

2008-2009 Undergraduate Calendar

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2008-2009 academic year, including the Summer Semester 2008, the Fall Semester 2008 and the Winter Semester 2009.

For your convenience the Undergraduate Calendar is available in PDF format.

If you wish to link to the Undergraduate Calendar please refer to the Linking Guidelines.

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Disclaimer

University of Guelph 2008

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2008-2009 academic year, including the Summer Semester 2008, the Fall Semester 2008 and the Winter Semester 2009.

The University reserves the right to change without notice any information contained in this calendar, including fees, any rule or regulation pertaining to the standards for admission to, the requirements for the continuation of study in, and the requirements for the granting of degrees or diplomas in any or all of its programs. The publication of information in this calendar does not bind the University to the provision of courses, programs, schedules of studies, or facilities as listed herein.

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In the event of a discrepancy between a print version (downloaded) and the Web version, the Web version will apply.

Published by: Undergraduate Program Services

Introduction

Collection, Use and Disclosure of Personal Information

Personal information is collected under the authority of the University of Guelph Act (1964), and in accordance with Ontario's Freedom of Information and Protection of Privacy Act (FIPPA) http://www.e-laws.gov.on.ca/DBLaws/Statutes/English/90f31_e.htm. This information is used by University officials in order to carry out their authorized academic and administrative responsibilities and also to establish a relationship for alumni and development purposes. Certain personal information is disclosed to external agencies, including the Ontario Universities Application Centre, the Ministry of Training, Colleges and Universities, and Statistics Canada, for statistical and planning purposes, and is disclosed to other individuals or organizations in accordance with the Office of Registrarial Services Departmental Policy on the Release of Student Information. For details on the use and disclosure of this information call the Office of Registrarial Services at the University at (519) 824-4120 or see <http://www.uoguelph.ca/registrar/registrar/index.cfm?index>.

Statistics Canada - Notification of Disclosure

For further information, please see Statistics Canada's web site at <http://www.statcan.ca> and Section XIV Statistics Canada.

Address for University Communication

Depending on the nature and timing of the communication, the University may use one of these addresses to communicate with students. Students are, therefore, responsible for checking all of the following on a regular basis:

Email Address

The University issued email address is considered an official means of communication with the student and will be used for correspondence from the University. Students are responsible for monitoring their University-issued email account regularly. See Section I--Statement of Students' Academic Responsibilities for more information.

Home Address

Students are responsible for maintaining a current mailing address with the University. Address changes can be made, in writing, through Undergraduate Program Services.

Name Changes

The University of Guelph is committed to the integrity of its student records, therefore, each student is required to provide either on application for admission or on personal data forms required for registration, his/her complete, legal name. Any requests to change a name, by means of alteration, deletion, substitution or addition, must be accompanied by appropriate supporting documentation.

Student Confidentiality and Release of Student Information Policy Excerpt

The University undertakes to protect the privacy of each student and the confidentiality of his or her record. To this end the University shall refuse to disclose personal information to any person other than the individual to whom the information relates where disclosure would constitute an unjustified invasion of the personal privacy of that person or of any other individual. All members of the University community must respect the confidential nature of the student information which they acquire in the course of their work.

Complete policy at <http://www.uoguelph.ca/policies>.

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Bachelor of Science in Environmental Sciences [B.Sc.(Env.)]

Program Information

Objectives of the Program

The Environmental Sciences program is designed to provide a strong interdisciplinary grounding in specific environmental sciences including the socioeconomic context in which environmental issues are resolved.

There is an emphasis on management and decision-making skills for the application of scientific knowledge to environmental problems, and the evaluation of appropriate environmental policies. A practical perspective based on defining and resolving problems is central to the program, and this is often done in the context of group work.

Substantial emphasis is placed on communication skills, including the development of competence in both written and oral presentations. These skills will be progressively developed in core courses from the first to the fourth year. Students in the final years of their program will be expected to take part in more intensive communication skill development. Graduates will seek employment in a range of fields, from government agencies to private industry and research.

Academic Counselling

General information on the degree program is available from the Program Counsellor, Faculty of Environmental Sciences. Advising for each major is available through the assigned faculty advisor responsible for the major. Students are encouraged to seek the advice of the faculty advisors when choosing restricted electives and planning course selections.

Degree

The degree granted for the successful completion of this honours program will be the Bachelor of Science in Environmental Sciences--B.Sc.(Env.).

Continuation of Study

Students are advised to consult the regulations for Continuation of Study in Section VIII--Undergraduate Degree Regulations and Procedures of this Calendar.

Conditions for Graduation

In order to graduate from the B.Sc.(Env.) program, students must successfully complete a minimum of 20.00 credits including all the stated course requirements for the program. As well, students must achieve a cumulative average of 60% or higher over all course attempts.

Environmental Sciences (Co-op)

Office of the Associate Dean, Faculty of Environmental Sciences.

A 5-year Honours Program in Environmental Sciences is offered as a Co-operative Education Program. This option is offered within the B.Sc. (Env.) degree and is available to all majors. The program requirements are the same as those listed for the regular B.Sc. (Env.) program, by the Co-operative Education Program and as outlined in the Continuation of Study policy (Section VIII--Undergraduate Degree Regulations & Procedures).

3 co-op work terms (COOP*1000, COOP*2000, COOP*3000) are required. An optional 4th co-op work term (COOP*4000) is available. COOP*1100 must be completed during semester 2.

Year	Fall	Winter	Spring
1	Academic Term 1	Academic Term 2	Off
2	Academic Term 3	COOP*1000	Academic Term 4
3	COOP*2000	Academic Term 5	COOP*3000
4	Academic Term 6	Academic Term 7	COOP*4000 (Optional)
5	Academic Term 8		

Since some of the program requirements in the degree program (core or major) are not offered each semester, careful planning and program consultation with the Faculty Co-op Advisor is essential. In particular, students are encouraged to seek advice when choosing for their Summer academic semester.

The Environmental Sciences Program

The degree in Environmental Sciences consists of a minimum of 20.00 credits, as follows:

1. 5.00 First Year Curriculum
2. 5.00 Environmental Sciences Core
3. 7.00 Environmental Sciences Major
4. free electives*

Within these courses, students must include at least 6.00 credits at the 3000 or 4000 level, and no program may include more than 7.00 credits at the 1000 level.

* There are not specific subject requirements for the elective courses, however, you may NOT select the following: BOT*1200, CHEM*1100, CIS*1000, GEOL*1100,

MATH*1050, MET*1000, MICR*1010, MICR*1020, MBG*1000, PHYS*1600, ZOO*1500.

