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FOCUS AREA BROCHURE



Focus Areas

Environmental Studies & Environmental Science

Environmental Studies and Environmental Science

The Environmental Studies and Environmental Science programs are designed to fill a need for quality, interdisciplinary undergraduate education. Several government and industry studies have identified the need for qualified experts with training that is holistic, multi-disciplinary with a 'big picture' approach of how their expertise can be used in conjunction with other specialists to solve practical environmental problems.

Undergraduate students in either program receive both a solid scientific background complimented by a core of environmental information, and also have the opportunity to specialize in one of a diverse range of focus areas. You will gain access to some excellent and unique resources. Among these are field courses on ecological and environmental topics, linkage with the Centre for Earth Observation Science, exposure to the work of the federal government's Freshwater Institute researchers, including nearby ecosystem research at the Experimental Lake Area.

What is a Focus Area?

A focus area is an individualized approach to undergraduate education. The student, in collaboration with a student advisor, will organize a body of courses from several subject fields around a central theme, topic, or set of related issues. The approach and coursework draw on different subjects, enabling a truly multi-disciplinary education to be obtained. The focus area must articulate a coherent field of study and provide a theoretical context for the focal issues.

How do I decide on a Focus Area?

Through student driven research and by identifying areas and careers that you are interested in, you will be able to develop a focus area to acquire the knowledge and skills required to enter further research programs and the workforce.

You should begin thinking about your focus area during your second year. Use some of the activities and information outlined in this brochure to narrow down your interests. From here, you can begin to characterize and develop the content that will make up your focus area.

Key activities

- Brainstorm, brainstorm, brainstorm
- Use the outline tools provided through websites like Environmental Careers Organization www.eco.ca
- Visit the Career Resource Centre and take advantage of the many services they offer
- Make a list of courses you would like to take in the future
- Talk to your student advisor, cooperative education coordinator, instructors, classmates, employers, family and alumni

By performing these activities, you should be able to make a list of important skills required in your chosen field.

Making the Most of It!

First Year

- Become knowledgeable about programs of interest and requirements
- Meet with an advisor at least once a term

Second Year

- Explore your academic and career interests
- Research courses
- Explore connections between your interests, strengths and potential careers
- Consider the Co-op Option
- Consider the Honours program

Third Year

- Network with people who work in your field of interest
- Identify education and/or additional skills you will need to attain employment or training in your field
- Be able to articulate what you are studying and why

Fourth Year

- Make decisions - it's a lifelong skill!
- Research employment or grad school options
- Understand skills employers or grad schools seek



Focus Areas

Students must complete a minimum of 9 credit hours in the General program, and 33 credit hours (to include at least 21 credit hours at the 3000/4000 level) in the Major and Honours program in one of the following focus areas:

natural resource management
conservation & biodiversity
environmental assessment
sustainable development
environmental health
wildlife management
sustainable building
northern studies
water resources
land systems
policy & law
stewardship
toxicology

Individualized Study is available to those students who wish to tailor their program to their specific needs, including those of potential employers and certification. Consultation with Faculty members, employers, professionals in the field, and student advisors is required in building your own focus area. Note that courses that are used in the focus area are subject to the approval of a Riddell Faculty Student Advisor.



Registration Holds

Prior to registration for the Fall and Winter term, a Program Approval Hold will be placed on your account preventing you from registering for courses. You must have your program approved by a Student Advisor. Advisors are available on a drop-in basis from 9am-4pm, Monday through Friday in the Riddell Dean's Office, 440 Wallace Building or by e-mail: riddell.faculty@umanitoba.ca

Remember, not all registration holds are from academic departments. Some holds may be the result of past due balances, outstanding library fees, parking fees, or other administrative fees. You can always check your holds on Aurora under "View Holds".

Registration Tips

Pre-requisites: Be sure you have the necessary pre-reqs before you try to register for a course. Prerequisites are in place to assist students to academically succeed. If you feel you have grounds for a professor to waive a prerequisite, you may start by emailing the prof and asking for a prerequisite waiver.

Prereq waiver e-mails from the prof should be forwarded to riddell.faculty@umanitoba.ca so that an Academic Advisor can load the permission.

Prerequisites are listed in brackets after courses in this brochure. Unless otherwise noted, a minimum grade of 'C' is required in a prerequisite course.

Department Head Approval: Why do some courses require 'department head approval' and how do I get it? Start by emailing the professor of the course and ask permission to complete the course. The prof will want to know what program and year you are in and why you want to take their course. E-mails granting permission to take the course should be forwarded to riddell.faculty@umanitoba.ca.

Topics Courses

Topics courses are marked with a T (T). Topics may vary each term and must be suitable to the Focus Area.

Courses applicable to all Focus Areas

ENVR 3350 Environmental Management Systems

ENVR 4000(T) Project Management for Environmental Practitioners

ENVR 4000(T) Decision-Making for Sustainability

GEOG 3200 Introduction to Remote Sensing

GEOG 3730 Geographic Information Systems

Crosslisted Courses

ENVR/CHEM 2550
Environmental Chemistry

ENVR/GEOG 3850
Sustainable Manitoba

ENVR/GEOG 4050
Ecosystem Management

ENVR/GEOG 4060
Biogeography



Please note that courses labeled (NLO) are no longer offered.

