



What are the Geological Sciences

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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:

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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

Students wishing to complete a degree program designed to train specialists in the Geological Sciences are encouraged to select one of the following two 4-year Honours degrees in Geology:

- **B.Sc. (Honours) Major concentration** 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) Subject of Specialization (SSP) program** provides the opportunity for intensive study of Geology and the supporting sciences. This program is designed to lead easily to registration as a Professional Geoscientist.

Students wishing to take a concentration in another discipline beside geology, but who still have a keen interest in learning more about the planet on which they live, may want to consider one of the following 4-year Honours programs (Geology Minor):

- **B.A. (Honours) Major-Minor concentration** (Geology forms the minor component of the degree program) allows a student whose primary interest is in the Humanities or Social Sciences to take a small group of fundamental geology courses. The Geology Minor degree requirements are combined with a Major in a Humanities or Social Science discipline to form a Major-Minor degree. The **B.A. (Honours) Major-General** concentration is similar, but here the Geology General degree requirements are combined with a Major in a Humanities or Social Science discipline to form a degree which has a somewhat larger Geology component.
- **B.Sc. (Honours) Major-Minor concentration** (Geology forms the minor component of the degree program) allows a student with a strong interest in another of the sciences to take a small group of fundamental geology courses. The Geology Minor degree requirements are combined with a Major in another science discipline to form a Major-Minor degree. The **B.Sc. (Honours) Major-General** concentration is similar, but here the Geology General degree requirements are combined with a Major in another science discipline to form a degree which has a somewhat larger Geology component.
- **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.

The Geology Department also offers the following three-year degree programs:

- **B.Sc. (General) concentration** provides a solid introduction to the Geological Sciences in a three-year degree that allows the student considerable flexibility in the selection of elective courses. The concentration requirements can also be combined with a Major degree in another discipline to form a Major-General degree (see above).
- **B.A. (Minor) concentration** provides access to a small group of fundamental geology courses and permits the student considerable flexibility in the selection of electives. The concentration requirements can also be combined with a Major degree in another discipline to form a Major-Minor degree (see above).

For general information about these various types of program, please visit:

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

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*/0.5 The Dynamic Earth [3 hours lectures, 2 hours lab each 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*/0.5 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-107*/0.5 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).

GEOLOGY DEGREE PROGRAMS

The following pages provide detailed descriptions of the content of each of the several degree 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 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

Both the Major and Subject of Specialization (SSP) degrees in Geological Science (Arts and Science) at Queen's University require students to take the Geology Core (the courses listed below), plus additional specified courses. All degrees also contain additional electives that are freely chosen by the student.

THE GEOLOGY CORE (5.5 full course credits)

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

ADDITIONAL SPECIFIED COURSES

- 1) A first-year course in calculus (normally MATH 121) is required in all programs except the Minor.
- 2) A first-year course in chemistry (CHEM-112 or CHEM-116) and physics (PHYS-104 or PHYS-106 or PHYS-107) is required in all programs except the General program, where only one of these two courses must be taken (see notes for specific programs).

ELECTIVES

- 1) You will require some number of freely chosen GEOL courses (the number required depends on your program). In the SSP degree, you also must take 1.0 credit in other specified departments (see more below).
- 2) Your remaining courses are free electives (any department, provided prerequisites have been fulfilled).

BSCH-SSP Bachelor of Science (Honours, Geological Sciences) -BSCH Subject of specialization –SSP [16 specified credits and 4 elective credits]

- a first-year credit in Chemistry (CHEM 112 or CHEM 116)
- a first-year credit in Mathematics (calculus; MATH 121 or equivalent)
- a first-year credit in either Biology or Mathematics(linear algebra)
- a first-year credit in Physics (PHYS 104 or PHY 106 or PHYS 107)
- the Geology Core Program (5.5 credits; see above)
- GEOL 337* Paleontology
- one half-course selected from GEOL 323*, 333* or 478*
- one half-course selected from GEOL 323*, 333*, 362*, 368*, 421* or 478*
- GEOL 488* Geology of North America
- GEOL 543 Research and Thesis
- STAT 263* Introduction to Statistics

-2.0 additional credits in Geology

-1.0 credits selected from the sciences, Mathematics or WRIT 175* (NOTE: These science and Mathematics courses should be at the 200-level or above. Some Geography courses are considered to be science courses: these include all courses in the categories of Physical Geography or Techniques and Research Methods (see listings in the Geography section of the Calendar). The only exceptions to the 200-level rule are CISC 101* and CISC 124*.)

