Master of Science Earth Sciences Specialization in Environmental Sustainability

Summary
- Degree offered: Master of Science (MSc)
- Registration status options: Full-time; Part-time
- Language of instruction: English
- Primary program: MSc Earth Sciences
- Collaborative specialization: Environmental Sustainability
- Program option (expected duration of the program):
  - with thesis (6 full-time terms; 24 consecutive months)

Program Description
Ottawa-Carleton Geoscience Centre
Established in 1982, the Ottawa-Carleton Geoscience Centre (OCGC) combines the research strengths of the University of Ottawa and Carleton University. The Centre offers graduate programs leading to the master's (MSc) and doctoral (PhD) degrees in Earth sciences.

Research facilities are shared between the two campuses. Students have access to the professors, courses and facilities at both universities; however, they must enroll at the “home university” of the thesis supervisor.

The Centre is one of the participating units in the collaborative program in chemical and environmental toxicology (at the master’s and doctoral levels) and in environmental sustainability (at master’s level).

Collaborative Program Description
The Institute of the Environment offers a master’s level collaborative program in Environmental Sustainability and an interdisciplinary Master of Science (MSc) in Environmental Sustainability. The master’s level collaborative program in Environmental Sustainability allows students enrolled in one of the participating master’s programs to specialize in environmental sustainability.

The guiding objective of the collaborative program is to provide graduate students with the knowledge and skills needed to identify and analyze the economic, legal, policy and scientific dimensions of environmental problems, and to employ an evidence-based approach to develop rational policy options for addressing those problems.

The degree awarded specifies the primary program and indicates “Specialization in Environmental Sustainability.”

Main Areas of Research
- Environmental geoscience
- Geochemistry
- Petrology
- Geomathematics
- Geomatics
- Mineral resources studies
- Sedimentary systems
- Tectonics
- Geophysics

Other Programs Offered Within the Same Discipline or in a Related Area
- Master of Science Earth Sciences (MSc)
- Master of Science Earth Sciences Specialization in Chemical and Environmental Toxicology (MSc)
- Master of Science Earth Sciences Specialization in Science, Society and Policy (MSc)
- Doctorate in Philosophy Earth Sciences (PhD)
- Doctorate in Philosophy Earth Sciences Specialization in Chemical and Environmental Toxicology (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 at each of the two universities.
- 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. 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 Contact Information
Graduate Studies Office, Faculty of Science (https://science.uottawa.ca/en/faculty-services/graduate-studies)
30 Marie-Curie Street, Gendron Hall, Room 181
Ottawa, Ontario, Canada
K1N 6N5

Tel.: 613-562-5800 x3145
Email: gradsci@uOttawa.ca

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Facebook | Faculty of Science (https://www.facebook.com/uOttawaScience)
Twitter | Institute of the Environment (https://twitter.com/uoEnvironment)
Facebook | Institute of the Environment (https://www.facebook.com/uOttawaIE)

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 (http://www.uottawa.ca/graduate-studies/programs-admission/apply/specific-requirements) webpage.

To be eligible, candidates must:
• Have a bachelor’s degree with a specialization or a major in earth sciences (or equivalent) with a minimum average of 75% (B+) in the last two years and a 70% (B) average overall.

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 funding requirements.

Note: International students must provide proof of financial support: i.e., a stipend provided by a supervisor as well as a combination of awards and/or trust funds.

• Pay the $100 ($CDN non-refundable) application fee.
• 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.
  • The choice of supervisor will determine the primary campus location of the student. It will also determine which university awards the degree.

Language Requirements
Applicants must be able to understand, write and fluently speak the language of instruction (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.

Language tests recognized by the University of Ottawa:
• TOEFL: 550 (paper-based) – 79-80 (internet-based); or
• IELTS: 6.5 Overall – 5.0 Individual (paper-based or internet-based); or
• An equivalent language test (http://www.uottawa.ca/graduate-studies/programs-admission/apply/required-documents).

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 Geoscience Centre (OCGC).
• Candidates must apply to the primary program and indicate in their application for admission to the master’s program in Earth Sciences that they wish to be accepted into the collaborative specialization in Environmental Sustainability. To be admitted to the collaborative program, candidates must also be accepted in the primary program. In exceptional cases, students could commence their specialization in environmental sustainability at the beginning of the second term of enrollment.

