# MASTER OF ENGINEERING ENVIRONMENTAL ENGINEERING

#### Summary

- Degree offered: Master of Engineering (MEng)
- · Registration status options: Full-time; Part-time
- Language of instruction: English

Most of the courses in this program are offered in English. Research activities can be conducted either in English, French, or both, depending on the language used by the professor and the members of his or her research group.

- Program options (expected duration of the program):
  within two years of full-time study
- Academic units: Faculty of Engineering (http:// engineering.uottawa.ca), Ottawa-Carleton Institute of Environmental Engineering (http://www.ociene.ca).

# **Program Description**

#### **Ottawa-Carleton Joint Program**

Established in 2000, the Ottawa-Carleton Institute of Environmental Engineering (OCIENE) combines the teaching and research strengths of the Department of Civil Engineering and the Department of Chemical Engineering at the University of Ottawa with that of the Departments of Civil and Environmental Engineering at Carleton University.

The Institute offers graduate programs leading to the degrees of Master of Applied Science in Environmental Engineering (MASc), Master of Applied Science in Environmental Engineering (MASc) Specialization in Environmental Sustainability, a Master of Engineering (MEng) and Doctor of Philosophy (PhD) in Environmental Engineering.

# **Main Areas of Research**

- · Biofilms and biofilm technologies for water and wastewater treatment
- Drinking water: membrane treatment and climate change adaptation technologies
- · Ecological engineering and agricultural waste management
- · Mining impacted water management
- · Northern, rural and First Nation water and wastewater
- Sustainable municipal waste management, groundwater, and remediation technologies
- Water resources and management

Note: Further information is posted on the departmental website.

### **Learning Outcomes**

- · Autonomy in conducting research
- · Autonomy in preparing scholarly publications

# Other Programs Offered Within the Same Discipline or in a Related Area

- Master of Applied Science Environmental Engineering (MASc)
- Master of Applied Science Civil Engineering (MASc)
- Master of Applied Science Environmental Engineering Specialization Environmental Sustainability (MASc)
- Master of Applied Science Civil Engineering Specialization in Science, Society and Policy (MASc)
- Master of Engineering Civil Engineering (MEng)
- Doctorate in Philosophy Environmental Engineering (PhD)
- Doctorate in Philosophy Civil Engineering (PhD)

# **Fees and Funding**

Program fees:

The estimated amount for university fees (https://www.uottawa.ca/ university-fees) associated with this program are available under the section Finance your studies (http://www.uottawa.ca/graduatestudies/programs-admission/finance-studies).

International students enrolled in a French-language program of study may be eligible for a differential tuition fee exemption (https://www.uottawa.ca/university-fees/differential-tuition-feeexemption).

• To learn about possibilities for financing your graduate studies, consult the Awards and financial support (https://www.uottawa.ca/graduate-studies/students/awards) section.

### Notes

- Programs are governed by the general regulations (http:// www.uottawa.ca/graduate-studies/students/general-regulations) in effect for graduate studies and by the general regulations of the Ottawa-Carleton Institute of Environmental Engineering (OCIENE).
- In accordance with the University of Ottawa regulation, students have the right to complete their assignments, examinations, research papers, and theses in French or in English.

### **Program Contact Information**

Graduate Studies Office, Faculty of Engineering (https://engineering.uottawa.ca/graduate-studies-office)

STE 1024

800 King Edward Ave.

Ottawa ON Canada

K1N 6N5

Tel.: 613-562-5347

Fax.: 613-562-5129

Email: engineering.grad@uottawa.ca

Twitter | Faculty of Engineering (https://twitter.com/uOttawaGenie? lang=en)

Facebook | Faculty of Engineer (https://www.facebook.com/ uottawa.engineering)

# **Admission Requirements**

For the most accurate and up to date information on application deadlines, language tests and other admission requirements, please visit the specific requirements (https://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements) webpage.

# To be eligible, candidates must:

#### · Have one of the following:

- An honours bachelor's degree with a specialization or a major in environmental engineering (or equivalent) with a minimum average of 70% (B);
- An honours bachelor's degree with a specialization or a major in related engineering disciplines (civil, chemical, mechanical, etc.) with a minimum average of 70% (B);
- An honours bachelor's degree with specialization or a major in environmental science disciplines with a minimum average of 70% (B).