Co-operative Education Option

The Clayton H. Riddell Faculty of Environment, Earth, and Resources Cooperative Education Option is a four year undergraduate program with mandatory courses and work terms in addition to regular studies. Co-op students are renowned for their high academic standards and a strong work ethic. Technical knowledge, professional development, and maturity are only a few of the skills that students acquire from their participation in the program. To enroll in the program, contact:

Leslie Goodman, Coordinator
Cooperative Education Option
440 Wallace Bldg.
Phone: (204) 474-7252

Jodena Baertsoen, Assistant
Cooperative Education Option
440 Wallace Bldg.
Phone: (204) 474-6225

The Clayton H. Riddell Faculty of Environment, Earth, and Resources operates a Cooperative Education program, which is designed to provide bright and motivated students with an opportunity to gain practical work experience. The program has been connecting students and employers since its inception in 1994. The goal of the program is for students to gain valuable skills by combining university education and employment training.

Benefits to the Student:

- Earn while you learn!
- You will be provided career information and guidance to help make important course choices and career decisions.
- Your performance will be evaluated and this is available to you for further promotion and employment recruitment.

Career Opportunities

Graduates from the Environmental Studies and Science programs have found successful employment in a wide range of fields. These include ecology, parks management, Geographic Information Systems land evaluation, trace contaminant and hazardous waste management, environmental education, and global environmental issues. The primary employers are private consultants, multinationals, government departments, crown corporations, and environmental non-governmental organizations. Other opportunities exist with Parks Canada, Provincial Parks, Dept. of Conservation, Federal Fisheries and Oceans, Nunavut Wildlife Management Boards, wildlife non-government agencies, Nature Conservancy, Ducks Unlimited, and World Wildlife Foundation.

Graduates are hired in the health sciences and international development agencies. They may also gain employment as community health officers, health care planners (ministry level as well as the RHAs), international aid workers and with the Red Cross.

Opportunities also exist with organizations such as the International Institute of Sustainable Development, Manitoba Habitat Heritage Corporation, Ducks Unlimited, municipal, provincial and federal parks and the Nature Conservancy.

There continues to be growth in environmental job markets. The Environmental Careers Organization (ECO) Canada projects 16% growth over the next five years, in contrast to 8% growth in the overall Canadian job market. Specific areas of growth are environmental education and water security and protection.

Conservation and Biodiversity

Conservation and Biodiversity deals with the plight of endangered species (plants and animals) and their habitats. Students might be interested in areas such as wetland ecology, prairies restoration, boreal forest management, or alpine systems. Maintenance and protection of habitat critical for the preservation of endangered species is explored.

For students in Environmental Studies, BIOL 1030 is recommended if you are interested in a Conservation and Biodiversity focus (BIOL 1030 may be used in lieu of BIOL 1010).

Selection of Relevant Courses: * or AGECE 2370

ENVR 3000 (T)	Topics: Aquatic Ecosystem Services (Permission of department head, and 60 credit hours of university credit.)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 4000(T)	Wildlife Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4000 (T)	Understanding Environmental Effects Monitoring (Department Head Approval and 60 credit hours of university credit)
ENVR 4020	Extended Field Topics in Environmental Science 2 (Department Head Approval)
ENVR 4050	Ecosystem Management (Department Head Approval)
ENVR 4060	Biogeography (Department Head Approval)
GEOG 2200	Introduction to Thematic Cartography (three credit hours from Geography courses numbered at the 1000 level)
GEOG 2900	Geography of Canadian Prairie Landscapes (three credit hours from Geography courses numbered at the 1000 level)
GEOG 3770 (T)	Environment and Tourism (Department Head Approval)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOG 4670	Human Dimensions of Wildlife (Department Head Approval)
GEOG 4750	Understanding Contemporary Environmentalism (Permission of the Instructor)
GEOL 2390	Environmental Geology (University Geology or GEOG 1290)
GEOL 2570	Energy and Mineral Resources (Any university-level Geology course)
BIOL 2200	The Invertebrates (BIOL 1030)
BIOL 2210	The Chordates (BIOL 1030)
BIOL 3242	Vascular Flora of Manitoba (BIOL 2240 or BIOL 2242)
BIOL 3280	Forest Botany (BIOL 2242 (C); and one of BIOL 2300 or AGECE 2370 (C))
BIOL 3310	Foundations of Population Ecology (BIOL 2300*; and one of STAT 1150 or STAT 2000)
BIOL 3312	Community Ecology (BIOL 2300*)
BIOL 3314	Field Ecology (BIOL 2300*; and one of STAT 1150 or STAT 2000 (D))
BIOL 3318	Boreal Ecology (BIOL 2300* and one of STAT 1150, STAT 1000)
BIOL 3350	Methods of Data Collection and Analysis in Ecology (BIOL 2300* and one of STAT 1150 or STAT 2000 (D))
BIOL 3360	Animal Behavior (BIOL 2300*; and BIOL 2210)
BIOL 3372	Wetland Ecology (BIOL 2300*)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
BIOL 4210	Biology of Fishes (BIOL 2210)
BIOL 4214	Biology of Amphibians and Reptiles (BIOL 2210)
BIOL 4216	Biology of Birds (BIOL 2210 and BIOL 3360)
BIOL 4218	Biology of Mammals (BIOL 2210 and BIOL 2300*)
BIOL 4220	Marine Biodiversity (BIOL 2300* and one of STAT 1150 or STAT 1000)
BIOL 4262	Wildlife Parasitology (BIOL 3270)
BIOL 4310	Applications of Population Ecology in Fisheries and Wildlife (BIOL 3310)
BIOL 4362	Behavioural Ecology and Cognitive Ethology (BIOL 3360)
SOIL 3600	Soils and Landscapes in Our Environment
SOIL 4500	Remediation of Contaminated Land (SOIL 3600)

