Geoscientists interpret the natural world, bringing methods such as geophysics, geomechanics geochemistry, geobiology and field geology together to understand the ancient and modern EARTH

Clues concealed in rocks and minerals, fluids and fossils, mountains and sediments, glaciers and volcanoes are marshaled to explain and model the Earth System at all scales

Discovery, development and sustainability of water, mineral and energy resources as well as coping with climate change, human impact and natural hazards facing increasing global populations, all depend on a deep understanding of natural processes

Our graduates study the Earth in this context, with careers in diverse fields including research, mineral and oil exploration, mining and hydrocarbon extraction, policy analysis, surface and underground construction, environmental assessment, protection and rehabilitation, groundwater investigation and resource management

The programs offered by this department focus on the whole planet and consider all global processes within an integrated, dynamic system

for info on Geological Sciences at Queen's University, contact:

Department of Geological Sciences and Geological Engineering
Queen's University

Queens
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Contact Dr. Bob Dalrymple
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More information on the Department (including engineering programs and graduate research opportunities) is available at:

www.geol.queensu.ca

Choosing the Appropriate Geology Program (Plan)

Students wishing to complete a degree program designed to prepare them for a career or a higher degree in geology are encouraged to select one of the following 4-year Honours degrees:

- **B.Sc. (Honours) Major plan** is ideal for students who are interested in a career-oriented program in the geosciences that also allows a wide choice of supporting and elective courses.
- **B.Sc. (Honours, Geological Sciences) Specialization plan** provides the opportunity for a more intensive study of Geology and the supporting sciences. This plan is designed to lead easily to registration as a 'Professional Geoscientist', a designation of increasing professional importance.
- **B.Sc. (Honours, Environmental Geology) Subject of Specialization (SSP) program** is offered by the School of Environmental Studies and provides a broad exposure to environmental issues while focusing on environmental aspects of the earth sciences.

Students who are interested in geology but who do not wish to take one of the three career-oriented Honours science degrees described above may want to consider one of the following 3-year or 4-year programs that allow you to combine a geology minor (arts or science) with a major in another subject, or to take a 3-year degree in geology.

- **B.Sc. (Honours) Major-General program:** The Geology Minor (Science) plan is combined with a Major in a Science discipline or Mathematics to form a 4-year Major-General degree program.

- **B.Sc. General program:** The Geology Minor (Science) plan by itself, with a suitable number of appropriate electives, allows a student to obtain a 3-year General degree.

- **B.A. (Honours) Major-Minor program:** The Geology Minor (Arts) plan is combined with a Major in a Humanities or Social Science discipline to form a 4-year Major-Minor degree program.

- **B.A. Minor program:** The Geology Minor (Arts) plan taken by itself, with a suitable number of electives, allows a student to obtain a 3-year Minor degree.

The following pages provide detailed descriptions of the content of each of the several degree plans and programs that can be followed in Geology. The material presented below has been taken from the Arts and Science Calendar. Because the precise specification of the various plans and programs changes from time to time, please note that the Calendar contains the official description of what is required in each program type. This information can be found at:

http://www.queensu.ca/calendars/artsci/Geological_Sciences_Degree_Programs.html

Information on the available first-year courses in Geology are provided after descriptions of the various Geology plans.

The "Specialization" Plan in Geological Sciences [16.0 specified credits as listed below]

This plan, together with 4.0 elective credits, leads to a B.Sc. (Honours, Geological Sciences) degree.

THE "SPECIALIZATION" PLAN

Supporting Sciences and Mathematics

- a first-year credit (total 6.0 units) in Chemistry (CHEM 112/6.0 or CHEM 116/6.0)
- a first-year credit (total 6.0 units) in Mathematics- calculus (MATH 121/6.0 or MATH 120/6.0 or (MATH 123/3.0 and MATH 124/3.0) or MATH 120/6.0)
- a first-year credit (total 6.0 units) in either Biology or Mathematics(linear algebra) (BIOL 102/3.0; BIOL103/3.0; BIOL 110/3.0; BIOL 111/3.0; MATH111/3.0; Math 110/3.0)
- a first-year credit (total 6.0 units) in Physics (PHYS 104/6.0 or PHY 106/6.0 or PHYS 117/6.0)
- STAT 263/3.0 Introduction to Statistics
- 1.0 credits (total 6.0 units) selected from WRIT 175/3.0, or any of the sciences or Mathematics at the 200-level or above. (NOTE: The sciences include BIOL, CISC, PHYS, STAT and GPHY- Physical Geogrpahy and GPHY- Techniques and Research Methods (see listings in the Geography section of the Calendar). The only exceptions to the 200-level rule are CISC 101/3.0, CISC 121/3.0 and CISC 124/3.0.

