

2006-2007 Undergraduate Calendar

The information published in this Undergraduate Calendar outlines the rules, regulations, curricula, programs and fees for the 2006-2007 academic year, including the Summer Semester 2006, the Fall Semester 2006 and the Winter Semester 2007.

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

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Disclaimer

University of Guelph 2006

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The University reserves the right to change without notice any information contained in this calendar, including 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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Table of Contents

Bachelor of Science in Environmental Sciences [B.Sc.(Env.)]	321
Program Information	321
Earth and Atmospheric Science (EAAS)	321
Earth and Atmospheric Science (EAAS:C)	322
Ecology (ECOL)	323
Ecology (ECOL:C)	323
Environmental Economics and Policy (EEP)	323
Environmental Economics and Policy (EEP:C)	324
Environmental Geography (ENVG)	324
Environmental Geography (ENVG:C)	325
Environmental Monitoring and Analysis (EMA)	325
Environmental Monitoring and Analysis (EMA:C)	325
Environmental Protection (ENVP)	326
Environmental Protection (ENVP:C)	326
Environmetrics (ENVM)	327
Environmetrics (ENVM:C)	327
Natural Resources Management (NRM)	328
Natural Resources Management (NRM:C)	328
Areas of Emphasis	329

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 problem solving perspective 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 both good writing ability and oral communication ability. This is emphasized particularly in the Environmental Sciences core courses, starting in first year, and running through to 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 qualify for graduation from the B.Sc.(Env.) program, the student must have completed successfully the stated course requirements for the program.

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 the semester preceding COOP*1000 (ie. in 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, major, area of emphasis) 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 20.00 credits, as follows:

1. 5.00 First Year Curriculum
2. 3.00 Environmental Sciences Core
3. 7.00-8.00 Environmental Sciences Major
4. 2.50 minimum Area of Emphasis
5. 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.

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental Chemistry II
ECON*1050	[0.50]	Introductory Microeconomics
GEOG*1300	[0.50]	Introduction to the Biophysical Environment
PHYS*1130	[0.50]	Physics with Applications

*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 below:

BIOL*2060	[0.50]	Ecology
ENVS*2010	[0.50]	Decision-making and Communication Skills
ENVS*4011/2	[0.50]	Colloquium/Project in Environmental Sciences
PHIL*2070	[0.50]	Philosophy of the Environment

Note: BIOL*2060 is to be taken in Semester 3 or 4, ENVS*2010 is to be taken in Semester 3, the series ENVS*4011, ENVS*4012 is to be taken consecutively during the last complete academic year (F-W) Semester 7/8 or Semester 6/7 (Co-op), and PHIL*2070 is to be taken in Semester 4, 5 or 6 (preference is earlier in program).

One of:

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

Note: Either AGECE*2700 or ECON*2100 is to be taken in Semester 3.

One of:

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

Note: One of GEOG*3210 and POLS*3370 are to be taken in Semester 4 or 6 or ZOO*4050 is to be taken in Semester 7 or 8.

Environmental Sciences Majors

Earth and Atmospheric Science

Ecology

Environmental Economics and Policy

Environmental Geography

Environmental Monitoring and Analysis

Environmental Protection

Environmetrics

Natural Resources Management

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

Area of Emphasis Requirements

All students must choose an area of emphasis consisting of a minimum of 2.50 credits in a particular topic area. These are listed after "Schedules of Studies". The sequence of courses normally begins in third year. With the approval of the Program Counsellor, students may develop their own area of emphasis. All areas of emphasis must be approved by the Program Counsellor. Students should note that entry to certain areas of emphasis is restricted by the student's choice of major. Thus program approval should be gained before registering in courses to count towards their area of emphasis.

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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

GEOG*1050	[0.50]	Geology and the Environment
MET*2030	[0.50]	Meteorology and Climatology
STAT*2040	[0.50]	Statistics I

1.00 core requirements or electives

Semester 4

SOIL*2010	[0.50]	Soil Science
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2.00 core requirements or electives

Semester 5

GEOG*2110	[0.50]	Earth Material Science
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1.50 core requirements, restricted electives or electives

One of:

MATH*1210	[0.50]	Calculus II
MATH*2080	[0.50]	Elements of Calculus II
STAT*2050	[0.50]	Statistics II

Semester 6

SOIL*3600	[0.50]	Remote Sensing
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One of:

GEOG*3060	[0.50]	Groundwater
SOIL*3070	[0.50]	Environmental Soil Physics

1.50 core requirements, restricted electives or electives

Semester 7

SOIL*4210	[0.50]	Earth and Atmospheric Science Field Camp
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2.00 core requirements, restricted electives or electives

Semester 8

2.50 core requirements, restricted electives or 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 consult with the faculty advisor for assistance.

