Earth Sciences
Earth is our home. It is a dynamic planet, integrating and recording the effects of physical, chemical and biological processes operating at time scales from milliseconds to hundreds of millions of years. In order to preserve it, we need to first understand it.

Using a spectrum of equipment—from a hand lens, a rock hammer, or a computer, to sophisticated instruments such as mass spectrometers or electron microprobes—earth scientists investigate geologic processes and Earth’s evolution to help predict changes to both the surface and interior of the planet.

This challenging and varied scientific field provides critical data to help us understand and sustain our resources and our environment. Areas of potential study include:

- **Economic Geology**
  Economic geologists search for mineral and hydrocarbon deposits of economic value today and for the future. Knowledge of the Earth contributes to the cost-effective identification, exploration and development of new energy and mineral resources.

- **Paleontology**
  Paleontologists use fossils to study the evolution of organisms, their extinction patterns and their responses to paleoecological change, to better understand ancient paleoenvironments and enhance current environmental policies and practices.

- **Geophysics**
  Geophysicists use remote sensing methods such as seismic, magnetic, electric and gravimetric imaging to investigate the structure and processes of Earth’s subsurface. Geophysical models and techniques are used to explore for mineral, water and oil resources; to mitigate against earthquakes; and to select sites for dams and bridges.

- **Isotope Geology**
  Isotope Geology is a powerful tool for understanding topics as diverse as the evolution of unicellular organisms or the evolution of the solar system. Isotope geochemists study the nature and timing of physical and chemical processes within the Earth, environmental geoscience, and the interaction between the biosphere and geosphere.

**The Carleton advantage**
Carleton University’s Department of Earth Sciences has a reputation as one of the foremost centres for
solid earth sciences in Canada. We collaborate with the Geological Survey of Canada, the Canadian Museum of Nature, the Ontario Geological Survey, the Canada Centre for Remote Sensing, Environment Canada and the University of Ottawa. You will have access to the extensive libraries of these institutions, as well as to lectures and seminars by their scientists and visiting researchers.

Carleton even has its own mineral. The mineral, named Carletonite, was discovered in 1969 at Mount St. Hilaire, Quebec, by a professor in the Earth Sciences department.

**Hands-on learning**

At Carleton, we know that your in-class studies form only a part of the background needed to become a professional earth scientist. While the detailed structure of a mountain chain or the variety of minerals in the Canadian Shield can be described in the classroom, hands-on experience in the field remains vital to your training.

The Department of Earth Sciences offers several field courses, as well as co-operative education. Our field courses take place annually in Ontario and the Maritimes. Through field camps, you will acquire experience in mapping techniques, measuring sections, recording data and geological interpretation.

Capstone field courses, with an equivalent in-class 0.5 credit, involve the study of geology at world-class international locations; for example, recent field courses have taken place in Chile, Bahamas, Germany, Hawaii, Iceland, Antarctica, the Alps, Italy, Ireland and the southwest US. [earthsci.carleton.ca/field-schools](http://earthsci.carleton.ca/field-schools)

Your education can extend into summer or co-op work experience with industry or government that includes geological field work, geophysical field work, or applied or theoretical research.

**Earth Sciences scholarships**

Students entering the first year of an Earth Sciences program with a minimum 90 per cent admission average and who are involved in extracurricular activities may apply for the Collins Prestige Scholarship. The scholarship is valued at full tuition in first, second, third and fourth years as long as the student maintains an A- standing. An application is required. The deadline to apply is March 1. Visit our Awards Office for information regarding Prestige Scholarships. [carleton.ca/awards](http://carleton.ca/awards)
Two or more Collins Memorial Entrance Scholarships, valued at $1,000 to $4,000, will be awarded to students entering the first year of an Earth Sciences program. The scholarship is awarded in addition to the Prestige or other Entrance scholarships. No application is required, and eligible students will automatically be considered.

The capital advantage
Ottawa is an ideal place to study the earth sciences. Igneous and metamorphic rocks of the Gatineau Hills (across the Ottawa River in Quebec) are part of the resource-rich Canadian Shield formed in Precambrian times, and Paleozoic sedimentary rocks underlie Eastern Ontario.

Choosing the right program
Bachelor of Science (Honours)
Bachelor of Science (Major)
Bachelor of Science (General)
At Carleton, you have the option of taking a four-year Major or Honours degree, or a three-year General degree.

Honours degree programs
Carleton’s Honours program in Earth Sciences prepares you for a career in earth sciences or for graduate school. The program consists of 20.0 university credits, usually completed in four years. As an Honours student, you will need to maintain high grades and complete an independent research project in your final year.

In addition, Honours students may choose to add a concentration to their program in order to focus on a particular area of study.

Our concentration in Finance: Resource Valuation is designed for those who wish to pursue a professional career in the resource exploration and exploitation sectors, or in investment banking.

For those who wish to engage in focused study of the physics of the Earth’s structure and processes, we offer a concentration in Geophysics.

For students preparing for a career in industry, we offer a concentration in Resource Economics, in which you’ll acquire an important understanding of the economics of natural resources.