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

First Year Curriculum

The first year courses have been selected to provide students with sufficient background and knowledge to enter any one of the Environmental Sciences majors.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Note: Co-op students must select COOP*1100 Introduction to Co-operative Education

Environmental Sciences Core

In addition to the common first year curriculum, students are required to take the following core Environmental Sciences courses in the semesters recommended in the schedule of studies:

BIOL*2060	[0.50]	Ecology
ENVS*2150	[0.50]	Terrestrial Systems
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
ENVS*4011/2	[0.50]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation
PHIL*2070	[0.50]	Philosophy of the Environment

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance
ZOO*4050	[0.50]	Natural Resources Policy

One of:

ECON*2740	[0.50]	Economic Statistics
GEOG*2460	[0.50]	Analysis in Geography
STAT*2040	[0.50]	Statistics I

Note: the statistics course required is prescribed by the student's choice of major.

Environmental Sciences Majors

Earth and Atmospheric Science

Ecology

Environmental Biology

Environmental Economics and Policy

Environmental Geography

Environmental Monitoring and Analysis

Environmetrics and Modelling

Natural Resources Management

Requirements for each of these majors are described in the detailed schedules of studies below.

Earth and Atmospheric Science (EAAS)

Department of Land Resource Science, Ontario Agricultural College

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

In this major there are fees charged to cover partial costs of some field trips. Students in need of financial assistance should approach the Chair of the department offering the course.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2			GEOG*4150	[0.50]	Sedimentary Processes
BIOL*1040	[0.50]	Biology II	GEOL*3190	[0.50]	Environmental Water Chemistry
CHEM*1050	[0.50]	General Chemistry II	SOIL*3080	[0.50]	Soil and Water Conservation
ECON*1050	[0.50]	Introductory Microeconomics	List D - Atmosphere		
GEOG*1300	[0.50]	Introduction to the Biophysical Environment	MET*3050	[0.50]	Microclimatology
PHYS*1130	[0.50]	Physics with Applications	MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation
Semester 3			MET*4300	[0.50]	Atmospheric Transport and Chemistry
ENVS*2150	[0.50]	Terrestrial Systems	Earth and Atmospheric Science (EAAS:C)		
GEOL*1050	[0.50]	Geology and the Environment	Department of Land Resource Science, Ontario Agricultural College		
MET*2030	[0.50]	Meteorology and Climatology	Major		
STAT*2040	[0.50]	Statistics I	Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.		
One of:			In this major there are fees charged to cover partial costs of some field trips. Students in need of financial assistance should approach the Chair of the department offering the course.		
AGEC*2700	[0.50]	Survey of Natural Resource Economics	Semester 1 - Fall		
ECON*2100	[0.50]	Economic Growth and Environmental Quality	BIOL*1030	[0.50]	Biology I
Semester 4			CHEM*1040	[0.50]	General Chemistry I
BIOL*2060	[0.50]	Ecology	ENVS*1020	[0.50]	Introduction to Environmental Sciences
GEOL*3060	[0.50]	Groundwater	MATH*1080	[0.50]	Elements of Calculus I
SOIL*2010	[0.50]	Soil Science	PHYS*1080	[0.50]	Physics for Life Sciences
One of:			Semester 2 - Winter		
MATH*1210	[0.50]	Calculus II	BIOL*1040	[0.50]	Biology II
MATH*2080	[0.50]	Elements of Calculus II	CHEM*1050	[0.50]	General Chemistry II
STAT*2050	[0.50]	Statistics II	COOP*1100	[0.00]	Introduction to Co-operative Education
0.50 electives or restricted electives			ECON*1050	[0.50]	Introductory Microeconomics
Semester 5			GEOG*1300	[0.50]	Introduction to the Biophysical Environment
GEOL*2110	[0.50]	Earth Material Science	PHYS*1130	[0.50]	Physics with Applications
One of:			Semester 3 - Fall		
GEOG*3210	[0.50]	Management of the Biophysical Environment	ENVS*2150	[0.50]	Terrestrial Systems
POLS*3370	[0.50]	Environmental Politics and Governance	GEOL*1050	[0.50]	Geology and the Environment
1.50 electives or restricted electives			MET*2030	[0.50]	Meteorology and Climatology
Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.			STAT*2040	[0.50]	Statistics I
Semester 6			One of:		
ENVS*3150	[0.50]	Aquatic Systems	AGEC*2700	[0.50]	Survey of Natural Resource Economics
ENVS*3160	[0.50]	Atmospheric Systems	ECON*2100	[0.50]	Economic Growth and Environmental Quality
NRS*3600	[0.50]	Remote Sensing	Winter Semester		
PHIL*2070	[0.50]	Philosophy of the Environment	COOP*1000	[0.00]	Co-op Work Term I
0.50 electives or restricted electives			Semester 4 - Summer		
Semester 7			BIOL*2060	[0.50]	Ecology
ENVS*4011	[0.00]	Project in Environmental Sciences	PHIL*2070	[0.50]	Philosophy of the Environment
ENVS*4300	[0.50]	Environmental Law & Regulation	SOIL*2010	[0.50]	Soil Science
2.00 electives or restricted electives			1.00 electives or restricted electives		
Semester 8			Fall Semester		
ENVS*4012	[0.50]	Project in Environmental Sciences	COOP*2000	[0.00]	Co-op Work Term II
2.00 electives or restricted electives			Semester 5 - Winter		
Restricted Electives			ENVS*3150	[0.50]	Aquatic Systems
Students must choose one of the following:			ENVS*3160	[0.50]	Atmospheric Systems
GEOL*3250	[0.50]	Field Methods in Geosciences	GEOL*3060	[0.50]	Groundwater
MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation	NRS*3600	[0.50]	Remote Sensing
SOIL*4250	[0.50]	Soils in the Landscape	One of:		
Additionally students in the Earth and Atmospheric Science major are required to choose 2.50 credits from the following lists. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000-4000 level. With prior approval, students may be able to use courses not on this list towards their Earth and Atmospheric Science restricted electives.			MATH*1210	[0.50]	Calculus II
List A - Environmental Geology			MATH*2080	[0.50]	Elements of Calculus II
GEOL*2020	[0.50]	Stratigraphy	STAT*2050	[0.50]	Statistics II
GEOL*2200	[0.50]	Glacial Geology	Summer Semester		
GEOL*3130	[0.50]	Agrogeology	COOP*3000	[0.00]	Co-op Work Term III
GEOL*3190	[0.50]	Environmental Water Chemistry	Semester 6 - Fall		
GEOL*4090	[0.50]	Sedimentology	ENVS*4011	[0.00]	Project in Environmental Sciences
GEOL*4130	[0.50]	Clay and Humic Chemistry	GEOL*2110	[0.50]	Earth Material Science
List B - Soil Science			One of:		
PBIO*4100	[0.50]	Soil Plant Relationships	GEOG*3210	[0.50]	Management of the Biophysical Environment
SOIL*3060	[0.50]	Environmental Soil Chemistry	POLS*3370	[0.50]	Environmental Politics and Governance
SOIL*3070	[0.50]	Environmental Soil Physics	1.50 electives or restricted electives		
SOIL*3080	[0.50]	Soil and Water Conservation	Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.		
SOIL*3170	[0.50]	Soil Processes in Landscape	Semester 7 - Winter		
SOIL*3200	[0.50]	Environmental Soil Biology	ENVS*4012	[0.50]	Project in Environmental Sciences
One of:			2.00 electives or restricted electives		
SOIL*4090	[0.50]	Soil Management	Summer Semester (Optional)		
SOIL*4130	[0.50]	Soil and Nutrient Management	COOP*4000	[0.00]	Co-op Work Term IV
List C - Water					
ENGG*2550	[0.50]	Water Management			
ENGG*3650	[0.50]	Hydrology			

