DOCTORATE IN PHILOSOPHY ENVIRONMENTAL ENGINEERING

Summary
- Degree offered: Doctorate in Philosophy (PhD)
- Registration status options: Full-time
- Language of instruction: English

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

- Program option (expected duration of the program):
  - within four years
- 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 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 Environmental Engineering (MEng)
- Master of Engineering Civil Engineering (MEng)
- 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/graduate-studies/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-fee-exemption).

  - 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)
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:

• Hold a master’s degree in environmental engineering or in an engineering discipline with an environmental specialization with a minimum average of 75% (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 research performance.

• Identify at least one professor who is willing to supervise your research and thesis.
  
  • We recommend that you contact potential thesis supervisors as soon as possible.
  
  • To register, you need to have been accepted by a thesis supervisor.

• The supervisor’s name is required at the time of application.

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 (OCIENE).

• Research facilities are shared between the two campuses. Students have access to the professors, courses and facilities at both universities; however, the choice of research supervisor will determine the primary campus location of the student. It will also determine which university awards the degree

Program Requirements

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

Candidates in the PhD program are expected to demonstrate a broad knowledge of the following areas within environmental engineering through coursework (undergraduate and graduate) already completed:

• 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

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

Students must meet the following requirements:

Compulsory Courses:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVG 5801</td>
<td>Seminar for Doctoral Candidates in Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EVG 9998</td>
<td>Comprehensive Examination ¹</td>
<td>1</td>
</tr>
<tr>
<td>THD 9999</td>
<td>Doctoral Thesis ², ³</td>
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</tr>
</tbody>
</table>

Note(s)

¹ The comprehensive examination should be completed within the first 16 months (or the equivalent of four full-time terms) of the student’s enrollment in the PhD program.

² Presentation and defense of a thesis based on original research carried out under the direct supervision of a research faculty member in the Department.

³ Students are responsible for ensuring they have met all of the thesis requirements (http://www.uottawa.ca/graduate-studies/students/theses).

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVG 7161</td>
<td>Traffic Related Air Pollution</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7162</td>
<td>Ambient Air Quality and Pollution Modelling</td>
<td>3</td>
</tr>
<tr>
<td>CHG 8132</td>
<td>Adsorption Separation Processes</td>
<td>3</td>
</tr>
<tr>
<td>EVG 5101</td>
<td>Air Pollution Control</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7104</td>
<td>Indoor Air Quality</td>
<td>3</td>
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</tbody>
</table>
Water Resources Management, Groundwater Management, and Contaminant Transport

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CVG 5124</td>
<td>Coastal Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5125</td>
<td>Statistical Methods Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5154</td>
<td>Random Vibration</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5160</td>
<td>Sediment Transport</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5162</td>
<td>River Hydraulics</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7108</td>
<td>Seepage and Water Flow Through Soils</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7163</td>
<td>Case Studies in Hydrogeology</td>
<td>3</td>
</tr>
<tr>
<td>GEO 5143</td>
<td>Environmental Isotopes and Groundwater Geochemistry</td>
<td>3</td>
</tr>
<tr>
<td>GEO 5147</td>
<td>Aqueous Inorganic Geochemistry and Modelling</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7301</td>
<td>Contaminant Hydrology</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7303</td>
<td>Multiphase Flow in Soils</td>
<td>3</td>
</tr>
</tbody>
</table>

Management of Solid, Hazardous, and Radioactive Waste and Pollution Prevention

<table>
<thead>
<tr>
<th>Course Code</th>
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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CVG 5133</td>
<td>Solid Waste Disposal</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5179</td>
<td>Anaerobic Digestion</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5331</td>
<td>Sludge Utilization and Disposal</td>
<td>3</td>
</tr>
<tr>
<td>EVG 5203</td>
<td>Hazardous and Radioactive Waste Management</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7201</td>
<td>Geo-Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7202</td>
<td>Contaminant Fate Mechanisms</td>
<td>3</td>
</tr>
</tbody>
</table>

