

EARTH SCIENCES

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Program Information

The Earth Sciences deal with the history of the Earth and its life, especially that which is recorded in rocks. Different component parts of the Earth system, the *lithosphere, biosphere, atmosphere and hydrosphere*, operate at different length and time scales. During interactions between the spheres there is feedback between the component parts as energy and mass are exchanged, transferred and redistributed. In a geological context, the feedback can occur on a global scale, or on very small scales such as that which we see in minerals. More recently humans have become a major force in this Earth system because we have intervened in many of these exchanges.

Considering the Earth's past, earth scientists typically work with long time scales (in the order of millions to billions of years). We also use Hutton's original philosophy of *uniformitarianism*, stated as the *present is the key to the past*, to solve geological problems. However, as we see changes at the Earth's surface (our environment) occurring on very short time scales we need to learn how to extract the anthropogenic signal. Once we understand and quantify the nature and extent of the Earth's natural evolution as well as our more recent environmental impact, earth scientists can help predict future changes to the Earth.

Earth Sciences provides the sciences that provide the quantitative data on the physical and chemical behaviour and characteristics of Earth materials - rocks, minerals, fluids and gases. These data are needed to model the behaviour of minerals in natural as well as many industrial systems. The theoretical and instrumental expertise needed to tackle

many resource extraction, mineral processing and environmental problems is resident in geo science departments. From a broad Earth, environmental and resource perspective our collective future will depend on sustainable use of our Earth's resources and care of the environment.

The three-year General program (comprising 90 credit hours) in Earth Sciences is designed to give students a basic understanding of the discipline in combination with a concentration of courses in a second subject area. The General Program is intended for those students who do not seek a career in the geosciences. Rather, it is a useful consideration for students planning to enter the Bachelor of Education program (see the Faculty of Education (<https://catalog.umanitoba.ca/undergraduate-studies/education/>) in this calendar) or other programs that require an undergraduate degree for admission. Students intending to pursue a career in the Earth Sciences or graduate study should hold an Honours or Major degree (comprising at least 120 credit hours) in Geology, Geophysics or Environmental Geoscience.

Professional Registration

The professional practice of geoscience in Canada is governed by provincial/territorial law and is regulated by professional geoscience associations. In Manitoba, Engineers Geoscientists Manitoba (EGM) regulates professional practice. The requirements for professional registration are acceptable academic preparation and a subsequent period of acceptable geoscience experience. Students considering professional registration should take the B.Sc. Honours or Major degree and make appropriate course selections, particularly in the basic sciences. Graduates who do not meet the academic requirements may be required by the professional association to take additional courses or examinations. Current registration information for EGM is available in the department or from the association's web site: www.enggeomb.ca (<http://www.enggeomb.ca>)

Earth Sciences Prerequisite Information

To fulfil prerequisite requirements, a grade of 'C' must be achieved in any course stipulated as a prerequisite to a further course in Earth Sciences unless otherwise stated. Please note that some GEOL courses require a minimum grade of 'C+' in the prerequisite course.

Programs

Degree/Diploma	Years to Completion	Total Credit Hours	Has Co-op Option
Earth Sciences, B.Sc. General (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/earth-sciences-bsc-general/)	3	90	
Earth Sciences Minor (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/earth-sciences-minor/)		18	
Environmental Geoscience, B.Sc. Honours (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/environmental-geoscience-bsc-honours/)	4	120	

Environmental Geoscience, B.Sc. Major (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/environmental-geoscience-bsc-major/)	4	120
Geology, B.Sc. Honours (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/geology-bsc-honours/)	4	120
Geology, B.Sc. Major (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/geology-bsc-major/)	4	120
Geophysics, B.Sc. Honours (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/geophysics-bsc-honours/)	4	120
Geophysics, B.Sc. Major (https://catalog.umanitoba.ca/undergraduate-studies/environment-earth-resources/earth-sciences/geophysics-bsc-major/)	4	120