

ENVIRONMENTAL STUDIES AND SCIENCES (ENV)

Updated March 11, 2013

Note: The department/program code ENV replaces the former code 84. Students cannot hold credit in ENV-xxxx and the former 84.xxxx having the same course number (e.g., ENV-1600(3) and 84.1600(3)).

Chair: D. Kumaragamage; Faculty: A. Diduck, D. Kumaragamage, J. Tardif, R. Westwood, C. Wong. Program Advisors: Biology, E. Byard; Forest Ecology, J. Tardif, R. Westwood; Sustainability, A. Diduck, K. Patel; Global Issues, M. Vachon, D. Kumaragamage; Environmental Chemistry, E. Segstro, C. Wong; GIS, E. Cloutis; Social Environment, K. Fish; Economics, S. Baksi; Politics, S. Peou; Philosophy, J. Zupko; Department Assistant: Tania Guevara Sandoval.

DEGREES/PROGRAMS OFFERED

3-Year BA

4-Year BA

4-year Honours BA

4-Year BSc

4- year Honours BSc

4-Year BSc (Business stream)

4-Year BSc in Applied Environmental Studies (UW/RRC)

5-Year BSc in Applied Environmental Studies (UW/RRC)

INTRODUCTION

The Environmental Studies Program was founded in 1970 as one of the first interdisciplinary undergraduate environment programs in Canada, and one of the first few to emerge worldwide. During the last three decades the activities and the functions of the program grew substantially and in 2012, changed its name and status to a Department.

Following the general principles of sustainability, the Department of Environmental Studies and Sciences takes an integrated yet practical approach to human-environmental interactions and resource and environmental problems. The mission of the Department is to maintain and restore the health of the ecosphere and its people by i) educating and training the environmental leaders of tomorrow, ii) creating and disseminating knowledge, and iii) engaging with communities at local, regional and global levels.

The Department of Environmental Studies and Sciences offers various degree options: 3-Year BA, 4-Year BA, 4-Year Honours BA, 4-Year BSc and 4-Year / 5- year BSc (joint program with Red River College) or 4-Year Honours BSc. BA students can take either the Issues in Sustainability stream or the Urban Environments stream. BSc students can choose from among four streams: Chemistry, Forest Policy and Management, Forest Ecology and Global Environmental Systems. Students also have the opportunity to add on a Business Stream (see the "Science with a Business Stream" section of this Course Calendar). The joint program with Red River College offers 4-year and 5-year options, where the 5-year option includes a full co-op work term.

REQUIREMENTS FOR A 3-YEAR BA

ADMISSION REQUIREMENT

Students must meet prerequisites where required.

GRADUATION REQUIREMENT

90 credit hours

RESIDENCE REQUIREMENT

Degree:

Minimum 30 credit hours

Major:

Minimum 18 credit hours

GENERAL DEGREE REQUIREMENT

Humanities:

12 credit hours in Humanities

Science:

6 credit hours in Science

Writing:

Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended.

Maximum Introductory Courses:

Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level.

Distribution:

Minimum three (3) credit hours from each of five (5) different subjects.

MAJOR REQUIREMENT

Single Major:

Issues in Sustainability, 60 credit hours; Urban Environments, 57 credit hours.

Double Major:

The student must meet both the requirements of Environmental Studies and Sciences and those of the second Major Department. A course listed by both Department counts towards both Majors (unless it is clearly stated otherwise in that discipline's section of this Calendar).

Combined Major:

Minimum 48 credit hours from two (2) different majors with not less than 18 credit hours from each major subject. Required courses depend on second major and will be determined in consultation with the department advisor

ISSUES IN SUSTAINABILITY

| | | | |
|-------------------------|--|---------------------|--|
| BIOL-1106(3) | Environmental Biology | ENV-3609(3) | Research Methods and Design |
| CHEM-2801(3) | Chemistry and Society | ENV-3610(3) | Research Projects |
| ECON-1104(3) | Introduction to Economic Theory | one of: | |
| ECON-2317(3) | Environmental Economics | POL-2505(3) | Issues in City Politics |
| GEOG-1201(3) | Introductory Atmospheric Science | POL-3411(3) | Aboriginal People and the Law 1 |
| GEOG-1202(3) | Introductory Earth Science | POL-4520(3) | Theories of Urban Poverty |
| GEOG-2309(3) | Statistical Techniques in Environmental Analysis | UIC-3030(3) | Urban and Community Planning |
| GEOG-2414(3) | The Urban Environment | one of: | |
| PHIL-2233(3) | Environmental Ethics | ECON-3305(3) | Economic Development* |
| POL-2300(6) | Public Administration | ECON-3306(3) | International Aspects of Economic Development* |
| ENV-1600(3) | Human-Environmental Interactions | IDS-3111(3) | An Analysis of Development Aid Policies* |
| ENV/IDS- 2603(3) | Environmental Sustainability: A Global Dilemma | IDS-3110(3) | Poverty-Focused Development* |

9 credit hours from among:

| | | | |
|---------------------|---|------------------------|---|
| ECON-2311(3) | Economics of Natural Resource Extraction | SOC-2404(3) | Sociology of Development and Underdevelopment* |
| ECON-2318(3) | Energy Economics | SOC-2501(3) | Technology and Society |
| GEOG-2204(3) | Human Impact on the Environment | SOC/ENV-2502(3) | Sociology of the Environment |
| GEOG-2401(3) | Agricultural Geography | ENV-2604(3) | Environment and Health |
| GEOG-2408(3) | Environmental Perception and Human Behaviour* | ENV/UID-3603(3) | Winnipeg and the Environment: A Case Study Approach |
| GEOG-2411(3) | Geography of Globalization* | ENV-4614(3) | Critical Environmental Issues |
| GEOG-3401(3) | Population Geography* | | |
| POL-3310(3) | Health Care and Environmental Policy | | |
| SOC-2121(3) | Population Problems* | | |

* courses with prerequisites that are not required courses in the major

URBAN ENVIRONMENTS

Required courses:

| | | | |
|---------------------|--|------------------------|---|
| BIOL-1106(3) | Environmental Biology | PHIL-2233(3) | Environmental Ethics |
| CHEM-2801(3) | Chemistry and Society | POL/UID-2020(3) | Colonization and Aboriginal Peoples |
| ECON-1104(3) | Introduction to Economic Theory | ENV-1600(3) | Human-Environmental Interactions |
| ECON-2317(3) | Environmental Economics | ENV-2604(3) | Environment and Health |
| GEOG-1201(3) | Introductory Atmospheric Science | ENV/UID-3025(3) | Issues in Sustainable Cities |
| GEOG-1202(3) | Introductory Earth Science | ENV-3035(3) | Law and the Environment |
| GEOG-2309(3) | Statistical Techniques in Environmental Analysis | ENV/UID-3603(3) | Winnipeg and the Environment: A case Study Approach |
| GEOG-2414(3) | The Urban Environment | ENV-3609(3) | Research Methods and Design |
| GEOG-2415(3) | An Introduction to Urban Development | ENV-3610(3) | Research Projects |