If you are interested in vertebrates such as dinosaurs, we offer a concentration in Vertebrate
Paleontology and Paleoecology, which includes a field course at sites where vertebrate fossils are excavated.

Major or General degree programs
The Major degree consists of 20.0 credits usually taken over four years, but does not include a research project in the final year; instead you’ll take additional geology courses at the fourth-year level. It provides professional training for employment in the mineral or oil and gas industries. It is generally not suitable for students considering graduate studies.

The General degree program consists of 15.0 credits usually taken over three years. It is ideal for those needing a general understanding of the earth sciences as background for a career in other areas such as business, resource management, environmental planning or teaching.

Combined degrees
If you have interests in more than one discipline, you may wish to consider a Combined Honours degree program. You may combine your studies in earth sciences with biology, chemistry, physical geography or geography. The combined program in geography can be completed with a formal concentration in Terrain Sciences. Combined Honours programs enable you to take an equal number of courses in each subject.

Many students enjoy the Combined Honours option because of the interdisciplinary nature of many outstanding problems in geology—these programs may lead to careers in, for example, geochemistry, geophysics and environmental geology.

Minor in Earth Sciences
The 4.0 credit Minor program in Earth Sciences: Earth Resources and Processes examines earth resources and the major geological processes that have shaped the planet’s geological history, including resource distribution and character. The Minor is available to students who are registered in degree programs other than those offered by the Department of Earth Sciences.

Co-op opportunities
If you are in the Honours program you may be admitted to our co-op program either directly from high school or at the beginning of your second year. This allows for profession-related employment during the course of your studies, but it will extend the time needed to complete the program. The
concentration in Finance: Resource Valuation does not currently offer a co-op option.

Core courses and electives
A typical first year of study consists of 5.0 credits, including mathematics, earth sciences and chemistry. One additional credit is chosen from science and one from arts and social sciences.

In years two and three, courses are offered in mineralogy, petrology (the study of rocks), field methods, paleontology (the study of ancient life), geophysics, paleogeography (the history of changing landscape of geological basins and landmasses), hydrogeology, sedimentology and tectonics (the study of the deformation of the Earth’s crust to form continents, oceans and mountain belts). In your final year, you are provided with a more in-depth analysis of areas of earth sciences, and opportunities for research.

Your first-year experience

A sample first year
- 1.0 credit in Exploring Planet Earth and The Earth System Through Time
- 1.0 credit in Elementary Calculus I and Linear Algebra I
- 1.0 credit in General Chemistry I and General Chemistry II
- 1.0 credit in Introductory Biology I and Introductory Biology II or 1.0 credit in Introductory Mechanics and Thermodynamics and Introductory Electromagnetism and Wave Motion
- 0.5 credit in Seminar in Science (NSCI 1000)
- 0.5 credit in an approved arts and social sciences elective

Future opportunities
The workplace
Carleton Earth Sciences graduates can be found:
- supervising diamond or gold exploration with a large mining company;
- interpreting geophysical and geological information to outline possible reservoirs of oil and gas;
- assessing earthquake hazards for engineering and construction purposes;
- studying fossil and modern organisms as indicators for environmental and climate change;
- measuring the stability of land around proposed dam and reservoir sites;
- helping to find suitable underground repositories for nuclear wastes; and
- teaching or carrying out curiosity based research.

Graduate studies
Graduates of the Honours program may also be eligible to go on to graduate studies in a variety of earth sciences fields.

Professional accreditation
The Major and Honours Earth Sciences programs satisfy current academic requirements for professional geoscience accreditation in Ontario.

Admission requirements
For admission to the Honours program in Earth Sciences, you must have the Ontario Secondary School Diploma (OSSD) or equivalent, including a minimum of six 4 U/M courses. Your six 4 U/M courses must include Advanced Functions or Calculus and Vectors, and two of Biology, Chemistry, Earth and Space Science, or Physics.

For admission to the Major or General program, you must have the Ontario Secondary School Diploma (OSSD) or equivalent, including a minimum of six 4 U/M courses. Your six 4 U/M courses must include Advanced Functions and two of Calculus and Vectors, Biology, Chemistry, Earth and Space Science, or Physics.

It is Carleton University policy to consider your best performance in any eligible course in the admissions assessment.

Since the number of qualified applicants may be greater than the number of available spaces, cut-off averages and required marks may vary. Please refer to our website at admissions.carleton.ca/requirements for the current admission requirements.

For more information
...about the Earth Sciences program at Carleton, please visit our website at earthsci.carleton.ca or consult the Carleton University Undergraduate Calendar at carleton.ca/cuuc.
Do you want more information? Please contact us at:

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This document is available in a variety of accessible formats upon request. A request can be made on the Carleton University website at: carleton.ca/accessibility/request.
For more information on all of Carleton’s undergraduate programs, visit

admissions.carleton.ca

where you can browse program descriptions, career possibilities, and electronic versions of all of our program guides. You can also check out financial aid options, book a tour, sign up for our monthly newsletter, watch Carleton videos, and connect with us on social media.

You may also wish to consult our current

Admissions Viewbook

We look forward to hearing from you!