

Multidisciplinary Programs and University Wide Courses

III. ENVIRONMENTAL SCIENCE – MAJOR

The purpose of this program is to provide students with an interdisciplinary but thorough education in the science of the environment. A student will become versed in the chemical and physical aspects of the environment (atmosphere, energy, thermodynamics, fluid dynamics, etc.) with the goal of understanding global phenomena such as climate change, pollution, environmental impact, and resource management. Along the way, a student will gain knowledge of the Earth's ecosystems and how they are affected in both negative and positive ways by human activity. A broad selection of electives related to this field of study will allow students to pursue their own interests as they relate to the environment as well. Given that the search for solutions of complex environmental problems involves not only scientific, but also economic (and social and political) aspects, this program is designed with an Economics component to better prepare the student in facing such issues in his or her professional life.

Students in this program will have the benefits of extremely small class sizes, individual instruction, an intimate environment, and mentoring professors. A student graduating from this program will be qualified to pursue further studies in graduate school or environmental law, or seek employment in the ever expanding fields and disciplines involving environmental issues.

Entrance Requirements

Students are considered for admission into a B.Sc. Environmental Science Major program after the completion of a Québec Diploma of Collegial Studies (DEC), or completion of a high-school grade 12, or the equivalent level of education from international origins. Students entering this program with a Diploma of Collegial Studies are admitted into a 3-year program of 93 lecture credits (including the English Writing Proficiency exam — EWP). Students entering with a grade 12 high-school diploma are admitted to a 4-year program of 123 lecture credits (including the EWP).

Entrance requirements are the same as those for other B.Sc. programs, namely:

- 1) Code R score at least 23 (for students with a DEC from a Québec cegep),
- 2) 75% average in 5 high-school grade 12 courses (including one math, one English and two other sciences; not including physical education).

Program Requirements

Students in the 3-year program must fulfill the following credit requirements:

English Writing Proficiency	3 credits	1 exam (or EWP 099)
Environmental Science core	33 credits	11 courses
Concentration Stream	21* credits	7 courses
Env. Studies and Geo. cognates	9 credits	3 courses
Economics cognates	12 credits	4 courses
Free Electives	15 credits	5 courses

Total **93 credits 30 courses**

Students in the 4-year program must fulfill the following credit requirements:

English Writing Proficiency	3 credits	1 exam (or EWP 099)
U0 science courses	21 credits	7 courses
U0 humanities requirement	6 credits	2 courses
Environmental Science core	33 credits	11 courses
Concentration Stream	21* credits	7 courses
Env. Studies and Geo. cognates	9 credits	3 courses
Economics cognates	12 credits	4 courses

Free Electives 18 credits 6 courses

Total **123 credits 40 courses**

* The “environmental physics” concentration stream requires 22 credits, since one of the required courses is 4 lecture credits (not the normal 3).

Notes:

1. Students with a Québec DEC who are missing some/all of the collegial equivalents of the seven Bishop’s U0 science courses: Bio 191, Che 191/192, Mat 191/192 and Phy 191/192 (see 4-yr program table below) will have these courses added to their 3-year program credit requirements, causing the total program length to extend beyond the normal 3 years.
2. Many science lecture courses have co-requisite laboratories, worth one additional “laboratory” credit. While the laboratories are mandatory, the lab credits earned do not count as lecture credits in meeting the program’s total (lecture) credit requirements, as per the lists above.

Required Courses – 3 Year Program Schedule (90 lecture credits + EWP + labs)

	Fall	Winter
U1	ENV 101 (Intro. Env. Science) ENV 104 / ENV 184 (Anal. Chem.) ENV 105 / ENV 185 (Org. Chem. I) PHY 101 (Stats for Exp. Sci.) ESG 127 (Intro. Phys. Geog.)	ENV 144 (Intro. Environmental Chem.) ENV 167 (Thermal & Fluid Phy.) ESG cognate 1 (chosen from list below) Stream Course 1 FREE OPTION 1
U2	ECO 102 (Microeconomics) ENV 177 / ENV 187 (Ecology) ESG cognate 2 (from list below) Stream Course 2 Stream Course 3	ECO 103 (Macroeconomics) ENV 244 / ENV 248 (Env. Chem. II) ENV 277 / ENV 287 (Adv. Ecology) ESG cognate 3 (chosen from list below) Stream Course 4
U3	ENV 267 (Economy of the Env.) ENV 375 (Environmental Physics) Stream Course 5 FREE OPTION 2 FREE OPTION 3	ENV 377 (Ecological Economics) Stream Course 6 Stream Course 7 FREE OPTION 4 FREE OPTION 5