Semester 8 - Fall

ENVS*4300	[0.50]	Environmental Law & Regulation
SOIL*4250	[0.50]	Soils in the Landscape

1.50 electives or restricted electives

Restricted Electives

Students in the Earth and Atmospheric Science major are required to choose 2.50 credits from the following lists. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of the B.Sc.(Env.) degree must be at the 3000-4000 level. With prior approval, students may be able to use courses not on this list towards their Earth and Atmospheric Science restricted electives.

List A - Environmental Geology

GEOL*2020	[0.50]	Stratigraphy
GEOL*2200	[0.50]	Glacial Geology
GEOL*3130	[0.50]	Agrogeology
GEOL*3190	[0.50]	Environmental Water Chemistry
GEOL*4090	[0.50]	Sedimentology
GEOL*4130	[0.50]	Clay and Humic Chemistry

List B - Soil Science

PBIO*4100	[0.50]	Soil Plant Relationships
SOIL*3060	[0.50]	Environmental Soil Chemistry
SOIL*3070	[0.50]	Environmental Soil Physics
SOIL*3080	[0.50]	Soil and Water Conservation
SOIL*3170	[0.50]	Soil Processes in Landscape
SOIL*3200	[0.50]	Environmental Soil Biology
SOIL*4090	[0.50]	Soil Management

List C - Water

ENGG*2550	[0.50]	Water Management
ENGG*3650	[0.50]	Hydrology
GEOG*4150	[0.50]	Sedimentary Processes
GEOL*3190	[0.50]	Environmental Water Chemistry
SOIL*3080	[0.50]	Soil and Water Conservation

List D - Atmosphere

MET*3050	[0.50]	Microclimatology
MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation
MET*4300	[0.50]	Atmospheric Transport and Chemistry

Ecology (ECOL)**College of Biological Science****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

BIOL*2210	[0.50]	Introductory Cell Biology
CHEM*2300	[0.50]	Chemical Reactivity
ENVS*2150	[0.50]	Terrestrial Systems
STAT*2040	[0.50]	Statistics I

One of:

CIS*1200	[0.50]	Introduction to Computing
CIS*1500	[0.50]	Introduction to Programming

Semester 4

BIOC*2580	[0.50]	Introductory Biochemistry
BIOL*3110	[0.50]	Population Ecology
MBG*2000	[0.50]	Introductory Genetics
STAT*2050	[0.50]	Statistics II

0.50 electives or restricted electives

Semester 5

BIOL*3010	[0.50]	Laboratory and Field Work in Ecology
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One of:

BOT*2100	[0.50]	Life Strategies of Plants
ZOO*3200	[0.50]	Comparative Animal Physiology I

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

1.00 electives or restricted electives

Semester 6

BIOL*3120	[0.50]	Community Ecology
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
PHIL*2070	[0.50]	Philosophy of the Environment

0.50 electives or restricted electives

Semester 7

BIOL*4110	[0.75]	Ecological Methods
ENVS*4011	[0.00]	Project in Environmental Sciences

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

1.25 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.

Semester 8

BIOL*4120	[0.50]	Evolutionary Ecology
ENVS*4012	[0.50]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation

1.00 electives

Note: Ecology majors are not required to complete BIOL*2060 as a core course.

Restricted Electives

One of:

MBG*3000	[0.50]	Population Genetics
ZOO*3300	[0.50]	Evolution

One of:

BOT*3410	[0.50]	Plant Anatomy
ZOO*2090	[0.50]	Vertebrate Structure and Function

Ecology (ECOL:C)**College of Biological Science****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

BIOL*2210	[0.50]	Introductory Cell Biology
CHEM*2300	[0.50]	Chemical Reactivity
ENVS*2150	[0.50]	Terrestrial Systems
STAT*2040	[0.50]	Statistics I

One of:

CIS*1200	[0.50]	Introduction to Computing
CIS*1500	[0.50]	Introduction to Programming

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOC*2580	[0.50]	Introductory Biochemistry
MBG*2000	[0.50]	Introductory Genetics
PHIL*2070	[0.50]	Philosophy of the Environment

1.00 electives or restricted electives

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

BIOL*3110	[0.50]	Population Ecology
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems

STAT*2050 [0.50] Statistics II
0.50 electives or restricted electives

Summer Semester

COOP*3000 [0.00] Co-op Work Term III

Semester 6 - Fall

BIOL*3010 [0.50] Laboratory and Field Work in Ecology
ENVS*4011 [0.00] Project in Environmental Sciences

One of:

AGEC*2700 [0.50] Survey of Natural Resource Economics
ECON*2100 [0.50] Economic Growth and Environmental Quality

1.50 electives or restricted electives

Semester 7 - Winter

BIOL*3120 [0.50] Community Ecology
BIOL*4120 [0.50] Evolutionary Ecology
ENVS*4012 [0.50] Project in Environmental Sciences

1.00 electives or restricted electives

Summer Semester (Optional)

COOP*4000 [0.00] Co-op Work Term IV

Semester 8 - Fall

BIOL*4110 [0.75] Ecological Methods
ENVS*4300 [0.50] Environmental Law & Regulation

One of:

GEOG*3210 [0.50] Management of the Biophysical Environment
POLS*3370 [0.50] Environmental Politics and Governance

0.75 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.

Note: Ecology majors are not required to complete as a core course.