Note: International candidates must check the admission equivalencies (https://www.uottawa.ca/graduate-studies/ international/study-uottawa/admission-equivalencies) for the diploma they received in their country of origin.

- Demonstrate a good academic performance in previous studies as shown by official transcripts, research reports, abstracts or any other documents demonstrating research skills.
- · Meet the following additional requirements:
  - All students entering the program are required to have courses in mathematics, probability and statistics equivalent to courses required in undergraduate engineering programs.
  - All students entering the program are also required to have taken three undergraduate courses equivalent to the following University of Ottawa courses:
    - CHG 2312 or CVG 2116
    - CVG 2132
    - CVG 3132
    - These courses are considered to provide the minimum background in fluid mechanics, and in physical, chemical, and biochemical treatment principles, necessary to adequately follow environmental engineering courses at the graduate level. Depending on their background, students may have been exposed to these principles through a different combination of courses in their undergraduate curriculum. Students entering the program without an equivalent background in these topics are expected to take these courses early in their studies and they are considered additional to those normally required for the degree. The undergraduate courses required are specified in the certificate of admission.

### Language Requirements

Applicants must be able to understand and fluently speak the language of instruction (French or English) in the program to which they are applying. Proof of linguistic proficiency may be required. Applicants whose first language is neither French nor English must provide proof of proficiency in the language of instruction.

Note: Candidates are responsible for any fees associated with the language tests.

### Notes

- The admission requirements listed above are minimum requirements and do not guarantee admission to the program.
- Admissions are governed by the general regulations (http:// www.uottawa.ca/graduate-studies/students/general-regulations) in effect for graduate studies and by the general regulations of the Ottawa-Carleton Institute of Environmental Engineering (OCIEE).

### Program Requirements Master's with Coursework and Project

Requirements for this program have been modified. Please consult the 2018-2019 calendars (http://catalogue.uottawa.ca/en/archives) for the previous requirements.

Candidates transferring from another university must take at least half their units at the Institute.

The Department may require students to take additional courses, depending on their backgrounds.

Students must meet the following requirements:

#### **Compulsory Courses:**

24 optional course units in environmental engineering (EVG) at the graduate level <sup>1</sup>		24 Units
Seminar		
EVG 5800	Seminar for Master's Candidates in Environmental Engineering	1 Unit
Project:		
EVG 6001	Environmental Engineering Project	6 Units

#### Note(s)

- A maximum of 6 course units may be taken from Engineering (GNG) courses at the 5000 level. A minimum of 3 course units must be selected from at least three of the following areas of study:
  - Air pollution
  - Water resources management, groundwater management and contaminant transport
  - · Water and waste water treatment
  - Management of solid, hazardous, and radioactive waste and pollution prevention
  - · Environmental impact assessment

### Master's with Coursework

Requirements for this program have been modified. Please consult the 2018-2019 calendars (http://catalogue.uottawa.ca/en/archives) for the previous requirements.

Candidates transferring from another university must take at least half their units at the Institute.

The Department may require students to take additional courses, depending on their backgrounds.

Students must meet the following requirements:

#### **Compulsory Courses:**

30 optional course units in environmental engineering	30 Units
(EVG) at the graduate level <sup>1</sup>	

#### Note(s)

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- A maximum of 9 course units may be taken from Engineering (GNG) courses at the 5000 level. A minimum of 3 course units must be selected from at least three of the following areas of study:
  - Air pollution
  - Water resources management, groundwater management and contaminant transport
  - Water and waste water treatment
  - Management of solid, hazardous, and radioactive waste and pollution
    prevention
  - · Environmental impact assessment

### **List of Optional Courses**

Course selection is subject to the approval of the advisor or the advisory committee. Students may choose courses offered at either university from among those listed below.

The courses listed below are grouped by area of study. Students must complete at least one course in three of the five areas. The director will decide when a course offered under a special topics or directed studies heading can be considered to meet the requirements of a given area. Course descriptions may be found in the departmental sections of the calendars concerned.