Required Courses – 4-year Program Schedule (120 lecture credits + EWP + labs)

	Fall	Winter
U0	ENV 101 (Intro. Env. Science) CHE 191 / CHE 081 PHY 191 / PHY 081 MAT 191 HUMANITIES OPTION ELA 116 FREE OPTION 1	CHE 192 / CHE 082 PHY 192 / PHY 082 MAT 192
U1	ENV 104 / ENV 184 (Anal. Chem.) ENV 105 / ENV 185 (Org. Chem. I) PHY 101 (Stats for Exp. Sci.) BIO 191 / BIL 191 ESG 127 (Intro. Phys. Geog.)	ENV 144 (Intro. Environmental Chem.) ENV 167 (Thermal & Fluid Phy.) ESG cognate1 (chosen from list below) Stream Course 1 Stream Course 2
U2	ECO 102 (Microeconomics) ENV 177 / ENV 187 (Ecology)	ECO 103 (Macroeconomics) ENV 244 / ENV 248 (Env. Chem. II)

	ESG cognate 2 (from list below)	ENV 277 / ENV 287 (Adv. Ecology)
	Stream Course 3	ESG cognate course 3 (from list below)
	Stream Course 4	FREE OPTION 2
U3	ENV 267 (Economy of the Env.)	ENV 377 (Ecological Economics)
	ENV 375 (Env. Physics)	Stream Course 6
	Stream Course 5	Stream Course 7
	FREE OPTION 3	FREE OPTION 5
	FREE OPTION 4	FREE OPTION 6

Concentration Streams

In addition to completing the required courses listed above, all students must choose either the Environmental Chemistry, or the Environmental Physics concentration stream. There are 7 courses to complete in the chosen concentration stream as per the lists below.

Environmental Chemistry Stream – 7 courses

(courses with a * have an associated lab)

CHE 102 Inorganic Chemistry (winter)
 CHE 103* Physical Chemistry I (winter)
 CHE 221* Elements and Minerals (winter)
 CHE 223* Physical Chemistry II (fall)
 CHE 225* Organic Chemistry II (fall)
 CHE 226* Organic Chemistry III (fall)
 CHE 227* Molecular Spectroscopy (fall)

Environmental Physics Stream – 7 courses

(courses with a * have an associated lab)

PHY 106* Waves and Optics (winter)
 PHY 212 Electric Circuits & Electronics
 PHY 270 Ordinary Differential Eqns. (fall)
 CSC 111* Programming Methodology (fall)
 MAT 106 Advanced Calculus I (fall)
 MAT 107 Advanced Calculus II (winter)
 MAT 108 Matrix Algebra (fall)

Environmental Studies and Geography Cognate Courses

All ENV students (3-year and 4-year) must choose 3 ESG courses from the following list:

ESG 226 Oceans I
 ESG 227 Oceans II
 ESG 250 Geomorphology
 ESG 251 Soils and Vegetation
 ESG 265 The Atmosphere and Weather
 ESG 361 Glacial Environments
 ESG 367 Climate Change

Required Course List by components – 3 yr. Program (90 credits + EWP + labs)

I. Environmental Science Core (11 courses / 33 credits + labs)

ENV 101 Introduction to Environmental Science
 ENV 104 / 184 Analytical Chemistry –
 An Environmental Approach (and lab)
 ENV 105 / 185 Organic Chemistry I (and lab)

ENV 144	Environmental Chemistry I – Energy and the Atmosphere
ENV 167	Thermal and Fluid Physics
ENV 177 / 187	Introduction to Ecology (and lab)
ENV 244 / 248	Environmental Chemistry II (and lab)
ENV 277 / 287	Advanced Ecology (and lab)
ENV 375	Environmental Physics
ESG 127	Physical Geography
PHY 101	Statistics

II. Concentration Stream (7 courses / 21 or 22 credits + labs)

All Env students choose one concentration stream as per the table above.