Restricted Electives

One of:

MBG*3000 [0.50] Population Genetics
ZOO*3300 [0.50] Evolution

One of:

BOT*2100 [0.50] Life Strategies of Plants
ZOO*3200 [0.50] Comparative Animal Physiology I

One of:

BOT*3410 [0.50] Plant Anatomy
ZOO*2090 [0.50] Vertebrate Structure and Function

Environmental Biology (ENVB)**Department of Environmental Biology, Ontario Agricultural College****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030 [0.50] Biology I
CHEM*1040 [0.50] General Chemistry I
ENVS*1020 [0.50] Introduction to Environmental Sciences
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences

Semester 2

BIOL*1040 [0.50] Biology II
CHEM*1050 [0.50] General Chemistry II
ECON*1050 [0.50] Introductory Microeconomics
GEOG*1300 [0.50] Introduction to the Biophysical Environment
PHYS*1130 [0.50] Physics with Applications

Semester 3

CHEM*2300 [0.50] Chemical Reactivity
ENVS*2150 [0.50] Terrestrial Systems
TOX*2000 [0.50] Principles of Toxicology

One of:

AGEC*2700 [0.50] Survey of Natural Resource Economics
ECON*2100 [0.50] Economic Growth and Environmental Quality

0.50 electives or restricted electives

Semester 4

BIOC*2580 [0.50] Introductory Biochemistry
BIOL*2060 [0.50] Ecology
MBG*2000 [0.50] Introductory Genetics
STAT*2040 [0.50] Statistics I

0.50 electives or restricted electives

Semester 5

One of:

GEOG*3210 [0.50] Management of the Biophysical Environment
POLS*3370 [0.50] Environmental Politics and Governance

2.00 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.

Semester 6

ENVS*3150 [0.50] Aquatic Systems
ENVS*3160 [0.50] Atmospheric Systems
PHIL*2070 [0.50] Philosophy of the Environment

1.00 electives or restricted electives

Semester 7

ENVS*4011 [0.00] Project in Environmental Sciences
ENVS*4300 [0.50] Environmental Law & Regulation

2.00 electives or restricted electives

Semester 8

ENVS*4012 [0.50] Project in Environmental Sciences

2.00 electives or restricted electives

Restricted Electives

Students in the Environmental Biology major are required to choose 5.00 credits from the following list. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of the B.Sc.(Env.) degree must be at the 3000-4000 level.

BIOL*3130 [0.50] Conservation Biology *
BIOL*3450 [0.50] Introduction to Aquatic Environments
BIOL*4060 [0.50] Restoration Ecology *
BIOL*4150 [0.50] Wildlife Conservation and Management
ENVB*2010 [0.50] Food Production and the Environment
ENVB*2030 [0.50] Current Issues in Forest Science
ENVB*2040 [0.50] Plant Health and the Environment
ENVB*3010 [0.50] Climate Change Biology
ENVB*3030 [0.50] Pesticides and the Environment
ENVB*3040 [0.50] Natural Chemicals in the Environment
ENVB*3230 [0.50] Agroforestry Systems
ENVB*3250 [0.50] Forest Health and Disease
ENVB*3270 [0.50] Forest Biodiversity
ENVB*3300 [0.50] Applied Ecology and Environment
ENVB*4020 [0.50] Water Quality and Environmental Management *
ENVB*4130 [0.50] Chemical Ecology: Principles & Practice *
ENVB*4240 [0.50] Biological Activity of Pesticides
ENVB*4550 [0.50] Ecotoxicological Risk Characterization *
ENVB*4780 [0.50] Forest Ecology *
ENVS*4220 [0.50] Environmental Impact Assessment
GEOG*3020 [0.50] Global Environmental Change
GEOL*3190 [0.50] Environmental Water Chemistry
MICR*4140 [0.50] Soil Microbiology and Biotechnology
MICR*4180 [0.50] Microbial Processes in Environmental Management
NRS*2120 [0.50] Introduction to Environmental Stewardship
PPIO*4530 [0.50] Environmental Pollution Stresses on Plants *
SOIL*3080 [0.50] Soil and Water Conservation *
TOX*3360 [0.50] Environmental Chemistry and Toxicology
ZOO*4350 [0.50] Biology of Polluted Waters *

* **Note:** Students should note that some restricted electives (marked by asterisks *) require other restricted electives as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

Environmental Biology (ENVB:C)**Department of Environmental Biology, Ontario Agricultural College****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1 - Fall

BIOL*1030 [0.50] Biology I
CHEM*1040 [0.50] General Chemistry I
ENVS*1020 [0.50] Introduction to Environmental Sciences
MATH*1080 [0.50] Elements of Calculus I
PHYS*1080 [0.50] Physics for Life Sciences

Semester 2 - Winter

BIOL*1040 [0.50] Biology II
CHEM*1050 [0.50] General Chemistry II
COOP*1100 [0.00] Introduction to Co-operative Education
ECON*1050 [0.50] Introductory Microeconomics
GEOG*1300 [0.50] Introduction to the Biophysical Environment
PHYS*1130 [0.50] Physics with Applications

Semester 3 - Fall

CHEM*2300	[0.50]	Chemical Reactivity
ENVS*2150	[0.50]	Terrestrial Systems
TOX*2000	[0.50]	Principles of Toxicology

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

0.50 electives or restricted electives

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOC*2580	[0.50]	Introductory Biochemistry
BIOL*2060	[0.50]	Ecology
MBG*2000	[0.50]	Introductory Genetics
STAT*2040	[0.50]	Statistics I

0.50 electives or restricted electives

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
PHIL*2070	[0.50]	Philosophy of the Environment

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

0.50 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.

Summer Semester

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

ENVS*4011	[0.00]	Project in Environmental Sciences
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2.50 electives or restricted electives

Semester 7 - Winter

ENVS*4012	[0.50]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation

1.50 electives or restricted electives

Summer Semester - (Optional)

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8 - Fall

2.50 electives or restricted electives

Restricted Electives

Students in the Environmental Biology major are required to choose 5.00 credits from the following list. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of the B.Sc.(Env.) degree must be at the 3000-4000 level.