Suggested electives:

| | | | |
|---------------------|---|------------------------|---------------------------------------|
| BIOL-4411(3) | Water Quality and Health* | POL-2505(3) | Issues in City Politics |
| BIOL-4475(3) | Urban Forestry* | POL-3500(6) | Globalization and City Politics |
| CHEM-3601(3) | Environmental Chemistry* | POL-4505(6) | Politics of Urban Planning |
| ECON-3303(3) | Economics of Public Expenditures* | POL-4520(3) | Theories of Urban Poverty |
| ECON-3315(3) | Urban Economics* | REL-2505(3) | Religious Interpretations of the City |
| GEOG-2411(3) | Geography of Globalization* | SOC-2120(3) | Sociology of Communities* |
| GEOG-3401(3) | Population Geography* | SOC-3113(6) | Sociology of Cities and Urban Life* |
| GEOG-3402(3) | Urbanization in the Developing World | UIC-2001(3) | Community Development |
| GEOG-3413(3) | Urban Revitalization | UIC-3020(3) | Women in the Inner Cities |
| GEOG-3480(3) | Water Resources | IDS-3110(3) | Poverty-Focused Development* |
| GEOG-4403(3) | Urban Land Use - Developmental Processes | ENV-2416 | |
| GEOG-4404(3) | Field Research in Urban Geography | /GEOG/WGS(3) | Sex, Gender, Space and Place |
| HIST-3544(6) | The History of Winnipeg | ENV/SOC-2502(3) | Sociology of the Environment |
| HIST-4550(6) | Advanced Studies in the History of Canadian Regions and Communities | ENV-2521(3) | Voluntary Simplicity |
| POL-2300(6) | Public Administration | ENV- 2603(3) | Environmental Sustainability |
| POL-2500(3) | City Politics | ENV-3606(3) | Business and the Environment |
| | | ENV-4611(6) | Environmental Impact Assessment |
| | | ENV-4614(3) | Critical Environmental Issues |

* courses with prerequisites that are not required courses in the major

REQUIREMENTS FOR A 4-YEAR BA

| | |
|-----------------------------------|--|
| ADMISSION REQUIREMENT | Students must meet prerequisites where required. |
| GRADUATION REQUIREMENT | 120 credit hours |
| RESIDENCE REQUIREMENT | |
| Degree: | Minimum 60 credit hours |
| Major: | Minimum 30 credit hours |
| GENERAL DEGREE REQUIREMENT | |
| Humanities: | 12 credit hours |
| Science: | 6 credit hours |
| Social Science: | 12 credit hours |
| Writing: | Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended. |
| Maximum Introductory Courses: | Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level. |
| Distribution: | Minimum three (3) credit hours from each of five (5) different subjects. |
| 4000-Level Courses: | Minimum 3.0 GPA (B) in major courses (students lacking the requisite 3.0 GPA should consult the department concerned regarding eligibility to take 4000-level courses). Permission of department. |
| MAJOR REQUIREMENT | |
| Single Major: | Issues in Sustainability, 72 credit hours; Urban Environments, 72 credit hours. |
| Double Major: | The student must meet both the requirements of Environmental Studies and Sciences and those of the second Major Department. A course listed by both Departments counts towards both Majors (unless it is clearly stated otherwise in that discipline's section of the Calendar). |
| Combined Major: | Minimum 60 credit hours from two (2) different majors with not less than 24 credit hours from each major subject. Required courses depend on second major and will be determined in consultation with the departmental advisor. |

ISSUES IN SUSTAINABILITY

Required courses:

| | | | |
|-----------------------------|--|------------------------|---|
| BIOL-1106(3) | Environmental Biology | ENV-1600(3) | Human-Environmental Interactions |
| CHEM-2801(3) | Chemistry and Society | ENV/IDS-2603(3) | Environmental Sustainability: A Global Dilemma |
| ECON-1104(3) | Introduction to Economic Theory | ENV-3609(3) | Research Methods and Design |
| ECON-2317(3) | Environmental Economics | ENV-3610(3) | Research Projects |
| GEOG-1201(3) | Introductory Atmospheric Science | one of: | |
| GEOG-1202(3) | Introductory Earth Science | ECON-3305(3) | Economic Development* |
| GEOG-2309(3) | Statistical Techniques in Environmental Analysis | ECON-3306(3) | International Aspects of Economic Development* |
| GEOG-2414(3) | The Urban Environment* | IDS-3111(3) | An Analysis of Development Aid Policies* |
| PHIL-2233(3) | Environmental Ethics | IDS-3110(3) | Poverty-Focused Development* |
| POL-2300(6) | Public Administration | | |
| POL-2505(3) | Issues in City Politics | | |
| POL-4520(3) | Theories of Urban Poverty | | |
| 18 credit hours from among: | | | |
| ECON-2311(3) | Economics of Natural Resource Extraction | POL-3105(6) | Global Political Economy |
| ECON-2318(3) | Energy Economics | POL-3310(3) | Health Care and Environmental Policy |
| ECON-3302(3) | International Finance | SOC-2121(3) | Population Problems* |
| ECON-3303(3) | Economics of Public Expenditures | SOC-2404(3) | Sociology of Development and Underdevelopment* |
| ECON-3315(3) | Urban Economics* | SOC-2501(3) | Technology and Society |
| GEOG-2204(3) | Human Impact on the Environment | SOC-3113(6) | Sociology of Cities and Urban Life* |
| GEOG-2401(3) | Agricultural Geography | IDS-1100(6) | Introduction to International Development |
| GEOG-2407(3) | Recreation Geography* | CRS-1200(6) | Introduction to Conflict Resolution Studies |
| GEOG-2408(3) | Environmental Perception and Human Behaviour* | IDS-2131(3) | Rural Development* |
| GEOG-2411(3) | Geography of Globalization* | IDS-2181(3) | Selected Topics in International Development Studies* |
| GEOG-3216(3) | Arctic Environments | IDS-3111(3) | Analysis of Development Aid Policies* |
| GEOG-3217(3) | Tropical Environments | ENV/SOC-2502(3) | Sociology of the Environment |
| GEOG-3401(3) | Population Geography* | ENV-2604(3) | Environment and Health |
| GEOG-3402(3) | Urbanization in the Developing World* | ENV-3606(3) | Business and the Environment |
| GEOG-3408(3) | Water Resources* | ENV/UIC-3603(3) | Winnipeg and the Environment: A Case Study Approach |
| GEOG-4441(3) | Advanced Studies in Environmental Perception* | | |
| POL-2100(6) | Global Politics | ENV-4614(3) | Critical Environmental Issues |