Documents Required for Admission
In addition to the documents required (http://www.uottawa.ca/graduate-studies/programs-admission/apply/required-documents) for graduate
and postdoctoral studies, candidates must submit the following documents:

- A resume
- A statement of purpose
  
  Letter outlining your professional goals and proposed research area.
- Two confidential letters of recommendation from professors who have known the applicant and are familiar with their work.
  
  You are strongly encouraged to contact your referee(s) prior to submitting your application in order to confirm their email address and their availability to complete your letter of recommendation.
- Transcripts from all universities attended:
  
  - You must submit official transcripts from all the universities you have attended.
  
  This applies to all courses and programs at any university you attended, including regular programs (completed or not), exchanges, letters of permission, online or correspondence courses, courses taken as a special student or visiting student, etc.
  
  - If the transcript and degree certificate are not in English or French, a certified translation (signed and stamped/sealed) must be submitted.
- The collaborative program enrollment form (https://www.uottawa.ca/environment/grad-programs/specialization/apply)
- A letter of recommendation from a professor confirming that he or she is willing to act as thesis supervisor.
- A cover letter, along with the application form, indicating what research topic or area the student would like to pursue, and why the student wishes to do so as part of the collaborative program.

Note: Documents that are not required for admission will not be consulted, conserved or returned to the student. These documents will be destroyed according to our administrative procedures.

Information about how to apply to this program is available under the Apply Now (http://www.uottawa.ca/graduate-studies/programs-admission/apply/#apply-now) section.

Students should complete and submit their online application with supporting documentation (if applicable) by the deadline indicated above. The supporting documentation should be sent by e-mail attachment, regular mail, or in person.

**Program Requirements**

**Master’s with Collaborative Specialization**

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

Students must meet the following requirements for the master’s with collaborative specialization:

**Compulsory Courses:**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>GEO 7999</td>
<td>M.Sc. Thesis</td>
<td>4-5</td>
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**Seminars:**

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<th>Course Code</th>
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<tr>
<td>EVD 5100</td>
<td>Seminar in Environmental Sustainability</td>
<td>3</td>
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**Note(s)**

1. The optional course units may also be selected from related disciplines approved by the Department of Earth Sciences.
2. Three of the nine optional course units may be taken at the 4000 level.
3. Presentation of a seminar at one of the biannual Ottawa-Carleton Geoscience Centre Graduate Symposia.
4. Presentation and defence of a thesis on a topic in environmental sustainability based on research carried out under the supervision of a professor who is a member of the student’s primary program and/or of the collaborative program. The Collaborative Program Committee determines whether or not the topic of the thesis is appropriate for the designation “Specialization in Environmental Sustainability.” At least one of the thesis examiners must be a member of the Environmental Sustainability collaborative program.
5. Students are responsible for ensuring they have met all of the thesis requirements (http://www.uottawa.ca/graduate-studies/students/theses).

**Fast-Track from Master’s to PhD**

Students enrolled in the master’s program in Earth Sciences 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 consult the “Admission Requirements” section of the PhD program.

**Minimum Requirements**

The passing grade in all courses is **B**.

Students who fail two courses (equivalent to 6 units), the thesis proposal, or whose research progress is deemed unsatisfactory must withdraw from the program.

**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 Science**

The Faculty of Science has become a true centre of excellence in research through its world-class professors as well as its programs and
The research accomplished by its 140 internationally recognized professors, its approximately 400 graduate students and its dozens of postdoctoral researchers and visiting scientists has positioned the Faculty of Science as one of the most research intensive science faculties in Canada. Our professors have received many international and national awards including three NSERC Gerhard Herzberg Gold Medal winners and numerous Fellows of the Royal Society of Canada.

The Faculty of Science, through its strategic use of infrastructure programs, hosts world-class Core Facilities and is at the leading edge for the study of Catalysis, Experimental and Computational Chemistry, Environmental Toxins, Nuclear Magnetic Resonance, Isotope Analysis, Molecular Biology and Genomics, X-Ray Spectrometry/Diffractometry, Geochemistry, Mass Spectrometry, Physiology and Genetics of Aquatic Organisms, and Photonics. The Faculty is also associated with the Fields Institute for research in mathematical science and the Centre de recherche mathématiques (CRM) at the Université de Montréal, providing a unique setting for mathematical research.