List A - Environmental Geology

GEOG*2020	[0.50]	Stratigraphy
GEOG*2200	[0.50]	Glacial Geology
GEOG*3100	[0.50]	Non-Renewable Earth Resources
GEOG*3130	[0.50]	Agrogeology
GEOG*4090	[0.50]	Sedimentology
GEOG*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*3610	[0.50]	Environmental Hydrology
GEOG*4150	[0.50]	Sedimentary Processes
GEOG*3190	[0.50]	Environmental Water Chemistry
SOIL*3080	[0.50]	Soil and Water Conservation

List D - Atmosphere

GEOG*2110	[0.50]	Climate and the Biophysical Environment
MET*3050	[0.50]	Microclimatology
MET*4210	[0.50]	Atmospheric Experimentation and Instrumentation
MET*4300	[0.50]	Atmospheric Transport and Chemistry

Earth and Atmospheric Science (EAAS: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*1300	[0.50]	Introductory Environmental Chemistry
ENV*1010	[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*1310	[0.50]	Introductory Environmental 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

GEOG*1050	[0.50]	Geology and the Environment
MET*2030	[0.50]	Meteorology and Climatology
STAT*2040	[0.50]	Statistics I

1.00 core requirements or electives

Winter Semester

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

SOIL*2010	[0.50]	Soil Science
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One of:

MATH*1210	[0.50]	Calculus II
MATH*2080	[0.50]	Elements of Calculus II
STAT*2050	[0.50]	Statistics II

1.50 core requirements, restricted electives or electives

Fall Semester

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

SOIL*3600	[0.50]	Remote Sensing
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One of:

GEOG*3060	[0.50]	Groundwater
SOIL*3070	[0.50]	Environmental Soil Physics

1.50 core requirements, restricted electives or electives

Summer Semester

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

GEOG*2110	[0.50]	Earth Material Science
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2.00 core requirements, restricted electives or electives

Semester 7- Winter

2.50 core requirements, restricted electives or electives

Summer Semester (Optional)

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

SOIL*4210	[0.50]	Earth and Atmospheric Science Field Camp
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2.00 core requirements, restricted electives or 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 consult with the faculty advisor for assistance.

List A - Environmental Geology

GEOG*2020	[0.50]	Stratigraphy
GEOG*2200	[0.50]	Glacial Geology
GEOG*3100	[0.50]	Non-Renewable Earth Resources
GEOG*3130	[0.50]	Agrogeology
GEOG*4090	[0.50]	Sedimentology
GEOG*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*3610	[0.50]	Environmental Hydrology
GEOG*4150	[0.50]	Sedimentary Processes
GEOG*3190	[0.50]	Environmental Water Chemistry

SOIL*3080 [0.50] Soil and Water Conservation

List D - Atmosphere

GEOG*2110 [0.50] Climate and the Biophysical Environment
 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*1300 [0.50] Introductory Environmental Chemistry
 ENVS*1010 [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*1310 [0.50] Introductory Environmental 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
 STAT*2040 [0.50] Statistics I

1.00 core requirements or electives

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

One of:

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

Semester 5

BIOL*3010 [0.50] Laboratory and Field Work in Ecology
 BIOL*3120 [0.50] Community Ecology

One of:

BOT*3410 [0.50] Plant Anatomy
 ZOO*2070 [0.50] Invertebrate Zoology I
 ZOO*2090 [0.50] Vertebrate Structure and Function

One of:

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

0.50 core requirements or electives

Semester 6

One of:

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

2.00 core requirements or electives

Semester 7

BIOL*4110 [0.75] Ecological Methods

1.75 core requirements or electives

Semester 8

BIOL*4120 [0.50] Evolutionary Ecology

2.00 core requirements or electives

Note: Ecology majors are not required to complete BIOL*2060 as a core course.**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*1300 [0.50] Introductory Environmental Chemistry
 ENVS*1010 [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*1310 [0.50] Introductory Environmental 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
 STAT*2040 [0.50] Statistics I

1.00 core requirements or electives

Winter Semester

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

Semester 4-Summer

BIOC*2580 [0.50] Introductory Biochemistry
 MBG*2000 [0.50] Introductory Genetics
 STAT*2050 [0.50] Statistics II

