

# ENVIRONMENTAL SCIENCE

**Department Website:** <https://www.smu.ca/environmental-science/>

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The Department of Environmental Science offers a rigorous interdisciplinary program based on core sciences and includes courses in business, social sciences and the humanities. This program can lead to a Bachelor of Science degree with a major.

In the Faculty of Science, students can pursue a Major, Honours or Minor in Environmental Science. Students can also pursue a Double Major or a Double Honours in Environmental Science and another science subject, as outlined in Sections 7 (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---double-major/>) and 11d (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---honours-double-honours/>) of the Faculty of Science pages in this *Calendar*. Students in the Environmental Science Honours program carry out a major research project under close faculty supervision, preparing them for admission to graduate programs in Environmental Science or related subjects (see the Graduate Academic Calenda (<https://smu-ca-public.courseleaf.com/graduate/>) for details).

Students who pursue the Co-op option available in Environmental Science participate in paid internships and graduate with "Cooperative Education" on their degree (see the Cooperative Education Programs (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/cooperative-education-programs-major-honours/>) in the Faculty of Science pages in this *Calendar* for details).

A dual degree with either the Faculty of Arts or Commerce is also an option (Academic Regulation 21 (<https://smu-ca-public.courseleaf.com/undergraduate/academic-regulations/regulations/requirements-two-baccalaureate-degrees/>) in this *Calendar*). Students in Arts or Commerce may also combine a Minor in Environmental Science with their degree

**NOTE:** For details on the Bachelor of Environmental Studies (BES) degree requirements in the Faculty of Arts, please refer to the BES (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-arts/requirements-completing-bes-degree/>) section in this *Academic Calendar*.

The Environmental Science program provides students with theoretical and hands-on academic preparation to understand – from a scientific perspective – major environmental topics like sustainable energy production, pollution control and mitigation, greenhouse gas emissions and climate change, biodiversity loss and conservation, renewable resource management, and responsible non-renewable resource extraction. Combined with studies of environmental impact assessment, environmental policy, and environmental management, graduating students are equipped with resources for entry into the work force and begin developing creative and effective solutions to the major challenges of our times. Students gain scientific and transferrable skills of practical importance to an Environmental Science professional, which are also useful in other areas of employment or further studies.

Environmental Science faculty are passionate about teaching and maintaining vibrant research programs, which generate new knowledge concerning environmental issues on scales ranging from local to global. Undergraduate students are directly involved in these research activities,

and interested students should get in touch early on with the Department Chair or individual professors about possible research projects.

All programs of study in Environmental Science are built from ENVS and other courses arranged into Groups A, B and C, as described below. Due to the interdisciplinary nature of Environmental Science, some courses are found in more than one group. Students should consult the Faculty of Science Program Requirement tables on the ENVS website for program requirements and a suggested sequence of courses for years 1 and 2. Students should consult with the Department Chair or a Science Advisor to chart their courses and to determine the best sequence of courses for years 3 and 4.

## Programs

The Bachelor of Science (B.Sc.) is a well-established, foundational degree. Its specific requirements are listed below alongside general graduation requirements (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science/>).

## Major in Environmental Science

The following requirements for the degree of Bachelor of Science with Major in Environmental Science must be fulfilled in addition to those requirements listed in the Faculty of Science pages in this *Academic Calendar*.

Sixty-nine (69) credit hours in the Major subject area courses. Students must achieve a minimum grade point average (GPA) of 2.20 in this group of courses used to satisfy 6 (d), the Major subject requirement:

Code	Title	Credit Hours
ENVS 1200	Environmental Sustainability	3
ENVS 1250	Energy in the Environment	3
ENVS 2200	Energy, Resources, and Pollution	3
ENVS 2400	Applications in Environmental Science	3
Select 6 (six) credit hours of the following ENVS courses:		6
ENVS 3410	Environmental Impact Assessment	
ENVS 3450	Aquatic Environments	
ENVS 4431	Environmental Information Management (formerly ENVS 3430)	
ENVS 4432	Data Science in the Environment	
ENVS 4450	Natural Resource Management	
ENVS 4460	Environmental Pattern Analysis	
ENVS 4470	Environmental Remediation and Restoration	
ENVS 4480	Environmental Contaminants	
ENVS 4490	Climate Change: Evidence and Uncertainty	
Select 3 (three) credits of the following:		3
GEOG 3326	Statistical Methods in Geography (Group C)	
BIOL 3308	Biostatistics	
MATH 1216	Introduction to Mathematical Statistics	
ENVS 4499	Environmental Seminar	6
Twelve (12) credit hours in Group A courses (p. 2)		12
Nine (9) credit hours in Group B courses (p. 3)		9
Nine (9) credit hours in Group C courses (p. 3) <sup>2</sup>		9
Three (3) credit hours of Field Course ENVS 3310- ENVS 3315		3
An additional nine (9) credit hours in Group C courses at the 4000-level (p. 3) <sup>2</sup>		9

Select 18 credits of the following non-ENVS science courses: 18

CHEM 1210	General Chemistry I	
CHEM 1212	General Chemistry II for Life Sciences or CHEM 1210 General Chemistry II for Physical Sciences	
BIOL 1212	Organismal and Ecological Biology	
BIOL 1213	Applications in Biology	
GEOL 1200	Understanding the Earth	
GEOL 1201	The Dynamic Earth	
Select six credit hours in MATH and /or CSCI at the 1210 level or above		6
Nine credits of Arts and Economics courses		9
GEOG 1200	People, Place and Environment (Group D)	
GEOG 3304	Environmental Management (Group D)	
ECON 1201	Principles of Economics: Micro	
Select 3 credits from the Economics courses:		3
ECON 3362	Natural Resource Economics	
ECON 3363	Environmental Economics	
ENGL 1205	Introduction to Literature	3
Select three credit hours in Humanities		3
Select nine credit hours of electives		9
<b>Total Credit Hours</b>		<b>120</b>

<sup>1</sup> Students may count up to a maximum of nine (9) credit hours in Environmental Science Field Courses for a Major or Honours B.Sc. in Environmental Science.

<sup>2</sup> BIOL 1201 may be substituted for Molecular and Cell Biology (BIOL 1211).

<sup>3</sup> BIOL 1202 may be substituted for Organismal and Ecological Biology (BIOL 1212).

Students should consult the Faculty of Science Program Requirement Tables (<https://www.smu.ca/faculty-of-science/scienceprogramrequirementtables/>) available online for the complete list of program requirements, recommended Science Electives, and a suggested sequence of courses for years 1 and 2. Students should consult with a Program Advisor or a Science Advisor to chart their courses, and to determine the best sequence of courses for years 3 and 4.

## Honours or Double Honours in Environmental Science

- Fulfillment of the requirements for a major in Environmental Science, as outlined above;
- Completion of Honours Research Project (ENVS 4599), which counts as six (6) credit hours towards the required nine (9) credit hours in Group C courses at the 4000-level; Students must secure a supervisor for their (Honours Research Project (ENVS 4599)) before applying to the Honours Program.
- Completion of Honours Research Frameworks (ENVS 4799) Honours Research Frameworks which counts as three (3) credit hours in Group B,
- Fulfillment of the requirements listed in the Faculty of Science pages in this Calendar, including a minimum DGPA of 3.00.

## Minor in Environmental Science

The specific thirty (30) credit hours required to satisfy 9 (b) for a Minor in Environmental Science are listed below, for which a minimum GPA of 2.20 is also required:

Code	Title	Credit Hours
Eighteen(18) credit hours required:		18
ENVS 1200	Environmental Sustainability	
ENVS 1250	Energy in the Environment	
ENVS 2200	Energy, Resources, and Pollution	
ENVS 2400	Applications in Environmental Science	
BIOL 1211	Molecular and Cell Biology or BIOL 1212 Organismal and Ecological Biology	
CHEM 1210	General Chemistry I	
Select six credit hours from: Group A ENVS Courses		6
Select three credit hours from: Group B or Group C ENVS Courses		3
Select three credit hours from: ENVS courses not already counted in meeting the above requirements <sup>2</sup>		3
<b>Total Credit Hours</b>		<b>30</b>

<sup>1</sup> BIOL 1201 may be substituted in lieu of Molecular and Cell Biology (BIOL 1211) and BIOL 1202 may be substituted in lieu of Organismal and Ecological Biology (BIOL 1212).