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 of the faculty or department (https://www.ualberta.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

Not all of the listed courses are given each year. The course is offered in the language in which it is described.

A 3-unit course at the University of Ottawa is equivalent to a 0.5-unit course at Carleton University.

GEO 5114 Mineralogy (3 units)
An advanced course covering selected topics in mineralogy, such as crystallography, crystal chemistry, crystal structure, mineralogy of rock-forming mineral groups, and instrumental methods in mineralogical research, such as use of electronic optical instruments, spectroscopy, and X-ray crystallography; seminar presentations and practical exercises included. This course is equivalent to ERTH 5104 at Carleton University.

Course Component: Lecture

GEO 5122 Advanced Igneous Petrology (3 units)
The course focuses on particular aspects of the discipline and integrates physical and chemical processes with the dynamics of magmatic systems to understand igneous processes. This course is equivalent to ERTH 5202 at Carleton University.

Course Component: Lecture

GEO 5124 Geology and Geochemistry of Ore Deposits (3 units)
An advanced course in ore deposits examining aspects of their geology, geochemistry, and exploration. Topics will be selected from a range of different deposit types, including hydrothermal and magmatic ore deposits, as well as laboratory and field examination of different ores and their host rocks. This course is equivalent to ERTH 5204 at Carleton University.

Course Component: Lecture

GEO 5131 Siliciclastic Sedimentology (3 units)
Origin and significance of physical and sedimentary processes and structures. Analysis of ancient siliciclastic depositional environments in a facies model and sequence stratigraphic framework. Course involves lectures, seminars and field excursions. This course is equivalent to ERTH 5301 at Carleton University.

Course Component: Lecture

GEO 5135 Carbonate Sedimentology (3 units)
Lectures and seminars will cover aspects of modern depositional systems, dynamic facies models, sequence stratigraphy, mineralogy, and diagenesis of carbonate sediments. Practical part of the course will consist of a field-laboratory project that integrates various techniques in carbonate sedimentology (mapping, petrography, staining, cathodoluminescence, fluorescence, SEM). This course is equivalent to ERTH 5305 at Carleton University.

Course Component: Lecture

GEO 5136 Paleobiology (3 units)
Selected topics in paleobiology of micro- and macro-invertebrates and vertebrates. Topics include extinctions, micro- and macro-evolutionary processes, long-term trends and cycles in the Phanerozoic, and functional morphology, as well as application of invertebrates to biostratigraphy, paleoceanography and paleolimnology. This course is equivalent to ERTH 5306 at Carleton University.

Course Component: Lecture

GEO 5139 Glacial and Periglacial Geology (3 units)
An examination of various sedimentary environments associated with glacial and periglacial processes and their significance for mineral exploration and environmental geochemistry. Study of cold climate non-glacial conditions and the development of permafrost and permafrost-related features, including the effect of groundwater flow on permafrost distribution. This course is equivalent to ERTH 5309 at Carleton University.

Course Component: Lecture

GEO 5142 Environmental Geoscience (3 units)
A study-seminar course in which students will examine, in depth, certain environmental problems, including geological hazards, mineral and energy consumption and environmental degradation. The relation between development and the environment will be considered. Students will prepare a report and present a seminar on a subject of their choice, and will participate in a research project centered in the Ottawa area. This course is equivalent to ERTH 5402 at Carleton University.

Course Component: Lecture

GEO 5143 Environmental Isotopes and Groundwater Geochemistry (3 credits)

Prerequisite: Fourth-year Hydrogeology (67.420 or GEO 4342) or equivalent.

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Volet : Cours magistral
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GEO 5146 Techniques of Groundwater Resources Evaluation (3 units)
Governing groundwater flow equations, initial and boundary conditions; simple numerical solutions (spreadsheets); complex numerical solutions (commercial software); and analytical solutions. Applications: aquifer response test analysis, capture zone analysis, groundwater flow modeling, water budgeting, and aquifer vulnerability assessment.

Course Component: Lecture
GEO 5147 Geochemistry of Natural Waters (3 units)
Aqueous speciation, solubility of metals, minerals and gas, reaction kinetics and equilibria. Chemistry and dynamics of groundwaters and hydrothermal fluids. This course is equivalent to ERTH 5407 at Carleton University.
Course Component: Lecture

GEO 5148 Theory of Flow and Contaminant Transport in Geological Materials (3 units)
Development of governing groundwater flow equations and solute transport equations from first principles, and application of principles in case studies. Topics: forces and potentials, fluids, geological materials, contaminants, case studies.
Course Component: Lecture
Prerequisite: undergraduate hydrogeology.