One of:

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

0.50 core requirements or electives

Fall Semester

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

Semester 5- Winter

BIOL*3110 [0.50] Population Ecology

One of:

BOT*3410 [0.50] Plant Anatomy
 ZOO*2070 [0.50] Invertebrate Zoology I
 ZOO*2090 [0.50] Vertebrate Structure and Function

One of:

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

1.00 core requirements or 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
 BIOL*3120 [0.50] Community Ecology

One of:

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

1.50 core requirements or electives

Semester 7- Winter

BIOL*4120 [0.50] Evolutionary Ecology

2.00 core requirements or electives

Summer Semester (Optional)

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

Semester 8

BIOL*4110 [0.75] Ecological Methods

1.75 core requirements or electives

Note: Ecology majors are not required to complete BIOL*2060 as a core course.**Environmental Economics and Policy (EEP)****Department of Economics, College of Social and Applied Human Sciences****Department of Agricultural Economics and Business, 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*1300 [0.50] Introductory Environmental Chemistry
 ENVS*1010 [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*1310 [0.50] Introductory Environmental 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

1.00 core requirements, restricted electives or electives

Semester 4

ECON*2310	[0.50]	Intermediate Microeconomics
ECON*2740	[0.50]	Economic Statistics *

1.50 core requirements, restricted electives or electives

Semester 5

AGEC*4290	[0.50]	Land Economics **
ECON*2410	[0.50]	Intermediate Macroeconomics
ECON*2770	[0.50]	Introductory Mathematical Economics

1.00 core requirements, restricted electives or electives

Semester 6

ECON*3740	[0.50]	Introduction to Econometrics
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2.00 core requirements, restricted electives or electives

Semester 7

ECON*3710	[0.50]	Advanced Microeconomics ***
ECON*4930	[0.50]	Environmental Economics ***

1.50 core requirements, restricted electives or electives

Semester 8

AGEC*4310	[0.50]	Resource Economics
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2.00 core requirements, restricted electives or electives

* Students may select between ECON*2740 and STAT*2040

**AGEC*4290 is taught in even-numbered years

*** students must obtain permission from instructor to take ECON*4930 and ECON*3710 at the same time

Restricted Electives

Students in the Environmental Economics and Policy major are required to choose 2.00 credits additional Agricultural Economics and Business (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 3000-4000 level.

Environmental Economics and Policy (EEP:C)

Department of Economics, College of Social and Applied Human Sciences

Department of Agricultural Economics and Business, 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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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

1.00 core requirements, restricted electives or electives

Winter Semester

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

ECON*2310	[0.50]	Intermediate Microeconomics
ECON*2410	[0.50]	Intermediate Macroeconomics
STAT*2040	[0.50]	Statistics I

1.00 core requirements, restricted electives or electives

Fall Semester

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

ECON*2770	[0.50]	Introductory Mathematical Economics
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2.00 core requirements, restricted electives or electives

Summer Semester

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

AGEC*4290	[0.50]	Land Economics *
ECON*3710	[0.50]	Advanced Microeconomics

1.50 core requirements, restricted electives or electives

Semester 7 - Winter

AGEC*4310	[0.50]	Resource Economics
ECON*3740	[0.50]	Introduction to Econometrics

2.00 core requirements, restricted electives or electives

Summer Semester (Optional)

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

ECON*4930	[0.50]	Environmental Economics
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2.00 core requirements, restricted electives or electives

*AGEC*4290 is taught in even-numbered years

Restricted Electives

Students in the Environmental Economics and Policy major are required to choose 2.00 credits additional Agricultural Economics and Business (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 3000-4000 level.

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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

GEOG*2000	[0.50]	Geomorphology
GEOG*2460	[0.50]	Analysis in Geography

1.50 core requirements or electives

Semester 4

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

1.00 core requirements or electives

Semester 5

GEOG*3110	[0.50]	Biotic and Natural Resources
GEOG*3210	[0.50]	Management of the Biophysical Environment *

1.50 core requirements, restricted electives** or electives

Semester 6

GEOG*3480	[0.50]	GIS and Spatial Analysis
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2.00 core requirements, restricted electives** or electives

Semester 7

GEOG*4690	[1.00]	Geography Field Research
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1.50 core requirements, restricted electives** or electives

OR

0.50 credits in Geography at the 3000-4000 level

2.00 core requirements, restricted electives** or electives

Semester 8

GEOG*4880	[0.50]	Contemporary Geographic Thought
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2.00 core requirements, restricted electives** or electives

* Note: Environmental Geography majors are required to complete GEOG*3210 and (POLS*3370 or ZOO*4050).