Geology Courses

- GEOL-104/3.0 The Dynamic Earth
- GEOL-107/3.0 History of Life
- GEOL-200/3.0 Oceanography
- GEOL-221/3.0 Geological Field Methods
- GEOL-232/3.0 Introduction to Mineralogy
- GEOL-235/3.0 Genesis and Characterization of Solid Earth Materials
- GEOL-238/3.0 Surficial Processes, Sedimentation and Stratigraphy
- GEOL-249/3.0 Geophysical Characterization of the Earth
- GEOL-300/3.0 Geological Field School
- GEOL 321/3.0 Analysis of Rock Structures
- GEOL 337/3.0 Paleontology
- GEOL 365/3.0 Geochemical Characterization of Earth Processes
- one half-course (total 3.0 units) selected from GEOL 323/3.0, GEOL 333/3.0 or GEOL 478/3.0
- one half-course (total 3.0 units) selected from GEOL 323/3.0, GEOL 333/3.0, GEOL 362/3.0, GEOL 368/3.0, GEOL 421/3.0 or GEOL 478/3.0
- GEOL 488/3.0 Geology of North America

- 3.0 additional credits (total 18.0 units) in Geology, freely chosen, provided you have the necessary prerequisites.

NOTE: This degree is our most rigorously prescribed degree program. It is intended to lead to a career in the geological sciences, or to further education at the graduate level. The courses specified in this degree (exclusive of the 4.0 elective credits) are intended to permit easy registration as a "Professional Geoscientist" with the Association of Professional Geoscientists of Ontario (APGO), a designation that is becoming a necessity to ensure easy career advancement. However, acceptance of courses as fulfilling the APGO "Knowledge Requirements" is at the sole discretion of the APGO. Interested students should visit the APGO registration site at http://www.apgo.net/register-how.htm.

The "Major" Plan in Geological Sciences [12.0 specified credits as listed below]

This plan, together with 8.0 elective credits, leads to a B.Sc. (Honours, Geological Sciences) degree.

THE "MAJOR" PLAN

Supporting Sciences and Mathematics

- two credits (total 12.0 units) chosen from the following courses in Chemistry, Mathematics-calculus and Physic (CHEM 112/6.0 or CHEM 116/6.0; MATH 121/6.0 or MATH 120/6.0 or (MATH 123/3.0 and MATH 124/3.0) or MATH 120/6.0; PHYS 104/6.0 or PHY 106/6.0 or PHYS 117/6.0) (i.e., one from two of the three subject areas listed)
- STAT 263/3.0 Introduction to Statistics

Geology Courses

- GEOL-104/3.0 The Dynamic Earth
- GEOL-107/3.0 History of Life
- GEOL-200/3.0 Oceanography
- GEOL-221/3.0 Geological Field Methods
- GEOL-232/3.0 Introduction to Mineralogy
- GEOL-235/3.0 Genesis and Characterization of Solid Earth Materials
- GEOL-238/3.0 Surficial Processes, Sedimentation and Stratigraphy
- GEOL-249/3.0 Geophysical Characterization of the Earth
- GEOL-300/3.0 Geological Field School
- GEOL 321/3.0 Analysis of Rock Structures
- GEOL 365/3.0 Geochemical Characterization of Earth Processes
- GEOL 488/3.0 Geology of North America

- 2.5 additional credits (total 15.0 units) in Geology, freely chosen, provided you have the necessary prerequisites

NOTE: This degree is less rigorously prescribed than the Specialization plan described above. However, it is also intended to lead to a career in the Geological Sciences. Students who complete this degree program can also go on to graduate studies, but should elect to take additional geology courses as "electives". While this degree program does not lead to automatic fulfillment of the APGO "Knowledge Requirements" (the basis for registration as a Professional Geoscientist), students taking the Major degree can still meet those Knowledge Requirements by a judicious selection of elective courses. Interested students should visit the APGO registration site at http://www.apgo.net/register-how.htm.