Faculty members with expertise include: Drs. Stephane McLachlan, Rick Baydack, Mary Benbow, Eric Collins and Lisa Loseto

Environmental Assessment covers an array of skills to predict the environmental effects of proposed initiatives before they are carried out by identifying possible environmental effects, proposing measures to mitigate adverse effects and by predicting whether there will be significant adverse environmental effects, even after the mitigation is implemented. (Canadian Environmental Assessment Agency)

Selection of Relevant Courses:

ENVR 3000 (T)	Topics: Aquatic Ecosystem Services (Permission of department head, and 60 credit hours of university credit.)
ENVR 3110	Environmental Conservation and Restoration (BIOL 2390 or 2300*)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3750	Green Building and Planning (ENVR 2000 and 57 credit hours)
ENVR 3850	Sustainable Manitoba (60 credit hours)
ENVR 4000(T)	Wildlife Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4000 (T)	Understanding Environmental Effects Monitoring (Department Head Approval and 60 credit hours of university credit)
ENVR 4050	Ecosystem Management (Department Head Approval)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
GEOG 4750	Understanding Contemporary Environmentalism (Permission of the Instructor)
GEOG 2330	Place, Populations and Mobility: Geographic Perspectives (three credit hours from Geography courses numbered at the 1000 level)
GEOG 2520	Geography of Natural Resources (three credit hours from Geography courses numbered at the 1000 level)
GEOG 2630	Geography of Culture and Environment (GEOG 1280)
GEOG 3340	Migration and Mobility in a Globalized World (GEOG 2330)
GEOG 3390	Introduction to Climate Change and Its Causes (three credit hours from Geography or Environment courses)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOG 4750	Understanding Contemporary Environmentalism: Power and Discourse (Permission of the Instructor)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
ECON 2400	Introduction to Energy Economics (six credit hours of 1000 level Economics)
ECON 3710	Sustainable Development: Issues and Policies (six credit hours of 1000 level Economics)
ECON 4470 (NLO)	Natural Resource Economics (6) (Department Head Approval)
LAW 3600	Environmental Law (Permission from the Faculty of Law)

* or AGECE 2370

Faculty members with expertise include: Drs. Stephane McLachlan, Rick Baydack and Juliana Marson

Toxicology

Environmental toxicology deals with the potential impacts of chemical and non-chemical stressors, both natural and synthetic, on ecosystem constituents. While significant emphasis is placed on understanding the response of individual organisms, the true focus is on characterizing the effects, both direct and indirect, and the risk they pose at the ecosystem-level.

Selection of Relevant Courses:

ENVR 2180	Introductory Toxicology (BIOL 1030 and CHEM 1310 or CHEM 1320)
ENVR 2550	Environmental Chemistry (CHEM 1310)
ENVR 3000 (T)	Topics: Aquatic Ecosystem Services (Permission of department head, and 60 credit hours of university credit.)
ENVR 3180	Methods in Ecotoxicology (ENVR 2180 or BIOL 2380 or AGRI 2180, and a second year course in the Faculty of Science or the Faculty of Agricultural and Food Sciences that has a laboratory component)
ENVR 3550 (NLO)	Environmental Analysis (ENVR 2550 (C), or CHEM 2550 (C), or CHEM 2470 (C))
ENVR 4000 (T)	Understanding Environmental Effects Monitoring (Department Head Approval and 60 credit hours of university credit)
ENVR 4180	Ecotoxicological Risk Characterization (ENVR 2180 or BIOL 2380 or AGRI 2180)
ENVR 4550	Aquatic Chemistry (ENVR 3550 or CHEM 3590)
GEOL 2390	Environmental Geology (University Geology or GEOG 1290)
ENTM 4250	Pesticide Toxicology (A course in biochemistry)
BIOL 2520	Cell Biology (BIOL 1030)
BIOL 3310	Foundations of Population Ecology (BIOL 2300*; and one of STAT 1150 or STAT 2000)
BIOL 3312	Community Ecology (BIOL 2300*)
BIOL 3318	Boreal Ecology (BIOL 2300* and one of STAT 1150, STAT 1000)
BIOL 3370	Limnology (BIOL 2300*)
BIOL 3470	Environmental Physiology of Animals I (BIOL 2200 or BIOL 2210)
BIOL 3472	Environmental Physiology of Animals II (BIOL 2200 or BIOL 2210)
BIOL 4380	Environmental Toxicology (one of CHEM 2370, MBIO 2370, CHEM 2780, or MBIO 2780 and one of BIOL 2300* and one of STAT 1150, STAT 1000 and one of BIOL 2410, BIOL 3470, BIOL 3472)
SOIL 3520	Pesticides: Environment, Economics and Ethics
SOIL 3600	Soils and Landscapes in our Environment
SOIL 4130	Soil Chemistry and Mineralogy (SOIL 3600)
SOIL 4400	Soil Ecology (AGEC 2370 or BIOL 2300 or SOIL 3600)
SOIL 4500	Remediation of Contaminated Land (SOIL 3600)
CHEM 2210	Introduction to Organic Chemistry 1 (CHEM 1310)
CHEM 2220	Introduction to Organic Chemistry 2 (CHEM 2210)
CHEM 2360	Biochemistry 1 (CHEM 1310 and BIOL 1030)
CHEM 2370	Biochemistry 2 (CHEM 2360 or MBIO 2360 and CHEM 2210)
CHEM 2470	Introductory Analytical Chemistry (CHEM 1310; and three credit hours of mathematics with the exception of MATH 1010, MATH 1190, MATH 1020, or FA 1020)
CHEM 3590	Instrumental Analysis (CHEM 2470)
GEOL 2390	Environmental Geology (Minimum 3 credit hours of university-level geology or GEOG 1290)