** students in the Environmental Geography major must take at least 4 additional geography courses at the 3000-4000 level 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:		
ENVS*4220	[0.50]	Environmental Impact Assessment
GEOG*3020	[0.50]	Global Environmental Change
GEOG*4110	[0.50]	Environmental Systems Analysis
GEOG*4210	[0.50]	Environmental Resource Analysis

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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

GEOG*2000	[0.50]	Geomorphology
GEOG*2460	[0.50]	Analysis in Geography

1.50 core requirements or electives

Winter Semester

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

GEOG*2210	[0.50]	Environment and Resources
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2.00 core requirements or electives

Fall Semester

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

GEOG*2110	[0.50]	Climate and the Biophysical Environment
GEOG*2480	[0.50]	Mapping and GIS
GEOG*3480	[0.50]	GIS and Spatial Analysis

1.00 core requirements, restricted electives** or electives

Summer Semester

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

GEOG*3110	[0.50]	Biotic and Natural Resources
GEOG*3210	[0.50]	Management of the Biophysical Environment *

1.50 core requirements, restricted electives** or electives

Semester 7 - Winter

GEOG*4880	[0.50]	Contemporary Geographic Thought
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One of:

1.50 core requirements, restricted electives ** or electives.

0.50 credits in Geography at the 3000-4000 level.

2.00 core requirements, restricted electives** or electives

Summer Semester

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

GEOG*4690	[1.00]	Geography Field Research
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2.00 core requirements, restricted electives** or electives.

* Note: Environmental Geography major are required to complete GEOG*3210 and (POLS*3370 or ZOO*4050).

** students in the Environmental Geography major must take at least 4 additional geography courses at the 3000-4000 level 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:

ENVS*4220	[0.50]	Environmental Impact Assessment
GEOG*3020	[0.50]	Global Environmental Change
GEOG*4110	[0.50]	Environmental Systems Analysis
GEOG*4210	[0.50]	Environmental Resource Analysis

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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
MATH*2080	[0.50]	Elements of Calculus II
MET*2030	[0.50]	Meteorology and Climatology

1.00 core requirements or electives

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

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

1.00 core requirements or electives

Semester 6

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

1.00 core requirement or electives

Semester 7

ENVS*3360	[0.50]	Waste Management and Utilization
TOX*3300	[0.50]	Analytical Toxicology

1.50 core requirement or electives

Semester 8

CHEM*4010	[0.50]	Chemistry and Industry
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2.00 core requirement or electives

* PHYS*2550 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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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
MATH*2080	[0.50]	Elements of Calculus II
MET*2030	[0.50]	Meteorology and Climatology

1.00 core requirements or 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
CHEM*2480	[0.50]	Analytical Chemistry I
STAT*2040	[0.50]	Statistics I

One of:

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

0.50 core requirements or electives

Fall Semester

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

PHYS*3080	[0.50]	Energy
STAT*2050	[0.50]	Statistics II

One of:

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

1.00 core requirements or electives

Summer Semester

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

ENVS*3360	[0.50]	Waste Management and Utilization
PHYS*2040	[0.50]	Fundamental Electronics and Sensors
PHYS*2550	[0.50]	Radiation and the Environment *
TOX*2000	[0.50]	Principles of Toxicology

0.50 core requirements or electives

Semester 7 - Winter

CHEM*4010	[0.50]	Chemistry and Industry
STAT*3510	[0.50]	Environmental Risk Assessment

1.50 core requirements or electives

Summer Semester (Optional)

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

TOX*3300	[0.50]	Analytical Toxicology
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2.00 core requirements or electives

* PHYS*2550 is offered in even numbered years.

Environmental Protection (ENVP)**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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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
ENVB*2030	[0.50]	Current Issues in Forest Science
STAT*2040	[0.50]	Statistics I

1.00 core requirements or electives

Semester 4

BIOC*2580	[0.50]	Introductory Biochemistry
ENVB*2010	[0.50]	Food Production and the Environment

One of:

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

1.00 core requirements or electives

2006-2007 University of Guelph Undergraduate Calendar

Semester 5

BIOC*3560	[0.50]	Structure and Function in Biochemistry
BIOL*3450	[0.50]	Introduction to Aquatic Environments
MET*2030	[0.50]	Meteorology and Climatology
TOX*2000	[0.50]	Principles of Toxicology

