

# GEOLOGY

**Department Website:** <https://smu.ca/academics/departments/geology.html>

**Department Email:** [geology@smu.ca](mailto:geology@smu.ca)

We are directly dependent on the Earth for our survival. Geology is the study of the Earth, its materials, the processes that affect its surface and interior, and the history of change that it has undergone. For students enrolled in the Bachelor of Science degree program with a Concentration, Major, or Honours in Geology, the Department offers a full program of courses. Many of these courses may also be taken by students majoring in other science subjects. A combined geology/geography program emphasizes environmental aspects of geology and a program combining geology and business studies emphasize the economic aspects of the Earth. In addition, a number of courses are offered for non-science students, emphasizing global aspects of geology, Earth history, and the interactions between the Earth and human society.

Science students interested in geology, including those who are planning to pursue the double majors and honours programs in geology, should take Understanding the Earth (GEOL 1200) and The Dynamic Earth (GEOL 1201). This course provides a broad survey of the discipline, with practical experience provided through labs and field trips. Courses in mineralogy (Mineralogy (GEOL 2301), Optical Mineralogy (GEOL 2302)) and the sedimentary environments (Sedimentology (GEOL 2325)) are also recommended as supporting science subjects for students majoring in other sciences.

Planet Earth: Atlantic Canada Perspective (GEOL 1202), Earth History: Atlantic Canada Perspective (GEOL 1203), Global Change (GEOL 1206), Environment, Radiation and Society (GEOL 1207), Environmental Geology: Atlantic Canada Perspective (GEOL 1208) and Dinosaurs and Their World (GEOL 1210) are designed chiefly for students in Commerce and Arts, including Atlantic Canada Studies. Of these, only Global Change (GEOL 1206), Environment, Radiation and Society (GEOL 1207) and Environmental Geology: Atlantic Canada Perspective (GEOL 1208) can be used as Science credits. In exceptional cases where a student has taken Planet Earth: Atlantic Canada Perspective (GEOL 1202) and Earth History: Atlantic Canada Perspective (GEOL 1203) (previously GEOL 204.0) with high standing, those courses may, with the permission of the Department, be accepted in the Geology Major or Honours program in lieu of Understanding the Earth (GEOL 1200) and The Dynamic Earth (GEOL 1201).

Students in the Geology Major and Honours programs should seek the advice of the Department as to their elective and supporting courses. Year 4 students are encouraged to participate in the research projects being carried out in the Department. Under special circumstances, some prerequisites for 3000 and 4000-level courses may be waived with the permission of the Department.

## Programs

The Bachelor of Science (B.Sc.) is a well-established, foundational degree and requires the requirements listed below alongside general graduation requirements (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science/>).

## Major in Geology

The requirements for the degree of Bachelor of Science with Major apply as listed in this Academic Calendar under the heading of

Faculty of Science, Bachelor of Science – Major (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science--major/>). The specific list of forty-eight (48) required credit hours in the Major subject used to satisfy 6(d) is provided below:

| Code                                 | Title                                      | Credit Hours |
|--------------------------------------|--|--------------|
| GEOL 1200                            | Understanding the Earth                    | 3            |
| GEOL 1201                            | The Dynamic Earth                          | 3            |
| GEOL 2301                            | Mineralogy                                 | 3            |
| GEOL 2302                            | Optical Mineralogy                         | 3            |
| GEOL 2305                            | Geophysics                                 | 3            |
| GEOL 2325                            | Sedimentology                              | 3            |
| GEOL 3300                            | Field Methods                              | 3            |
| GEOL 3312                            | Igneous Petrology                          | 3            |
| GEOL 3313                            | Metamorphic Petrology                      | 3            |
| GEOL 3323                            | Palaeontology: History of Life             | 3            |
| GEOL 3326                            | Sedimentary Petrology and Stratigraphy     | 3            |
| GEOL 3413                            | Structural Geology                         | 3            |
| GEOL 3453                            | Principles of Geochemistry                 | 3            |
| GEOL 4441                            | Mineral Resources                          | 3            |
| or GEOL 4466                         | Petroleum Geology                          | 3            |
| Select six credits of the following: |  | 6            |
| GEOL 3305                            | Geomatics                                  |              |
| GEOL 3340                            | Principles of Hydrogeology                 |              |
| GEOL 3410                            | Environmental Impact Assessment            |              |
| GEOL 3454                            | Applied Geochemistry                       |              |
| GEOL 4301                            | Geological Mapping                         |              |
| GEOL 4400                            | International Field Camp                   |              |
| GEOL 4414                            | Tectonics                                  |              |
| GEOL 4423                            | Advanced Palaeontology                     |              |
| GEOL 4442                            | Economic Geology Field School              |              |
| GEOL 4450                            | Advanced Igneous and Metamorphic Petrology |              |
| GEOL 4465                            | Advanced Sedimentology                     |              |
| GEOL 4800 -                          | Special Topics and Directed Study          |              |
| GEOL 4899                            |  |              |
| Total Credit Hours                   |  | 48           |

The suggested sequence of courses for years 1 and 2 is available online on the Faculty of Science website listings for Program Requirement Tables (<https://smu.ca/academics/science-program-requirement-tables.html>). Students should consult with a Science Advisor or the Department Chairperson for course selections and the suggested best sequence of courses for years 3 and 4.

