# ENVIRONMENTAL SCIENCES - BACHELOR OF SCIENCE

## Overview

The Environmental Science Major provides an interdisciplinary foundation for understanding and addressing critical environmental challenges, including climate change and ecological sustainability. Students integrate concepts from Biology, Chemistry, and Earth Science, with coursework in ecology, environmental chemistry, environmental sciences, and geographic information systems (GIS). Emphasizing experiential learning and analytical skills, the program will equip students with knowledge, skills, and analytical tools to recognize the impact of human activity on the environment and to innovate solutions for maintaining ecological balance, reversing damage, and preventing future impact. Coursework from the major can be applied toward the Professional Geoscientist (P.Geo.), Professional Biologist (P.Biol.), or Professional Agrologist (P.Ag.) designations.

**Contact Information**

Department of Physical Sciences
Room 5-132, City Centre Campus
10700 - 104 Avenue
Edmonton, AB T5J 4S2
T: 780-497-4490

Arts and Science Academic Advising
Room 6-211, City Centre Campus
T: 780-497-4505
E: artsandscience@macewan.ca

## Bachelor of Science

*Faculty of Arts and Science*
MacEwan.ca/Science (http://MacEwan.ca/Science/)

The Bachelor of Science (BSc) is a foundational general degree that provides broad and widely applicable knowledge and abilities rather than a niche specialization. This broad base equips graduates with generalist knowledge and skills that give the flexibility and agility so highly valued in a dynamic world economy. It also offers students a solid foundation to specialize in future employment or further schooling.

The degree provides a breadth of study across various Arts and Science disciplines and sets the foundation for later years. The major and minor areas of study allow students to focus and gain in-depth expertise in complementary or entirely disparate disciplines; there is a wide array of possible combinations. Finally, options enable students to explore courses outside their disciplines or even within their program, enhancing their diversity of learning. The small classes, close interaction between instructors and students, opportunities for individual study, and faculty with a strong focus on teaching are signature strengths of this program.

### General Program Information

The BSc requires students to complete 120 credits of non-duplicative coursework. The BSc emphasizes breadth and depth and has been designed for exceptional flexibility and customization. Students can complete a major and a minor, a double major, or a major and two minors. Students can choose a secondary major in an Arts or Science discipline, but the primary major must be in a Science discipline.

All newly admitted students enter the BSc program as “Undeclared.” Undeclared means a student has not yet chosen their major(s) and minor(s). Students may declare at any time after being accepted to the BSc, and typically, they declare after completing a minimum of 45 credits. The Arts and Science Academic Advising Office will send information about majors and minors via email and newsletters; please contact the Advising Office if you require further assistance with this decision.

### Science Disciplines

| Discipline | Major | Minor | Honours |
|---|---|---|---|
| Applied Statistics | ◉ | - | ◉ |
| Biological Sciences | ◉ | ◉ | ◉ |
| Chemistry | ◉ | ◉ | - |
| Computer Science | ◉ | ◉ | - |
| Cybersecurity Studies | - | ◉ | - |
| Earth and Planetary Sciences | - | ◉ | - |
| Environmental Sciences | ◉ | ◉ | - |
| Mathematics | ◉ | ◉ | ◉ |
| Mathematical Sciences | ◉ | - | - |
| Planetary Physics | - | ◉ | - |
| Physical Sciences | ◉ | - | - |
| Physics | - | ◉ | - |
| Psychology | ◉ | ◉ | ◉ |
| Statistics | - | ◉ | - |

### Arts Disciplines

| Discipline | Major | Minor |
|---|---|---|
| Anthropology | ◉ | ◉ |
| Classics | | ◉ |
| Creative Writing | | ◉ |
| Economics | ◉ | ◉ |
| English | ◉ | ◉ |
| Film Minor for Arts and Science | | ◉ |
| French | | ◉ |
| Gender Studies | | ◉ |
| History | ◉ | ◉ |
| Indigegogy | | ◉ |
| Philosophy | ◉ | ◉ |
| Political Science | ◉ | ◉ |
| Sociology | ◉ | ◉ |
| Spanish | | ◉ |
| Urban Wellness | | ◉ |

## Out of Faculty Minors

| Discipline | Minor |
|---|---|
| Accounting Minor for Arts and Science | ◉ |
| Art History | ◉ |
| Arts and Cultural Management | ◉ |
| Business Law | ◉ |
| Business Studies | ◉ |
| Childhood, Youth, and Family Studies | ◉ |
| Digital Experience Design | ◉ |
| Finance Minor for Arts and Science | ◉ |
| Human Resources Minor for Arts and Science | ◉ |
| Marketing Minor for Arts and Science | ◉ |

## Laddering a Diploma into the Bachelor of Science

Students with an accredited diploma can ladder into the Bachelor of Science (BSc) and use some of their diploma coursework towards their degree requirements. If you have questions about the diploma laddering process, please visit www.macewan.ca/bscstudent or contact artsandscience@macewan.ca.