0.50 core requirements or electives

Semester 6

ENVB*3030	[0.50]	Pesticides and the Environment
MBG*2000	[0.50]	Introductory Genetics

1.50 core requirements or electives

Semester 7

ENVB*3300	[0.50]	Applied Ecology and Environment
MICR*4140	[0.50]	Soil Microbiology and Biotechnology
MICR*4180	[0.50]	Microbial Processes in Environmental Management
ZOO*4350	[0.50]	Biology of Polluted Waters

0.50 core requirements or electives

Semester 8

ENVB*4240	[0.50]	Biological Activity of Pesticides
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2.00 core requirements or electives

Environmental Protection (ENVP: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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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
ENVB*2030	[0.50]	Current Issues in Forest Science
STAT*2040	[0.50]	Statistics I

1.00 core requirements or 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*3450	[0.50]	Introduction to Aquatic Environments
MBG*2000	[0.50]	Introductory Genetics

1.00 core requirements or electives

Fall Semester

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

ENVB*2010	[0.50]	Food Production and the Environment
ENVB*3030	[0.50]	Pesticides and the Environment

One of:

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

1.00 core requirements or electives

Summer Semester

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

BIOC*3560	[0.50]	Structure and Function in Biochemistry
ENVB*3300	[0.50]	Applied Ecology and Environment
MET*2030	[0.50]	Meteorology and Climatology
TOX*2000	[0.50]	Principles of Toxicology

0.50 core requirements or electives

Semester 7 - Winter

ENVB*4240	[0.50]	Biological Activity of Pesticides
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2.00 core requirements or electives

Summer Semester - (Optional)

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

Semester 8 - Fall

MICR*4140 [0.50] Soil Microbiology and Biotechnology
 MICR*4180 [0.50] Microbial Processes in Environmental Management
 ZOO*4350 [0.50] Biology of Polluted Waters

1.00 core requirements or electives

Environmetrics (ENVM)**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*1300 [0.50] Introductory Environmental Chemistry
 ENVS*1010 [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*1310 [0.50] Introductory Environmental 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
 STAT*2040 [0.50] Statistics I

One of:

MATH*1210 [0.50] Calculus II
 MATH*2080 [0.50] Elements of Calculus II

1.00 core requirements, restricted electives or electives

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

Semester 4

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

One of:

MATH*2150 [0.50] Applied Matrix Algebra
 MATH*2160 [0.50] Linear Algebra I

Note: MATH*2160 is preferred for mathematics emphasis.

0.50 core requirements, restricted electives or electives

Semester 5

2.50 core requirements, restricted electives or electives

Semester 6

MATH*3510 [0.50] Biomathematics
 STAT*3510 [0.50] Environmental Risk Assessment

1.50 core requirements, restricted electives or electives

Semester 7

2.50 core requirements, restricted electives or electives

Semester 8

2.50 core requirements, restricted electives or 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 3000/4000 level and of these a minimum of 1.00 must be at the 4000 level.

List

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*4430 [0.50] Advanced Numerical Methods
 MATH*4070 [0.50] Case Studies in Modeling
 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*4350 [0.50] Applied Multivariate Statistical Methods
 STAT*4510 [0.50] Advanced Risk Analysis
 STAT*4340 [0.50] Statistical Inference
 STAT*4360 [0.50] Applied Time Series Analysis
 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*3460 [0.50] System Simulation
 CIS*3490 [0.50] The Analysis and Design of Computer Algorithms
 CIS*3530 [0.50] Data Base Systems and Concepts

Environmetrics (ENVM: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*1300 [0.50] Introductory Environmental Chemistry
 ENVS*1010 [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*1310 [0.50] Introductory Environmental 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
 STAT*2040 [0.50] Statistics I

One of:

MATH*1210 [0.50] Calculus II
 MATH*2080 [0.50] Elements of Calculus II

1.00 core requirements, restricted electives or electives

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

Winter Semester

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

Semester 4 - Summer

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

1.00 core requirements, restricted electives or electives

Fall Semester

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

Semester 5 - Winter

STAT*3510 [0.50] Environmental Risk Assessment

One of:

MATH*2150 [0.50] Applied Matrix Algebra
 MATH*2160 [0.50] Linear Algebra I

Note: MATH*2160 is preferred for mathematics emphasis

1.50 core requirements, restricted electives or electives

Summer Semester

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

Semester 6 - Fall

2.50 core requirements, restricted electives or electives

Semester 7 - Winter

MATH*3510 [0.50] Biomathematics

2.00 core requirements, restricted electives or electives

Summer Semester (Optional)

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

Semester 8

2.50 core requirements, restricted electives or 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 3000/4000 level and of these a minimum of 1.00 must be at the 4000 level.