BIOL*3130	[0.50]	Conservation Biology *
BIOL*3450	[0.50]	Introduction to Aquatic Environments
BIOL*4060	[0.50]	Restoration Ecology *
BIOL*4150	[0.50]	Wildlife Conservation and Management
ENVB*2010	[0.50]	Food Production and the Environment
ENVB*2030	[0.50]	Current Issues in Forest Science
ENVB*2040	[0.50]	Plant Health and the Environment
ENVB*3010	[0.50]	Climate Change Biology
ENVB*3030	[0.50]	Pesticides and the Environment
ENVB*3040	[0.50]	Natural Chemicals in the Environment
ENVB*3230	[0.50]	Agroforestry Systems
ENVB*3250	[0.50]	Forest Health and Disease
ENVB*3270	[0.50]	Forest Biodiversity
ENVB*3300	[0.50]	Applied Ecology and Environment
ENVB*4020	[0.50]	Water Quality and Environmental Management *
ENVB*4130	[0.50]	Chemical Ecology: Principles & Practice *
ENVB*4240	[0.50]	Biological Activity of Pesticides
ENVB*4550	[0.50]	Ecotoxicological Risk Characterization *
ENVB*4780	[0.50]	Forest Ecology *
ENVS*4220	[0.50]	Environmental Impact Assessment
GEOG*3020	[0.50]	Global Environmental Change
GEOL*3190	[0.50]	Environmental Water Chemistry
MICR*4140	[0.50]	Soil Microbiology and Biotechnology
MICR*4180	[0.50]	Microbial Processes in Environmental Management
NRS*2120	[0.50]	Introduction to Environmental Stewardship
PBIO*4530	[0.50]	Environmental Pollution Stresses on Plants *
SOIL*3080	[0.50]	Soil and Water Conservation *
TOX*3360	[0.50]	Environmental Chemistry and Toxicology
ZOO*4350	[0.50]	Biology of Polluted Waters *

* **Note:** Students should note that some restricted electives (marked by asterisks *) require other restricted electives as prerequisites. Students should consult the most recent undergraduate calendar for specific requirements.

Environmental Economics and Policy (EEP)

Department of Economics, College of Management and Economics

Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2100	[0.50]	Economic Growth and Environmental Quality
ENVS*2150	[0.50]	Terrestrial Systems

0.50 electives or restricted electives

Semester 4

BIOL*2060	[0.50]	Ecology
ECON*2310	[0.50]	Intermediate Microeconomics
ECON*2740	[0.50]	Economic Statistics
PHIL*2070	[0.50]	Philosophy of the Environment

0.50 electives or restricted electives

Note: STAT*2040 may be substituted for ECON*2740.

Semester 5

AGEC*3190	[0.50]	Markets, Firms & Natural Amenities
AGEC*4290	[0.50]	Land Economics
ECON*2410	[0.50]	Intermediate Macroeconomics
ECON*2770	[0.50]	Introductory Mathematical Economics

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

Note: AGECE*4290 is taught in even-numbered years.

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.

Semester 6

AGEC*3170	[0.50]	Cost-Benefit Analysis
ECON*3740	[0.50]	Introduction to Econometrics
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems

0.50 electives or restricted electives

Semester 7

ECON*3710	[0.50]	Advanced Microeconomics
ECON*4930	[0.50]	Environmental Economics
ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation

1.00 electives or restricted electives

Note: Students must obtain permission from instructor to take ECON*4930 and ECON*3710 at the same time.

Semester 8

AGEC*4310	[0.50]	Resource Economics
ENVS*4012	[0.50]	Project in Environmental Sciences

1.50 restricted electives or electives

Restricted Electives

Students in the Environmental Economics and Policy major are required to choose 2.00 credits additional Food, Agricultural and Resource Economics (AGEC*XXXX) or Economics (ECON*XXXX). Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000 level or higher.

Environmental Economics and Policy (EEP:C)

Department of Economics, College of Management and Economics

Department of Food, Agricultural and Resource Economics, Ontario Agricultural College

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*1100	[0.50]	Introductory Macroeconomics
ECON*2100	[0.50]	Economic Growth and Environmental Quality
ENVS*2150	[0.50]	Terrestrial Systems

0.50 electives or restricted electives

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOL*2060	[0.50]	Ecology
ECON*2310	[0.50]	Intermediate Microeconomics
ECON*2410	[0.50]	Intermediate Macroeconomics
PHIL*2070	[0.50]	Philosophy of the Environment
STAT*2040	[0.50]	Statistics I

Note: STAT*2040 may be substituted for ECON*2740.**Fall Semester**

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

AGEC*3170	[0.50]	Cost-Benefit Analysis
ECON*2770	[0.50]	Introductory Mathematical Economics
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.**Summer Semester**

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

AGEC*3190	[0.50]	Markets, Firms & Natural Amenities
AGEC*4290	[0.50]	Land Economics
ECON*3710	[0.50]	Advanced Microeconomics
ENVS*4011	[0.00]	Project in Environmental Sciences

1.00 electives or restricted electives

Note: AGEC*4290 is taught in even-numbered years.**Semester 7 - Winter**

AGEC*4310	[0.50]	Resource Economics
ECON*3740	[0.50]	Introduction to Econometrics
ENVS*4012	[0.50]	Project in Environmental Sciences

1.00 electives or restricted electives

Summer Semester (Optional)

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8 - Fall

ECON*4930	[0.50]	Environmental Economics
ENVS*4300	[0.50]	Environmental Law & Regulation

1.50 electives or restricted electives

Restricted Electives

Students in the Environmental Economics and Policy major are required to choose 2.00 credits additional Food, Agricultural and Resource Economics (AGEC*XXXX) or Economics (ECON*XXXX). Students are encouraged to seek advice on their choices and

are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000 level or higher.

Environmental Geography (ENVG)

Department of Geography, College of Social and Applied Human Sciences

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

ENVS*2150	[0.50]	Terrestrial Systems
GEOG*2000	[0.50]	Geomorphology
GEOG*2460	[0.50]	Analysis in Geography

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

0.50 electives

Semester 4

BIOL*2060	[0.50]	Ecology
GEOG*2110	[0.50]	Climate and the Biophysical Environment
GEOG*2210	[0.50]	Environment and Resources
GEOG*2480	[0.50]	Mapping and GIS

0.50 electives

Semester 5

GEOG*3110	[0.50]	Biotic and Natural Resources
GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

1.00 electives or restricted electives*

Note: Environmental Geography majors are required to complete GEOG*3210 and (POLS*3370 or ZOO*4050). ZOO*4050 may be substituted for POLS*3370 and would be taken in Semester 8.**Semester 6**

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
GEOG*3480	[0.50]	GIS and Spatial Analysis
PHIL*2070	[0.50]	Philosophy of the Environment

0.50 electives or restricted electives*

Semester 7

ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation
GEOG*4690	[1.00]	Geography Field Research

1.00 electives or restricted electives*

OR

ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation

0.50 credits in Geography at the 3000 level or higher

1.50 electives or restricted electives*

Semester 8

ENVS*4012	[0.50]	Project in Environmental Sciences
GEOG*4880	[0.50]	Contemporary Geographic Thought

1.50 electives or restricted electives*

* students in the Environmental Geography major must take at least 4 additional geography courses at the 3000 level or higher including:

At least one of:

GEOG*3000	[0.50]	Fluvial Processes
GEOG*3610	[0.50]	Environmental Hydrology
GEOG*3620	[0.50]	Desert Environments

At least two of:

GEOG*3020	[0.50]	Global Environmental Change
GEOG*4110	[0.50]	Environmental Systems Analysis
GEOG*4210	[0.50]	Environmental Governance
GEOG*4230	[0.50]	Environmental Impact Assessment

