

ENVIRONMENTAL EARTH SCIENCE

Environmental Earth Science Program

Offered in English.

Core faculty

Department of Earth Sciences

Program coordinator

E.A. Gallie, B.Sc. (Queen's), Ph.D. (UBC)
- associate professor

Department of Biology

P.J. Beckett, B.Sc., Ph.D. (London) - associate professor

G.M. Courtin, B.Sc.F. (UNB), M.S., Ph.D. (Illinois) - emeritus professor

J.D. Litzgus, B.Sc., M.Sc. (Guelph), Ph.D. (South Carolina) - assistant professor

Department of Chemistry & Biochemistry

F. Caron, B.Sc. (Chicoutimi), M.Sc. (INRS-Eau), Ph.D. (McMaster) - associate professor

G.A. Spiers, B.Sc. (Waikato), M.Sc., Ph.D. (Alberta) - Chair in Environmental Monitoring, associate professor

Department of Geography

R.W. Dirszowsky, B.Sc., M.Sc., Ph.D. (Toronto) - assistant professor

G.O. Tapper, B.A. (Florida Atlantic), M.A. (East Tennessee State), Ph.D. (Cal., Riverside) - professor

A. Watelet, B.Sc., B.A., Ph.D. (Ottawa) - assistant professor

Admission requirements

Ontario secondary schools

- 1 grade 12 4U English
- 1 grade 12 4U mathematics
- 2 grade 12 4U sciences
- 2 other grade 12 4U/M courses

It is recommended that students have taken grade 12 4U biology and chemistry. Students who have not taken this chemistry course must normally take CHMI 1041 before enrolling in the required 1st-year chemistry course.

See "Admissions" for other requirements.

General information

See "Earth Science" for information on the Bachelor of Arts in Earth Science.

The 4-year Environmental Earth Science program is multidisciplinary and combines environmental and earth science courses from the geology, biology, geography and chemistry programs. The breadth of knowledge allows students to appreciate the complexity of the natural environment and the effects of human activity on the surface processes and life on Earth.

Graduates are well prepared for careers with consulting companies, municipal, provincial and federal government agencies, and industries requiring environmental or environmental geoscience expertise. The program also provides a solid academic base for graduate studies at the master's or Ph.D. level.

Students are required to complete the core courses, but then have considerable flexibility in designing the remainder of their program according to their personal interests.

Students who choose their electives carefully can qualify for either the Environmental Biology Certificate (see Biology) or the Certificate in Applied Geography (see Geography).

Alternatively, careful selection of courses from the Earth Sciences (ERTS) may provide sufficient specialization in the geosciences for graduates to qualify for professional registration as Environmental Geoscientists by the Association of Professional Geoscientists of Ontario (APGO), provided that students take a calculus course and, in most cases, 6 credits of computer science.

Students should plan each year of study in consultation with the program coordinator.

The program is administered through a Coordinating Committee consisting of representatives from each of the departments. The committee is responsible for the direction and operation of the program through the coordinator, who reports to the dean of the Faculty of Science and Engineering.

For the purpose of this program only, courses are designated ERTS (Earth Science) or ENVS (Environmental Science). These acronyms are not used in other programs nor for other purposes.

Students must complete all core courses, compulsory courses and elective courses to meet the following requirements:

1. min. 72 credits from science and engineering
2. min. 54 credits from those designated ERTS (with at least 30 GEOL credits)
3. min. 27 credits from those designated ENVS
4. min. 39 credits taken from 3000- or 4000-series courses

Program

Bachelor of Science in Environmental Earth Science (4-year)

TOTAL: 120 credits

RECOMMENDED PROGRAM

1st year (30 cr)

GEOL 1006	GEOL 1007
BIOL 1506	BIOL 1507
CHMI 1006	CHMI 1007
GEOG 1026	

+ electives in MATH & COSC * or social science & humanities** (9 cr)

* Min. 6 credits in MATH and/or COSC recommended in 1st or 2nd year.

** Min. 6 credits in social sciences (excluding GEOG) and 6 credits in humanities required over 4 years.

2nd year (30 cr)

GEOL 2006	GEOL 2126
GEOL 2237	GEOG 2107
BIOL 2356	GEOG 3106*

+ ERTS or ENVS elective ** (3 cr)

+ electives in MATH & COSC*** or social science & humanities (9 cr)

* Taken in either second or third year depending on course offerings.

** See lists of approved ERTS and ENVS electives below.

*** Min. 6 credits in MATH and/or COSC recommended in 1st or 2nd year.

3rd year (30 cr)

GEOG 3036	GEOG 3037
GEOL 3806	

+ BIOL 3056*

or
GEOL 3397*

+ GEOG 3107

or
BIOL 3047

or
BIOL 3067

+ statistics courses** (6 cr)

+ ERTS or ENVS elective*** (3 cr)

+ electives (6 cr)

* Taken in either third or fourth year depending on course offerings.

** Students may choose STAT 2246 or 2126 (3 cr) plus BIOL 3327 or GEOG 2027 (3 cr), or the equivalent with coordinator's approval.