## Preparing for Professional Studies

Students intending to enter professional programs at other universities can take their pre-professional programs in the Faculty of Arts and Science at MacEwan University. The university offers the first and second years of several pre-professional programs, including chiropractic medicine, dental hygiene, dentistry, medical laboratory science, medicine, optometry, pharmacy, and veterinary medicine. All courses in these pre-professional programs are credit courses, and, as such, they may apply to the degrees offered by MacEwan University.

Students are advised to consult the admissions requirements for the universities and programs of their choice and to select their MacEwan University courses accordingly. Completing pre-professional courses at MacEwan University does not guarantee admission to the subsequent professional program. Each professional program requires a separate application, and entry is competitive, not automatic.

# Degree Requirements

## Breadth Requirements

All Bachelor of Science degrees require Breadth Requirements. Courses can satisfy both the breadth requirements and requirements for the major(s), minor(s), Honours, or options. BIOL, CHEM, EASC, or PHYS courses must include a laboratory component.

| Breadth Element | Description | Credits |
|---|---|---|
| Biological or Earth and Planetary Sciences | BIOL or EASC (not including BIOL 101, BIOL 102, or BIOL 103) | 6 |
| Chemistry or Physics | CHEM or PHYS | 6 |
| English | ENGL 102 and 3 credits in university English (not including ENGL 111, ENGL 108, or ENGL 211) | 6 |
| Humanities | CLAS, COMP, HIST, HUMN, PHIL or a language other than English | 6 |
| Mathematical Sciences | One of MATH 114, MATH 120, or MATH 125, and 3 credits in MATH, STAT, or CMPT (not including MATH 160, MATH 170, or CMPT 104) | 6 |
| Social Sciences | ANTH, ECON, GEND, LING, POLS, PSYC, or SOCI | 6 |

## Bachelor of Science Degree

| Program Element | Description | Credits |
|---|---|---|
| Primary Major | The Science major will range from 42 to 60 credits with a minimum 36 credits taken at the senior-level.[1] | 42-60 |
| Secondary Major or Minor(s) | Students have the option of completing a second Science or Arts major, or one or two minors. Minor courses must be completed at the senior-level.[1] | 18-60 |
| Options | Students can choose from Arts and Science courses or up to 18 credits in out-of-faculty options.[2] | Up to 60 |
| | Total Degree Credits Including Breadth | 120 |

[1] Multi-disciplinary majors consist of 60-84 junior- and senior-level credits. Students who declare a multi-disciplinary major may pursue a minor but are not required to do so.

[2] Students can take up to 3 credits from Physical Activity (PACT), Emergency Communications and Response (ECRP), Travel (TRVL), or Office Assistant (OAAS, OADM, OALS, or OAMS) to fulfill out-of-faculty options.

## Environmental Sciences Major

The Bachelor of Science (BSc) in Environmental Sciences requires the completion of 120 credits of non-duplicative coursework. As a multidisciplinary major, Environmental Sciences provides sufficient breadth and depth to allow students the option of not declaring a minor. To meet degree requirements, students must complete designated option courses. All BSc degrees are subject to Breadth Requirements. Individual courses may be used to satisfy both Breadth Requirements and requirements for the major, minor (if declared), or option courses.

The Environmental Sciences Major is 72 to 84 credits, with a maximum of 21 credits at the 100-level, a minimum of 18 credits at the 300-level, and 9 credits at the 400-level. Students must complete all Specific Major Requirements and choose 21 to 33 credits from the Major Electives.

NOTE: Students majoring in Environmental Sciences are required to complete prerequisite courses ECON 101, MATH 114, STAT 151, and POLS 244. These courses do not count towards the program of study but are used as Options and fulfill the Mathematics and Social Sciences Breadth Requirements for the Bachelor of Science.

