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)
- Academic units: Faculty of Science (http://science.uottawa.ca/), Department of Earth and Environmental Sciences (http://science.uottawa.ca/earth/), Ottawa-Carleton Geoscience Centre (http://science.uottawa.ca/earth/ocgc-institute/), Institute of the Environment (https://www.uottawa.ca/environnement/).

Program Description

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/graduated-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
Twitter | Faculty of Science (https://twitter.com/uOttawaScience?lang=en/)
Facebook | Faculty of Science (https://www.facebook.com/uOttawaScience/)
Twitter (https://twitter.com/uoEnvironment/) | Institute of the Environment
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 (https://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 an overall average of a 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 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.

- 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.

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.

Program Requirements
Master’s with Collaborative Specialization
Requirements for this program have been modified. Please consult the 2019-2020 calendars (http://catalogue.uottawa.ca/en/archives/) for the previous requirements.

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:

<table>
<thead>
<tr>
<th>Compulsory Courses:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9 optional course units in Earth sciences (GEO) at the graduate level</td>
<td>9 Units</td>
</tr>
<tr>
<td>Seminars: 3</td>
<td></td>
</tr>
<tr>
<td>EVD 5100</td>
<td>Seminar in Environmental Sustainability</td>
</tr>
<tr>
<td>GEO 5900</td>
<td>MSc Seminar</td>
</tr>
<tr>
<td>Thesis:</td>
<td></td>
</tr>
<tr>
<td>THM 7999</td>
<td>Master’s Thesis</td>
</tr>
</tbody>
</table>

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 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.
4 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 infrastructure in Biology, Chemistry, Earth Sciences, Mathematics and Statistics, and Physics.

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.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

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 5115 Thermodynamics, Kinetic Theory and Metamorphic Petrology (3 units)

Phase equilibria, phase diagrams, and the kinetics of mineral reactions; mass transfer, regional and global aspects of metamorphic, petrogenesis. Course may include one or two weeks of field-based instruction with costs borne by students. This course is equivalent to ERTH 5105 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 5125 Natural Hazards in Canada - Risk and Impacts (3 units)

Overview of natural hazards and severe weather phenomena in Canada. Notions of risk, return period and probability of occurrence of natural disasters. Impact on society and infrastructure. Mitigation policies and strategies. This course is equivalent to ERTH 5215 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)
Aspects of modern depositional systems, dynamic facies models, sequence stratigraphy, mineralogy, and diagenesis of carbonate sediments. The 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)
Extinctions, micro- and macro- evolutionary processes, long-term trends and cycles in the Phanerozoic; functional morphology; application of invertebrates to biostratigraphy, paleoceanography and paleoecology. May include one or two weeks of field-based instruction with costs borne by the student. This course is equivalent to ERTH 5306 at Carleton University.

Course Component: Lecture

GEO 5137 Evolutionary Developmental Biology (3 units)
Explores the mechanistic basis of organismic evolution from genetic, morphogenetic and epigenetic perspectives, within a phylogenetic context of living and extinct vertebrates. Lectures two hours a week and a laboratory of three hours a week. This course is equivalent to ERTH 5307 at Carleton University.

Course Component: Lecture

GEO 5138 Advanced Micropaleontology (3 units)
Paleobiology, biostratigraphy and paleoecology of microfossils in the context of paleoceanography, paleoecology and paleoclimatology. Course may involve a field trip with costs to be paid by students. This course is equivalent to ERTH 5308 at Carleton University.

Course Component: Lecture

GEO 5143 Environmental Isotopes and Groundwater Geochemistry (3 units)
Geochemistry and environmental isotopes in studies of groundwater dynamics, age and contaminant hydrogeology. Environments from shallow groundwater and surface water to deep crustal brines are examined. Low temperature aqueous geochemistry and mineral solubility with emphasis on the carbonate system. This course is equivalent to ERTH 5403 at Carleton University.

Course Component: Laboratory

GEO 5144 Isotope Mapping and Provenance Applications (3 units)
Isotopes are used to trace provenance of organic and inorganic materials. This course will discuss how traditional isotope systems vary in the environment at different spatiotemporal scales and how mapping their variations can solve problems in hydrology, climatology, ecology, and archeology. This course is equivalent to ERTH 5414 at Carleton University.

Course Component: Lecture

GEO 5145 Radiosotope Geochemistry Methods (3 units)
Overview of the basic principles of radiochemistry and examination of the occurrence, sources and production of radionuclides in the earth system that have been used extensively in environmental and geochemical studies. Discussion of and practice using the key methods of radionuclide detection. Equivalent to course ERTH 5405 at Carleton University.