Environmental Geography (ENVG:C)

Department of Geography, College of Social and Applied Human Sciences

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are strongly encouraged to seek advice from the appropriate advisor when selecting and scheduling courses, **before Semester 3.**

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

ENVS*2150	[0.50]	Terrestrial Systems
GEOG*2000	[0.50]	Geomorphology
GEOG*2460	[0.50]	Analysis in Geography
One of:		
AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

0.50 electives

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOL*2060	[0.50]	Ecology
GEOG*2210	[0.50]	Environment and Resources
PHIL*2070	[0.50]	Philosophy of the Environment

1.00 electives

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
GEOG*2110	[0.50]	Climate and the Biophysical Environment
GEOG*2480	[0.50]	Mapping and GIS

0.50 electives or restricted electives*

Summer Semester

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

ENVS*4011	[0.00]	Project in Environmental Sciences
GEOG*3110	[0.50]	Biotic and Natural Resources
GEOG*3210	[0.50]	Management of the Biophysical Environment
GEOG*3480	[0.50]	GIS and Spatial Analysis
POLS*3370	[0.50]	Environmental Politics and Governance

0.50 electives or restricted electives*

Note: Environmental Geography majors are required to complete GEOG*3210 and (POLS*3370 or ZOO*4050). ZOO*4050 may be substituted for POLS*3370 and would be taken in Semester 8.

Semester 7 - Winter

ENVS*4012	[0.50]	Project in Environmental Sciences
GEOG*4880	[0.50]	Contemporary Geographic Thought

1.50 electives or restricted electives*

Summer Semester

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8 - Fall

ENVS*4300	[0.50]	Environmental Law & Regulation
GEOG*4690	[1.00]	Geography Field Research

1.00 electives or restricted electives*

OR

ENVS*4300	[0.50]	Environmental Law & Regulation
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0.50 credits in Geography at the 3000 level or higher

1.50 electives or restricted electives*

* students in the Environmental Geography major must take at least 4 additional geography courses at the 3000 level or higher including:

At least one of:		
GEOG*3000	[0.50]	Fluvial Processes

GEOG*3610	[0.50]	Environmental Hydrology
GEOG*3620	[0.50]	Desert Environments
At least two of:		
GEOG*3020	[0.50]	Global Environmental Change
GEOG*4110	[0.50]	Environmental Systems Analysis
GEOG*4210	[0.50]	Environmental Governance
GEOG*4230	[0.50]	Environmental Impact Assessment

Environmental Monitoring and Analysis (EMA)

College of Physical and Engineering Science

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

CHEM*2300	[0.50]	Chemical Reactivity
ENVS*2150	[0.50]	Terrestrial Systems
MATH*2080	[0.50]	Elements of Calculus II
MET*2030	[0.50]	Meteorology and Climatology

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

Semester 4

BIOC*2580	[0.50]	Introductory Biochemistry
CHEM*2480	[0.50]	Analytical Chemistry I
PHYS*2040	[0.50]	Fundamental Electronics and Sensors
STAT*2040	[0.50]	Statistics I

One of:

CIS*1200	[0.50]	Introduction to Computing
CIS*1500	[0.50]	Introduction to Programming

Semester 5

BIOL*2060	[0.50]	Ecology
PHYS*2550	[0.50]	Radiation and the Environment
STAT*2050	[0.50]	Statistics II
TOX*2000	[0.50]	Principles of Toxicology

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

Note: PHYS*2550 is offered in even numbered years.

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8 - Winter.

Semester 6

CHEM*3360	[0.50]	Environmental Chemistry and Toxicology
ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
PHIL*2070	[0.50]	Philosophy of the Environment
STAT*3510	[0.50]	Environmental Risk Assessment

Semester 7

ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation
TOX*3300	[0.50]	Analytical Toxicology

1.50 core requirement or electives

Semester 8

CHEM*4010	[0.50]	Chemistry and Industry
ENVS*4012	[0.50]	Project in Environmental Sciences
PHYS*3080	[0.50]	Energy

One of:

MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation
MET*4300	[0.50]	Atmospheric Transport and Chemistry

0.50 electives

Note: MET*4300 is offered in even numbered years.

Environmental Monitoring and Analysis (EMA:C)**College of Physical and Engineering Science****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

CHEM*2300	[0.50]	Chemical Reactivity
ENVS*2150	[0.50]	Terrestrial Systems
MATH*2080	[0.50]	Elements of Calculus II
MET*2030	[0.50]	Meteorology and Climatology

One of:

CIS*1200	[0.50]	Introduction to Computing
CIS*1500	[0.50]	Introduction to Programming

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOC*2580	[0.50]	Introductory Biochemistry
BIOL*2060	[0.50]	Ecology
CHEM*2480	[0.50]	Analytical Chemistry I
PHIL*2070	[0.50]	Philosophy of the Environment
STAT*2040	[0.50]	Statistics I

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
CHEM*3360	[0.50]	Environmental Chemistry and Toxicology
PHYS*2040	[0.50]	Fundamental Electronics and Sensors
STAT*2050	[0.50]	Statistics II

Summer Semester

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

ENVS*4011	[0.00]	Project in Environmental Sciences
PHYS*2040	[0.50]	Fundamental Electronics and Sensors
PHYS*2550	[0.50]	Radiation and the Environment
TOX*2000	[0.50]	Principles of Toxicology

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

0.50 electives

Note: PHYS*2550 is offered in even numbered years.

Semester 7 - Winter

CHEM*4010	[0.50]	Chemistry and Industry
ENVS*4012	[0.50]	Project in Environmental Sciences
PHYS*3080	[0.50]	Energy
STAT*3510	[0.50]	Environmental Risk Assessment

One of:

MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation
MET*4300	[0.50]	Atmospheric Transport and Chemistry

Note: MET*4300 is offered in even numbered years.

Summer Semester (Optional)

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8

ENVS*4300	[0.50]	Environmental Law & Regulation
TOX*3300	[0.50]	Analytical Toxicology

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

1.00 electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7 - Winter.

Environmetrics and Modelling (EMM)**Department of Mathematics and Statistics, College of Physical and Engineering Science****Department of Computing and Information Science, College of Physical and Engineering Science****Major**

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

CIS*1500	[0.50]	Introduction to Programming
ENVS*2150	[0.50]	Terrestrial Systems
STAT*2040	[0.50]	Statistics I

One of:

MATH*2080	[0.50]	Elements of Calculus II
MATH*2160	[0.50]	Linear Algebra I

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

Note: Only one of MATH*1210/MATH*2080 and only one of MATH*2150/MATH*2160 will count towards the degree (see Semester 4). MATH*1210 and MATH*2160 are preferred for mathematics emphasis.