**Bachelor of Science - Environmental Sciences Major**

| Code | Title | Credits |
|---|---|---|
| **Specific Major Requirements** | | |
| *Junior-Level Courses* | | |
| BIOL 108 | Introduction to Evolution | 3 |
| CHEM 101 | Introductory University Chemistry I | 3 |
| CHEM 102 | Introductory University Chemistry II | 3 |
| EASC 101 | Introduction to Physical Science | 3 |
| EASC 102 | Introduction to Environmental Earth Science | 3 |
| *Foundation Courses* | | |
| BIOL 208 | Principles of Ecology | 3 |
| CHEM 261 | Organic Chemistry I | 3 |
| CHEM 372 | Environmental Chemistry | 3 |
| or EASC 322 | Biogeochemistry | |
| EASC 221 | Introduction to Geographic Information Systems | 3 |
| EASC 226 | Introduction to Soil Science | 3 |
| EASC 323 | Hydrogeology | 3 |
| ENVS 200 | Introduction to Environmental Science | 3 |
| ENVS 496 | Environmental Science Capstone | 3 |
| SCIE 201 | Scientific Process: From Research Questions to Printed Manuscript | 3 |
| *Experiential Learning Courses* | | |
| Choose 3 credits (1 course) from the following: | | 3 |
| BIOL 492 | Field Placement | |
| CHEM 497 | Chemistry Internship Practicum | |
| ENVS 492 | Environmental Sciences Work Integrated Learning | |
| ENVS 494 | Environmental Sciences Work Integrated Learning | |
| ENVS 498 | Advanced Independent Study | |
| *Economics or Policy Studies* | | |
| ECON 369 | Economics of the Environment | 3 |
| or POLS 343 | Environmental Policy and Politics | |
| *Indigenous Studies* | | |
| ANTH 250 | Introduction to Indigenous Peoples in Canada | 3 |
| **Major Electives** | | |
| Choose 21 to 33 credits (7 to 11 courses) from the list of Major Electives (see below). | | 21-33 |
| **Minor** | | |
| Students have the option of completing a minor. Minor courses must be completed at the senior level. | | 0-18 |
| **Options (includes Breadth Requirements and Prerequisite Courses)** | | |
| ECON 101 | Introduction to Microeconomics | 3 |
| MATH 114 | Elementary Calculus I | 3 |
| STAT 151 | Introduction to Applied Statistics | 3 |
| POLS 244 | Introduction to Policy Studies | 3 |
| ENGL 102 | Analysis and Argument | 3 |
| Choose 3 credits (1 course) from the following (Breadth) | | 3 |
| ENGL 103 | Approaches to Literature: Trends and Traditions | |
| ENGL 104 | Approaches to Literature: Narrative Across Media | |
| ENGL 105 | Approaches to Literature: Contemporary Literature and Culture | |
| Choose 6 credits (2 courses) from CLAS, COMP, HIST, HUMN, PHIL or a language other than English (Breadth) | | 6 |
| Remaining option courses [1] | | 0-21 |
| **Total Credits** | | **120** |

[1] Students can take up to 3 credits from Physical Activity (PACT), Emergency Communications and Response (ECRP), Travel (TRVL), or Office Assistant (OAAS, OADM, OALS, or OAMS) to fulfill out-of-faculty options.

**List of Major Electives**

Choose 21 to 33 credits in Major Electives (see list below), including courses from at least three of the following six disciplinary categories: Biological Sciences, Chemistry, Earth and Planetary Sciences, Environmental Sciences, Physics, and the interdisciplinary grouping of Economics, Political Science, Sustainability, and Writing. Students may use up to 6 credits (two courses) from the interdisciplinary grouping of Economics, Political Science, Sustainability, and Writing to fulfill major requirements [2].

| Code | Title | Credits |
|---|---|---|
| **Biological Sciences** | | |
| BIOL 107 | Introduction to Cell Biology | |
| BIOL 207 | Principles of Genetics | |
| BIOL 211 | Introduction to Microbiology | |
| BIOL 245 | Fundamentals of Plant Biology | |
| BIOL 310 | Freshwater Ecology | |
| BIOL 312 | Terrestrial Ecology | |
| BIOL 314 | Population Ecology | |
| BIOL 316 | Community Ecology | |
| BIOL 337 | Biostatistics and Research Design | |
| BIOL 361 | Marine Biology | |
| BIOL 365 | Tropical Rainforest Ecology | |
| BIOL 367 | Conservation Biology | |
| BIOL 371 | Animal Behaviour | |
| BIOL 410 | Techniques in Field Ecology | |
| BIOL 414 | Invasion Ecology and Management | |
| BIOL 422 | Methods in Experimental Ecology | |
| BIOL 445 | Plant Symbiotic Interactions | |
| BIOL 467 | Advanced Conservation Biology | |
| BIOL 477 | Contemporary Issues in Freshwater Ecology | |
| BIOL 492 | Field Placement | |
| BIOL 495 | Special Topics | |
| BIOL 498 | Advanced Independent Study | |
| ZOOL 224 | Vertebrate Adaptations and Evolution | |
| ZOOL 241 | Animal Physiology I: Homeostasis | |
| ZOOL 242 | Animal Physiology II: Intercellular Communication | |
| ZOOL 250 | Invertebrate Zoology | |
| ZOOL 325 | Entomology | |
| **Chemistry** | | |
| CHEM 211 | Applied Analytical Chemistry | |
| CHEM 320 | Introduction to Geochemistry | |
| CHEM 372 | Environmental Chemistry [3] | |