* courses with prerequisites that are not required courses in the major

URBAN ENVIRONMENTS

Required courses:

| | | | |
|---------------------|--|------------------------|---|
| BIOL-1106(3) | Environmental Biology | PHIL-2233(3) | Environmental Ethics |
| CHEM-2801(3) | Chemistry and Society | POL-2500(3) | City Politics |
| ECON-1104(3) | Introduction to Economic Theory | POL-2505(3) | Issues in City Politics |
| ECON-2317(3) | Environmental Economics | ENV-1600(3) | Human-Environmental Interactions |
| GEOG-1201(3) | Introductory Atmospheric Science | ENV-2604(3) | Environment and Health |
| GEOG-1202(3) | Introductory Earth Science | ENV/UIC-3025(3) | Issues in Sustainable Cities |
| GEOG-2309(3) | Statistical Techniques in Environmental Analysis | ENV-3035(3) | Law and the Environment |
| GEOG-2414(3) | The Urban Environment | ENV/UIC-3603(3) | Winnipeg and the Environment: A Case Study Approach |
| GEOG-2415(3) | An Introduction to Urban Development | ENV-3609(3) | Research Methods and Design |
| | | ENV-3610(3) | Research Projects |

15 credit hours from among:

| | | | |
|---------------------|---|------------------------|---------------------------------------|
| BIOL-4411(3) | Water Quality and Health* | POL-4505(6) | Politics of Urban Planning |
| BIOL-4475(3) | Urban Forestry* | POL-4520(3) | Theories of Urban Poverty |
| CHEM-3601(3) | Environmental Chemistry* | REL-2505(3) | Religious Interpretations of the City |
| ECON-3303(3) | Economics of Public Expenditures* | SOC-2120(3) | Sociology of Communities* |
| ECON-3315(3) | Urban Economics* | SOC-3113(6) | Sociology of Cities and Urban Life* |
| GEOG-2411(3) | Geography of Globalization* | UIC-2001(3) | Community Development |
| GEOG-3401(3) | Population Geography* | | |
| GEOG-3402(3) | Urbanization in the Developing World | UIC 2220 (3) | Urban Poverty and Policy |
| GEOG-3413(3) | Urban Revitalization | UIC-3020(3) | Women in the Inner Cities |
| GEOG-3480(3) | Water Resources | UIC-3030(3) | Urban and Community Planning |
| GEOG-4403(3) | Urban Land Use - Developmental Processes | IDS-3110(3) | Poverty-Focused Development* |
| GEOG-4404(3) | Field Research in Urban Geography | ENV-2416(3) | Sex, Gender, Space and Place |
| HIST-3544(6) | The History of Winnipeg | ENV/SOC-2502(3) | Sociology of the Environment |
| HIST-4550(6) | Advanced Studies in the History of Canadian Regions and Communities | ENV-2521(3) | Voluntary Simplicity |
| POL-2300(6) | Public Administration | ENV-2603(3) | Environmental Sustainability |
| POL-3500(6) | Globalization and City Politics | ENV-3606(3) | Business and the Environment |
| | | ENV-4611(6) | Environmental Impact Assessment |
| | | ENV-4614(3) | Critical Environmental Issues |

*courses with prerequisites that are not required courses in the major

REQUIREMENTS FOR AN HONOURS BA

ADMISSION REQUIREMENT Students must consult with the Department Advisor in planning their studies.

GRADUATION REQUIREMENT 120 credit hours
 Graduation G.P.A. Requirement To graduate with a BA Honours, students must have completed the course requirements for a BA in Environmental Studies with a minimum GPA of 3.0 on all Environmental Studies and Sciences courses, which will be calculated on all course attempts in the major. Students must also have a minimum 2.75 GPA on all non-major courses, which will be calculated as for the General Degree (i.e., F's are not included and, in the case of repeated courses, only the highest grade will be used).

RESIDENCE REQUIREMENT
 Degree: Minimum 60 credit hours
 Honours: Minimum 30 credit hours, including minimum 18 credit hours at upper level (3000/4000) of which a minimum of 9 credit hours at 4000 level

GENERAL DEGREE REQUIREMENT
 Humanities: 12 credit hours in Humanities
 Science: 6 credit hours
 Social Science: 12 credit hours
 Writing: Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended.
 Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level.
 Distribution: Minimum three (3) credit hours from each of five (5) different subjects.
 4000-level Courses: Minimum 3.0 GPA (B) in major courses (students lacking the requisite 3.0 GPA should consult the department concerned regarding eligibility to take 4000-level courses).
 Permission of the department.

HONOURS REQUIREMENT
 Single Honours: Minimum requirements for a 4 year BA degree in Environmental Studies in either of the following streams: Issues in Sustainability or Urban Environment. Minimum 30 credit hours in upper-level (3000 and 4000) courses of which a minimum of 12 credit hours must be at the 4000 level.

Required Courses:

GEOG-2309(3)
ENV-4611 (6)
ENV-4701(6)

Statistical Techniques in Environmental Analysis
Environment Impact Assessment
Environmental Studies Honours Thesis

REQUIREMENTS FOR A 4-YEAR BSc

ADMISSION REQUIREMENT Students must meet prerequisites where required.

GRADUATION REQUIREMENT 120 credit hours

RESIDENCE REQUIREMENT

Degree: Minimum 60 credit hours
Major: Minimum 30 credit hours

GENERAL DEGREE REQUIREMENT

Humanities: 12 credit hours
Science: 6 credit hours
Writing: Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended.
Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level.
Distribution: Minimum three (3) credit hours from each of five (5) different subjects.

MAJOR REQUIREMENT

Single Major: Chemistry, 84 credit hours; Global Environmental Systems, 84 credit hours; Forest Ecology, 87 credit hours; Forest Policy and Management, 84 credit hours.
Double Major: The student must meet both the requirements of Environmental Studies and Sciences and those of the second Major Department. A course listed by both Departments counts towards both Majors (unless it is clearly stated otherwise in that discipline's section of the Calendar).
Combined Major: Minimum 60 credit hours from two (2) different majors with not less than 24 credit hours from each major subject. Required courses depend on second major and will be determined in consultation with the departmental advisor.

Required courses:

(These are the core courses for all BSc students.)

