ENVIRONMENTAL SCIENCE (ENVS)

ENVS 1200 Environmental Sustainability
3 credit hours
This course provides a scientific introduction to environmental problems and their interdisciplinary, evidence-based solutions. The emphasis is on critical thinking to understand ecological processes and their importance to global sustainability and a healthy planet.

ENVS 1250 Energy in the Environment
3 credit hours
Prerequisite: Nova Scotia Grade 12 Mathematics or equivalent

Students study fundamental physical processes underpinning energy use and flows in the environment. Topics include different energy types and conversions; heat and its transport; force, work and power. The connection with climate change is emphasized for a numbers-based understanding of energy policies and geoengineering proposals for climate change mitigation.

ENVS 1800 – 1825 Special Topics in Environmental Science
6 credit hours
Course content varies from year to year.

ENVS 1826 – 1849 Special Topics in Environmental Science
3 credit hours
Course content varies from year to year.

ENVS 2100 Green Chemistry CHEM 2100
3 credit hours
Prerequisite: CHEM 1211, CHEM 1212, or CHEM 1213

Green chemistry, or environmentally benign chemistry, is the design of chemical products and processes that reduce or eliminate the use and generation of hazardous substances. Students examine the chemical principles and processes in the development of technology and in the effects that this technology has on the environment. Traditional approaches are avoided that only consider the treatment of pollution after it is created, and will focus on alternative routes that limit the production of waste. Classes 3 hrs. per week.

ENVS 2200 Energy, Resources, and Pollution
3 credit hours
Prerequisite: ENVS 1200 or ENVS 1250 or CHEM 1210

This course builds on concepts of sustainability and energy flow to examine how energy use, resource extraction, environmental pollution and climate change are connected. Pollution topics include water, air, and solid waste. Conventional energy production and renewable energy sources are introduced.

ENVS 2400 Applications in Environmental Science
3 credit hours
Prerequisite: ENVS 1200 and ENVS 1250, or Permission of Instructor

This skills-based course introduces methods commonly applied in environmental science. Topics include research design, field and laboratory skills, and data analysis, including measurement and statistical uncertainty. Students also develop the skills of science communication in different formats. This course is required for many upper-level ENVS courses that include laboratories.

ENVS 2800 – 2825 Special Topics in Environmental Science
6 credit hours
Course content varies from year to year.

ENVS 2826 – 2849 Special Topics in Environmental Science
3 credit hours
Course content varies from year to year.

ENVS 3310-3315 Field Course in Environmental Science
3 credit hours
Prerequisite: 45 credit hours in Science, including one of ENVS 2300, ENVS 2310 or ENVS 2400
Field courses are unique learning opportunities designed to bring theory to life in a natural setting. Normally double lectures held every second week during the regular semester are coupled with an intensive field component in spring or summer. Topics can vary with season and instructor expertise. Classes 3 hrs per week, plus intensive field lab.
Notes: 1. Multiple versions of this course taught on different topics may be offered within the same calendar year. 2. Students may count up to a maximum of nine (9) Field Courses toward their Group C requirements for a major or honours BSc in Environmental Science.

ENVS 3340 Principles of Hydrogeology GEOL 3340
3 credit hours
Prerequisite: GEOL 1200 and GEOL 1201

Students are introduced to the essential concepts of groundwater flow and wells. Topics include: flow through varying geologic material, water resources management, baseline groundwater quality, contamination of sub-surface environments, and an introduction to quantitative methods. Students will learn to recognize and interpret groundwater flow and chemical data, and have an opportunity to apply this knowledge via course work, laboratory exercises and field work. Classes 3 hrs. and lab 3 hrs. per week. Labs may involve field work.

ENVS 3410 Environmental Impact Assessment GEOL 3410
3 credit hours
Prerequisite: 45 credit hours, including one of ENVS 2200, ENVS 2300, ENVS 2310 or ENVS 2400

This course describes the legislative background and techniques for the prediction of impacts on biophysical and socio-economic environments. This course will cover screening, scoping, baseline studies, impact prediction, mitigation, monitoring and auditing. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 3440 The Environment and Human Health
3 credit hours
Prerequisite: 45 credit hours, including one of BIOL 1212 (formerly BIOL 1202), ENVS 1200, or ENVS 2300

A range of natural and anthropogenic agents that result in human health problems in industrialized and developing countries are examined. Students explore the scientific causes, the potential health effects and any known synergistic effects of these agents, through case studies, readings, and discussion. Existing policies are evaluated. Students research, critique, and present at least three comprehensive case studies. Classes 3 hrs. per week.