| | |
|---|---|
| CHEM 472 | Environmental Fate of Organic Contaminants |
| CHEM 474 | Environmental Analytical Chemistry |
| CHEM 484 | Sustainable and Green Chemistry |
| **Earth and Planetary Science** | |
| EASC 219 | Mineralogy |
| EASC 225 | Introduction to Geomorphology |
| EASC 230 | Invertebrate Paleontology |
| EASC 238 | Geology of Natural Resources |
| EASC 240 | Sedimentology and Stratigraphy |
| EASC 271 | The Oceans |
| EASC 320 | Introduction to Geochemistry |
| EASC 321 | Structural Geology and Tectonics |
| EASC 322 | Biogeochemistry [3] |
| EASC 324 | Quaternary Environments |
| EASC 326 | Soil Chemistry |
| EASC 350 Geophysics | |
| EASC 373 | Anthropogenic Climate Change |
| EASC 375 | Paleoclimatology |
| EASC 334 | Remote Sensing |
| EASC 409 | Geology of Western Canada |
| **Environmental Sciences** | |
| ENVS 398 | Independent Study |
| ENVS 492 | Environmental Sciences Work Integrated Learning [3] |
| ENVS 494 Environmental Sciences Field Course [3] | |
| ENVS 495 | Special Topics in Environmental Sciences |
| ENVS 498 | Advanced Independent Study |
| **Physics** | |
| PHYS 124 | Physics for Life Sciences I |
| PHYS 126 | Physics for Life Sciences II |
| PHYS 144 | Mechanics |
| PHYS 146 | Electromagnetism |
| PHYS 224 | Fluids and Heat |
| PHYS 252 | Physics of the Earth |
| PHYS 261 | Physics of Energy |
| PHYS 495 | Special Topics in Physics and Astrophysics |
| **Economics, Political Science, Sustainability, and Writing Courses** | |
| ECON 261 | Introduction to Agricultural Economics |
| ECON 355 | Economics of Project Evaluation |
| ECON 365 | Resource Economics |
| ECON 366 | Energy Economics |
| ECON 369 | Economics of the Environment |
| ECON 467 | Environmental and Natural Resource Policy |
| POLS 343 | Environmental Policy and Politics |
| POLS 344 | Fundamentals of Policy Analysis |
| SUST 201 | Introduction to Sustainability |
| SUST 301 | Sustainability Challenges |
| SUST 302 | Systems Thinking |
| SUST 310 | Indigenous and Western Perspectives of Sustainability: Walking Side-by-Side |
| SUST 390 | Topics in Sustainability |
| WRIT 301 Writing Science | |

[2] Additional courses from the *Economics, Political Science, Sustainability, and Writing* interdisciplinary grouping can be used to fulfill option requirements within the BSc.

[3] Courses not used to fulfill the Specific Major Requirements can be used as a Major Elective.

## Environmental Sciences Minor

The Environmental Sciences Minor requires 18 credits (six courses) with a minimum of six credits (two courses) at the 300- or 400-level. Students are limited to a maximum of three courses from within one discipline to fulfill minor requirements. The requirement to take courses from different disciplines helps ensure the program's interdisciplinary nature.

| Code | Title | Credits |
|---|---|---|
| BIOL 208 | Principles of Ecology | 3 |
| EASC 221 | Introduction to Geographic Information Systems | 3 |
| ENVS 200 | Introduction to Environmental Science | 3 |
| Choose 9 credits (3 courses) from the following with no more than 6 credits (2 courses) in any one discipline (BIOL, CHEM, EASC, or ENVS) | | 9 |
| BIOL 310 | Freshwater Ecology | |
| BIOL 312 | Terrestrial Ecology | |
| BIOL 314 | Population Ecology | |
| BIOL 316 | Community Ecology | |
| BIOL 361 | Marine Biology | |
| BIOL 365 | Tropical Rainforest Ecology | |
| BIOL 367 | Conservation Biology | |
| BIOL 410 | Techniques in Field Ecology | |
| BIOL 414 | Invasion Ecology and Management | |
| BIOL 422 | Methods in Experimental Ecology | |
| BIOL 467 | Advanced Conservation Biology | |
| BIOL 477 | Contemporary Issues in Freshwater Ecology | |
| CHEM 372 | Environmental Chemistry | |
| CHEM 472 | Environmental Fate of Organic Contaminants | |
| CHEM 474 | Environmental Analytical Chemistry | |
| CHEM 484 | Sustainable and Green Chemistry | |
| EASC 225 | Introduction to Geomorphology | |
| EASC 226 | Introduction to Soil Science | |
| EASC 238 | Geology of Natural Resources | |
| EASC 271 | The Oceans | |
| EASC 320 | Introduction to Geochemistry | |
| EASC 321 | Structural Geology and Tectonics | |
| EASC 322 | Biogeochemistry | |
| EASC 326 | Soil Chemistry | |
| EASC 334 | Remote Sensing | |
| EASC 373 | Anthropogenic Climate Change | |
| EASC 375 | Paleoclimatology | |
| ENVS 300 | Principles of Environmental Science | |
| ENVS 398 | Independent Study | |
| ENVS 492 | Environmental Sciences Work Integrated Learning | |
| ENVS 495 | Special Topics in Environmental Sciences | |
| ENVS 498 | Advanced Independent Study | |
| **Total Credits** | | **18** |