GEO 5151 Precambrian Geology (3 units)
Geology and tectonic history of the Canadian Shield, emphasizing modern four-dimensional interpretations (map, depth, time); comparison and correlation with other Precambrian shields; global Precambrian tectonic evolution through review of continental reconstructions; Precambrian mineral deposits; field trips and research projects. This course is equivalent to ERTH 5501 at Carleton University.
Course Component: Lecture

GEO 5153 Computer Techniques in the Earth Sciences (3 units)
A practical course in the application of computer techniques in the acquisition and interpretation of geoscientific data. Topics will be selected from the following: remote sensing and geographic information systems; geostatistical analysis techniques; analysis and modelling of geoscientific data. This course is equivalent to ERTH 5503 at Carleton University.
Course Component: Lecture

GEO 5157 Tectonic Processes Emphasizing Geochronology and Metamorphism (3 units)
Applications of empirical, analytical and quantitative techniques to problems in regional geology and crustal tectonics; orogenic processes; heat and metamorphism; isotopic geochronology as applied to thermal history. This course is equivalent to ERTH 5507 at Carleton University.
Course Component: Lecture

GEO 5160 Chemistry of the Earth (3 units)
Examine the composition of the mantle and crust in selected tectonic settings, such as subduction zones and hot spots. Topics may include how geochemical data constrain geodynamic settings of study area. This course is equivalent to ERTH 5600 at Carleton University.
Course Component: Lecture

GEO 5163 Stable Isotope Geochemistry (3 units)
Mechanisms of isotope fractionation, fractionation in nature; physical and chemical isotope fractionation, kinetic isotope effects. Variations of stable isotope ratios (hydrogen, carbon, oxygen and sulphur) in nature. Preparation techniques of natural samples for isotope analysis. Applications of stable isotopes to study magma genesis, ore genesis, nature of water and formation fluids and sedimentary environments. This course is equivalent to ERTH 5603 at Carleton University.
Course Component: Lecture

GEO 5169 Radioisotope Geochemistry (3 units)
Course Component: Lecture

GEO 5171 Physics of the Earth (3 units)
The physics and dynamics of the solid Earth: seismology; gravitational and magnetic fields; thermal state. Geophysical constraints on the structure and composition of the interior. Geodynamic processes. This course is equivalent to ERTH 5701 at Carleton University.
Course Component: Lecture

GEO 5173 Structural Geology (3 units)
Deformation processes and the analysis of geological structures at all scales. This course is equivalent to ERTH 5703 at Carleton University.
Course Component: Lecture

GEO 5174 Tectonics (3 units)
Dynamical and geological aspects of plate tectonics throughout Earth history. This course is equivalent to ERTH 5704 at Carleton University.
Course Component: Lecture

GEO 5177 Engineering Seismology (3 units)
Seismological topics with engineering applications. Characterization of seismicity and seismic sources (areas and faults). Seismic hazard analysis. Empirical and theoretical modeling of strong ground motion in time and frequency domains. This course is equivalent to ERTH 5707 at Carleton University.
Course Component: Lecture

GEO 5178 Geophysical Signal Processing (3 units)
Practical aspects of earthquake and other geophysical signal process; focus on application of Fourier analysis, digital filters, instrument response. This course is equivalent to ERTH 5708 at Carleton University.
Course Component: Lecture

GEO 5193 Field Studies (3 units)
Systematic investigations of geological problems, based on a minimum of 15 days field work plus related library research and laboratory projects. Written report required. This course is equivalent to ERTH 5903 at Carleton University.
Course Component: Research

GEO 5294 Problems in Historical Geology and Geological Time (3 units)
Controversial ideas concerning the Earth and time: historical development of thought on the physical and biological evolution of the Earth. Understanding the stratigraphic column in regard to duration, age and correlation, including evidence from paleontology and sedimentology, particularly gaps in the succession and rhythmic or episodic events. Origin and nature of life, relationship between crustal events and evolution, including extinctions. Concepts and models in geology; responsibility of the geologist to humanity. Half-course given during Fall and Winter sessions.
Course Component: Lecture