*** See lists of approved ERTS and ENVS electives below.

Environmental Earth Science

4th year (30 cr)

- GEOL 4706 CHMI 3326
+ BIOL 3056*
or
GEOL 3397*
+ ENES 4105
or
ENES 4205**
+ electives*** (15 cr)

* *Whichever has not already been taken.*

** *A specialized thesis course may be taken instead (see "Research" below).*

*** *To satisfy graduation requirements.*

ERTS (Earth Science) courses

Compulsory core courses

- BIOL 3056 - Mineral Exploitation & the Biosphere
GEOG 2107 - Geomorphology II
GEOG 3036 - Air Photo Interpretation
GEOG 3037 - Remote Sensing of Enviro.
GEOG 3106 - Climatology
GEOL 1006/07 - Intro. Geology I & II
GEOL 2006 - Field Geology
GEOL 2126 - Mineralogy I
GEOL 2237 - Sedimentary, Igneous & Metamorphic Rocks
GEOL 3397 - Intro. Soil Science
GEOL 3806 - Geochemistry I
GEOL 4706 - Hydrogeology

Electives

- CHMI 2117 - Intro. Quantitative Analysis
CHMI 2316 - Inorganic Chemistry I
CHMI 4197 - Enviro. Analytical Chemistry
ENGR 2106 - Intro. to Mineral Resources Eng.
GEOG 2016 - Intro. to Cartography
GEOG 2017 - Appl. Cartogr. & Intro. to GIS
GEOG 4056 - Geog. Info. Systems (GIS)
GEOG 4057 - Topics in GIS Application
GEOG 4106 - Applied Geomorphology
GEOG 4107 - Land Resources & Evaluation
GEOL 2021 - Geology of Earth Resources
GEOL 2127 - Optical Mineralogy
GEOL 2406/07 - Paleobiology I/II
GEOL 3217 - Sedimentary Facies
GEOL 3417 - Oceanography
GEOL 4037 - Applied Remote Sensing
GEOL 4136 - Environmental Mineralogy
GEOL 4226 - Pleistocene & Glacial Geology
GEOL 4416 - Global Change

ENVS (Environmental Science) courses

Compulsory core courses

- BIOL 1506/1507 - Biology I & II
BIOL 2356 - Principles of Ecology
BIOL 3047 - Bioclimatology *or*
BIOL 3067 - Winter Ecology *or*
GEOG 3107 - Applied Climatology
GEOG 1026 - Intro. to Physical Geography

Electives

- BIOL 1000 - Canadian Enviro. Biology
BIOL 2366 - Divers. of Prokaryotes & Fungi
BIOL 2376 - Divers. of Non-Vascular Plants
BIOL 2386 - Divers. of Vascular Plants
BIOL 2716 - Intro. to Invertebrates
BIOL 2727 - Intro. to Vertebrates
BIOL 3006 - Evolutionary Biology
BIOL 3025 - Microbiology
BIOL 3306 - Vascular Plant Systematics
BIOL 3317 - Plant Ecophysiology
BIOL 3336 - Plant Ecology
BIOL 3376 - Restoration Ecology I
BIOL 3706 - General Entomology
BIOL 3807 - Applied Entomology *or*
BIOL 3927 - Forest Entomology
BIOL 3977 - Biodiversity & Conservation
BIOL 4056 - General Limnology
BIOL 4066 - Quantitative Ecology
BIOL 4316 - Advanced Plant Ecophysiology
BIOL 4366 - Soil Biology
BIOL 4386 - Wetland Eco. & Conservation
BIOL 4706 - Animal Ecology
BIOL 4756 - Freshwater Biology
BIOL 4777 - Wildlife Management
BIOL 4907 - Fisheries Science
GEOG 3115 - Biogeography
GEOG 4116 - Human Act & the Environment
GEOG 4117 - Water Issues of the 21st Century
GEOG 4805 - Natural Resource Development

ERTS and ENVS courses may only be substituted with approval of the program coordinator.

Other compulsory courses

Statistics

- STAT 2126 *or* 2246
BIOL 3327 *or* GEOG 2027

Math/Computer Science

(Min. 6 credits approved MATH and/or COSC courses)

Normally from:

- MATH 1911* MATH 1912*
MATH 1036/37 COSC 1701
COSC 2831 GEOL 3056**

*See "Mathematics" section for limitations.

** Not available for ERTS credit.

Chemistry

- CHMI 1006/1007 CHMI 3326

Research/Seminar/Thesis*

One course from:

- ENES 4105 (ENVS/ERTS)
ENES 4205 (ENVS/ERTS)
BIOL 4035 (ENVS)
GEOG 4995 (ERTS)
GEOL 4005 (ERTS)

* *The research thesis or directed study is normally interdisciplinary and counted as 3 ENVS and 3 ERTS credits. A single discipline thesis may be taken instead, subject to the approval of the department concerned and the program coordinator, and the availability of a supervisor from the department. In this case, 6 credits are counted in the ENVS or ERTS group.*

Course descriptions

See appropriate sections for course descriptions not listed here.

- BIOL = Biology
CHMI = Chemistry
COSC = Computer Science
ENGR = Engineering
GEOG = Geography
GEOL = Geology
MATH = Mathematics
PHYS = Physics

ENES 4105 E - Thesis

A thesis requiring independent research and the guidance of one or more faculty members from the core departments. The topic selected will reflect the interdisciplinary nature of the program. A final copy of the thesis is normally submitted two weeks prior to the end of classes of the 2nd term. *cr 6*

ENES 4205 E - Directed Studies

Develops understanding of independent research through the intensive study of a topic in environmental earth science not involving field or laboratory research. One or more faculty members of the core departments supervise the student's program. A dissertation, normally submitted two weeks prior to the end of classes of the 2nd term, and a seminar presentation are required. *Students cannot take both ENES 4205 & 4105. cr 6*