# Degree Regulations

Students are strongly encouraged to seek advice from the faculty advisors about program planning.

## Academic Residency - Credit Requirements

In addition to the academic residency requirements of the University, while enrolled in the Bachelor of Science (BSc), students must complete at MacEwan University:

- A minimum of 24 credits at the senior-level in the major discipline, with 12 of those senior credits completed at the 300- or 400-level. All 400-level requirements are to be completed at MacEwan University.
- If applicable, a minimum of nine credits in a minor at the senior-level, with at least three of those credits completed at the 300- or 400-level.

Students with a previous MacEwan University credential are required to complete a minimum of 45 credits while enrolled in the BSc.

Students who hold a baccalaureate degree from another post-secondary institution must complete a minimum of 60 additional MacEwan University credits applicable to the BSc. Forty-five of these credits must be completed while the students is enrolled in the BSc. This credit requirement applies to students who began their studies at MacEwan University and completed a credential at another institution.

Students who interrupt their program and who must apply for readmission to the program will be required to comply with any new regulations upon resumption of their studies.

## Breadth Requirements

Courses taken to fulfil the major, minor, or option requirements can also be used to satisfy breadth requirements.

## Declaration of a Major and Minor

Students are advised to declare a primary major and minor, a primary major and a secondary major, a major and two minors, or a multi-disciplinary major by the time they have completed 45 credits. Primary majors are selected from Science disciplines and consist of 42 to 60 junior- and senior-level credits; multi-disciplinary majors consist of 60 to 84 junior- and senior-level credits. Students who declare a multidisciplinary major may pursue a minor but are not required to do so. Secondary majors can be from a Science or Arts discipline. Students cannot combine a major with a multidisciplinary major. Except for students in an Honours program, a maximum of 60 credits may be completed from any one discipline for credit towards the degree. A major and minor cannot be in the same discipline and students may not declare more than one out-of-faculty minor. Students can re-declare their major(s) and/or minor(s) if required.

For students completing multiple majors or minors, the Faculty cannot guarantee a schedule of classes that will permit students to complete their degree in eight consecutive fall and winter semesters. Furthermore, depending on the configuration of the student's degree, meeting the requirements for the degree may require the completion of more than 120 credits for graduation. Students are strongly encouraged to consult with an academic advisor in the Faculty of Arts and Science Advising Office and a discipline advisor in their major and minor prior to this declaration.

## Restricted Enrolment Courses

The Faculty of Arts and Science strives to accommodate all students wishing to enrol in a given course when it is appropriate to their program: however, classes in some courses must, for academic reasons, be restricted in size. If such a course is found to be oversubscribed, priority in registration will be given to those students whose programs may require it (e.g., majors, Honours, and/or minors) and then to other students as space permits.

## Graduation Grade Point Average

As part of the Graduation Grade Point Average regulation, Bachelor of Science students must obtain an overall GGPA of 2.0 or higher, with a minimum GPA of 2.0 on all courses credited toward the major(s) and a minimum GPA of 2.0 on all courses credited toward the minor(s).

## Graduation Requirements

Graduation requirements are governed by the date on which a student declares their major(s) and minor(s). Students who declare their major(s) and minor(s) on or before the published deadline are bound by the requirements of the current academic year. Those students who declare after this date are bound by the programs of study and degree requirements of the upcoming academic year as published in the MacEwan Academic Calendar.

## Junior - and Senior-Level Courses

Courses numbered from 100 to 199 are considered junior-level and courses numbered from 200 to 499 are considered senior-level.

## Major or Minor 300- and 400- Level Requirements

The 300- and 400-level requirements in the major or minor cannot consist solely of project, field placement, and/or individual study courses.

## Maximum Individual Learning Courses

The maximum number of credits for individual learning courses, including projects, field placement, internship, work-integrated learning, community-service learning, or independent study (excluding the Honours Thesis), is 15. Specific disciplines may have further restrictions.