ENVS 3450 Aquatic Environments
3 credit hours
Prerequisite: 45 credit hours, including two of ENVS 2200, ENVS 2300, ENVS 2310, ENVS 2400, or with permission from instructor

Aquatic resources are essential to all living things on Earth. Students examine the similarities and differences in ecology, chemistry and physics of diverse aquatic ecosystems from marine to freshwater. Wetlands, lakes, rivers, estuaries, tidal systems and oceans are all considered. There are field trips to representative habitats. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 3460 Indigenous Experience and Environmental Impact
3 credit hours
Prerequisite: 45 credit hours, including one of ENVS 2310, ENVS 2200, GEOG 3304

The Indigenous experience is examined in relation to environmental assessments (EA) using case-studies. The degree to which Indigenous peoples participate in the EA process is discussed. The challenges and shortcomings of the EA process from an Indigenous perspective are investigated. An examination of EA reviews helps to identify gaps in the current environmental assessment legislation. Classes 3hrs. per week.

ENVS 3473 Environmental Chemistry I CHEM 3473
3 credit hours
Prerequisite: Forty-eight (48) credit hours including one of CHEM 2332 or ENVS 2400 or GEOL 3454

Students examine sources, movements and ultimate destinations of chemicals in air, water and soil by using peer-reviewed literature. The course focuses on development of effective scientific communication skills. Topics include: reactions of the ozone layer; chemistry of ground-level air pollution; greenhouse effect and climate change; alternative energy sources; polycyclic organic compounds; and the chemistry of natural waters.

ENVS 3800 – 3825 Special Topics in Environmental Science
6 credit hours
Prerequisite: 45 credit hours and permission of the instructor

ENVS 3826 – 3849 Special Topics in Environmental Science
3 credit hours
Prerequisite: 45 credit hours and permission of the instructor

ENVS 3876 – 3899 Directed Study in Environmental Science
3 credit hours
Prerequisite: 45 credit hours and permission of the instructor

ENVS 4430 Directed Research
3 credit hours
Prerequisite: 60 credit hours, including one of ENVS 2300, ENVS 2310, or ENVS 2400, and permission of the Environmental Science Chairperson.

Students pursue a short term research project in such areas as: oceanographic sampling and analysis, policy development or environmental impact assessment. Students must identify an appropriate supervisor; provide a project proposal; and at the end of the project, submit a written report. Lab 6 hrs. per week.

ENVS 4431 Environmental Information Management (formerly ENVS 3430)
3 credit hours
Prerequisite: 60 credit hours, including one of ENVS 2300, ENVS 2310, ENVS 2400 or GEOG 2306

Students develop information management skills required for an effective approach to environmental challenges in a complex and fast-changing context, involving a wide range of stakeholders. Concepts, methods, and practical training are provided in an interdisciplinary active learning environment that focuses on real-world applications regarding information identification, interpretations, and context-adapted processing. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4432 Data Science in the Environment BIOL 4403
3 credit hours
Prerequisite: 60 credit hours, including one of GEOG 3326, BIOL 3308, or MATH 1216

Data science, including skills such as database management, data manipulation, mapping, data visualization and interpretation, data ethics, coding, and statistical analysis, is increasingly important in environmental science. Students in this course work with ecological data collected in the field at the beginning of the course to develop skills in data science and learn to use the programming language R. Class sessions focus on active and hands-on learning.
Note: Data will be collected in the field at the start of the semester (two 7.5 hour days on the Monday and Tuesday immediately prior to the start of fall term classes) to allow analysis of the collected dataset throughout the semester and additionally allow students to gain field ecology skills. Classes 1.5 hrs. and lab 3 hrs. per week.

ENVS 4440 Environmental Policy
3 credit hours
Prerequisite: 75 credit hours, including one of ENVS 2200, ENVS 2300, ENVS 2310, ENVS 2400, or GEOG 3304

Students study the creation of government policy for protecting and managing the environment and natural resources – locally, provincially, nationally and internationally. Using case examples, students are introduced to the complexity of enviro-policymaking: participatory and stakeholder processes, conflict resolution, cost-benefit and related economic analysis, and legislation/regulation to establish targets and compliance.