BIOL-1115(3) Cells and Cellular Processes
BIOL-1116(3) Evolution, Ecology and Biodiversity
BIOL-2403(3) Principles of Ecology
CHEM-1111(3) Introduction to the Chemical Properties of Matter
CHEM-1112(3) Basic Principles of Chemical Reactivity
ECON-1104(3) Introduction to Economic Theory
GEOG-1201(3) Introductory Atmospheric Science
GEOG-1202(3) Introductory Earth Science
PHIL-2233(3) Environmental Ethics
ENV-1600(3) Human-Environmental Interactions
ENV/IDS-2603(3) Environmental Sustainability: A Global Dilemma
ENV-3035(3) Law and the Environment
ENV-4611(6) Environmental Impact Assessment

3 credit hours from among:

GEOG-2309(3) Statistical Techniques in Environmental Analysis
STAT-1301(3) Statistical Analysis I
STAT-1501(3) Elementary Biological Statistics I

CHEMISTRY

Required courses:

Core courses for all BSc students PLUS

BIOL-4411(3) Water Quality and Health
CHEM-2102(3) Thermodynamics and Kinetics
CHEM-2202(3) Organic Chemistry I
CHEM-2203(3) Organic Chemistry II
CHEM-2302(3) Quantitative Chemical Analysis
CHEM-2401(3) Inorganic Chemistry I
CHEM-2501(3) Principles of Biochemistry or **CHEM-3502(3)** Intermediate Biochemistry I or **ENV/CHEM-3611(3)** Environmental Toxicology
CHEM-3302(3) Methods of Chemical Analysis
CHEM-3601(3) Environmental Chemistry

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|---------------------|---|
| MATH-1101(6) | Introduction to Calculus |
| PHYS-1101(6) | Foundations of Physics I or PHYS-1301(6) Introduction to Physics |

GLOBAL ENVIRONMENTAL SYSTEMS

Required courses:

Core courses for all BSc students PLUS

| | |
|---------------------|---------------------------|
| GEOG-2207(3) | Climatology |
| GEOG-2213(3) | Introductory Soil Science |
| GEOG-2214(3) | Soil-Vegetation Systems |
| GEOG-3210(3) | Hydrology |
| GEOG-3401(3) | Population Geography* |

6 credit hours from among the following techniques courses:

| | |
|---------------------|--|
| GEOG-2304(3) | Computer Mapping |
| GEOG-2306(3) | Introduction to Geographic Information Systems |
| GEOG-2316(3) | Introduction to Remote Sensing |
| GEOG-3319(3) | Advanced Remote Sensing |

6 credit hours from the following geography options:

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|---------------------|---|
| GEOG-2408(3) | Environmental Perception and Human Behaviour* |
| GEOG-2411(3) | Geography of Globalization* |
| GEOG-2414(3) | The Urban Environment* |
| GEOG-3408(3) | Water Resources* |
| GEOG-3508(3) | Geographical Issues in the Developing World* |
| GEOG-2212(3) | Natural Hazards |
| GEOG-2204(3) | Human Impact on the Environment |

6 credit hours from the following physical geography options:

| | |
|---------------------|-----------------------------------|
| GEOG-2215(3) | Mineralogy and Petrology |
| GEOG-2216(3) | Physical Geology |
| GEOG-2218(3) | Fluvial and Hillslope Processes |
| GEOG-2219(3) | Glacial and Periglacial Processes |
| GEOG-3204(3) | Climate Change and Variability |
| GEOG-3215(3) | Biogeography |
| GEOG-3216(3) | Arctic Environments |
| GEOG-3217(3) | Tropical Environments |
| GEOG-3219(3) | Quaternary Environments |
| ENV-4615(3) | Environmental Soil Science |

6 credit hours from the following options:

| | |
|------------------------|---|
| PHIL-1002(6) | Values and the Human Condition |
| POL-3105(6) | Global Political Economy |
| POL-3120(3) | International Law |
| SOC-2110(6) | Social Change * |
| IDS-1100(6) | Introduction to International Development Studies |
| IDS-2131(3) | Rural Development * |
| IDS-3160(3) | Cultural Perspectives on Global Processes * |
| CRS-1200(6) | Introduction to Conflict Resolution Studies |
| ENV/SOC-2502(3) | Sociology of the Environment |
| ENV-2604(3) | Environment and Health |
| ENV-3606(3) | Business and the Environment |
| ENV/UIC-3025(3) | Issues in Sustainable Cities |
| ENV 4614 (3) | Critical Environmental Issues |

*courses with prerequisites that are not required courses in the major

FOREST ECOLOGY

The **Forest Ecology and Forest Policy and Management streams** are now recognized by the Canadian Institute of Forestry (CIF), Canada's professional organization of foresters and leading voice for the forest industry. This designation allows graduates from these streams to have the prestige associated with a **nationally recognized forestry baccalaureate program**, giving students a competitive edge and the specialized skills needed to work in the forest industry or many associated professions. **Graduates of the University of Winnipeg's Forest Ecology program receive Silver Ring recognition from the CIF** which symbolizes their responsibility to manage the forest for future generations and is a commitment to life-long learning and worn with pride. The Silver Rings are presented at a special ceremony with representatives of the CIF and the University of Winnipeg. The Silver Rings recognize that students are educated and trained in the complex interrelationships of forest ecosystems, water, fish and wildlife, as well as the social, cultural and economic aspects of forestry.

Required courses:

Core courses for all BSc students (except that ENV-2603(3) Environmental Sustainability: A Global Dilemma is not required and GEOG-2309(3) Statistical Techniques in Environmental Analysis is required) PLUS

| | |
|-------------------------|------------------------------|
| BIOL-2153(3) | Biology of Vascular Plants |
| BIOL/ENV-2401(1) | Forest Field Skills Camp ** |
| BIOL-2477(3) | Forest Measurement + |
| BIOL-3152(3) | Flowering Plants in Manitoba |
| BIOL-3471(3) | Forest Ecology |

| | |
|-------------------------|--|
| BIOL-3473(3) | Principles of Silviculture + |
| BIOL/ENV-3476(3) | Forest Policy and Management |
| BIOL-4451/2 | Forest Ecosystems Field Course ** |
| BIOL-4471(3) | Ecological Methodology |
| BIOL-4473(3) | Dendrochronology + |
| BIOL-4474(3) | Forest Health and Protection* + |
| BIOL-4475(3) | Urban Forestry* + |
| GEOG-2213(3) | Introductory Soil Science |
| GEOG-2306(3) | Introduction to Geographic Information Systems |
| ENV-3607(3) | Forests and the Environment + |
| ENV-3608(3) | Forest Wildlife Management + |

Suggested electives:

| | |
|---------------------|--|
| BIOL-2115(3) | Biology of Invertebrates |
| BIOL-3410(3) | Freshwater Ecology |
| BIOL-3801(3) | General Entomology* |
| BIOL-4116(3) | Biology Honours Thesis |
| GEOG-2207(3) | Climatology |
| GEOG-2316(3) | Remote Sensing |
| GEOG-2414(3) | The Urban Environment* |
| GEOG-3210(3) | Hydrology |
| GEOG-3215(3) | Biogeography |
| GEOG-3306(3) | Advanced Geographic Information Systems |
| GEOG-3319(3) | Advanced Remote Sensing |
| ENV-4613(3) | Directed Studies in Environmental Studies and Sciences |
| ENV 4614 (3) | Critical Environmental issues |
| ENV-4615(3) | Environmental Soil Science |

* courses with prerequisites that are not required courses in the major

** The field courses are typically held in alternating years in the spring or summer session.

+ Typically held in alternating years in the fall/winter session.