## Maximum Junior-Level Courses

A maximum of 48 credits at the 100-level are permitted in completion of the B.Sc. degree. Additional courses at the 100-level are extra to the 120 credits required to complete the B.Sc. degree and will not be counted toward fulfilment of graduation requirements.

## Minimum Science Courses

Students are required to complete successfully a minimum of 72 total credits from Science courses.

## Minimum Passing Grade

A minimum grade of D or credit CR is required for all Science degree courses unless otherwise noted next to the appropriate course in the program of study.

## Minimum Transfer Grade for Credit

A minimum grade of D is required on any transfer credit granted for the program. Unless otherwise stated, Arts and Science courses require a minimum grade of C- when the course is used as a prerequisite. Transfer credit decisions made by the university are final and cannot be appealed.

## Out-of-Faculty Options Requirements

Students may take a maximum of 18 credits from courses offered by a MacEwan University Faculty or School other than Arts and Science. Students completing an out-of-faculty minor or laddering students who have met the minor requirements with a MacEwan University diploma

must complete their degree requirements from courses offered within the Faculty of Arts and Science or from the list of *Cross-Faculty Course Recognitions* in the Academic Calendar. Courses deemed as *Cross-Faculty Course Recognitions* are used to fulfill in-Faculty courses within the BSc and do not count as out-of-Faculty options.

### Progression of Studies

Students are responsible for ensuring they meet the prerequisite and/or co-requisite requirements as noted on all courses that may fulfill Bachelor of Science program requirements.

# Program Learning Outcomes

## Faculty of Arts and Science Degree-Level Learning Outcomes

*Thinking about knowledge is at the core of University education and learning within the Faculty of Arts and Science. Students develop capacities to "think-through" - to practice wonder, reflection, and engage in thoughtful inquiry and dialogue. Thinking-through involves questioning beyond the confines of one's immediate personal, social, and disciplinary surroundings. First, knowledge is acquired and understood. Learning moves beyond acquiring information and data to a formally disciplined manner of thinking about knowledge. Next, knowledge is interrogated by asking and answering questions, distinguishing between opinion and knowledge, and developing tools to assess reasons and evidence. Finally, knowledge is synthesized as students develop coherent arguments, and link ideas together beyond what is immediately apparent. Learning is a lifelong creative process of discovery and action that happens beyond the classroom and the degree. Our graduates interact with and contribute to their community by integrating and applying the research and communication skills and ways of knowing developed through their education. Learning outcomes capture the observable knowledge, skills, and abilities graduates acquire that are the foundation of learning.*

Graduates will demonstrate their ability to "think-through" by:

1. Analysing puzzles, problems, concepts, and theories.
2. Conceptualizing questions based on disciplinary knowledge.
3. Evaluating knowledge within and across disciplines in ways that acknowledge historical, cultural, and social contexts.

Graduates will demonstrate research and scholarship skills by:

1. Applying appropriate research skills and ethical principles.
2. Interpreting results appreciating the value and limits of conclusions.
3. Recognizing how research involves an ongoing process of reflection, dialogue, and reassessment.

Graduates will demonstrate diverse skills for communication by:

1. Conveying complex ideas coherently in a variety of formats.
2. Appraising information in ways that consider context and audience.
3. Interpreting the ideas and arguments of others in ways that reflect their knowledge, judgement, and comprehension.

Graduates will demonstrate durable skills necessary for learning beyond their degree by:

1. Collaborating with diverse groups.
2. Examining different perspectives and challenging biases and preconceptions.
3. Exploring the continuous impact and limitations of disciplinary knowledge and expertise.

## Environmental Sciences Major Program Learning Outcomes

Upon completion of a BSc with a major in Environmental Sciences, students will be able to:

1. Apply Environmental Sciences concepts to address real-world environmental issues and propose effective solutions by incorporating data and knowledge from appropriate subjects such as Biology, Chemistry, and Earth Sciences.

2. Gather and analyze environmental data in the field and the laboratory using appropriate tools and techniques.

3. Demonstrate proficiency in the use of standard laboratory equipment and classical laboratory techniques, and demonstrate knowledge in the use, theory, and application of modern chemistry laboratory techniques and instrumentation.

4. Effectively communicate environmental science concepts in styles and formats appropriate for the purpose and the audience, including local and Indigenous communities, regulators, and stakeholders.

5. Adopt ethical and environmentally responsible professional practices.

6. Develop hands-on experience through research projects, fieldwork, or work-integrated learning, providing a background in practical applications of environmental science to bridge theory with real-world solutions.

7. Analyze and evaluate the impacts of human activities on the environment, including air, soil and water pollution, climate change, habitat destruction, and resource management.