* or AGECE 2370

Faculty members with expertise include: Drs. Fei Wang and Mark Hanson

"Environment and Health is a growing area of research and an area of influence on government policy. This wide ranging field includes things like the analysis of how polluted environments influence human health, how the state of health care systems impacts the health of both individuals and particular user groups such as the elderly or new immigrants, the relationship between access to adequate housing and food supplies in poor neighbourhoods or remote rural communities, and the causes and impacts of community-wide measures of health, such as fitness levels or disease rates." Bonnie Hallman, Environment and Health Professor, University of Manitoba

Selection of Relevant Courses:

GEOG 3870	Food Geographies (GEOG 1280 or HNSC 1200)
GEOG 4290	Geographies of Health and Health Care (Department Head Approval)
ENVR 3400	Introduction to Environment and Health (60 credit hours of university credit)
ENVR 3890	Geography of Wellness (ENVR 1000 or GEOG 1280 or GEOG 1700)
ENVR 4400	Advanced Issues in Environmental Health (ENVR 3400)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
CHEM 2210	Introduction to Organic Chemistry 1 (CHEM 1310)
CHEM 2220	Introduction to Organic Chemistry 2 (CHEM 2210)
CHEM 2360	Biochemistry 1 (CHEM 1310 and BIOL 1030)
CHEM 2370	Biochemistry 2 (CHEM 2360 or MBIO 2360 and CHEM 2210)
CHEM 2470	Introductory Analytical Chemistry (CHEM 1310; and three credit hours of mathematics with the exception of MATH 1010, MATH 1190, MATH 1020, or FA 1020)
BIOL 2410	Human Physiology 1 (BIOL 1030 or BIOL 1412; or a "C+" or better in both BIOL 1000 and BIOL 1010)
BIOL 2420	Human Physiology 2 (BIOL 2410 (D), or BIOL 3460 (D))
EVLU 4006(T)	Topics Course: Health and Community Design (Permission from the Faculty of Architecture)
MBIO 3010	Mechanisms of Microbial Disease (MBIO 2020)
ANTH 2560	Anthropology of Illness (ANTH 1220 or ANTH 1520)
NATV 3240	Native Medicine and Health
ENTM 4250	Pesticide Toxicology (A course in biochemistry)
FOOD 4150	Food Microbiology 1
FOOD 4260	Water Management in Food Processing
LABR 3060	Workplace Health and Safety (LABR 1260 and LABR 1290 or both HRIR 3450 and 6 credit hours of other HRIR courses or written consent of the Labour Studies coordinator)

* or AGECE 2370

Faculty members with expertise include: Drs. Bonnie Hallman and Eric Collins

Land Systems

The properties and processes responsible for land systems are controlled by geological material, soil and land features found on Earth. This focus area examines the processes and techniques that are applicable to land systems. This is accomplished through an investigation from micro (mineralogy/soil ecology) through to macro scale (land use/geomorphology).

Selection of Relevant Courses:

ENVR 2010(T)	Special Topics: MEIA Soil Sampling (1.5) (Department Head Approval)
GEOG 2200	Introduction to Thematic Cartography (three credit hours from Geography courses numbered at the 1000 level)
GEOG 2272	Natural Hazards (one of GEOG 1290, GEOL 1340, or GEOL 1410)
GEOG 2550	Geomorphology (GEOG 1290)
GEOG 4200	Advanced Methods in Remote Sensing (GEOG 3200)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOL 2390	Environmental Geology (University Geology or GEOG 1290)
GEOL 2440	Structural Geology (GEOL 1340 (C+) and one of MATH 1300, MATH 1500, MATH 1510 or MATH 1520)
GEOL 2500	Introductory Mineralogy with Essential of Mineral Optics (40S Chemistry or CHEM 0900 and GEOL 1340. CHEM 1300 is highly recommended.)
GEOL 2570	Energy and Mineral Resources (Any university-level Geology course)
GEOL 2770	Principles of Inorganic Geochemistry (GEOL 2500 or GEOL 2540. CHEM 1300 is also required but may be taken concurrently)
SOIL 3600	Soils and Landscapes in our Environment
SOIL 3520	Pesticides: Environment, Economics and Ethics
SOIL 3610	Field Methods in Land Resource Science (SOIL 3600)
SOIL 4060	Physical Properties of Soils (SOIL 3600 or BIOE 2110)
SOIL 4130	Soil Chemistry and Mineralogy (SOIL 3600)
SOIL 4400	Soil Ecology (AGEC 2370 or BIOL 2300 or SOIL 3600)
SOIL 4500	Remediation of Contaminated Land (SOIL 3600)
SOIL 4510	Soil and Water Management (SOIL 3600)
SOIL 4520	Soil Fertility (SOIL 3600)

Faculty members with expertise include: Drs. David Walker, John Iacozza, Dustin Isleifson and Karen Alley

Natural Resource Management

Natural resource management refers to the management of natural resources such as land, water, soil, plants and animals, with a particular focus on the reasonable and sustainable use of natural resources, balanced with conservation, to ensure quality of life for future generations. Natural resource management specifically focuses on a scientific and technical understanding of resources and ecology and the life-supporting capacity of those resources.