<sup>2</sup> Environmental Seminar (ENVS 4499) (6 credit hours) can be taken with permission of the Department.

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## Group A – Courses

Code	Title	Credit Hours
<b>ENVS Core Required and Elective Courses:</b>		
ENVS 1200	Environmental Sustainability	3
ENVS 1250	Energy in the Environment	3
ENVS 2100	Green Chemistry	3
ENVS 2200	Energy, Resources, and Pollution	3
ENVS 2400	Applications in Environmental Science	3
ENVS 3310- ENVS 3315	Field Course in Environmental Science	3
ENVS/GEOL 3340	Principles of Hydrogeology	3
ENVS/GEOL 3410	Environmental Impact Assessment	3
ENVS 3440	The Environment and Human Health	3
ENVS 3450	Aquatic Environments	3
ENVS 3460	Indigenous Experience and Environmental Impact	3
ENVS 3876-ENVS 3899	Directed Study in Environmental Science	3
ENVS 4430	Directed Research	3
ENVS 4431	Environmental Information Management (formerly ENVS 3430)	3
ENVS 4432	Data Science in the Environment	3
ENVS 4440	Environmental Policy	3

ENVS 4450	Natural Resource Management	3
ENVS 4460	Environmental Pattern Analysis	3
ENVS 4470	Environmental Remediation and Restoration	3
ENVS 4480	Environmental Contaminants	3
ENVS 4490	Climate Change: Evidence and Uncertainty	3
ENVS 4499	Environmental Seminar	6
ENVS 4876-ENVS 4899	Directed Study in Environmental Science	3

## Group B - Courses

Code	Title	Credit Hours
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**Environment Related Courses in the Sobey School of Business and the Faculty of Arts (Students may enquire about other relevant courses with their Advisor)**

ECON 3362	Natural Resource Economics	3
ECON 3363	Environmental Economics	3
ENGL 2318	The Writer and Nature	3
ENVS 3410	Environmental Impact Assessment	3
ENVS 3440	The Environment and Human Health	3
ENVS 3460	Indigenous Experience and Environmental Impact	3
ENVS 4431	Environmental Information Management (formerly ENVS 3430)	3
ENVS 4440	Environmental Policy	3
ENVS 4450	Natural Resource Management	3
GDST 4470	Environment and Development	3
GEOG 1100	Global Perspectives on Land and Life (Group D)	3
GEOG 2315	The Oceans (Group D)	3
GEOG 3304	Environmental Management (Group D)	3
GEOG 3329	Geographical Perspectives on Nature (Group A)	3
GEOG 3454	Bay of Fundy: Environments and Issues (Group D)	6
GEOG 4434	Watershed Management (Group D)	3
HIST 2201	Environmental History of Europe, 1300 - 1900	3
MGMT 3480	Business Ethics & Responsibility	3
MGSC 4748	Sustainability Management	3
PHIL 2305	Environmental Ethics	3
POLI 2304	Canadian Politics in the 21st Century	6
POLI 3307	Provincial Government and Politics (formerly POLI 2307)	3
POLI 3321	International Organizations	3
POLI 3322	Global Political Economy	3
POLI 4493	Global Social Movements	3
PSYC 2580	Environmental Psychology (formerly PSYC 4418) (Group A)	3
RELS 2347	Ecology and Religion	3
RELS 3348		3
SOCI 3491	Rural Sociology	3
<b>Background/Techniques Courses in Business, Social Sciences and Humanities:</b>		
COMM 2293	Business Communication Essentials	3
COMM 3394	Business Presentation Essentials	3
ECON 1202	Principles of Economics: Macro	3
ECON 3364	Cost-Benefit Analysis	3
GSCI 1300	Introduction to Science Communication	3