8. Collaborate effectively in teams by recognizing each member's diverse skills and knowledge while acknowledging the limitations of their own expertise.

9. Apply the principles of sustainability and be able to evaluate and balance the economic, social, and political impact of human activities on the environment.

# Student Plan

- The student plan provides a suggested course sequence with the minimum number of credits required for the major
- The suggested course sequence depends on course availability, the student's schedule, and the student's choice of minor(s) or secondary major
- It is highly recommended that students complete their Breadth Requirements by the end of year 2

| Year 1 | Credits |
|---|---|
| BIOL 108 | 3 |
| CHEM 101 | 3 |
| CHEM 102 | 3 |
| EASC 101 | 3 |
| EASC 102 | 3 |
| ECON 101 | 3 |
| ENGL 102 | 3 |
| MATH 114 | 3 |
| STAT 151 | 3 |
| Breadth requirement | 3 |
| | **30** |

| Year 2 | Credits |
|---|---|
| ANTH 250 | 3 |
| BIOL 208 | 3 |
| CHEM 261 | 3 |
| EASC 221 | 3 |
| EASC 226 | 3 |
| ENVS 200 | 3 |
| POLS 244 | 3 |
| SCIE 201 | 3 |
| Breadth, Option, Minor, or Major Requirements | 6 |
| | **30** |
| **Year 3** | **Credits** |
| EASC 323 | 3 |
| Choose 3 credits (1 course) from the following: | 3 |
| CHEM 372 | |
| EASC 322 | |
| Choose 3 credits (1 course) from the following: | 3 |
| ECON 369 | |
| POLS 343 | |
| Choose 9 credits (3 courses) from the list of Major Electives at the 300 level | 9 |
| Breadth, Option, Minor, or Major Requirements | 12 |
| | **30** |
| **Year 4** | **Credits** |
| ENVS 496 Environmental Science Capstone (in development) | 3 |
| Choose 3 credits (1 course) from the following: | 3 |
| BIOL 492 | |
| CHEM 497 | |
| ENVS 492 | |
| ENVS 494 Environmental Sciences Work Integrated Learning (in development) | |
| ENVS 498 | |
| Choose 3 credits (1 course) from the list of Major Electives at the 400 level | 3 |
| Choose 9 credits (3 courses) from the list of Major Electives | 9 |
| Breadth, Option, Minor, or Major Requirements | 12 |
| | **30** |

**Total Credits 120**

Applicants may be admitted to one of the following:

## Regular Admission

*To be evaluated through the Office of the University Registrar*

Applicants must have a minimum overall average of 65 percent, with no course grade lower than 50 percent, in the following high school courses:

1. ELA 30-1
2. Mathematics 30-1
3. Two of Biology 30, Chemistry 30, Mathematics 31, Physics 30, or Computing Science-Advanced Career and Technology Studies (5 credits)
4. One subject from Group A, B, C or D

**Notes:**

- A maximum of one Group D subject may be presented. Group D subjects used for admission must be 5-credit or any credit combination of at least 5 credits (e.g., two 3-credit subjects).

Applicants with nine to 23 university-level credits must also present a minimum Admission Grade Point Average (AGPA) of 2.0 on a 4.0 scale. Applicants with 24 or more university-level credits will be considered under Previous Post-Secondary Work.

## Mature Admission

*To be evaluated through the Office of the University Registrar*

Applicants must be Canadian Applicants, 20 years of age or older, and have been out of full-time high school at least one year by the beginning of the intake term. Applicants must have a minimum overall average of 60 percent, with no course grade lower than 50 percent, in the following high school courses:

1. ELA 30-1
2. Mathematics 30-1
3. Two of Biology 30, Chemistry 30, Mathematics 31, Physics 30, or Computing Science-Advanced Level Career and Technology Studies (5 credits)

Applicants with nine to 23 university-level credits must also present a minimum Admission Grade Point Average (AGPA) of 2.0 on a 4.0 scale. Applicants with 24 or more university-level credits will be considered under Previous Post-Secondary Work.

## Previous Post-Secondary Work

*To be evaluated through the Office of the University Registrar*

Admission in this category does not imply or guarantee the transfer of any coursework and/or credential unless a block transfer agreement (internal or external) is in effect and published in the calendar by the Office of the University Registrar. In addition, transfer of coursework does not imply or guarantee that an applicant will be admitted.

Applicants must have successfully completed the following:

- A minimum of 24 university-level credits, from a recognized institution, with a minimum Admission Grade Point Average (AGPA) of 2.0 on a 4.0 scale.
- The required mathematics and science courses listed under the Regular or Mature Admission category.