List

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*4430	[0.50]	Advanced Numerical Methods
MATH*4070	[0.50]	Case Studies in Modeling
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*4350	[0.50]	Applied Multivariate Statistical Methods
STAT*4510	[0.50]	Advanced Risk Analysis
STAT*4340	[0.50]	Statistical Inference
STAT*4360	[0.50]	Applied Time Series Analysis
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*3460	[0.50]	System Simulation
CIS*3490	[0.50]	The Analysis and Design of Computer Algorithms
CIS*3530	[0.50]	Data Base Systems and Concepts

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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

MET*2030	[0.50]	Meteorology and Climatology
SOIL*2120	[0.50]	Introduction to Environmental Stewardship
STAT*2040	[0.50]	Statistics I

1.00 core requirements, restricted electives or electives

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

Semester 4

SOIL*2010	[0.50]	Soil Science
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2.00 core requirements, restricted electives or 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

1.00 core requirements, restricted electives or electives

Semester 6

SOIL*3100	[0.50]	Resource Planning Techniques
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One of:

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

1.50 core requirements, restricted electives or electives

Semester 7

SOIL*4110	[0.50]	Natural Resources Management Field Camp
ZOO*4110	[0.50]	Principles of Fish and Wild Life Management

1.50 core requirements, restricted electives or electives

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

Semester 8

2.50 core requirements, restricted electives or electives

Restricted Electives

Students in the Natural Resources Management major are required to choose 1.50 restricted elective credits from the following list:

CROP*2280	[0.50]	Crops in Land Reclamation
ENVB*3000	[0.50]	Nature Interpretation
ENVB*4780	[0.50]	Forest Ecology
ENVS*3320	[0.50]	Principles of Landscape Ecology
ENVS*4220	[0.50]	Environmental Impact Assessment
GEOG*2420	[0.50]	Aerial-photo Interpretation
GEOG*3210	[0.50]	Management of the Biophysical Environment
GEOG*3480	[0.50]	GIS and Spatial Analysis
GEOL*3130	[0.50]	Agrogeology
LARC*4520	[0.50]	Park and Recreation Administration
MET*3050	[0.50]	Microclimatology
SOIL*3060	[0.50]	Environmental Soil Chemistry
SOIL*3070	[0.50]	Environmental Soil Physics
SOIL*3170	[0.50]	Soil Processes in Landscape
SOIL*3200	[0.50]	Environmental Soil Biology
SOIL*3600	[0.50]	Remote Sensing

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*1300	[0.50]	Introductory Environmental Chemistry
ENVS*1010	[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*1310	[0.50]	Introductory Environmental 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
MET*2030	[0.50]	Meteorology and Climatology
SOIL*2120	[0.50]	Introduction to Environmental Stewardship

1.00 core requirements, restricted electives or electives

Winter Semester

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

SOIL*2010	[0.50]	Soil Science
STAT*2040	[0.50]	Statistics I

1.50 core requirements, restricted electives or electives

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

Fall Semester

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

One of:

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

2.00 core requirements, restricted electives or electives

Summer Semester

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

SOIL*3050	[0.50]	Land Utilization
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SOIL*3080 [0.50] Soil and Water Conservation
1.50 core requirements, restricted electives or electives

Semester 7 - Winter

2.50 core requirements, restricted electives or electives

Summer Semester (Optional)

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

Semester 8 - Fall

SOIL*4110 [0.50] Natural Resources Management Field Camp
ZOO*4110 [0.50] Principles of Fish and Wild Life Management

1.50 core requirements, restricted electives or 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:

CROP*2280 [0.50] Crops in Land Reclamation
ENVB*3000 [0.50] Nature Interpretation
ENVB*4780 [0.50] Forest Ecology
ENVS*3320 [0.50] Principles of Landscape Ecology
ENVS*4220 [0.50] Environmental Impact Assessment
GEOG*2420 [0.50] Aerial-photo Interpretation
GEOG*3210 [0.50] Management of the Biophysical Environment
GEOG*3480 [0.50] GIS and Spatial Analysis
GEOL*3130 [0.50] Agrogeology
LARC*4520 [0.50] Park and Recreation Administration
MET*3050 [0.50] Microclimatology
SOIL*3060 [0.50] Environmental Soil Chemistry
SOIL*3070 [0.50] Environmental Soil Physics
SOIL*3170 [0.50] Soil Processes in Landscape
SOIL*3200 [0.50] Environmental Soil Biology
SOIL*3600 [0.50] Remote Sensing

Areas of Emphasis

All students must choose an area of emphasis consisting of a minimum of 2.50 credits in a particular topic area. The sequence of courses normally begins in third year. With the approval of the program counsellor, students may develop their own area of emphasis. All areas of emphasis must be approved by the program counsellor. Students should note that entry to certain areas of emphasis is restricted by the student's choice of major. Thus program approval should be gained before registering in courses to count towards their area of emphasis.