Selection of Relevant Courses:

ENVR 3020	Extended Field Topics in Environmental Science 1 (Department Head Approval)
ENVR 3350	Environmental Management Systems (Department Head Approval)
ENVR 3850	Sustainable Manitoba (60 credit hours)
ENVR 4000(T)	Wildlife Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4000 (T) credit	Understanding Environmental Effects Monitoring (Department Head Approval and 60 hours of university credit)
ENVR 4020	Extended Field Topics in Environmental Science 2 (Department Head Approval)
ENVR 4050	Ecosystem Management (Department Head Approval)
ENVR 4060	Biogeography (Department Head Approval)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
GEOG 3770 (T)	Environment and Tourism (Department Head Approval)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOG 4670	Human Dimensions of Wildlife (Department Head Approval)
GEOG 4750	Understanding Contemporary Environmentalism (Permission of the Instructor)
NATV 2000	Selected Topics in Native Studies (NATV 1200 or both NATV 1220 and NATV 1240)
NATV 2030	Working with Elders (NATV 1200 or both NATV 1220 and NATV 1240)
NATV 2110	Introduction to Aboriginal Community Development (NATV 1200 or both NATV 1220 and NATV 1240)
<i>Students may not hold credit for both NATV 2110 and NATV 2000 when titled "Introduction to Aboriginal Community Development."</i>	
BIOL 2200	The Invertebrates (BIOL 1030)
BIOL 2210	The Chordates (BIOL 1030)
BIOL 3242	Vascular Flora of Manitoba (BIOL 2240 or BIOL 2242)
BIOL 3318	Boreal Ecology (BIOL 2300* and one of STAT 1150, STAT 1000)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
BIOL 3350	Methods of Data Collection and Analysis in Ecology (BIOL 2300* and STAT 2000 (D))
BIOL 3360	Animal Behavior (BIOL 2300*; and BIOL 2210)
BIOL 3372	Wetland Ecology (BIOL 2300*)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
BIOL 4210	Biology of Fishes (BIOL 2210)
BIOL 4214	Biology of Amphibians and Reptiles (BIOL 2210)
BIOL 4216	Biology of Birds (BIOL 2210 and BIOL 3360)
BIOL 4218	Biology of Mammals (BIOL 2210 and BIOL 2300*)

* or AGECE 2370

Faculty members with expertise include: Drs. Rick Baydack, Jonathan Peyton and David Walker

Northern Studies

The Northern Studies stream provides students with an opportunity to explore individual interests in any combination of human, physical, and natural relationships in the North. Courses range from the physical aspects of climate change to cultural diversity across the Canadian and the Circumpolar Arctic, Boreal and Antarctic regions. Field trips, discussions, and internationally renowned researchers provide students with a wide range of perspectives and once-in-a-lifetime experiences.

Selection of Relevant Courses:

ENVR 3020(T)	Topics Course: Traditional Land Use and Ecology of Cumberland Sound (Department Head Approval)
ENVR 3010(T)	Topics Course: Ecotourism and the Environment (1.5) (Department Head Approval)
ENVR 3000(T)	What is North? Environmental and Geographical Concepts (Department Head Approval and 60 credit hours of university credit.)
ENVR 4020(T)	Extended Field Topics in Environmental Science 2: Wildlife and Ethnoecology of the Manitoba Coastal Region (Department Head Approval) (Summer Session Field Trip)
GEOG 2640	Geography of Culture and Inequality (GEOG 1200 or GEOG 1280)
GEOG 3760(T)	Special Topics: Canadian Natural Environments & Landscapes (6) (Department Head Approval)
GEOG 3770(T)	Special Topics: International Development Issues/Global Issues (Department Head Approval)
GEOG 4260	Sacred Lands (Department Head Approval)
NATV 2080	Inuit Society and Culture (NATV 1200 or both NATV 1220 and NATV 1240) <i>Students may not hold credit for both NATV 2080 (032.208) and NATV 2000 (032.200) with the topic "Inuit Society and Culture."</i>
NATV 2012	Indigenous History in Canada (6)
NATV 2110	Introduction to Aboriginal Community Introduction to Aboriginal Community (NATV 1200 or both NATV 1220 and NATV 1240) <i>Students may not hold credit for both NATV 2110 and NATV 2000 (032.200) when titled "Introduction to Aboriginal Community Development."</i>
NATV 3240	Native Medicine and Health
NATV 3330	Aboriginal People, Science and the Environment (Department Head Approval)
NATV 3390	Cultural Continuity and Change in Cumberland Sound <i>Students may not hold credit for both NATV 3390 and NATV 3000 when titled "Culture and History in Cumberland Sound."</i>
NATV 4220	Environment, Economy, and Aboriginal Peoples (Department Head Approval)
NATV 4240	Arctic Lifestyles (Department Head Approval)
ANTH 3500	Peoples of the Arctic (ANTH 1220 or ANTH 1520)
SWRK 4220	Aboriginal People and Social Work Practice (6) (SWRK 1310, SWRK 2080, SWRK 2090, and SWRK 3140)
POLS 4150	Indigenous Governance (Department Head Approval) <i>Students may not hold credit for both POLS 4150 and POLS 4160 when offered with the topic "Indigenous Governance."</i>
ECON 2350	Community Economic Development
HIST 2280 (NLO)	Aboriginal History of Canada (6)
BIOL 3318	Boreal Ecology (one of BIOL 2300 or AGECE 2370 and one of STAT 1150, STAT 1000)

Faculty members with expertise include: Drs. Stephane McLachlan, Dave Barber, Jill Oakes, Lisa Loseto, Jonathan Peyton, Eric Collins and Juliana Marson

Policy and Law is the foundation for understanding how environmental problems are addressed systematically. From international agreements on climate change, to fostering local green businesses, to developing clean energy technologies - understanding, implementing and improving environmental policy and law is key.