The "Minor (Science)" Plan in Geological Sciences [8.0 specified credits, as listed below]

When taken on its own, together with 7.0 elective credits, leads to a three-year B.Sc. General degree in Geological Sciences. When combined with a Major plan in a science discipline or Mathematics, plus sufficient electives to total 120 credits, leads to a four-year B.Sc. (Honours) Major-General degree.

The "Minor (Science)" Plan

Supporting Sciences and Mathematics

- MATH121/6.0
- a first-year course in either Chemistry (CHEM 112/6,0 or CHEM 116/6.0) OR Physics (PHYS 106/6,0 or PHYS 117/6.0)

Geology Courses

- GEOL 104/3.0 The Dynamic Earth
- GEOL 107/3.0 History of Life
- GEOL 200/3.0 Oceanography
- GEOL 232/3.0 Introduction to Mineralogy
- GEOL 235/3.0 Genesis and Characterization of Solid Earth Materials
- GEOL 238/3.0 Surficial Processes, Sedimentation and Stratigraphy
- GEOL 249/3.0 Geophysical Characterization of the Earth
  OR GEOL 365/3.0 Geochemical Characterization of Earth Processes

- 2.5 additional credits (total 15.0 units) in Geology—These can be any Geology course, provided you have the necessary prerequisites.

NOTE: Neither of the degree programs that include the Minor (Science) plan is intended as preparation for a professional career as a geological scientist.

The "Minor (Arts)" Plan in Geological Sciences [6.0 specified credits, as listed below]

When taken on its own, together with 9.0 elective credits, leads to a three-year B.A. Minor degree in Geological Sciences. When combined with a Major plan in a humanities or social science discipline, plus sufficient electives to total 120 credits, leads to a four-year B.A. (Honours) Major-Minor degree.

The "Minor (Arts)" Plan

Supporting Science or Mathematics

- a first-year course (total 6.0 units) in Biology, Chemistry, Computing Science, Mathematics or Physics

Geology Courses

- GEOL 104/3.0 The Dynamic Earth
- GEOL 107/3.0 History of Life

- 4.0 additional credits (total 24.0 units) in Geology—These can be any Geology course, provided you have the necessary prerequisites.

NOTE: Neither of the degree programs that include the Minor (Arts) plan is intended as preparation for a professional career as a geological scientist.

A NOTE ABOUT FIRST YEAR COURSES IN GEOLOGY

This brochure is for information only. The official calendar text takes precedence.

Our First Year Offerings:

GEOL 104/3.0 The Dynamic Earth [3 hours lectures, 2 hours lab every other week]

An introduction to the internal structure of the earth and to the dynamic processes which have shaped the earth's surface. An integrated study of global tectonics and continental movement, rock genesis, mountain building, resource occurrence, glaciation and geological time. Laboratories give an overview of the earth scientist's toolbox including rock and mineral identification, geochronology, geomorphology and structural geology. A field trip to local exposures may be offered. GEOL 104 is required for entrance into any program of study in Geology.

NOTE: Lab manual and materials cost about $20. Course offered in both the fall and winter terms. EXCLUSION: APSC 151.

GEOL 106/3.0 Environmental Geology and Natural Hazards [3 hours lectures each week]

The relationship between human-kind and our ever-changing planet, with a focus on natural geologic hazards (volcanic eruptions, earthquakes, landslides, tsunamis, mass movement, floods, extraterrestrial impacts, etc.), and environmental impacts which result from population and land-use expansion and our increased use of water, energy and mineral resources. A study of the sources and impacts of pollution and global climate change. Public perception of and response to geological risk. GEOL 106 is not a required part of any Geology plan, but can be used toward the degree requirements in any Geology plan.

GEOL 107/3.0 History of Life [3 hours lectures each week, plus four 3-hour labs]

The history of life, from its inception four billion years ago to the present day, focusing on the inter-relationship between organic evolution and global change. Co-evolution of early life and the atmosphere; development of marine animals and their ecosystems; invasion of the land; dinosaurs and their world; mass extinctions; the Age of Mammals; and hominid evolution. GEOL 107 is a required course in all Geology programs.

NOTE 1: Of the above courses, only GEOL 104 and GEOL 107 are components of the Geology Core, and at least one of these is normally taken in first year. However, either GEOL 106 or GEOL 107 alone may be sufficient for entrance into 2nd year ONLY IF GEOL 104 is then taken immediately in 1st term of 2nd year and GEOL 107 (if not previously completed) is taken at some time during the program.

If possible, it is preferable to take GEOL 104 in first year (offered in the fall and again in winter).