Note: Students in the Environmetrics and Modelling major must consult the Environmetrics and Modelling Faculty Advisor for course scheduling in semester 4 through 8.

Semester 4

BIOL*2060	[0.50]	Ecology
MATH*2130	[0.50]	Numerical Methods
MATH*2170	[0.50]	Differential Equations I
STAT*2050	[0.50]	Statistics II

One of:

MATH*1210	[0.50]	Calculus II
MATH*2150	[0.50]	Applied Matrix Algebra

Semester 5

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

2.00 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.

Semester 6

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
MATH*3510	[0.50]	Biomathematics
PHIL*2070	[0.50]	Philosophy of the Environment
STAT*3510	[0.50]	Environmental Risk Assessment

Semester 7

ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation

2.00 electives or restricted electives

Semester 8

ENVS*4012	[0.50]	Project in Environmental Sciences
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2.00 electives or restricted electives

Restricted Electives

Students in the Environmetrics major are required to choose 3.50 credits of restricted electives. A minimum of 2.50 credits must be at the 3000 level or higher and a minimum of 1.00 must be at the 4000 level.

List

CIS*1900	[0.50]	Discrete Structures in Computer Science
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CIS*2430	[0.50]	Object Oriented Programming
CIS*2460	[0.50]	Modelling of Computer Systems
CIS*2500	[0.50]	Intermediate Programming
CIS*2520	[0.50]	Data Structures
CIS*2750	[0.75]	Software Systems Development and Integration
CIS*3490	[0.50]	The Analysis and Design of Computer Algorithms
CIS*3530	[0.50]	Data Base Systems and Concepts
MATH*2200	[0.50]	Advanced Calculus I
MATH*2210	[0.50]	Advanced Calculus II
MATH*3100	[0.50]	Differential Equations II
MATH*3170	[0.50]	Partial Differential Equations and Special Functions
MATH*3240	[0.50]	Operations Research
MATH*4070	[0.50]	Case Studies in Modeling
MATH*4430	[0.50]	Advanced Numerical Methods
MATH*4510	[0.50]	Environmental Transport and Dynamics
STAT*3100	[0.50]	Introductory Mathematical Statistics I
STAT*3110	[0.50]	Introductory Mathematical Statistics II
STAT*3240	[0.50]	Applied Regression Analysis
STAT*3320	[0.50]	Sampling Theory with Applications
STAT*4340	[0.50]	Statistical Inference
STAT*4350	[0.50]	Applied Multivariate Statistical Methods
STAT*4360	[0.50]	Applied Time Series Analysis

Environmetrics and Modelling (EMM:C)

Department of Mathematics and Statistics, College of Physical and Engineering Science

Department of Computing and Information Science, College of Physical and Engineering Science

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

CIS*1500	[0.50]	Introduction to Programming
ENVS*2150	[0.50]	Terrestrial Systems
MATH*2080	[0.50]	Elements of Calculus II
STAT*2040	[0.50]	Statistics I

0.50 electives or restricted electives

Note: Students in the Environmetrics and Modelling major must consult the Environmetrics and Modelling Faculty Advisor for course scheduling in semester 4 through 8.

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOL*2060	[0.50]	Ecology
MATH*2150	[0.50]	Applied Matrix Algebra
MATH*2170	[0.50]	Differential Equations I
PHIL*2070	[0.50]	Philosophy of the Environment

0.50 electives or restricted electives

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
MATH*2130	[0.50]	Numerical Methods
STAT*2050	[0.50]	Statistics II

0.50 electives or restricted electives

Summer Semester

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

ENVS*4011	[0.00]	Project in Environmental Sciences
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One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality
One of:		
GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

1.50 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.

Semester 7 - Winter

ENVS*4012	[0.50]	Project in Environmental Sciences
MATH*3510	[0.50]	Biomathematics
STAT*3510	[0.50]	Environmental Risk Assessment

1.00 electives or restricted electives

Summer Semester (Optional)

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8 - Fall

ENVS*4300	[0.50]	Environmental Law & Regulation
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2.00 electives or restricted electives

Restricted Electives

Students in the Environmetrics major are required to choose 3.50 credits of restricted electives. A minimum of 2.50 credits must be at the 3000 level or higher and of these a minimum of 1.00 must be at the 4000 level.

List

CIS*1900	[0.50]	Discrete Structures in Computer Science
CIS*2430	[0.50]	Object Oriented Programming
CIS*2460	[0.50]	Modelling of Computer Systems
CIS*2500	[0.50]	Intermediate Programming
CIS*2520	[0.50]	Data Structures
CIS*2750	[0.75]	Software Systems Development and Integration
CIS*3490	[0.50]	The Analysis and Design of Computer Algorithms
CIS*3530	[0.50]	Data Base Systems and Concepts
MATH*2200	[0.50]	Advanced Calculus I
MATH*2210	[0.50]	Advanced Calculus II
MATH*3100	[0.50]	Differential Equations II
MATH*3170	[0.50]	Partial Differential Equations and Special Functions
MATH*3240	[0.50]	Operations Research
MATH*4070	[0.50]	Case Studies in Modeling
MATH*4430	[0.50]	Advanced Numerical Methods
MATH*4510	[0.50]	Environmental Transport and Dynamics
STAT*3100	[0.50]	Introductory Mathematical Statistics I
STAT*3110	[0.50]	Introductory Mathematical Statistics II
STAT*3240	[0.50]	Applied Regression Analysis
STAT*3320	[0.50]	Sampling Theory with Applications
STAT*4340	[0.50]	Statistical Inference
STAT*4350	[0.50]	Applied Multivariate Statistical Methods
STAT*4360	[0.50]	Applied Time Series Analysis

Natural Resources Management (NRM)

Department of Land Resource Science, Ontario Agricultural College

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

In this major there are fees charged to cover partial costs of some field trips. Students in need of financial assistance should approach the Chair of the department offering the course.

Semester 1

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I
PHYS*1080	[0.50]	Physics for Life Sciences

Semester 2

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3

ENVS*2150	[0.50]	Terrestrial Systems
MET*2030	[0.50]	Meteorology and Climatology
NRS*2120	[0.50]	Introduction to Environmental Stewardship
STAT*2040	[0.50]	Statistics I

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

Note: GEOG*2460 may be substituted for STAT*2040.

Semester 4

BIOL*2060	[0.50]	Ecology
PHIL*2070	[0.50]	Philosophy of the Environment
SOIL*2010	[0.50]	Soil Science

1.00 electives or restricted electives

Semester 5

ENVB*2030	[0.50]	Current Issues in Forest Science
SOIL*3050	[0.50]	Land Utilization
SOIL*3080	[0.50]	Soil and Water Conservation

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

0.50 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 8.