Water and Wastewater Treatment

<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>CVG 5130</td>
<td>Wastewater Treatment Process Design</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5132</td>
<td>Unit Operations of Water Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5134</td>
<td>Chemistry for Environmental Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5137</td>
<td>Water and Wastewater Treatment Process Analysis</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5138</td>
<td>Advanced Water Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7160</td>
<td>Biofilm Processes in Waste-Water Treatment</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5180</td>
<td>Biological Nutrient Removal</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5232</td>
<td>Unit Operations of Water Treatment Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>CVG 5238</td>
<td>Advanced Water Treatment Process Lab</td>
<td>1.5</td>
</tr>
<tr>
<td>CHG 8181</td>
<td>Advanced Biochemical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CHG 8192</td>
<td>Membranes in Clean Processes</td>
<td>3</td>
</tr>
<tr>
<td>CHG 8198</td>
<td>Membrane Gas Separation Processes</td>
<td>3</td>
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Environmental Impact Assessment

<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>EVG 7401</td>
<td>Environmental Impact Assessment of Major Projects</td>
<td>3</td>
</tr>
<tr>
<td>CVG 5139</td>
<td>Environmental Assessment of Civil Engineering Projects</td>
<td>3</td>
</tr>
</tbody>
</table>

Other Courses

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVG 6108</td>
<td>Directed Studies I</td>
<td>3</td>
</tr>
<tr>
<td>EVG 6109</td>
<td>Directed Studies II</td>
<td>3</td>
</tr>
<tr>
<td>EVG 6300</td>
<td>Special Topics in Environmental Engineering I</td>
<td>3</td>
</tr>
<tr>
<td>EVG 6301</td>
<td>Special Topics in Environmental Engineering II</td>
<td>3</td>
</tr>
<tr>
<td>EVG 6302</td>
<td>Special Topics in Environmental Engineering III</td>
<td>3</td>
</tr>
<tr>
<td>EVG 7402</td>
<td>Finite Elements in Field Problems</td>
<td>3</td>
</tr>
<tr>
<td>GNG 5121</td>
<td>Planning of Experiments in Engineering Design</td>
<td>3</td>
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</tbody>
</table>

GNG 5122 | Operational Excellence and Lean Six Sigma | 3 Units

Dynamic Processes

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHG 8194</td>
<td>Membrane Liquid Separation Processes and Materials</td>
<td>3</td>
</tr>
</tbody>
</table>
| CHG 8195    | Advanced Numerical Methods in Chemical and Biological Engineering | 3 Units

Transport Phenomena

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>CHG 8196</td>
<td>Interfacial Phenomena in Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7140</td>
<td>Statistics, Probabilities and Decision-Making</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7150</td>
<td>Intercity Transportation, Planning and Management</td>
<td>3</td>
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<table>
<thead>
<tr>
<th>Course Code</th>
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</thead>
<tbody>
<tr>
<td>CVG 7151</td>
<td>Traffic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CVG 7153</td>
<td>Urban Transportation and Management</td>
<td>3</td>
</tr>
</tbody>
</table>

Minimum Requirements

The passing grade in all courses is B.

Students who fail 6 units, or whose research progress is deemed unsatisfactory are required to withdraw from the program.

Transfer from Master’s to PhD

Master’s students with outstanding performance in the master’s courses may request transfer into the PhD program without completing the master’s degree. Students who are permitted to do so must successfully complete a total of 24 course units (15 at the Master’s and 9 at the PhD) for a PhD.

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.

IMPORTANT: Candidates and students looking for professors to supervise their thesis or research project can also consult the website http://catalogue.uottawa.ca/en/graduate/doctorate-philosophy-environmental-engineering/index.html
of the faculty or department (https://www.uottawa.ca/graduate-studies/students/academic-unit-contact-information) of their program of choice. Uniweb does not list all professors authorized to supervise research projects at the University of Ottawa.

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