Selection of Relevant Courses:

ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 4000(T)	Special Topics: Decision-Making for Sustainability (Department Head Approval and 60 credit hours of university credit)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
GEOG 2640	Geography of Culture and Inequality (GEOG 1200 or GEOG 1280)
GEOG 4750	Understanding Contemporary Environmentalism: Power and Discourse (Permission of the Instructor)
ECON 3710	Sustainable Development: Issues and Policy (six credit hours of 1000 level Economics)
PHIL 2750	Ethics and the Environment
NATV 3280	Aboriginal People and the Canadian Justice System (NATV 1200 or both NATV 1220 and NATV 1240)
NATV 4220	Environment, Economy, and Aboriginal Peoples (Department Head Approval)
NATV 4240	Arctic Lifestyles (Department Head Approval)
POLS 2040(NLO)	Introduction to International Relations (6)
POLS 2504	Introduction to International Relations
POLS 4150	Indigenous Governance Indigenous Governance (Department Head Approval) <i>Students may not hold credit for both POLS 4150 and POLS 4160 when offered with the topic "Indigenous Governance."</i>
SOC 3380	Power, Politics and the Welfare State (SOC 1200)
SOC 3838	Ecology and Society (SOC 1200)
ANTH 2430	Ecology, Technology and Society
ANTH 2500	Culture, Environment, and Technology (ANTH 1220 or ANTH 1520) <i>Please note: Students may not hold credit for both ANTH 2430 and ANTH 2500.</i>
LABR 3010	Labour Law (LABR 1260 and LABR 1290 or HRIR 3450 and 6 credit hours of other HRIR courses)

* or AGECE 2370

Faculty members with expertise include: Dr. Nicole Wilson

Stewardship

Stewardship is maintaining natural resources for future generations. Stewardship means, as humans we are responsible for our actions on earth. Future generations are dependant upon the continuity of the natural environment. We must respect life and integrate our uses of the natural environment. We must respect life and integrate our uses of the natural resources in a manner compatible with the continuity on earth. It requires a lot of education, research, work and dedication to successfully change the current systems to create and/or enhance sustainability of our actions.

Selection of Relevant Courses:

GEOG 2520	Geography of Natural Resources (three credit hours from Geography courses numbered at the 1000 level)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOG 4750	Understanding Contemporary Environmentalism: Power and Discourse ((Permission of the Instructor)
ENVR 3110	Environmental Conservation and Restoration (BIOL 2390 or 2300or AGECE 2370)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3750	Green Building and Planning (ENVR 2000 and 57 credit hours)
ENVR 3850	Sustainable Manitoba (60 credit hours of course work)
ENVR 4000(T)	Topics Course: Decision Making for Sustainability (Department Head Approval and 60 credit hours of university credit)
ENVR 4000(T)	Wildlife Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4050	Ecosystem Management (Department Head Approval)
ENVR 4060	Biogeography (Department Head Approval)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
GEOL 4370	Global Change (GEOL 3900 and GEOL 3490)
ECON 2400	Introduction to Energy Economics (six credit hours of 1000 level Economics)
ECON 3710	Sustainable Development: Issues and Policies (six credit hours of 1000 level Economics)
ECON 4470(NLO)	Natural Resource Economics (6) (Department Head Approval)
AGECE 3510(NLO)	Agroecology (BIOL 2300*)
ANTH 2430	Ecology, Technology and Society
ANTH 2500	Culture, Environment, and Technology (ANTH 1220 or ANTH 1520) Please note: Students may not hold credit for both ANTH 2430 and ANTH 2500.
NATV 3280	Aboriginal People and the Canadian Justice System (NATV 1200 or both NATV 1220 and NATV 1240)
NATV 4220	Environment, Economy and Aboriginal People (Department Head Approval)
PHIL 2750	Ethics and the Environment
BIOL 3318	Boreal Ecology (BIOL 2300* and one of STAT 1150, STAT 1000)
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300*; or BIOL 1030 and BIOL 2390)

* or AGECE 2370

Faculty members with expertise include: Drs. Stephane McLachlan and Eric Collins

Sustainable Building, or Green Building describes projects that are sited to promote livable communities; protect sensitive lands and preserve natural resources; are energy efficient and/or use renewable energy; incorporate environmentally-friendly building materials and practices; and promote occupant health and well-being. As with all issues of sustainability the solutions are particular to the place and people.

Selection of Relevant Courses:

ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3750	Green Building and Planning (ENVR 2000 and 57 credit hours)
ENVR 3850	Sustainable Manitoba (60 credit hours of course work)
GEOG 2272	Natural Hazards (one of GEOG 1290, GEOL 1340, or GEOL 1410, GEOG 1200, GEOL 1360)
GEOG 2630	Geography of Culture and the Environment (GEOG 1200 or GEOG 1280)
GEOG 3460	Urban Geography (6) (GEOG 1200 or GEOG 1280)
EVDS 2702	Natural and Human Systems (EVDS 1680 (C+))
EVDS 2200	Ecology and Design (EVDS 2702)
EVLU 3002	Site Planning (Permission by the Faculty of Architecture)
EVLU 3010	Landscape and Urbanism Theory (Permission by the Faculty of Architecture)
EVLU 3014	Placemaking Fundamentals (Permission by the Faculty of Architecture)
EVLU 4006(T)	Special Topics: Health and Community Design (Permission by the Faculty of Architecture)
EVLU 4008	Plants, Ecosystems and Designs (Permission by the Faculty of Architecture)
EVLU 4018	Principles of Urban Design (Permission by the Faculty of Architecture)
SOC 3838	Ecology and Society (SOC 1200)
SOC 3840	Community and Social Reconstruction (SOC 1200)
PHIL 2750	Ethics and the Environment

* or AGECE 2370



Faculty members with expertise include:
TBA

Sustainable Development

Sustainable development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present, but also for future generations. The achievement of sustainable development requires the integration of its economic, environmental and social components at all levels.