GEO 5301 Seminars in Earth Sciences I (3 units)
One-session modular course covering a spectrum of Earth science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. A minimum of 4 modules is offered per session; 3 must be completed to obtain unit for a course. Students may not normally obtain units for modules that are offered by their supervisors. The choice of modules must be approved by the Director of the Geoscience Centre or a designate. This course complements GEO 5302 (ERTH 5002). This course is equivalent to ERTH 5001 at Carleton University.
Course Component: Lecture
GEO 5302 Seminars in Earth Sciences II (3 units)
One-session modular course covering a spectrum of Earth science topics and current research problems, ranging from the geology and geophysics of the solid Earth, to its surface environment and crustal resources. A minimum of 4 modules is offered per session; 3 must be completed to obtain unit for a course. Students may not normally obtain units for modules that are offered by their supervisors. The choice of modules must be approved by the Director of the Geoscience Centre or a designate. This course complements GEO 5301 (ERTH 5001). This course is equivalent to ERTH 5202 at Carleton University.
Course Component: Lecture

GEO 5306 Hydrothermal Ore Deposits (3 units)
An advanced course in economic geology related to hydrothermal ore deposits, including their geology and geochemistry, physical and chemical controls on hydrothermal mineralization, the recognition and characterization of ore-fluid reservoirs, and the nature of large-scale fluid flow and alteration, with an emphasis on applications to exploration. This course is equivalent to ERTH 5206 at Carleton University.
Course Component: Lecture

GEO 7999 Thèse de maîtrise / M.Sc. Thesis
Ce cours est équivalent à ERTH 5909 à la Carleton University. / This course is equivalent to ERTH 5909 at Carleton University.
Volet / Course Component: Recherche / Research

GEO 9998 Examen de synthèse (doctorat) / Comprehensive Examination (Ph.D.)
Ce cours est équivalent à ERTH 6908 à la Carleton University. / This course is equivalent to ERTH 6908 at Carleton University.
Volet / Course Component: Recherche / Research

GEO 9999 Ph.D. Thesis / Ph.D. Thesis
Ce cours est équivalent à ERTH 6909 à la Carleton University. / This course is equivalent to ERTH 6909 at Carleton University.
Volet / Course Component: Recherche / Research

EVD 5100 Seminar in Environmental Sustainability (3 units)
Overview of environmental sustainability issues using climate change as an example. Application of integrated analyses based on concepts in science, law, economics and policy to devise policy solutions. The debate about the scientific evidence for climate change and international efforts to negotiate an agreement. The economic, political and social dimensions of climate change and measures taken both nationally and internationally to mitigate its effects.
Course Component: Seminar

EVD 5101 Economics of Environmental Law and Policy (3 units)
Environmental issues and the environmental policy framework from an economics perspective. Review of the underlying theory in relation to economic concepts such as efficiency, market failure, externalities, cost-benefit, and valuation. Overview of macroeconomic topics such as economic growth and green accounting, and their relation to law and policy. Application of these theoretical concepts to various environmental challenges, from climate change and energy regulation to managing ecosystem services and conserving biodiversity. Policy options for managing environmental challenges, from traditional “command and control” regulation to economic instruments such as environmental taxation, and cap and trade programs. Evaluation of the environmental, social, and economic effectiveness of the various policy options, and integration of economic theory into environmental policy development.
Course Component: Lecture

EVD 5106 Foundations of Environmental Law (1.5 units)
Foundations of environmental law, including theory of sustainability, constitutional division of powers, approaches to regulation of environmental issues, including examples of legal frameworks for different environmental problems, and access to justice.
Course Component: Seminar

EVD 5109 Applied Environmental Sustainability (3 units)
Uses an environmental sustainability case study, such as climate change, to learn how to synthesize information about a problem from multiple disciplinary perspectives, to critically evaluate such information using rigorous methodological approaches, and to design and evaluate policy or regulatory solutions.
Course Component: Seminar
Prerequisites: EVD 5106, EVD 5107, EVD 5121, EVD 5122.