Course Component: Lecture

GEO 5147 Aqueous Inorganic Geochemistry and Modelling (3 units)
Covers concepts in aqueous geochemistry including ion hydration and hydrolysis, aqueous activity, complexation, mineral solubility, carbonate system, redox, adsorption/surface complexation and reaction kinetics. Bi-weekly assignments provide an introduction to equilibrium geochemical modelling. This course is equivalent to ERTH 5407 at Carleton University.

Course Component: Lecture

GEO 5149 Reactive Transport Modelling (3 units)
Introduction to the theory of numerical models and application of reactive transport models in hydrogeology. Focus will be on development of appropriate conceptual models of flow, transport and bi- and geochemical reactions and simulation of these conceptual models using reactive transport codes. This course is equivalent to ERTH 5409 at Carleton University.

Course Component: Lecture

GEO 5151 Precambrian Geology (3 units)
Geology of the main Archean cratons and Proterozoic belts with emphasis on North America. Formation of the Earth, composition and evolution of the crust and mantle during the first 4 billion years of Earth’s history, from its formation to the end of the Proterozoic. 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 for mapping, quantitative analysis, integration and modeling of spatial data related to geosciences and engineering applications using a combination of GIS, statistical and geostatistical analysis techniques. This course is equivalent to ERTH 5503 at Carleton University.

Course Component: Lecture

GEO 5155 Climate Change (3 units)
Considers climate changes and their driving mechanisms over a broad range of timescales based on observations from geological archives and more recent instrumented evidence. Future climate projections and their accuracy are also considered. This course is equivalent to ERTH 5505 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 Radiogenic Isotope Geochemistry (3 units)
Radiogenic isotope systematics applied to the solid Earth and their use to understand various geological processes. Evolution of large-scale isotopic reservoirs throughout Earth's history. Application of different radiometric dating techniques, assessment of geochronological data, models and interpretations. This course is equivalent to ERTH 5609 at Carleton University.
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 processing; focus on application of Fourier analysis, digital filters, instrument response. This course is equivalent to ERTH 5708 at Carleton University.
Course Component: Lecture

GEO 5191 Research Topics in Earth Sciences (3 units)
Directed reading/field/laboratory studies unrelated to thesis research, under the guidance of directors other than the thesis supervisor. A written proposal including research plan, deliverables, and evaluation must be submitted for departmental approval prior to registration. Written report required. This course is equivalent to ERTH 5901 at Carleton University.
Course Component: Research

GEO 5193 Field Studies (3 units)
Field investigations, unrelated to thesis research, not under the guidance of the thesis supervisor. Minimum of ten days field work, plus library/lab research. Individual projects require an approved research plan, deliverables, and evaluation scheme prior to registration. Field costs may be borne by the student. This course is equivalent to ERTH 5903 at Carleton University.
Course Component: Research

GEO 5301 Seminars in Earth Sciences (3 units)
Covers a spectrum of Earth Sciences topics and research problems, ranging from the solid Earth to its surface environment and climate. A strong discussion component and has the primary aims of exposing students to current research problems and improving their communications skills (oral and written). This course is equivalent to ERTH 5001 at Carleton University.
Course Component: Seminar

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 5900 Séminaire de Maîtrise / MSc Seminar
Une fois inscrits au programme, les étudiants doivent présenter leurs recherches oralement à l'un des symposiums biannuels du Centre de géoscience Ottawa-Carleton. La conférence sur la recherche en sciences de la Terre, qui se tient périodiquement à l'Université d'Ottawa ou à l'Université Carleton, est un alternatif acceptable pour ces présentations. / Once during their enrolment in the program, students are required to present their research orally at one of the biannual Ottawa-Carleton Geoscience Centre graduate symposia. The Advances in Earth Science Research Conference, which is hosted periodically at the University of Ottawa or Carleton University, is an acceptable alternative venue for these presentations.
Volet / Course Component: Séminaire / Seminar

GEO 8900 Séminaire de doctorat / PhD Seminar
Une fois inscrits au programme, les étudiants doivent présenter leurs recherches oralement à l'un des symposiums biannuels du Centre de géoscience Ottawa-Carleton. La conférence sur la recherche en sciences de la Terre, qui se tient périodiquement à l'Université d'Ottawa ou à l'Université Carleton, est un alternatif acceptable pour ces présentations. / Once during their enrolment in the program, students are required to present their research orally at one of the biannual Ottawa-Carleton Geoscience Centre graduate symposia. The Advances in Earth Science Research Conference, which is hosted periodically at the University of Ottawa or Carleton University, is an acceptable alternative venue for these presentations.
Volet / Course Component: Séminaire / Seminar