Atmospheric Resources (AR)

MET*2030 [0.50] Meteorology and Climatology

Four of:

GEOG*2110 [0.50] Climate and the Biophysical Environment
MET*2020 [0.50] Agrometeorology
MET*3050 [0.50] Microclimatology
MET*4210 [0.50] Atmospheric Experimentation and Instrumentation
MET*4300 [0.50] Atmospheric Transport and Chemistry

Biotic Systems (BS)

BIOL*3110 [0.50] Population Ecology
BIOL*3120 [0.50] Community Ecology

Three of:

BIOL*3010 [0.50] Laboratory and Field Work in Ecology
BIOL*3130 [0.50] Conservation Biology
BIOL*3450 [0.50] Introduction to Aquatic Environments
BOT*2050 [0.50] Plant Ecology
ENVB*4780 [0.50] Forest Ecology
MBG*2000 [0.50] Introductory Genetics
MICR*4140 [0.50] Soil Microbiology and Biotechnology
ZOO*4350 [0.50] Biology of Polluted Waters

Crop Ecology (CE)

ENVB*2010 [0.50] Food Production and the Environment

Four of:

CROP*2110 [0.50] Crop Ecology
CROP*2280 [0.50] Crops in Land Reclamation
CROP*4220 [0.50] Cropping Systems
CROP*4240 [0.50] Weed Science
CROP*4340 [0.50] Seminar: Selected Topics in Crop Science
ENVB*2040 [0.50] Plant Health and the Environment
ENVB*3030 [0.50] Pesticides and the Environment
GEOG*3320 [0.50] Agriculture and Society
SOIL*2010 [0.50] Soil Science

Development and Stewardship (DS)

SOIL*2120 [0.50] Introduction to Environmental Stewardship
and 4 courses from List A or List B:

List A

AGEC*4210 [0.50] World Agriculture and Economic Development
IDEV*2010 [0.50] International Development Studies
REXT*4020 [0.50] Rural Extension in Change and Development

List B

GEOG*4390 [0.50] Seminar in Rural Geography
LARC*2820 [0.50] Urban and Regional Planning
SOIL*3050 [0.50] Land Utilization

Environmental Administration (EA)

GEOG*3210 [0.50] Management of the Biophysical Environment
HAFA*4390 [0.50] Individuals and Groups in Organizations

Three of:

HAFA*3000 [0.50] Human Resources Management
LARC*2820 [0.50] Urban and Regional Planning
MCS*2020 [0.50] Information Management
POLS*2250 [0.50] Public Administration
POLS*3250 [0.50] Public Policy: Challenges and Prospects
REXT*3040 [0.50] Communication Process

Environmental Degradation (ED)

Three of:

ENGG*2550 [0.50] Water Management
ENVS*3360 [0.50] Waste Management and Utilization
MICR*4180 [0.50] Microbial Processes in Environmental Management
SOIL*3200 [0.50] Environmental Soil Biology
TOX*2000 [0.50] Principles of Toxicology
ZOO*4350 [0.50] Biology of Polluted Waters

Two of:

BIOL*3010 [0.50] Laboratory and Field Work in Ecology
CROP*2280 [0.50] Crops in Land Reclamation
GEOG*3110 [0.50] Biotic and Natural Resources
SOIL*3050 [0.50] Land Utilization
SOIL*3080 [0.50] Soil and Water Conservation

Environmental Economics and Policy (EEP)

ECON*1100 [0.50] Introductory Macroeconomics

One of:

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

Note: Whichever course of AGECE*2100 or AGECE*2700 is not taken for the Environmental Sciences core is required for this area of emphasis.

Three of:

AGEC*4290 [0.50] Land Economics
AGEC*4310 [0.50] Resource Economics
ECON*2310 [0.50] Intermediate Microeconomics
ECON*2650 [0.50] Introductory Development Economics
ECON*3580 [0.50] Economics of Regulation
ECON*4930 [0.50] Environmental Economics

Note: Additional prerequisites are needed for ECON*4930.