EVD 5111 Capstone Seminar in Environmental Sustainability (3 units)
Involves partnering with organization(s) working on a sustainability issue. Students work in interdisciplinary teams to identify the scientific, economic, legal and social dimensions of a particular environmental problem, evaluate a set of candidate solutions, and recommend an approach.
Course Component: Seminar

EVD 5113 Foundations of Environmental Policy (3 units)
Study of the key political and administrative factors affecting the formulation and implementation of environmental policy, including democratic institutions, various methods for citizen and stakeholder engagement and their influence on the decision-making process in government, public opinion and the framing of policy problems, values and the use of scientific evidence in policy-making, lobbying and the role of interest representation, federalism and multi-level environmental governance, and the international governance of environmental problems. Case studies will place Canada in a comparative context and explore the importance of political factors across areas of environmental policy.
Course Component: Seminar

EVD 5114 Professional Skills for Environmental Sustainability (1.5 units)
Oral and written communications skills, including presenting to parliamentary committees, preparing memos to cabinet, writing editorials, doing media interviews, and producing interdisciplinary public policy reports. Project and process management skills, including multi-stakeholder processes.
Course Component: Seminar

EVD 5121 Foundations of Environmental Science (3 units)
Provides students with a thematic understanding of the current state of environmental science. Major themes include: the set of environmental issues that are currently of major concern in Canada and abroad; the range of scientific approaches currently employed to understand and predict the effects of human activities on ecosystems; the nature of environmental science evidence; and how environmental sustainability is characterized from the perspective of environmental science.
Course Component: Seminar
EVD 5122 Foundations of Environmental Economics (3 units)
Key elements of economics including formal models and their underlying assumptions as they relate to the development of sustainability policy. Covers concepts such as public goods, market failure, non-market valuation, incentives, welfare economics, regulation, the equity-efficiency trade-off and market-based instruments. The course explains how fundamental economic concepts, particularly their advantages and limitations, are used to analyze issues at the interface of the economy and the environment. Examines renewable (e.g., fisheries, forests) and non-renewable (e.g., oil, gas, minerals) resource management and other topics (e.g., climate change, ozone depletion, cap and trade) in applied environmental economics. Explores the institutions and trade-offs that individuals and governments face in the context of sustainability policy.
Course Component: Seminar

EVD 5123 Evidence Synthesis and Evaluation (3 units)
Reviews different understandings of what constitutes research, both as it pertains to the production of evidence and to the evaluation of existing evidence relating to policy, to regulatory and statutory interventions and to identifying evidence gaps. Students learn research methodologies to design research so as to maximize its evidentiary value (given existing constraints); they will also learn to synthesize and assess the evidentiary value of existing research.
Course Component: Seminar

EVD 5500 Séminaire en durabilité de l'environnement (3 crédits)
Survol des enjeux en durabilité de l'environnement en se servant du changement climatique comme exemple. Application d'analyses intégrant des concepts en sciences, en droit, en science économique et en études politiques. Le débat au sujet de la preuve scientifique du changement climatique et les efforts sur le plan international pour négocier une entente. Les dimensions économiques, sociales et politiques du changement climatique et les mesures à ce jour pour atténuer ses effets, au niveau international et au niveau national.
Volet : Séminaire

EVD 5501 Approche économique et le droit de l'environnement (3 crédits)
Les enjeux environnementaux et le système de réglementation du point de vue de la science économique. Étude de la théorie qui sous-tend certains concepts économiques, tels l'efficacité, la défaillance du marché, les externalités et la valuation. Survol des concepts macroéconomiques, tels la croissance économique et la comptabilité environnementale. Application de ces concepts théoriques aux défis environnementaux tels le changement climatique, la réglementation de l'énergie, la gestion des services écologiques et la conservation de la biodiversité. Les divers outils de réglementation pour la gestion des défis liés à l'environnement, incluant la réglementation traditionnelle de type « commande et contrôle », les moyens économiques tels que la taxation environnementale et les systèmes de droits d'échanges. Évaluation de l'efficacité environnementale, sociale et économique des diverses approches, et intégration de la théorie économique dans le développement de la réglementation environnementale.
Volet : Cours magistral

EVD 5506 Rudiments du droit de l'environnement (1.5 crédits)
Rudiments du droit de l'environnement, y compris la théorie du développement durable, la division constitutionnelle des pouvoirs, les démarches visant à réglementer les questions environnementales, avec exemples de cadres légaux pour différents problèmes environnementaux et accès à la justice.
Volet : Cours magistral

EVD 5509 Développement durable appliqué (3 crédits)
Étude de cas en développement durable (changements climatiques, par exemple) pour apprendre à synthétiser l'information sur un problème à partir de plusieurs perspectives disciplinaires, pour évaluer l'information selon un schéma critique, en faisant usage de méthodes rigoureuses, et pour concevoir et évaluer des politiques ou règlements.
Volet : Cours magistral
Préalables : EVD 5506, EVD 5507, EVD 5521, EVD 5522.