FOREST POLICY AND MANAGEMENT

Required courses:

Core courses for all BSc students (except that GEOG-2309(3) Statistical Techniques in Environmental Analysis is required) PLUS

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|-------------------------|--|
| BIOL-2153(3) | Biology of Vascular Plants |
| BIOL/ENV-2401(1) | Forest Field Skills Camp ** |
| BIOL-3471(3) | Forest Ecology |
| BIOL/ENV-3476(3) | Forest Policy and Management |
| BIOL-4451/2 | Forest Ecosystems Field Course ** |
| BIOL-4474(3) | Forest Health and Protection* |
| BIOL-4475(3) | Urban Forestry* |
| ECON-2317(3) | Environmental Economics |
| GEOG-2306(3) | Introduction to Geographic Information Systems |
| POL-2300(6) | Public Administration |
| POL-3411(3) | Aboriginal People and the Law I |
| ENV-3606(3) | Business and the Environment |
| ENV-3607(3) | Forests and the Environment |

Suggested electives:

| | |
|---------------------|--|
| BIOL-2477(3) | Forest Measurement |
| BIOL-3473(3) | Principles of Silviculture |
| GEOG-2204(3) | Human Impact on the Environment |
| GEOG-3306(3) | Advanced Geographic Information Systems |
| POL/UIC-2020 | Colonization and Aboriginal Peoples |
| POL-3405(3) | Aboriginal Politics in Manitoba |
| POL-3415(3) | Aboriginal People and the Law II |
| REL-2801(3) | Introduction to Aboriginal Spirituality |
| REL-2802(3) | Aboriginal and Christian Encounter |
| CRS-1200(3) | Introduction to Conflict Resolution Studies |
| ENV-3608(3) | Forest Wildlife Management |
| ENV-4613(3) | Directed Studies in Environmental Studies and Sciences |
| ENV 4614 (3) | Critical Environmental issues |
| ENV-4615(3) | Environmental Soil Science |

* courses with prerequisites that are not required courses in the major

** The field courses are typically held in alternating years in the spring or summer session.

REQUIREMENTS FOR THE UNIVERSITY OF WINNIPEG / RED RIVER COLLEGE 4-YEAR BSc (JOINT PROGRAM IN APPLIED ENVIRONMENTAL STUDIES)

INTRODUCTION

This is a joint degree program whereby students are required to take courses at both The University of Winnipeg and Red River College in a prescribed sequence. The program has been specifically designed to prepare students for careers in industry where practical and theoretical skills are necessary.

There are 4-year and 5-year versions of the joint program:

In the **4-year version**, students are enrolled at the University of Winnipeg in years one, two and four, and at Red River College in year three. Students who successfully complete the entire program will receive a joint 4-Year BSc degree parchment from The University of Winnipeg and Red River College.

In the **5-year version**, students are enrolled at the University of Winnipeg in years one, two and five, and at Red River College for years three and four. The 5-year structure includes the benefit of a full co-op work term plus the preparation with a co-op coordinator. (The work term credit requires that the student complete a minimum of 16 weeks of full-time, paid work experience related to their training. Students may register with RRC's co-op placement coordinator to access placement assistance.) The 5-year structure will increase future opportunities for students because they will also be eligible for certification by the Certified Technicians and Technologists Association of Manitoba. Students who successfully complete the entire program will receive a joint 4-Year BSc degree parchment from The University of Winnipeg and an Environmental Protection Technology Diploma from Red River College.

Note: Transfer of courses between institutions applies only to students who are officially registered in the joint program.

The Red River College courses require a laptop computer and this cost will be reflected in the tuition fee.

ADMISSION REQUIREMENT

Students must meet the entrance requirements for admission to The University of Winnipeg. **Application to the program in Applied Environmental Studies must be completed through the Admissions Office of The University of Winnipeg by March 1st in order to enter the program in September of the same year..**

GRADUATION REQUIREMENT

120 credit hours

RESIDENCE REQUIREMENT

Degree: Minimum 60 credit hours

Major: Minimum 30 credit hours

GENERAL DEGREE REQUIREMENT

Humanities: 12 credit hours in Humanities

Science: 6 credit hours

Writing: Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended.

Maximum Introductory Courses:

Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level.

Distribution: Minimum three (3) credit hours from each of five (5) different subjects.

MAJOR REQUIREMENT:

4-YEAR VERSION

Year 1 - University of Winnipeg

BIOL-1115(3) Cells and Cellular Processes
BIOL-1116(3) Evolution, Ecology and Biodiversity
CHEM-1111(3) Introduction to the Chemical Properties of Matter
CHEM-1112(3) Basic Principles of Chemical Reactivity
ECON-1104(3) Introduction to Economic Theory
GEOG-1201(3) Introductory Atmospheric Science
GEOG-1202(3) Introductory Earth Science
ENV-1600(3) Human-Environmental Interaction
Academic Writing Requirement
3 credit hours Humanities

Year 2 - University of Winnipeg

BIOL-2403(3) Principles of Ecology
CHEM-2302(3) Quantitative Chemical Analysis
CHEM-3302(3) Methods of Chemical Analysis
ECON-2317(3) Environmental Economics
PHIL-2233(3) Environmental Ethics
ENV-2603(3) Environmental Sustainability: A Global Dilemma
ENV-3035(3) Law and the Environment
3 credit hours Humanities
3 credit hours from among:
GEOG-2309(3) Statistical Techniques in Environmental Analysis
STAT-1301(3) Statistical Analysis 1
STAT-1501(3) Elementary Biological Statistics I
3 credit hours from among:
BIOL-3492(3) Quantitative and Theoretical Biology
CHEM-2701(3) Introduction to Computers in Chemistry

ACS-1453(3) Introduction to Computers

Year 3 - Red River College

CIV-2323(3) Health and Safety, PLUS:

5 courses from among:

| | |
|-----------|----------------------------------|
| CIVC-1044 | Project Administration |
| CIVL-2006 | Geo-Enviro Fundamentals |
| CIVL-2007 | Environmental Management |
| CIVL-2009 | Fundamentals of GIS |
| CIVL-2012 | Environmental Analysis |
| CIVL-3007 | Waste Management |
| CIVL-3008 | Water and Waste Water |
| CIVL-3011 | Remote Sensing and Digital Photo |
| CIVL-3016 | Hydrology |

Year 4 - University of Winnipeg

| | |
|-------------|---------------------------------|
| ENV-3609(3) | Research Methods and Design |
| ENV-3610(3) | Research Projects |
| ENV-4611(6) | Environmental Impact Assessment |

3 credit hours Humanities

15 credit hours from among:

| | |
|------------------|------------------------------------|
| BIOL-2902(3) | Biology of Prokaryotes and Viruses |
| BIOL-3410(3) | Freshwater Ecology |
| BIOL-3471(3) | Forest Ecology |
| BIOL/ENV-3476(3) | Forest Policy and Management |
| BIOL-3901(3) | Microorganisms and Disease |
| BIOL-3902(3) | Microbial Ecology |
| BIOL-4411(3) | Water Quality and Health |
| BIOL-4471(3) | Ecological Methodology |
| CHEM-3601(3) | Environmental Chemistry |
| GEOG-2213(3) | Introductory Soil Science |
| GEOG-2214(3) | Soil-Vegetation Systems |
| GEOG-2414(3) | The Urban Environment |
| GEOG-3408(3) | Water Resources |
| ENV-3607(3) | Forests and the Environment |
| ENV-4614(3) | Critical Environmental Issues |
| ENV 4615(3) | Environmental Soil Science |

5-YEAR VERSION

Year 1 - University of Winnipeg (same as year 1 in 4-year program)

Year 2 - University of Winnipeg (same as year 2 in 4-year program)

Year 3 - Red River College

| | |
|-----------|--------------------------------|
| CIVC-1044 | Project Administration |
| CIVL-2021 | Environmental Statistics |
| CIVL-2006 | Geo-Environmental Fundamentals |
| CIVL-2007 | Environmental Management |
| CIVL-2009 | Fundamentals of GIS |
| CIVL-2012 | Environmental Analysis |
| CIVW-2008 | Co-op Work Placement |

Year 4 - Red River College

| | |
|-----------|----------------------------------|
| CIVL-3005 | Applied Research Project |
| CIVL-3006 | Health and Safety |
| CIVL-3007 | Waste Management |
| CIVL-3008 | Water and Waste Water |
| CIVL-3011 | Remote Sensing and Digital Photo |
| CIVL-3016 | Hydrology |

Year 5 - University of Winnipeg (same as year 4 in the 4-year program)

REQUIREMENTS FOR A 4-YEAR BSC WITH A BUSINESS STREAM

Students must complete the requirements of the 4-year BSc in Environmental Studies in any stream (see previous section) and the set of core courses indicated in the "Science with a Business Stream" section of the Calendar

REQUIREMENTS FOR AN HONOURS BSC

ADMISSION REQUIREMENT

Students must consult with the Department Advisor in planning their studies.

GRADUATION REQUIREMENT

Graduation G.P.A. Requirement

120 credit hours

To graduate with a BSc Honours, students must have completed the course requirements for a BSc in Environmental Studies with a minimum GPA of 3.0 on all Environmental Studies and Sciences courses, which will be calculated on all course attempts in the major. Students must also have a minimum 2.75 GPA on all non-major courses, which will be calculated as for the General Degree (i.e., F's are not included and, in the case of repeated courses, only the highest grade will be used).

RESIDENCE REQUIREMENT

Degree:

Minimum 60 credit hours

Honours:

Minimum 30 credit hours, including minimum 18 credit hours at upper level (3000/4000) of which a minimum of 9 credit hours at 4000 level

GENERAL DEGREE REQUIREMENT

Humanities:

12 credit hours in Humanities

Science:

6 credit hours

Social Science:

12 credit hours

Writing:

Minimum 3 credit hours of Academic Writing. RHET-1106(3) Academic Writing: Links with the Disciplines, Environmental Studies, is recommended.

Maximum Introductory Courses: Students may use a maximum of 42 credit hours at the 1000 level. Of these, a maximum of 6 credit hours may be below the 1000 level.

Distribution:

Minimum three (3) credit hours from each of five (5) different subjects.

4000-level Courses:

Minimum 3.0 GPA (B) in major courses (students lacking the requisite 3.0 GPA should consult the department concerned regarding eligibility to take 4000-level courses).
Permission of the department.

HONOURS REQUIREMENT

Single Honours:

Minimum requirements for a BSc degree in Environmental Studies in any of the following streams: Forest Ecology, Forest Policy and Management, Global Environment Systems and Chemistry. Minimum 30 credit hours in upper-level (3000 and 4000) courses of which a minimum of 12 credit hours must be at the 4000 level.

Required Courses:

GEOG-2309(3)

Statistical Techniques in Environmental Analysis

ENV-4611(6)

Environmental Impact Assessment

ENV-4701(6)

Environmental Studies Honours Thesis

COURSE DESCRIPTIONS

ENV-1600(3) HUMAN-ENVIRONMENTAL INTERACTIONS

(Le3) This course deals with a variety of topics which illustrate the complexity and diversity of environmental issues. The central theme is "understanding natural processes in the environment" as a means of measuring human impact. Topics dealt with reflect current environmental concerns—for example, global warming, overexploitation, wildlife management, urban issues, health issues.

This course may be used towards fulfilling the Science requirement for the BA degree

RESTRICTIONS: Students with standing in the former ENV-2600(3) may not receive credit for this course.

ENV-2401(1) FOREST FIELD SKILLS CAMP (1A) This intensive two-week field course is mandatory for students in the Forest Ecology program and is designed to give students field survival and basic forestry skills. Topics include bush camp construction; safe use of boats, ATV's, and chainsaws; and basic bush survival skills. Students also learn how to correctly use topographical maps, compasses, air photos, GIS maps and other forestry equipment. This course is offered at University College of the North at The Pas, Manitoba.

CROSS-LISTED: Biology BIOL-2401(1).

ENV-2416(3) SEX, GENDER, SPACE AND PLACE (Le3)

This course examines, from interdisciplinary perspectives including those of Women's Studies, Geography, and Environmental Studies, relationships among sex, gender, space and place in societies, cultures, environments, and ecosystems. Selected relevant topics are considered, such as ecofeminism, the cultural politics and political geography

of sex and sexual identities, the gendering and sexing of city landscape and architecture, notions of public and private space, and the space/place in the sociocultural construction of femininity and masculinity. We consider how sex, gender, race, ethnicity, class, sexuality, and other aspects of identity affect the transformation of space into place.