#### **Air Pollution**

CVG 7161	Traffic Related Air Pollution	3 Units
CVG 7162	Ambient Air Quality and Pollution Modelling	3 Units
CHG 8132	Adsorption Separation Processes	3 Units
EVG 5101	Air Pollution Control	3 Units
EVG 7104	Indoor Air Quality	3 Units
Water Resour and Contamin	rces Management, Groundwater Management, nant Transport	
CVG 5124	Coastal Engineering	3 Units
CVG 5125	Statistical Methods Hydrology	3 Units
CVG 5154	Random Vibration	3 Units
CVG 5160	Sediment Transport	3 Units
CVG 5162	River Hydraulics	3 Units
CVG 7108	Seepage and Water Flow Through Soils	3 Units
CVG 7163	Case Studies in Hydrogeology	3 Units
GEO 5143	Environmental Isotopes and Groundwater Geochemistry	3 Units
GEO 5147	Aqueous Inorganic Geochemistry and Modelling	3 Units
EVG 7301	Contaminant Hydrology	3 Units
EVG 7303	Multiphase Flow in Soils	3 Units
Management	of Solid, Hazardous, and Radioactive Waste	
and Pollution	Prevention	
CVG 5133	Solid Waste Disposal	3 Units
CVG 5179	Anaerobic Digestion	3 Units
CVG 5331	Sludge Utilization and Disposal	3 Units

EVG 5203	Hazardous and Radioactive Waste Management	3 Units		
EVG 7201	Geo-Environmental Engineering	3 Units		
EVG 7202	Contaminant Fate Mechanisms	3 Units		
Water and Wa	astewater Treatment			
CVG 5130	Wastewater Treatment Process Design	3 Units		
CVG 5132	Unit Operations of Water Treatment	3 Units		
CVG 5134	Chemistry for Environmental Engineering	3 Units		
CVG 5137	Water and Wastewater Treatment Process	3 Units		
CVG 5138	Advanced Water Treatment	3 Units		
CVG 7160	Biofilm Processes in Waste-Water Treatment	3 Units		
CVG 5180	Biological Nutrient Bemoval	3 Units		
CVG 5232	Unit Operations of Water Treatment Lab	1.5 Units		
CVG 5238	Advanced Water Treatment Process Lab	1.5 Units		
CHG 8181	Advanced Biochemical Engineering	3 Units		
CHG 8192	Membranes in Clean Processes	3 Units		
CHG 8198	Membrane Gas Separation Processes	3 Units		
Environmenta	al Impact Assessment			
EVG 7401	Environmental Impact Assessment of Major	3 Units		
	Projects			
CVG 5139	Environmental Assessment of Civil	3 Units		
	Engineering Projects			
Other Course	s			
EVG 6108	Directed Studies I	3 Units		
EVG 6109	Directed Studies II	3 Units		
EVG 6300	Special Topics in Environmental Engineering I	3 Units		
EVG 6301	Special Topics in Environmental Engineering II	3 Units		
EVG 6302	Special Topics in Environmental Engineering III	3 Units		
EVG 7402	Finite Elements in Field Problems	3 Units		
GNG 5121	Planning of Experiments in Engineering Design	3 Units		
GNG 5122	Operational Excellence and Lean Six Sigma	3 Units		
GNG 5123	Enterprise Architecture	3 Units		
GNG 5124	Internet Technologies and Mobile Commerce	3 Units		
GNG 5125	Data Science Applications	3 Units		
GNG 5130	Business Communication and Influence	3 Units		
GNG 5131	Sales and Influence for Engineers	3 Units		
GNG 5140	Engineering Design	3 Units		
GNG 5141	Creativity and Innovation	3 Units		
GNG 5231	Sales Engineer Internship Project	6 Units		
GNG 5300	Topics in Engineering	3 Units		
GNG 5310	Topics in Industry Practice	3 Units		
GNG 5299	Industry Internship Project	6 Units		
Dynamic Pro	cesses			
CHG 8194	Membrane Liquid Separation Processes and Materials	3 Units		
CHG 8195	Advanced Numerical Methods in Chemical and Biological Engineering	3 Units		
Transport Phenomena				
CHG 8196	Interfacial Phenomena in Engineering	3 Units		
CVG 7140	Statistics, Probabilities and Decision-Making	3 Units		

CVG 7150	Intercity Transportation, Planning and Management	3 Units
CVG 7151	Traffic Engineering	3 Units
CVG 7153	Urban Transportation and Management	3 Units

### **Minimum Requirements**

The passing grade in all courses is B.

## Fast-track from Master's to PhD

Students enrolled in the master's program in environmental engineering at the University of Ottawa may be eligible to fast-track directly into the doctoral program without writing a master's thesis. For additional information, please contact the graduate studies office of the Faculty of Engineering.