EVD 5511 Séminaire d'intégration sur le développement durable (3 crédits)
Partenariat avec des organisations travaillant en développement durable. Les étudiants forment des équipes multidisciplinaires pour étudier les dimensions scientifiques, économiques, juridiques et sociales d'un problème environnemental particulier, pour évaluer un éventail de solutions possibles et pour recommander les mesures à prendre.
Volet : Cours magistral

EVD 5513 Rudiments des politiques environnementales (3 crédits)
Étude des principaux facteurs politiques et administratifs influençant la formulation et la mise en œuvre des politiques environnementales, y compris les institutions démocratiques, les méthodes de participation des citoyens et des parties prenantes et leur influence sur les processus décisionnels des gouvernements, l'opinion publique et la définition des problèmes, le rôle des valeurs et de la science dans la formulation des politiques, le lobbying et la représentation des intérêts, le fédéralisme et la gouvernance multi-niveaux des enjeux environnementaux, et la politique internationale de l'environnement. Des études de cas situeront le Canada dans une perspective comparée et exploreront l'importance de ces facteurs politiques dans divers secteurs des politiques environnementales.
Volet : Cours magistral

EVD 5514 Compétences professionnelles pour le développement durable (1.5 crédits)
Compétences orales et écrites en communication, notamment les présentations aux comités parlementaires, la préparation de mémoires au cabinet, la rédaction d'éditoriaux, les entrevues médiatiques et la production de rapports multidisciplinaires sur les politiques publiques. Gestion de projet et de processus faisant intervenir de nombreux joueurs.
Volet : Cours magistral

EVD 5521 Rudiments des sciences de l'environnement (3 crédits)
Donne aux étudiants une compréhension thématique de l'état actuel des sciences environnementales. Principaux thèmes : éventail des enjeux environnementaux d'importance au Canada et à l'étranger; les démarches scientifiques déployées pour comprendre et prédire les conséquences des activités humaines pour les écosystèmes; la nature des preuves apportées par les sciences de l'environnement; la perspective des sciences de l'environnement sur le développement durable.
Volet : Cours magistral

EVD 5509 Développement durable appliqué (3 crédits)
Étude de cas en développement durable (changements climatiques, par exemple) pour apprendre à synthétiser l'information sur un problème à partir de plusieurs perspectives disciplinaires, pour évaluer l'information selon un schéma critique, en faisant usage de méthodes rigoureuses, et pour concevoir et évaluer des politiques ou règlements.
Volet : Cours magistral
Préalables : EVD 5506, EVD 5507, EVD 5521, EVD 5522.

EVD 5511 Séminaire d'intégration sur le développement durable (3 crédits)
Partenariat avec des organisations travaillant en développement durable. Les étudiants forment des équipes multidisciplinaires pour étudier les dimensions scientifiques, économiques, juridiques et sociales d'un problème environnemental particulier, pour évaluer un éventail de solutions possibles et pour recommander les mesures à prendre.
Volet : Cours magistral

EVD 5513 Rudiments des politiques environnementales (3 crédits)
Étude des principaux facteurs politiques et administratifs influençant la formulation et la mise en œuvre des politiques environnementales, y compris les institutions démocratiques, les méthodes de participation des citoyens et des parties prenantes et leur influence sur les processus décisionnels des gouvernements, l'opinion publique et la définition des problèmes, le rôle des valeurs et de la science dans la formulation des politiques, le lobbying et la représentation des intérêts, le fédéralisme et la gouvernance multi-niveaux des enjeux environnementaux, et la politique internationale de l'environnement. Des études de cas situeront le Canada dans une perspective comparée et exploreront l'importance de ces facteurs politiques dans divers secteurs des politiques environnementales.
Volet : Cours magistral