-4.0 elective credits

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). 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>.

BSCH-MAJ Bachelor of Science (Honours, Geological Sciences)-BSCH Major–MAJ

[12.0 specified credits; 8.0 elective credits]

- a first-year credit in Chemistry (CHEM 112 or CHEM 116)
 - a first-year credit in Mathematics (calculus; MATH 121 or equivalent)
 - a first-year credit in Physics (PHYS 104 or PHYS 106 or PHYS 107)
 - the Geology Core Program (5.5 credits; see above)
 - GEOL 488* Geology of North America
 - STAT 263* Introduction to Statistics
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- 2.5 additional credits in Geology
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- 8.0 elective credits

NOTE: This degree is less rigorously prescribed than the Subject of Specialization (SSP) degree program 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 General Program [8.0 specified credits]

- MATH121
 - a first-year course in Chemistry (CHEM 112 or CHEM 116)
 OR Physics (PHYS 106 or PHYS 107)
 - GEOL 104* The Dynamic Earth
 - GEOL 107* History of Life
 - GEOL 200* Oceanography
 - GEOL 221* Geological Field Methods
 - GEOL 232* Introduction to Mineralogy
 - GEOL 235* Genesis and Characterization of Solid Earth Materials
 - GEOL 238* Surficial Processes, Sedimentation and Stratigraphy
 - GEOL 249* Geophysical Characterization of the Earth
 OR GEOL 365* Geochemical Characterization of Earth Processes
 - GEOL 300* Geological Field School
 - GEOL 321* Analysis of Rock Structures
- 1.0 additional credits in Geology

NOTE: This degree specification can be used in three different degree programs:

- 1) As a stand-alone 3-year B.Sc. degree. To obtain this degree, the student must add 7.0 elective credits. Such a degree is not intended as preparation for a career in the geological sciences.
- 2) Combined with a Major degree program in a humanities or social science discipline, to produce a Bachelor of Arts (Honours) Major-General degree. In this pattern, the additional 11.0 credits will largely be specified by the Major program, although there may be a small number of elective credits.
- 3) Combined with a Major degree program in another science discipline, to produce a B.Sc. (Honours) Major-General degree. In this pattern, the additional 12.0 credits will largely be specified by the Major program, although there may be a small number of elective credits.

No degree that contains the General Geology program is intended as preparation for a professional career as a geological scientist.

The Minor Program [6.0 specified credits]

- 1.0 credits in any of Biology, Chemistry, Computing, Mathematics or Physics
- GEOL 104* The Dynamic Earth
- GEOL 107* History of Life

- 4.0 additional credits in Geology

NOTE: This degree specification can be used in three different degree programs:

- 1) As a stand-alone 3-year Bachelor of Arts degree. To obtain this degree, the student must add 9.0 elective credits.
- 2) Combined with a Major degree program in a humanities or social science discipline, to produce a Bachelor of Arts (Honours) Major-Minor degree. In this pattern, the additional 13.0 credits will largely be specified by the Major program, although there may be a small number of elective credits.
- 3) Combined with a Major degree program in another science discipline, to produce a Bachelor of Science (Honours) Major-Minor degree. In this pattern, the additional 14.0 credits will largely be specified by the Major program, although there may be a small number of elective credits.

No degree that contains the Geology Minor is intended as preparation for a career as a geological scientist.

This description is intended as a guide. See

http://www.queensu.ca/calendars/artsci/Bachelor_of_Arts___BA_12.html

for the official calendar description of the Geology Minor. For more general information about the various degree programs that might involve the Geology Minor, please follow the various links at

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