## Geology Major for Professional Registration Qualification

The Geoscience Profession Act was proclaimed in Nova Scotia in March 2003. This Act requires that one be a member in good standing of The Association of Professional Geoscientists of Nova Scotia (or another provincial counterpart) in order to work in geoscience-related fields in this province. For the 2014-2017 period, the requirements for professional registration are summarized by the Canadian Council of Professional Geoscientists (CCPG) at: [geoscientistscanada.ca](http://geoscientistscanada.ca) (<http://geoscientistscanada.ca>)

Geology Major students who wish to qualify for professional registration should complete the following program which combines all elements of the GEOL Major plus those which satisfy the Canadian Council of Professional Geoscientists (CCPG) knowledge requirements.

| Code   | Title                                      | Credit Hours |
|--|--|--------------|
| <b>Core Program</b>  |  |              |
| GEOL 1200  | Understanding the Earth                    | 3            |
| GEOL 1201  | The Dynamic Earth                          | 3            |
| GEOL 2301  | Mineralogy                                 | 3            |
| GEOL 2302  | Optical Mineralogy                         | 3            |
| GEOL 2305  | Geophysics                                 | 3            |
| GEOL 2325  | Sedimentology                              | 3            |
| GEOL 3300  | Field Methods                              | 3            |
| GEOL 3312  | Igneous Petrology                          | 3            |
| GEOL 3313  | Metamorphic Petrology                      | 3            |
| GEOL 3323  | Palaeontology: History of Life             | 3            |
| GEOL 3326  | Sedimentary Petrology and Stratigraphy     | 3            |
| GEOL 3413  | Structural Geology                         | 3            |
| GEOL 3453  | Principles of Geochemistry                 | 3            |
| GEOL 4441  | Mineral Resources                          | 3            |
| GEOL 4466  | Petroleum Geology                          | 3            |
| Select 15 credit hours (five courses) of the following (including the above list): |  | 15           |
| GEOL 3305  | Geomatics                                  |              |
| GEOL 3340  | Principles of Hydrogeology                 |              |
| GEOL 3410  | Environmental Impact Assessment            |              |
| GEOL 3454  | Applied Geochemistry                       |              |
| GEOL 4301  | Geological Mapping                         |              |
| GEOL 4400  | International Field Camp                   |              |
| GEOL 4414  | Tectonics                                  |              |
| GEOL 4423  | Advanced Palaeontology                     |              |
| GEOL 4442  | Economic Geology Field School              |              |
| GEOL 4450  | Advanced Igneous and Metamorphic Petrology |              |
| GEOL 4465  | Advanced Sedimentology                     |              |
| GEOL 4550  | Honours Project GEOL <sup>1</sup>          |              |
| <b>Mandatory Science Foundation Requirements</b>                                   |  |              |
| MATH 1250  | Calculus for Life Sciences I               | 3            |
| or MATH 1210 Introductory Calculus I   |  |              |
| CHEM 1210  | General Chemistry I                        | 3            |
| PHYS 1000  | Physics for Life Sciences I                | 3            |
| or PHYS 1210 University Physics I  |  |              |
| Select an additional 18 credits of foundational science courses <sup>2</sup>       |  | 18           |
| Total Credit Hours   |  | 87           |

<sup>1</sup> For students in the Honours Program only.

<sup>2</sup> In the following subject areas: MATH, PHYS, CHEM, CSCI, BIOL; with no more than six (6) credit hours in any one subject area, and at least three (3) credit hours in MATH or CSCI.

The suggested sequence of courses for years 1 and 2 is available online on the Faculty of Science website listings for Program Requirement Tables (<https://smu.ca/academics/science-program-requirement-tables.html>). Students should consult with a Science Advisor or the

Department Chairperson for course selections and the suggested best sequence of courses for years 3 and 4.

## Honours in Geology

The requirements for the degree of Bachelor of Science with honours apply as listed in this *Academic Calendar* under the heading of Faculty of Science, Bachelor of Science – Honours (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---honours-double-honours/>). The specific list of required credit hours used to satisfy 11(a) include:

- Mandatory core courses for the Major;
- Honours Project GEOL (GEOL 4550) (Students must secure a supervisor for the honours project before applying to the honours program);
- Sufficient GEOL courses for a minimum of sixty (60) credit hours, of which only six (6) credit hours may be at the 1000-level.

## Double Major and Double Honours in Geology

Students may pursue a double major (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---double-major/>) in Geology and another science subject. Students may also pursue a double honours (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---honours-double-honours/>) in Geology and another science subject.