### Research Research Fields & Facilities

Located in the heart of Canada's capital, a few steps away from Parliament Hill, the University of Ottawa is among Canada's top 10 research universities.

uOttawa focuses research strengths and efforts in four Strategic Areas of Development in Research (SADRs):

- · Canada and the World
- Health
- · e-Society
- · Molecular and Environmental Sciences

With cutting-edge research, our graduate students, researchers and educators strongly influence national and international priorities.

# **Research at the Faculty of Engineering**

Areas of research:

- Environmental Engineering
- · Chemical and Biological Engineering
- Civil Engineering
- Electrical Engineering and Computer Science
- Mechanical Engineering

For more information, refer to the list of faculty members and their research fields on Uniweb (https://uniweb.uottawa.ca/#!arts/themes).

### Courses

Course selection is subject to the approval of the advisor or the advisory committee. Students may choose courses offered at either university from among those listed below.

The courses listed below are grouped by area of study. Students must complete at least one course in three of the five areas. The director will decide when a course offered under a special topics or directed studies heading can be considered to meet the requirements of a given area. Course descriptions may be found in the departmental sections of the calendars concerned. Only a selection of courses given in a particular academic year. EVG 5001 Biofilm Processes in Wastewater Treatment (3 crédits / 3 units)

Volet / Course Component: Cours magistral / Lecture

**EVG 5101 Air Pollution Control (3 units)** This course is equivalent to ENVE 5101 at Carleton University. **Course Component:** Lecture

**EVG 5203 Hazardous and Radioactive Waste Management (3 units)** This course is equivalent to ENVE 5203 at Carleton University. **Course Component:** Lecture

EVG 5800 Seminar for Master's Candidates in Environmental Engineering (1 crédit)

Ce cours est équivalent à ENVE 5800 à la Carleton University. **Volet :** Recherche

EVG 5801 Seminar for Doctoral Candidates in Environmental Engineering (3 crédits)

Ce cours est équivalent à ENVE 7800 à la Carleton University. **Volet :** Recherche

EVG 6001 Projet en génie de l'environnement / Environmental Engineering Project (6 crédits / 6 units)

Ce cours est équivalent à ENVE 5900 à la Carleton University. / This course is equivalent to ENVE 5900 at Carleton University. **Volet / Course Component:** Recherche / Research

EVG 6108 Directed Studies I (3 units) This course is equivalent to ENVE 5906 at Carleton University. Course Component: Research

EVG 6109 Directed Studies II (3 units) This course is equivalent to ENVE 5907 at Carleton University. Course Component: Research

EVG 6300 Special Topics in Environmental Engineering I (3 units) Course Component: Lecture

**EVG 6301 Special Topics in Environmental Engineering II (3 units)** This course is equivalent to ENVE 5701 at Carleton University. **Course Component:** Lecture

**EVG 6302 Special Topics in Environmental Engineering III (3 units)** This course is equivalent to ENVE 5702 at Carleton University. **Course Component:** Lecture

EVG 6508 Études dirigées I (3 crédits) Volet : Cours magistral

EVG 6509 Études dirigées II (3 crédits) Volet : Cours magistral

EVG 7104 Indoor Air Quality (3 units) This course is equivalent to ENVE 5104 at Carleton University. Course Component: Lecture

**EVG 7201 Geo-Environmental Engineering (3 units)** This course is equivalent to ENVE 5201 at Carleton University. **Course Component:** Lecture

**EVG 7202 Contaminant Fate Mechanisms (3 units)** This course is equivalent to ENVE 5202 at Carleton University. **Course Component:** Lecture

EVG 7301 Contaminant Hydrology (3 units) This course is equivalent to ENVE 5301 at Carleton University. Course Component: Lecture

EVG 7303 Multiphase Flow in Soils (3 units) This course is equivalent to ENVE 5303 at Carleton University. Course Component: Lecture

#### EVG 7401 Environmental Impact Assessment of Major Projects (3 units)

This course is equivalent to ENVE 5401 at Carleton University. **Course Component:** Lecture

**EVG 7402 Finite Elements in Field Problems (3 units)** This course is equivalent to ENVE 5402 at Carleton University. **Course Component:** Lecture

EVG 9998 Examen de synthèse / Comprehensive Examination Volet / Course Component: Recherche / Research