GEO 9998 Examen de synthèse (doctorat) / Comprehensive Examination (Ph.D.)
L'examen de synthèse comprend une proposition de thèse et un examen oral dans trois domaines de spécialisation différents. Cet examen doit être passé dans les douze premiers mois suivant l'inscription au programme. Ce cours est équivalent à ERTH 6908 à l'Université Carleton. / The Comprehensive Examination involves a thesis proposal and oral examination in three different areas of specialization. This exam should be taken within the first twelve months of registration in the program. This course is equivalent to ERTH 6908 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 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

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 unit)
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 5124 Foundations of Environmental Law (3 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 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 valorisation. 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 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 : Séminaire

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)
Volet : Cours magistral

EVD 5514 Compétences professionnelles pour le développement durable (1.5 crédit)
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 5523 Synthèse et évaluation de données probantes (3 crédits)
La recherche vise soit à produire des données probantes, soit à évaluer les données probantes existantes en ce qu’elles ont trait à des interventions politiques, réglementaires et étatiques, y compris les lacunes en la matière. Ainsi, les étudiants acquièrent les compétences nécessaires qui leur permettent de concevoir un programme de recherche de façon à en optimiser la valeur probante (en fonction des contraintes existantes) et de synthétiser les résultats de recherches existantes et d’évaluer leur valeur probante.
Volet : Cours magistral

EVD 5524 Rudiments du droit de l’environnement (3 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 : Séminaire

EVD 6000 Stage coop I / Co-Op Work Term I (6 crédits / 6 units)
Expérience en milieu de travail. Évalué P (réussite) / F (échec) par un professeur du programme selon les résultats du rapport écrit et l’évaluation du superviseur de stage. Préalable : permission du responsable des études supérieures. / Experience in a workplace setting. Evaluated P (Pass) / F (Fail) by a professor in the program based on the written report and the evaluation of the internship supervisor.
Volet / Course Component: Stage / Work Term

EVD 6002 Stage coop II / Co-Op Work II (6 crédits / 6 units)
Expérience en milieu de travail. Évalué P (réussite) / F (échec) par un professeur du programme selon les résultats du rapport écrit et l’évaluation du superviseur de stage. Préalable : permission du responsable des études supérieures. / Experience in a workplace setting. Evaluated P (Pass) / F (Fail) by a professor in the program based on the written report and the evaluation of the internship supervisor.
Volet / Course Component: Stage / Work Term

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 / Course Component:** 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:** Recherche / Research
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 8100 Theory and Practice in Environmental Sustainability (3 units)
Characterization of environmental sustainability from the perspective of economics, political science, environmental science, and law. Demonstration of how often-divergent perspectives and values of stakeholders from various backgrounds frame both sustainability problems themselves, and acceptable solutions.
**Course Component:** Seminar

EVD 8500 Théorie et pratique en durabilité environnementale (3 crédits)
La caractérisation de la durabilité environnementale du point de vue de la science économique, de la science politique, de la science environnementale et du droit. Démonstration de comment les perspectives et les valeurs divergentes des parties prenantes de divers horizons définissent à la fois les problèmes et les solutions acceptables en durabilité.
**Volet / Séminaire**

EVD 8901 Conception de recherche et méthodologie pour la recherche en durabilité de l'environnement / Research Design and Methods for Environmental Sustainability (3 crédits / 3 units)
Vue d'ensemble des méthodes de recherche employées dans les quatre domaines principaux de la durabilité (science de l'environnement, droit, politique et économie). À l'aide d'études de cas, examen des types d'inférences causales que l'on peut ou ne peut pas tirer d'un plan de recherche, les menaces à la déduction valable et les plans de recherche pouvant atténuer ces menaces. Accent particulier sera mis sur la relation entre les conceptions de recherche et la force de l'inférence causale. / Overview of research methods employed in the four main subject areas underlying sustainability (environmental science, law, policy and economics). Through case studies, examination of the kinds of causal inferences one can and cannot draw from a research design, threats to valid inference, and research designs that can mitigate those threats. Particular emphasis placed on the relationship between research designs and strength of causal inference.
**Volet / Course Component:** Séminaire / Seminar

EVD 9997 Examen d'entrée / Qualifying Examination
**Volet / Course Component:** Recherche / Research

EVD 9998 Projet de thèse / PhD Thesis Proposal
**Volet / Course Component:** Recherche / Research