III. Environmental Studies & Geography Cognate Courses

(3 courses / 9 credits)

All ENV students must choose 3 ESG courses from the list above

IV. Economics Cognate Courses (4 courses / 12 credits)

ECO 102	Introduction to Microeconomics
ECO 103	Introduction to Macroeconomics
ECO 237 / ENV 267	Economy of the Environment
ECO 337 / ENV 377	Ecological Economics

V. Free Elective Courses (5 courses / 15 credits)

TOTAL **30 courses + labs**

Required Course List by components – 4 yr. Program

(123 credits + EWP + labs)

I. UO Science and Humanities Requirements

(9 courses / 27 credits + labs)

BIO 191 / BIL 191	Introductory Biology (and lab)
CHE 191 / 081	General Chemistry I (and lab)
CHE 192 / 082	General Chemistry II (and lab)
MAT 191	Calculus I
MAT 192	Calculus II
PHY 191 / 081	Introductory Physics I: Mechanics (and lab)
PHY 192 / 082	Introductory Physics II: Electricity and Magnetism (and lab)
ELA 116	Effective Writing
Humanities Elective	Course 1xx – chosen from CLA, ENG, HIS, LIB, PHI, REL

II. Environmental Science Core (11 courses / 33 credits + labs)

ENV 101	Introduction to Environmental Science
ENV 104 / 184	Analytical Chemistry – An Environmental Approach (and lab)
ENV 105 / 185	Organic Chemistry I (and lab)
ENV 144	Environmental Chemistry I – Energy and the Atmosphere
ENV 167	Thermal and Fluid Physics
ENV 177 / 187	Introduction to Ecology (and lab)
ENV 244	Environmental Chemistry II
ENV 277 / 287	Advanced Ecology (and lab)

ENV 375	Environmental Physics
ESG 127	Physical Geography
PHY 101	Statistics

III. Concentration Stream (7 courses / 21 or 22 credits + labs)

All ENV students choose one concentration stream as per the table above

IV. Environmental Studies & Geography Cognate Courses (3 courses / 6 credits)

All ENV students must choose 3 ESG courses from the list above

V. Economics Cognate Courses (4 courses / 12 credits)

ECO 102	Introduction to Microeconomics
ECO 103	Introduction to Macroeconomics
ECO 237 / ENV 267	Economy of the Environment
ECO 337 / ENV 377	Ecological Economics

VI. Free Elective Courses (6 courses / 18 credits)

TOTAL **40 courses + labs**

Recommended Courses for Free Electives

Students in the four-year program must complete six free electives courses while the three-year students only complete five free electives. All courses in the concentration stream not chosen are recommended, plus any in the lists below:

Biology

BIO 110	Introductory Cell Biology
BIO 115 / BIL 115	Diversity of Life I (fall)
BIO 118 / BIL 118	Genetics (winter)
BIO 221	Biogeography
BIO 359	Human Genetics
BIO 360	Molecular Genetics

Biochemistry

BCH 192	Biochemistry of Biomolecules
BCH 338	Environmental Biochemistry and Toxicology

Chemistry

CHE 222 / CHE 282	Inorganic Chemistry III (winter)
CHE 224 / CHE 284	Physical Chemistry III (winter)
CHE 464	Computational Chemistry and Molecular Modeling
CHE 465	Topics in Advanced Organic Chemistry and Biochemistry

Mathematics

MAT 103	Environmental Modeling
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MAT 109 Linear Algebra (winter)
MAT 279 Scientific Programming

Physics

PHY 117 Introduction to Mechanics (fall)
PHY 220 Statistical and Thermal Physics
PHY 271 Mathematical Methods of Physics (winter)

Environmental Studies and Geography

ESG 100 Introduction to Environmental Studies
ESG 126 Introduction to Human Geography
ESG 224 Human Impact on the Environment
ESG 249 Resource Management
ESG 266 Environmental Policy
ESG 267 Global Environmental Change:
 a Physical Perspective
ESG 358 International Environmental Issues
ESG 366 Ethical Perspectives on Environmental Problems

Marketing & Economics

ECO 270 Public Economics (winter)
BMK 350 Marketing Strategies for
 Environment Sustainability

Courses

ENV 101 Introduction to Environmental Science 3-3-0

This survey course introduces the student to environmental science from the physical, chemical, and biological points of view. Contents include a general introduction to the environment, energy, pollution, climate and weather, limits on renewable resources, and the Hubbert model. All of these topics are examined from a rigorous scientific perspective and include empirical analyses.

ENV 375/PHY 335 Environmental Physics 3-3-0

This quantitative, calculus-based, course discusses fundamental environmental problems within a physical context. Topics covered include: the greenhouse effect, blackbody radiation, the ozone problem, mathematical techniques, heat transfer, electricity, the transport of pollutants, plumes, and basic groundwater hydrology.

Prerequisites: Environmental Science 101; Environmental Science 167 or Physics 107.

Note : See Physics 335. Students may not take this course for credit if they have received credit for Physics 335