Selection of Relevant Courses:

GEOG 2330	Place, Populations and Mobility: Geographic Perspectives (three credit hours from Geography courses numbered at the 1000 level)
GEOG 2630	Geography of Culture and the Environment (GEOG 1200 or GEOG 1280)
GEOG 2640	Geography of Culture and Inequality (GEOG 1200 or GEOG 1280)
GEOG 3460	Urban Geography (6) (GEOG 1200 or GEOG 1280)
GEOG 3640	Social Geography of the Environment (GEOG 1200 or GEOG 1280)
GEOG 3272	Social Vulnerability to Natural Hazards (a minimum of three credit hours from Geography courses numbered at the 1000 level, or GPE 1700 or GEOL 1340 or GEOL 1410)
GEOG 3770 (T)	Environment and Tourism (Department Head Approval)
GEOG 3870	Food Geographies (GEOG 1280 or HNSC 1200)
GEOG 4280	Gender and the Human Environment (a grade of C or better in a minimum of six credit hours in Geography)
GEOG 4750	Understanding Contemporary Environmentalism: Power and Discourse (Permission of the Instructor)
GEOG 4670	Human Dimensions of Wildlife (Department Head Approval)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3400	Introduction to Environment and Health (60 credit hours of university credit)
ENVR 3750	Green Building and Planning (ENVR 2000 and 57 credit hours)
ENVR 3850	Sustainable Manitoba (60 credit hours of course work)
ENVR 4050	Ecosystem Management (Department Head Approval)
ENVR 4650	Advanced Issues in Environmental Law and Policy (ENVR 3160)
ECON 3710	Sustainable Development: Issues and Policy (six credit hours of 1000 level Economics)
ANTH 2430	Ecology, Technology and Society
ANTH 2500	Culture, Environment, and Technology (ANTH 1220 or ANTH 1520) Please note: Students may not hold credit for both ANTH 2430 and ANTH 2500.
NATV 2000	Selected Topics in Native Studies (NATV 1200 or both NATV 1220 and NATV 1240)
NATV 2110	Introduction to Aboriginal Community (NATV 1200 or both NATV 1220 and NATV 1240) Students may not hold credit for both NATV 2110 and NATV 2000 (032.200) when titled "Introduction to Aboriginal Community Development."
NATV 4220	Environment, Economy and Aboriginal Peoples (Department Head Approval)
NATV 4240	Arctic Lifestyles (Department Head Approval)
POLS 2040(NLO)	Introduction to International Relations (6)
POLS 2504	Introduction to International Relations
POLS 3220(NLO)	Globalization and the World Economy (POLS 2040)
POLS 3250	International Political Economy (grade of "C" or better in one of: POLS 2504, or POLS 2045, or the former POLS 2040)
SOC 2390	Social Organization (SOC 1200)
SOC 2480	Population Problems (SOC 1200)
SOC 3460(T)	Special Topics: Building a Community Commons (SOC 1200)
SOC 3838	Ecology and Society (SOC 1200)
SOC 3840	Community and Social Reconstruction (SOC 1200)

* or AGECE 2370

Faculty members with expertise include: Drs. Bruce Erickson, Eric Collins and Dr. Michael Campbell

The study of water resources is gaining increasing attention as society recognizes the limitations that exist with this important renewable resource. Water resources are important to the environment generally in terms of being a critical factor in most biotic and abiotic processes. Ensuring a safe and healthy supply of water globally for human uses including household, agricultural, industrial, and recreational is the focus of this field of study. Careers in this area can be further explored through the EcoCanada website (www.eco.ca).

Selection of Relevant Courses:

ENVR 2180	Introductory Toxicology (BIOL 1030 and CHEM 1310 or CHEM 1320)
ENVR 2550	Environmental Chemistry (CHEM 1310)
ENVR 3000 (T)	Topics: Aquatic Ecosystem Services (Permission of department head, and 60 credit hours of university credit.)
ENVR 3180	Methods in Ecotoxicology (ENVR 2180 or BIOL 2380 or AGRI 2180, and a second year course in the Faculty of Science or the Faculty of Agricultural and Food Sciences that has a laboratory component)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3550(NLO)	Environmental Analysis (ENVR 2550 (C), or CHEM 2550 (C), or CHEM 2470 (C))
ENVR 4000(T)	Topics: Water Resource Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4000 (T)	Understanding Environmental Effects Monitoring (Department Head Approval and 60 credit hours of university credit)
ENVR 4180	Ecotoxicological Risk Characterization (ENVR 2180 or BIOL 2380 or AGRI 2180)
ENVR 4550	Aquatic Chemistry (ENVR 3550 or CHEM 3590)
GEOG 2310	Introduction to Process Hydrology (GEOG 1290 and PHYS 1020 or PHYS 1050 or MATH 1500 or MATH 1510 or MATH 1520 or MATH 1530)
GEOG 2540	Weather and Climate (three credit hours from Geography courses numbered at the 1000 level)
GEOG 4050	Ecosystem Management (Department Head Approval)
GEOG 4060	Biogeography (Department Head Approval)
GEOG 2930	Introduction to Oceanography (GEOG 1290 or GEOG 1200 or ENVR 1000 or GEOL 1340)
GEOG 3920	Biological Oceanography I: Lower Trophic Levels (GEOG 2930 and BIOL 1030)
GEOG 4930	Chemical Oceanography (ENVR 2550 and GEOG 2930)
GEOG 4960	Biological Oceanography II: Higher Trophic Levels (GEOG 3920 and a 2000- level BIOL course)
GEOL 2390	Environmental Geology (Minimum 3 credit hours of university-level geology or GEOG 1290)
BIOL 2210	The Chordates (BIOL 1030)
BIOL 2262	Biology of Algae (BIOL 1030)
BIOL 3370	Limnology (BIOL 2300*)
BIOL 3372	Wetland Ecology (BIOL 2300*)
BIOL 4210	Biology of Fishes (BIOL 2210 or BIOL 2231)
BIOL 4220	Marine Biodiversity (BIOL 2300* and one of STAT 1150 or STAT 1000)
BIOL 4310	Application of Population Ecology in Fisheries and Wildlife (BIOL 3310)
BIOL 4340(NLO)	Aquaculture (STAT 2000 or STAT 2001 (D); and consent of instructor)
BIOL 4374	Aquatic Botany (BIOL 2300*)
CHEM 3590	Instrumental Analysis (CHEM 2470)
SOIL 3520	Pesticides: Environment, Economics and Ethics
SOIL 3600	Soils and Landscapes in our Environment
SOIL 4060	Physical Properties of Soils (SOIL 3600 or BIOE 2110)
SOIL 4500	Remediation of Contaminated Land (SOIL 3600)
SOIL 4510	Soil and Water Management (SOIL 3600)

*or AGECE 2370

Faculty members with expertise include: Drs. Mark Hanson, Feiyue Wang, Rick Baydack, Tim Papakyriakou, Gary Stern, Eric Collins and CJ Mundy

Wildlife Management

Wildlife and ecosystem management continue to be dynamic and emerging fields in environmental science and studies. Wildlife management is the science and art of changing characteristics and interactions between animal populations, habitats, and humans to achieve specific societal goals. Ecosystem management addresses societal objectives for the broader consideration of all biological and abiotic components and their interacting processes in a defined geographical area. Both areas of study focus on reducing the loss of biological diversity. The Wildlife Society website (www.wildlife.org) provides additional details on career prospects and course requirements for Certification in these fields.

Selection of Relevant Courses:

ENVR 3010(T)	Field Topics in Environmental Science 1 (1.5) (Department Head Approval)
ENVR 3020(T)	Extended Field Topics in Environmental Science 1 (Department Head Approval)
ENVR 3250	Environmental Assessment (ABIZ 3550 or ENVR 3160 and BIOL 2300* or BIOL 2390)
ENVR 3850	Sustainable Manitoba (60 credit hours of course work)
ENVR 4000(T)	Wildlife Management (Department Head Approval and 60 credit hours of university credit)
ENVR 4020(T)	Extended Field Topics in Environmental Science 2 (Department Head Approval)
ENVR 4050	Ecosystem Management (Department Head Approval)
GEOG 3770 (T)	Environment and Tourism (Department Head Approval)
GEOG 4060	Biogeography (Department Head Approval)
GEOG 4350	Parks and Protected Areas Planning and Management: Field Studies (Department Head Approval)
GEOG 4670	Human Dimensions of Wildlife (Department Head Approval)
BIOL 2210	The Chordates (BIOL 1030)
BIOL 3242	Vascular Flora of Manitoba (BIOL 2240 or BIOL 2242)
BIOL 3310	Foundations of Population Ecology (BIOL 2300*; and one of STAT 1150 or STAT 2000)
BIOL 3312	Community Ecology (BIOL 2300*)
BIOL 3314	Field Ecology (BIOL 2300*; and one of STAT 1150 or STAT 2000 (D))
BIOL 3318	Boreal Ecology (one of BIOL 2300 or AGECE 2370 and one of STAT 1150, STAT 1000)
BIOL 3372	Wetland Ecology (BIOL 2300*)
BIOL 3350	Methods of Data Collection and Analysis in Ecology (BIOL 2300* and STAT 2000 (D))
BIOL 3600	Biological Diversity and Sustainability (BIOL 2300* or BIOL 1030 and BIOL 2390)
BIOL 4210	Biology of Fishes (BIOL 2210)
BIOL 4214	Biology of Amphibians and Reptiles (BIOL 2210)
BIOL 4216	Biology of Birds (BIOL 2210 and BIOL 3360)
BIOL 4218	Biology of Mammals (BIOL 2210 and BIOL 2300*)
BIOL 4220	Marine Biodiversity (BIOL 2300* and one of STAT 1150 or STAT 1000)
BIOL 4310	Application of Population Ecology in Fisheries and Wildlife (BIOL 3310)
SOIL 3600	Soils and Landscapes in our Environment
SOIL 4060	Physical Properties of Soils (SOIL 3600 or BIOE 2110)
SOIL 4500	Remediation of Contaminated Land (SOIL 3600)
SOIL 4510	Soil and Water Management (SOIL 3600)

* or AGECE 2370

Faculty members with expertise include:

Drs. Rick Baydack, David Walker, Michael Campbell, Mary Benbow and Lisa Loseto



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