Semester 6

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
NRS*3100	[0.50]	Resource Planning Techniques

One of:

ENGG*2550	[0.50]	Water Management
GEOG*3610	[0.50]	Environmental Hydrology
GEOL*3060	[0.50]	Groundwater

0.50 electives or restricted electives

Semester 7

ENVS*4011	[0.00]	Project in Environmental Sciences
ENVS*4300	[0.50]	Environmental Law & Regulation
NRS*4110	[0.50]	Natural Resources Management Field Camp
ZOO*4110	[0.50]	Principles of Fish and Wild Life Management

1.00 electives or restricted electives

Note: BIOL*4150 may be substituted for ZOO*4110.

Semester 8

ENVS*4012	[0.50]	Project in Environmental Sciences
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2.00 electives or restricted electives

Restricted Electives

Students in the Natural Resources Management major are required to choose 1.50 restricted elective credits from the following list. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000 level or higher.

CROP*2280	[0.50]	Crops in Land Reclamation
ENVB*3000	[0.50]	Nature Interpretation
ENVB*3230	[0.50]	Agroforestry Systems
ENVB*3270	[0.50]	Forest Biodiversity
ENVB*4780	[0.50]	Forest Ecology
GEOG*2420	[0.50]	Aerial-photo Interpretation
GEOG*3210	[0.50]	Management of the Biophysical Environment
GEOG*3480	[0.50]	GIS and Spatial Analysis
GEOG*4230	[0.50]	Environmental Impact Assessment
GEOL*3130	[0.50]	Agrogeology
LARC*3320	[0.50]	Principles of Landscape Ecology
LARC*4520	[0.50]	Park and Recreation Administration
MET*3050	[0.50]	Microclimatology
NRS*3600	[0.50]	Remote Sensing
SOIL*3060	[0.50]	Environmental Soil Chemistry
SOIL*3070	[0.50]	Environmental Soil Physics
SOIL*3200	[0.50]	Environmental Soil Biology

Natural Resources Management (NRM:C)

Department of Land Resource Science, Ontario Agricultural College

Major

Please note that not all courses in the "One of:" options are available each semester (F, W, S). Students are encouraged to seek advice from the appropriate advisor when selecting and scheduling courses.

In this major there are fees charged to cover partial costs of some field trips. Students in need of financial assistance should approach the Chair of the department offering the course.

Semester 1 - Fall

BIOL*1030	[0.50]	Biology I
CHEM*1040	[0.50]	General Chemistry I
ENVS*1020	[0.50]	Introduction to Environmental Sciences
MATH*1080	[0.50]	Elements of Calculus I

PHYS*1080	[0.50]	Physics for Life Sciences
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Semester 2 - Winter

BIOL*1040	[0.50]	Biology II
CHEM*1050	[0.50]	General Chemistry II
COOP*1100	[0.00]	Introduction to Co-operative Education
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

Semester 3 - Fall

ENVB*2030	[0.50]	Current Issues in Forest Science
ENVS*2150	[0.50]	Terrestrial Systems
MET*2030	[0.50]	Meteorology and Climatology
NRS*2120	[0.50]	Introduction to Environmental Stewardship
STAT*2040	[0.50]	Statistics I

Note: GEOG*2460 may be substituted for STAT*2040.

Winter Semester

COOP*1000	[0.00]	Co-op Work Term I
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Semester 4 - Summer

BIOL*2060	[0.50]	Ecology
PHIL*2070	[0.50]	Philosophy of the Environment

1.50 electives or restricted electives

Fall Semester

COOP*2000	[0.00]	Co-op Work Term II
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Semester 5 - Winter

ENVS*3150	[0.50]	Aquatic Systems
ENVS*3160	[0.50]	Atmospheric Systems
SOIL*2010	[0.50]	Soil Science

One of:

ENGG*2550	[0.50]	Water Management
GEOG*3610	[0.50]	Environmental Hydrology
GEOL*3060	[0.50]	Groundwater

0.50 electives or restricted electives

Summer Semester

COOP*3000	[0.00]	Co-op Work Term III
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Semester 6 - Fall

ENVS*4011	[0.00]	Project in Environmental Sciences
SOIL*3050	[0.50]	Land Utilization
SOIL*3080	[0.50]	Soil and Water Conservation

One of:

AGEC*2700	[0.50]	Survey of Natural Resource Economics
ECON*2100	[0.50]	Economic Growth and Environmental Quality

One of:

GEOG*3210	[0.50]	Management of the Biophysical Environment
POLS*3370	[0.50]	Environmental Politics and Governance

0.50 electives or restricted electives

Note: ZOO*4050 may be substituted for GEOG*3210 or POLS*3370 and would be taken in Semester 7.

Semester 7 - Winter

ENVS*4012	[0.50]	Project in Environmental Sciences
NRS*3100	[0.50]	Resource Planning Techniques

1.50 electives or restricted electives

Summer Semester (Optional)

COOP*4000	[0.00]	Co-op Work Term IV
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Semester 8 - Fall

ENVS*4300	[0.50]	Environmental Law & Regulation
NRS*4110	[0.50]	Natural Resources Management Field Camp
ZOO*4110	[0.50]	Principles of Fish and Wild Life Management

1.00 electives or restricted electives

Note: BIOL*4150 may be substituted for ZOO*4110.

Restricted Electives

Students in the Natural Resources Management major are required to choose 1.50 restricted elective credits from the following list. Students are encouraged to seek advice on their choices and are reminded that 6.00 credits of their B.Sc.(Env.) degree must be at the 3000 level or higher.

CROP*2280	[0.50]	Crops in Land Reclamation
ENVB*3000	[0.50]	Nature Interpretation
ENVB*3230	[0.50]	Agroforestry Systems
ENVB*3270	[0.50]	Forest Biodiversity
ENVB*4780	[0.50]	Forest Ecology
GEOG*2420	[0.50]	Aerial-photo Interpretation
GEOG*3210	[0.50]	Management of the Biophysical Environment
GEOG*3480	[0.50]	GIS and Spatial Analysis
GEOG*4230	[0.50]	Environmental Impact Assessment

GEOL*3130	[0.50]	Agrogeology
LARC*3320	[0.50]	Principles of Landscape Ecology
LARC*4520	[0.50]	Park and Recreation Administration
MET*3050	[0.50]	Microclimatology
NRS*3600	[0.50]	Remote Sensing
SOIL*3060	[0.50]	Environmental Soil Chemistry
SOIL*3070	[0.50]	Environmental Soil Physics
SOIL*3200	[0.50]	Environmental Soil Biology