directed Studies
83.600-83.603	(CVG6300-6399)	Advanced Topics

Projects and Theses

82.590	Engineering Project
82.599	M.Eng. Thesis
82.699	Ph.D. Thesis
CVG6000	Civil Engineering Report/ Rapport en génie civil
CVG7999	M.A.Sc.Thesis/Thèse
CVG9998	Comprehensive Examination (Ph.D.) Examen general de doctorat
CVG9999	Ph.D. Thesis/Thèse