EVD 5514 Compétences professionnelles pour le développement durable (1.5 crédits)
Compétences orales et écrites en communication, notamment les présentations aux comités parlementaires, la préparation de mémoires au cabinet, la rédaction d'éditoriaux, les entrevues médiatiques et la production de rapports multidisciplinaires sur les politiques publiques. Gestion de projet et de processus faisant intervenir de nombreux joueurs.
Volet : Cours magistral

EVD 5521 Rudiments des sciences de l'environnement (3 crédits)
Donne aux étudiants une compréhension thématique de l'état actuel des sciences environnementales. Principaux thèmes : éventail des enjeux environnementaux d'importance au Canada et à l'étranger; les démarches scientifiques déployées pour comprendre et prédire les conséquences des activités humaines pour les écosystèmes; la nature des preuves apportées par les sciences de l'environnement; la perspective des sciences de l'environnement sur le développement durable.
Volet : Cours magistral
EVD 5522 Rudiments de l'économie de l'environnement (3 crédits)
Principaux éléments de l'économie, y compris les modèles économiques officiels et les présuppositions afférentes à l'élaboration de politiques de développement durable. Étude de divers concepts : patrimoine commun; échec des marchés; non évaluation des valeurs courantes; mesures incitatives; économie du bien-être; réglementation; équilibre entre équité et efficience; instruments reposant sur les mécanismes de marché. On examinera plus en détail les concepts fondamentaux de l'économie et leurs avantages et inconvénients pour l'examen des enjeux au carrefour de l'économie et de l'environnement. Étude de la gestion des ressources renouvelables (pêches, forêts, etc.) et non renouvelables (pétrole, gaz, minerai, etc.) et d'autres sujets en économie de l'environnement appliquée (ex. changements climatiques, destruction de la couche d'ozone, programmes de plafonnement et d'échange). Étude des institutions et programmes de compensation auxquels sont confrontés les individus et les gouvernements dans le contexte des politiques de développement durable.
Volet : Cours magistral

EVD 6112 Selected Topics in Environmental Sustainability (3 units)
In-depth examination of a question or topic linked to new trends or research areas in environmental sustainability.
Course Component: Lecture

EVD 6512 Thèmes choisis en durabilité de l'environnement (3 crédits)
Analyse approfondie d'une problématique ou d'une question liée aux nouvelles tendances en recherche ou aux nouveaux thèmes de recherche en durabilité de l'environnement.
Volet : Cours magistral

EVD 6912 Thèmes choisis en durabilité de l'environnement / Selected Topics in Environmental Sustainability (3 crédits / 3 units)
Analyse approfondie d'une problématique ou d'une question liée aux nouvelles tendances en recherche ou aux nouveaux thèmes de recherche en durabilité de l'environnement. / In-depth examination of a question or topic linked to new trends or research areas in environmental sustainability.
Volet / Course Component: Cours magistral / Lecture
Préalable : connaissance passive de l'anglais. / Prerequisite: passive knowledge of French

EVD 6932 Lectures dirigées en durabilité de l'environnement / Directed Readings in Environmental Sustainability (3 crédits / 3 units)
Cours individuel ayant pour objectif d'approfondir les connaissances de l'étudiant dans un domaine particulier ou de lui permettre de se familiariser avec un nouveau domaine. Le sujet est déterminé et développé en consultation avec le professeur responsable et en conformité avec les directives de l'Institut de l'environnement. Le travail remis dans ce cours doit être différent de ce qui a pu être soumis dans d'autres cours, y compris le projet de recherche, la thèse ou le mémoire. On permet un maximum d'un cours de lectures dirigées par étudiant et la permission n'est accordée que dans des circonstances exceptionnelles. / Individual course aimed at deepening a student's knowledge of a particular area or at gaining knowledge of a new area. The topic is selected and developed in consultation with the supervising professor in accordance with institute guidelines. The work submitted for this course must be different from that submitted for other courses, including the research proposal, the thesis or the research paper. Maximum of one directed readings course per student, and permission is granted only under exceptional circumstances.
Volet / Course Component: Cours magistral / Lecture
Préalable: Connaissance passive de l’anglais. / Prerequisite: Passive knowledge of French.

EVD 6999 Mémoire / Research Paper (6 crédits / 6 units)
Volet / Course Component: Recherche / Research

EVD 7997 Projet de thèse / Thesis Proposal
Volet / Course Component: Recherche / Research

EVD 7999 Thèse de maîtrise / Master's Thesis
Volet / Course Component: Recherche / Research