PREREQUISITES: ENV-1600(3) OR GEOG-1102(3) and GEOG-1103(3) OR WGS-1232(6) or permission of instructor.

CROSS-LISTED: Geography GEOG-2416(3) and Women & Gender Studies WGS-2416(3).

ENV-2502(3) SOCIOLOGY OF THE ENVIRONMENT (Le3)

This course offers an examination of environmental issues and concerns from a sociological perspective. Topics for review include environmental values, attitudes and behaviour; the environment movement; the political economy of the environment, and environmental risk and risk assessment. Debates surrounding such concepts as sustainable development, deep ecology, environmental justice and global change are emphasized.

PREREQUISITES: ENV-1600(3) or SOC-1101(6), or permission of instructor.

CROSS-LISTED: Sociology SOC-2502(3).

ENV-2521(3) VOLUNTARY SIMPLICITY (Le3)

Development is increasingly understood as a participatory, deliberate process aimed at enhancing quality of life for individuals within community. This course examines the concept, theory, and practice of voluntary simplicity as a means of development for individuals seeking alternatives to consumer values and culture. The course explores both the historical roots of voluntary simplicity and its modern

expressions, with special emphasis on the relevance of simplicity to building emotional well-being, vibrant community, sustainable environment, and social justice.

PREREQUISITES: ENV-1600(3) or IDS-1100(6), or permission of instructor.

CROSS-LISTED: International Development Studies IDS-2521(3).

ENV-2603(3) ENVIRONMENTAL SUSTAINABILITY: A GLOBAL DILEMMA (Le3)

This course focuses on environmental factors relevant to understanding and implementing sustainable development. Its aim is to teach students to understand and appreciate fundamental ecological principles within the context of social values and technological constraints. Moreover, the course seeks to equip students to assess environmental problems from an interdisciplinary perspective, and to develop strategies that might solve these problems. Topics or issues that may be addressed include: ecosystem dynamics; feedback in environmental processes; the concepts of carrying capacities and population thresholds; optimum yield theory; loss of biodiversity; over consumption and overpopulation; deforestation, desertification and pollution; energy demand versus supply; urbanization trends; global warming; ozone layer depletion; resource management, conservation, and recovery; and environmental monitoring and impact assessment. This course may be taken for major credit in Environmental Studies and International Development Studies.

This course may be used towards fulfilling the Science requirement for the BA degree

PREREQUISITES: ENV-1600(3) or IDS-1100(6), or permission of instructor.

CROSS-LISTED: International Development Studies IDS-2603(3).

ENV-2604(3) ENVIRONMENT AND HEALTH (Le3) There is growing concern amongst the scientific community, media, and general public that environmental chemical contamination may be responsible for some human and ecosystem health problems. This course provides a scientific overview of selected chemical contamination issues, discusses relative risks of recognized and potential hazards, and assesses possible technical and regulatory solutions. Topics may include stratospheric ozone depletion, tropospheric air pollution, acid rain, greenhouse gas emissions, anthropogenic pollutants such as PCBs and perfluorinated chemicals, and other relevant issues. Knowledge of high school level chemistry is useful, but not absolutely necessary.

This course may be used towards fulfilling the Science requirement for the BA degree

PREREQUISITES: ENV-1600(3) or permission of instructor.

ENV-3025(3) ISSUES IN SUSTAINABLE CITIES (Le3) This course addresses issues of sustainable urban development. Topics may include the following: world population growth and urbanization in developed and developing countries; the impact of technology, trade, and commercial globalization on urban environments; the degradation of land, water, and air inside of cities and in their bio-regions; the consumption of fossil fuels and the local and global impact of their combustion; the politics of sustainable urban development; the role of planning and urban administrative practices and policies in environmental degradation and mitigation; and the place of local environmental initiatives in national environmental actions.

PREREQUISITES: GEOG-2414(3), the former GEOG-2404(6), or UIC-1001(3), or permission of instructor.

CROSS-LISTED: Urban and Inner City Studies UIC-3025(3).

ENV-3035(3) LAW AND THE ENVIRONMENT (Le3) This course provides an introduction to Canadian environmental

law, including common law and statutory regimes. Topics include endangered species, air, water and waste management, toxic pollutants, contaminated land, resource development, the division of constitutional powers, regulatory approaches, environmental assessment, monitoring and enforcement, and environmental torts. The socio-economic, political, and scientific backgrounds of environmental problems are also considered. Current Manitoba examples are used to illustrate the concepts, problems and solutions discussed.

ENV-3476(3) FOREST POLICY AND MANAGEMENT (Le3)

This course addresses the principles and practices of sustainable forestry in Canada. Topics include evolution of the forest industry including past and current forestry policy and practices. Important aspects of harvesting, reforestation, forest protection, private woodlot forestry, natural products and first nations forestry are discussed. The role of the forest industry in Canada is examined within the larger context of government regulation, multi-resource management, multi-stakeholder processes, and global markets. The environmental impact of forest management activities on natural landscapes is reviewed under ever changing environmental codes and restrictions and the need to produce "green products."

PREREQUISITES: Students may not hold credit for BIOL-3476(3) and the former BIOL-4476(3).

CROSS-LISTED: Biology BIOL-3476(3).

ENV-3603(3) WINNIPEG AND THE ENVIRONMENT: A CASE STUDY APPROACH (Le3)

This course focuses on the particular problems facing the City of Winnipeg in its interaction with the environment. Students are required to participate in an in-class strategic planning session to select issues and concerns that will become the case study content of the course. Municipal planning initiatives are used to select the issues, to define their scope, and to propose policy and program solutions. The course format involves small interactive group discussions led by the students and facilitated by the instructor. A high level of student participation is expected.

PREREQUISITES: ENV-1600(3), or UIC 1001(3), or the former ENV-2600(3) or permission of instructor.

CROSS-LISTED: Urban and Inner-City Studies UIC-3603(3).

ENV-3606(3) Business and Environment (Le3)

This course examines practical examples of ways in which business operations have responded to environmental and sustainability challenges and opportunities. The course provides an historical perspective on corporate environmentalism, and covers current topics such as self-regulation and voluntary initiatives, environmental management systems, product stewardship, life-cycle analysis, industrial ecology, toxics use reduction, strict liability and due diligence, and sustainable performance management. The course uses case studies from Canada and elsewhere, including less-developed nations, to illustrate the issues, problems, and solutions discussed.

PREREQUISITE: ECON 2317(3) or permission of instructor.