GSCI 3300	Advanced Science Communication	3
MGMT 3392	Occupational Health and Safety	3
PHIL 2302	Ethics	6
PHIL 2318	Science and Society	3
PHIL 3448	Philosophy of Science	3
PSYC 1510	Introduction to Social Psychology (formerly PSYC 1250) (Group B)	3
PSYC 2570	Community Psychology (formerly PSYC 4497) (Group B)	3
PSYC 3220	Human Factors and Performance (formerly PSYC 3309) (Group A)	3
RELS 3349		3
SOCI 3387	Women and Development	3
Any language courses, up to 6 credit hours		6

## Group C - Courses

Code	Title	Credit Hours
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**ENVS and Supporting Discipline Courses in the Natural Sciences (Students may enquire about other relevant courses with their Advisor):**

BIOL 1211	Molecular and Cell Biology	3
BIOL 2324	Ecology	3
BIOL 3303	Plant Biology (formerly BIOL 2303)	3
BIOL 3398	Microbiology	3
BIOL 3428	Applied Entomology (formerly BIOL 4428)	3
BIOL 4404	Behavioral Ecology	3
BIOL 4410	Plant Ecology	3
BIOL 4422	Conservation Biology	3
BIOL 4424	Diversity and Ecology of Fishes	3
BIOL 4430	Ornithology	3
BIOL 4431	Herpetology	3
BIOL 4448	Biology Field Course	3
CHEM 2332	Introductory Analytical Chemistry: Wet Methods	3
CHEM 2333	Introductory Analytical Chemistry: Electrochemistry and Spectroscopy	3
CHEM 2344	Organic Chemistry I	3
CHEM 2345	Organic Chemistry II <sup>1</sup>	3
CHEM 2346	Organic Chemistry for Life Sciences	3
CHEM 3473	Environmental Chemistry I	3
CHEM 3451	Introductory Biochemistry	3
CHEM 4452	Biochemistry: Intermediary Metabolism	3
ENVS/CHEM 2100	Green Chemistry	3
ENVS 3310 - ENVS 3315	Field Course in Environmental Science	
ENVS 3340	Principles of Hydrogeology	3
ENVS 3410	Environmental Impact Assessment	3
ENVS 3450	Aquatic Environments	3
ENVS 3876 - ENVS 3899	Directed Study in Environmental Science	3
ENVS 4430	Directed Research	3
ENVS 4431	Environmental Information Management (formerly ENVS 3430)	3

ENVS 4450	Natural Resource Management	3
ENVS 4460/ GEOG 4444	Environmental Pattern Analysis	3
ENVS 4470	Environmental Remediation and Restoration	3
ENVS 4480	Environmental Contaminants	3
ENVS 4490	Climate Change: Evidence and Uncertainty	3
ENVS 4876 - ENVS 4899	Directed Study in Environmental Science	3
GEOG 2306	Geospatial Concepts (Group C)	3
GEOG 2313	Geomorphology (Group B)	3
GEOG 2333	Biogeography (Group B)	3
GEOG 2343	Weather and Climate (Group B)	3
GEOG 3356	Remote Sensing of the Environment (Group C)	3
GEOG 3386	Concepts in Geographic Information Systems (GIS) Analysis (Group C)	3
GEOG 4413/ GEOL 4476	Coastal Geomorphology (Group B)	3
GEOG 4423/ GEOL 4475	Glaciers and Glaciation (Group B)	3
GEOG 4443	Natural Hazards and Climate Change (Group B)	3
GEOG 4496	Applications in Geographic Information Systems (Group C)	3
GEOL 1206	Global Change	3
GEOL 2301	Mineralogy	3
GEOL/GEOG 2325	Sedimentation and Stratigraphy	3
GEOL 3340	Principles of Hydrogeology	3
GEOL 3453	Principles of Geochemistry	3
GEOL 3454	Analytical and Environmental Geochemistry	3
PHYS 1210	University Physics I	3
PHYS 1211	University Physics II	3