Environmental Impact Assessment (EIA)

ENVS*4220 [0.50] Environmental Impact Assessment
STAT*3510 [0.50] Environmental Risk Assessment

One of:

ENGG*3340 [0.50] Geographic Information Systems in Environmental Engineering
GEOG*3480 [0.50] GIS and Spatial Analysis

Two of:

BIOL*3450 [0.50] Introduction to Aquatic Environments
GEOG*4110 [0.50] Environmental Systems Analysis
GEOL*3190 [0.50] Environmental Water Chemistry
PBIO*4530 [0.50] Environmental Pollution Stresses on Plants
PHYS*3080 [0.50] Energy
TOX*2000 [0.50] Principles of Toxicology
ZOO*4350 [0.50] Biology of Polluted Waters

Note: Additional prerequisites are needed for GEOG*3480 and STAT*3510.

Environmental Management in the U.S. (EMUS)

This Area of Emphasis is undertaken at Bowling Green State University, Ohio. Students are strongly encouraged to undertake an internship (for University of Guelph credit) at a location/agency in the U.S. to be approved jointly by Bowling Green State University (Center for Environmental Programs) and the University of Guelph (Associate Dean's Office, Faculty of Environmental Sciences). The internship is undertaken upon the completion of the courses at Bowling Green State University.

At least 2 of the following BGSU courses:

ENVS301 - Environmental Problems (3 cr.)
ENVS401 - Environmental Strategies (2 cr.)
ENVS402 - Environmental Impact Statements (3 cr.)

At least 2 of the following BGSU courses:

POLS302 - American Domestic Public Policy (3 cr.)

POLS303 - Introduction to Public Administration (3 cr.)

POLS331 - State and Local Government (3 cr.)

POLS336 - Environmental Policy and Politics (3 cr.)

Students must complete at least 15 BGSU credits. Upon completion of the U.S. internship, students will receive credit for ENVS*3100.

Land Resources (LR)

GEOG*2000 [0.50] Geomorphology
 GEOL*1050 [0.50] Geology and the Environment
 SOIL*2010 [0.50] Soil Science

Two of:

GEOL*2200 [0.50] Glacial Geology
 GEOL*3130 [0.50] Agrogeology
 MET*2030 [0.50] Meteorology and Climatology
 SOIL*3080 [0.50] Soil and Water Conservation
 SOIL*3170 [0.50] Soil Processes in Landscape

Landscape Ecology (LE)

ENVS*3320 [0.50] Principles of Landscape Ecology

Four of:

BIOL*3010 [0.50] Laboratory and Field Work in Ecology
 BIOL*4150 [0.50] Wildlife Conservation and Management
 ENVB*2030 [0.50] Current Issues in Forest Science
 ENVB*4780 [0.50] Forest Ecology
 GEOG*2000 [0.50] Geomorphology
 GEOG*2110 [0.50] Climate and the Biophysical Environment
 GEOG*4110 [0.50] Environmental Systems Analysis
 LARC*2100 [0.50] Landscape Analysis
 SOIL*2010 [0.50] Soil Science
 SOIL*3080 [0.50] Soil and Water Conservation
 ZOO*4110 [0.50] Principles of Fish and Wild Life Management

Mathematical Modelling and Risk Assessment (MMRA)

MATH*2150 [0.50] Applied Matrix Algebra
 MATH*2170 [0.50] Differential Equations I
 MATH*3510 [0.50] Biomathematics
 STAT*2050 [0.50] Statistics II
 STAT*3510 [0.50] Environmental Risk Assessment

One of:

MATH*2080 [0.50] Elements of Calculus II
 STAT*2040 [0.50] Statistics I

If any of the above are included in the student's major, then one of the following must be taken:

CIS*2650 [0.50] Programming II
 MATH*2130 [0.50] Numerical Methods
 STAT*3240 [0.50] Applied Regression Analysis

Water Resources (WR)

GEOL*3060 [0.50] Groundwater

One of:

ENGG*3650 [0.50] Hydrology
 GEOG*3610 [0.50] Environmental Hydrology

Three of:

BIOL*3450 [0.50] Introduction to Aquatic Environments
 ENGG*2550 [0.50] Water Management
 GEOG*3000 [0.50] Fluvial Processes
 GEOL*3190 [0.50] Environmental Water Chemistry
 SOIL*3070 [0.50] Environmental Soil Physics