# Additional Admission Criteria

All applicants must meet the following:

## 1. English Language Proficiency

*To be evaluated through the Office of the University Registrar*

**Applicable to All Admission Categories**

All applicants must meet an acceptable level of English language proficiency. We will require official documents such as high school or post-secondary transcripts or proof of successful completion of standardized language evaluation. Full details are available in MacEwan University's academic calendar or online at MacEwan.ca/ELP (http://MacEwan.ca/ELP/).

## 2. Other Admission Criteria

*To be evaluated through the Office of the University Registrar*

**Applicable to All Admission Categories**

Applicants who have been assigned two unsatisfactory academic records within the past five years will not be considered for admission or re-admission to the program until a minimum three years from the date of the assignment of the last unsatisfactory academic record. For the purpose of admission or re-admission, an unsatisfactory record is defined as a transcript with the notation 'required to withdraw' or equivalent.

## 3. Internationally or Out-of-Province Educated Applicants

*To be evaluated through the Office of the University Registrar*

**Applicable to Regular and Mature admission categories**

The Office of the University Registrar will assess high school/senior secondary applicants' academic preparedness based on an informed consideration of the academic curriculum completed by the applicant.

General Admission Criteria for Internationally Educated Applicants or Applicants Educated Out of Province:

1. Senior Secondary school credential appropriate for entry to university in the system or country of education; and
2. Program-specific prerequisite admission subjects, which must be completed at the senior/grade 12 level or equivalent for program preparedness; and
3. Minimum average required for regular or competitive admission on all academic subjects successfully completed in the final year of secondary education.

# Environmental Sciences Courses

**ENVS 200**
**Introduction to Environmental Science**
**3 Credits Weekly (3-0-0)**
This course provides an introduction to the interdisciplinary nature of environmental science. Students will learn about the relationships between geological materials, air, water, soil, and ecosystems and the interconnections between biology, Earth science, and environmental science. Human interactions with the environment and environmental change will be examined on local and global scales by exploring issues such as climate change (past, present, and future), environmental pollution, environmental monitoring and remediation, endangered species, habitat loss, and land reclamation. Aspects of environmental policy and assessment will be introduced.
*Prerequisites: Minimum grades of C- in EASC 102 and in BIOL 108.*

**ENVS 300**
**Principles of Environmental Science**
**3 Credits Weekly (3-1.5-0)**
This course provides an introduction to the interdisciplinary nature of environmental science. Students will learn about the relationships between geological materials, air, water, soil, and ecosystems, and the interconnections between ecology, Earth science, and chemistry. Human interactions with the environment and environmental change will be examined on local and global scales by exploring issues such as climate change (past, present, and future), environmental pollution, environmental monitoring and remediation, endangered species, habitat loss, and land reclamation. Aspects of environmental policy and assessment will be introduced.
*Prerequisite: Minimum grades of C- in BIOL 208, EASC 102, EASC 221, and CHEM 261.*

**ENVS 398**
**Independent Study**
**3 Credits Total (0-0-72)**
This course permits an intermediate-level student to work with a faculty member to explore a specific topic in depth through research or through directed reading of primary and secondary sources. The student plans, executes, and reports the results of their research or study project under the direction of a faculty supervisor. To be granted enrollment in the course, the student must have made prior arrangements with a faculty member willing to supervise their project. This course can be taken twice for credit.

**ENVS 492**
**Environmental Sciences Work Integrated Learning**
**3 Credits Total (0-0-90)**
The student engages in work integrated learning in environmental sciences in a professional setting that would typically last for one semester. Any placement needs department approval. After the successful completion of the placement, there is a critical analysis/demonstration of the learning accomplished. The contact hours are a minimum of 90 hours but can involve more depending on the placement. Consent of the Department is required.

**ENVS 495**
**Special Topics in Environmental Sciences**
**3 Credits Weekly (0-0-3)**
This course involves reading, discussing, and critically evaluating current research on specialized topics in Environmental Science. Topics covered vary with the interests of students and faculty. Note: This course is intended for students in the final year of their degree. This course may be taken twice for credit, provided the course topic is different.

**ENVS 498**
**Advanced Independent Study**
**3 Credits Total (0-0-72)**
This course permits a senior-level student to work with a faculty member to explore a specific topic in depth through research or through directed reading of primary and secondary sources. The student plans, executes, and reports the results of their research or study project under the direction of a faculty supervisor. To be granted enrollment in the course, the student must have made prior arrangements with a faculty member willing to supervise their project. This course can be taken twice for credit.
*Prerequisites: A minimum grade of B- in at least one 300-level course in Biological Sciences, Chemistry, or Earth and Planetary Sciences; faculty mentors may require specific prerequisites according to the project needs.*