ENVS 4450 Natural Resource Management GEOG 4424
3 credit hours
Prerequisite: 60 credit hours, including one of ENVS 2200, ENVS 2300, ENVS 2310, ENVS 2400, or GEOG 3304

This interdisciplinary course is an examination of the management of natural resource industries such as fisheries, forestry, mining and energy, focusing on interactions between biophysical, ecological, socioeconomic, and technological components. Topics include: sustainable development and environment-economy interactions in the resource sector; approaches to integrated natural resource development; theoretical and practical aspects of managing resources and resource industries; economics of sustainable resource use; methods for analysing the impacts of resource use. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4460 Environmental Pattern Analysis GEOG 4444
3 credit hours
Prerequisite: 60 credit hours, including one of ENVS 2310, ENVS 2400 or GEOG 2306

Students focus on theory and practical methods for characterizing the structural and dynamic features relating to environmental systems. Practical applications include environmental systems related to rivers, lakes, coastal areas, fisheries, forests, ecosystems, underground mineral distribution, atmospheric variables (wind, temperature), and pollution. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4470 Environmental Remediation and Restoration
3 credit hours
Prerequisite: 60 credit hours including one of ENVS 2300, ENVS 2400 or BIOL 2324

Current approaches to remediating damaged ecosystems, including such topics as mine reclamation, invasive species control, ecological restoration and constructed ecosystems are examined. Emphasis is placed on the scientific and socioeconomic bases for remediation and restoration, including the following: theoretical approaches; the role of traditional ecological knowledge; gaps between theory and practice; and hands-on training in local ecological restoration projects. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4480 Environmental Contaminants
3 credit hours
Prerequisite: 60 credit hours including two of ENVS 2300, ENVS 2310, ENVS 2200, ENVS 2400, or with permission from instructor

The focus of this course is on key environmental contaminants, including mercury, other metals, and selected volatile organic compounds. Emphasis is placed on experiential approaches, including field work and laboratory research, to study these environmental contaminants. Students are expected to participate in the critical analyses of literature, and in the discussion and presentation of their own research results. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4490 Climate Change: Evidence and Uncertainty
3 credit hours
Prerequisite: 60 credit hours including one of ENVS 2310, ENVS 2400, PHYS 1210, CHEM 1211, CHEM 1212, CHEM 1213, or permission of Instructor

Students review scientific evidence for climate change, and its natural and anthropogenic attributions. The mechanisms of climate change are emphasized and students analyze and evaluate proposed climate change mitigation strategies. Other topics include major impacts, feedback effects, modeling and prediction, the international assessment process, and “skepticism”. Classes 3 hrs. and lab 3 hrs. per week.

ENVS 4499 Environmental Seminar
6 credit hours
Prerequisite: 75 credit hours, including one of ENVS 2200, ENVS 2300, ENVS 2310 or ENVS 2400. Restricted to students registered in Environmental Science (minor, major, or honours) and to students registered in the Bachelor of Environmental Studies, or with permission of the Environmental Science Chairperson.

The course deals with selected topics in environmental science. Specific topics vary depending on current issues, new developments, availability of speakers and the interests of students and instructor. Seminar 3 hrs. per week.

ENVS 4599 Honours Research Project
6 credit hours
Prerequisite: Honours standing in Environmental Science

Honours students work with a research advisor who will guide the students in the formulation of research proposals, the methodology to be followed during the course of the research, and in the analysis and write-up of the research findings. The thesis is presented orally. Lab 6 hrs. (minimum) per week.

ENVS 4799 Honours Research Frameworks
3 credit hours
Prerequisite: Honours standing. This course is offered to Honours students in Environmental Science (who are enrolled in ENVS 4599).

Through a series of seminars and discussions, students review and develop their knowledge of and capability with a range of Environmental Science research methods, skills and approaches across various environmental research frameworks. Students prepare research for presentation within the School of the Environment.

ENVS 4800 – 4825 Special Topics in Environmental Science
6 credit hours
Prerequisite: 60 credit hours and permission of the instructor.

ENVS 4826 – 4849 Special Topics in Environmental Science
3 credit hours
Prerequisite: 60 credit hours and permission of the instructor.

ENVS 4876 - 4899 Directed Studies in Environmental Science
3 credit hours
Prerequisite: Restricted to students in the honours program or with permission of the Chairperson of Environmental Science.
The course provides an opportunity for ENVS honours students to study a particular subject in detail. It requires independence and initiative from the student. It involves discussion of research papers and lab work. This course is intended particularly to meet the special needs and interests of honours students. Major students may be admitted with permission of the Environmental Science Program Coordinator. Classes and labs 6 hrs. per week.