ENV-3607(3) FORESTS AND THE ENVIRONMENT (Le3)

This course is intended to provide students with the fundamental knowledge of the interactions between human and forest ecosystems. It examines current forestry practices and study new alternatives in forest resources management based on our growing knowledge of the natural dynamics of these ecosystems. The concepts underlying forest sustainability and forest conservation in a changing world are developed. Using the boreal forest as an example, students acquire an understanding of natural ecosystem dynamics and of proposed alternatives in forestry practices.

The effect of global climate change and increasing human pressure on our forests are also examined.

PREREQUISITE: BIOL-2403(3) or the former BIOL-3403(3).

ENV-3608(3) FOREST WILDLIFE MANAGEMENT (Le3)

This course focuses on the management of wildlife populations in forested environments in Canada. Students participate in an examination of forest biodiversity including discussion of terrestrial and aquatic species, ecosystems, conservation strategies, coarse and fine filter approaches, forest fragmentation, core habitat ranges, management at forest stand and landscape levels and how animals use forest habitats. Topics include habitat supply and modelling, population monitoring methods, the cumulative effects of forest management activities, legislation and guidelines, role of endangered species, adaptive forest management and the importance of terrestrial and wetland classification.

COREQUISITE: ENV-3607(3)

ENV-3609(3) RESEARCH METHODS AND DESIGN (Le3)

This course is a pre-requisite for the Research Projects course (ENV-3610(3)) and teaches students the steps and methods required to produce a successful research project. Students learn to develop a clear research question, form hypotheses and predictions and formulate a study with the appropriate measurements and design structure. Students are shown examples of experimental and other designs and methods used in the natural and social sciences. Finally, students develop a research design for their own project used in the Research Projects course.

PREREQUISITES: GEOG 2309(3) or STAT 1201 (3) or STAT 1501(3) or permission of the Chair of Environmental Studies and Sciences.

ENV-3610(3) RESEARCH PROJECTS (Le3) This course teaches students to understand, develop, and complete research projects with relevance to real world situations. The primary objective is to help students develop research skills for the workplace. Students are required to undertake a research project in an area of environmental interest, typically using proposals developed in ENV-3609(3). Presentation of results, both orally and in written form, is required. Students work closely with the instructor or another member of the faculty and an external advisor from the community during completion of the project. Research projects are designed to assist community groups, government departments, private sector firms or other organizations.

PREREQUISITES: ENV-3609(3) and completion of a minimum of 60 credit hours towards their degree or permission of the Chair of Environmental Studies and Sciences.

ENV-3611(3) Environmental Toxicology (Le3) This course provides an understanding of how and why chemicals may damage humans and other organisms. Students learn basic principles of toxicology and environmental chemical exposure, and detailed analysis of the body's defenses against toxicants and the physiological and/or biochemical mechanisms by which toxicants cause effects. Toxicological modeling and environmental risk assessment are introduced. Students apply these principles to explore emerging topics of interest in their own disciplines.

PREREQUISITES: CHEM-2202 (3) and CHEM-2203 (3) or the former CHEM-2201 (6).

CROSS-LISTED: Chemistry CHEM 3611(3).

GEOG-4450(3) GEOGRAPHIC PERSPECTIVES ON ENVIRONMENT AND SUSTAINABILITY (S3) This course considers geographic and environmental approaches to sustainable staples-based development, particularly as they apply to water, energy, and mining. Discussion begins by outlining change, complexity, uncertainty and conflicts associated with primary and derived resources, including

those contributing to climate change. Important technological innovations and policy developments designed to address these challenges are contemplated. Topics include corporate social responsibility policies, public-private initiatives, community-based resource management, adaptive management, and social learning through public participation.

PREREQUISITES: Two of GEOG-2204(3), GEOG-2212(3), GEOG-3408(3), GEOG-3508(3), ENV-2603(3), or permission of the instructor.

ENV-4611(6) ENVIRONMENTAL IMPACT ASSESSMENT (Le3)

This course explores the methodology of environmental impact assessment (EIA). Students learn about various types of EIA, the components of EIA review, the regulatory aspects of EIA, and how to complete their own EIA. Students are expected to undertake EIA examples in both written and oral form.

PREREQUISITES: Completion of a minimum of 60 credit hours towards their degree or permission of the Chair of Environmental Studies and Sciences.

ENV-4613(3) DIRECTED STUDIES IN ENVIRONMENTAL STUDIES (Le3)

This course allows students to undertake research in their areas of interest. The research may take the form of a literature review, may be experimental in nature or involve analysis of existing data. Evaluation is based on a written submission summarizing the student's findings. Permission to enrol is dependent on the availability of an instructor in the student's field of interest and the permission of the Director of Environmental Studies.

PREREQUISITES: ENV-1600(3) and permission of the Chair of Environmental Studies and Sciences.

ENV-4614(3) CRITICAL ENVIRONMENTAL ISSUES (Le3)

This course examines current issues of controversy and public concern in environmental studies and environmental science. The content varies from year to year and students should consult the Environmental Studies department for a more detailed description of topic areas in terms in which the course is offered.

PREREQUISITES: ENV-1600(3) or permission of the Chair of Environmental Studies and Sciences.

RESTRICTIONS: Students may take this course only once.

ENV-4615(3) ENVIRONMENTAL SOIL SCIENCE (Le3) The course provides students with a comprehensive knowledge of environmental issues related to soil science emphasizing the significant role soil plays in sustaining environmental quality. It focuses on soil functions, soil quality and quality indicators, environmental significance of physical, chemical, biological properties and processes, ecological implications of soil-water-nutrient interactions, fate and transport of organic and inorganic contaminants in soils, and environmental impact of soil erosion, all of which are interconnected to current environmental issues such as global warming, surface and groundwater pollution, soil degradation, ozone layer depletion, atmospheric pollution etc. The course also aims to provide the conceptual knowledge required to manage soil on a scientifically-based, environmentally friendly, and ecologically sustainable manner.

PREREQUISITES: GEOG-2213 (3) and CHEM-1112 (3) (or the former CHEM-1101 (6)) or the permission of instructor

ENV-4701(6) HONOURS ENVIRONMENTAL STUDIES THESIS (P)

This course provides an opportunity for students to undertake a research project of personal interest under the guidance of a faculty member or equivalent and the Course Coordinator. Practical experience is provided in research design and methodology, data analysis, in the verbal and written presentation of the findings, and participation in academic conferences. This course is

intended to provide students with a solid background for entry into graduate programs or research-oriented careers.

PREREQUISITES: GEOG 2309 (3) and ENV 4611 (3); 30 credit hours in the Environmental Studies major; A minimum 3.0 GPA (B) in honours subject courses.

RESTRICTIONS: Enrolment in this course is limited by the availability of faculty to serve as supervisors. Students must obtain written permission from the Chair to register for the course. A written agreement between the student and the faculty supervisor is required before permission is granted.