Students taking a double major are required to take at least thirty-six (36) credit hours in geology from the following list, and students taking a double honours are required to take at least forty-two (42) credit hours from the same list. (The course listing that follows has three courses added to it: Geomorphology (GEOL 2373); Geological Mapping (GEOL 4301); and International Field Camp (GEOL 4400).)

| Code      | Title                                  | Credit Hours |
|-----------|--|--------------|
| GEOL 1200 | Understanding the Earth                | 3            |
| GEOL 1201 | The Dynamic Earth                      | 3            |
| GEOL 2301 | Mineralogy                             | 3            |
| GEOL 2302 | Optical Mineralogy                     | 3            |
| GEOL 2305 | Geophysics                             | 3            |
| GEOL 2325 | Sedimentology                          | 3            |
| GEOL 3300 | Field Methods                          | 3            |
| GEOL 3305 | Geomatics                              | 3            |
| GEOL 3312 | Igneous Petrology                      | 3            |
| GEOL 3313 | Metamorphic Petrology                  | 3            |
| GEOL 3323 | Palaeontology: History of Life         | 3            |
| GEOL 3326 | Sedimentary Petrology and Stratigraphy | 3            |
| GEOL 3340 | Principles of Hydrogeology             | 3            |
| GEOL 3410 | Environmental Impact Assessment        | 3            |
| GEOL 3413 | Structural Geology                     | 3            |
| GEOL 3453 | Principles of Geochemistry             | 3            |
| GEOL 3454 | Applied Geochemistry                   | 3            |
| GEOL 4301 | Geological Mapping                     | 3            |
| GEOL 4400 | International Field Camp               | 3            |
| GEOL 4414 | Tectonics                              | 3            |

|           |  |   |
|-----------|--|---|
| GEOL 4423 | Advanced Palaeontology                     | 3 |
| GEOL 4441 | Mineral Resources                          | 3 |
| GEOL 4442 | Economic Geology Field School              | 3 |
| GEOL 4450 | Advanced Igneous and Metamorphic Petrology | 3 |
| GEOL 4465 | Advanced Sedimentology                     | 3 |
| GEOL 4466 | Petroleum Geology                          | 3 |
| GEOL 4475 | Glaciers and Glaciation                    | 3 |

## Cooperative Education in Geology

This program, which is available at both the major and Honours level, integrates on-the-job experience and academic studies. Upon completion of one of the Cooperative Education programs, the student receives the Bachelor of Science degree in geology, at the major or Honours level, with the added qualification of “Cooperative Education”.

Further details and regulations on the Cooperative Education program (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/cooperative-education-programs-major-honours/>) are found in the Faculty of Science listing in this Calendar.

## Concentration in Geology

Students may choose to obtain a B.Sc. General with a Concentration in Geology (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---general-w-concentration/>). Students must complete thirty (30) credit hours in GEOL courses with no more than twelve (12) credit hours at the 1000-level.

## Minor in Geology

It is possible to combine a minor in Geology with a major in another discipline within or outside the Faculty of Science. To obtain a minor in Geology, students must complete thirty (30) credit hours in GEOL courses, according to 9(b) (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science---major-minor/>) of this *Calendar*, including Understanding the Earth (GEOL 1200) and The Dynamic Earth (GEOL 1201), with no more than twelve (12) credit hours at the 1000-level.

## Combined Programs

The Bachelor of Science (B.Sc.) is a well-established, foundational degree and requires the requirements listed below alongside general graduation requirements (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/bachelor-science/>).

## Geology/Geography Combined Programs

### Geology/Geography Major Program

| Code   | Title  | Credit Hours |
|--|--|--------------|
| Select at least 36 credits from the list of geology courses under ‘Double Major and Honours’ |  | 36           |
| Select at least 36 geography credits including the following:                                |  | 36           |
| GEOG 1100  | Global Perspectives on Land and Life                               |              |
| GEOG 1200  | People, Place and Environment                                      |              |
| GEOG 2306  | Geospatial Concepts  |              |
| GEOG 2325  | Sedimentology  |              |
| GEOG 2313  | Geomorphology  |              |
| GEOG 2386  | Introduction to Mapping and Geographical Information Systems (GIS) |              |

|   |                           |    |
|---|---------------------------|----|
| Select at least 12 credits of the following:                              |                           | 12 |
| GEOG 2305   | The Oceans: Physical Geog |    |
| GEOG 2333   | Biogeography              |    |
| GEOG 3343   | Weather and Climate       |    |
| GEOG 4413   | Coastal Geomorphology     |    |
| GEOG 4423   | Glaciers and Glaciation   |    |
| GEOG 4443   | Natural Hazards           |    |
| Select six additional credit hours in geography from Group B or C courses |                           | 6  |
| Total Credit Hours  |                           | 90 |

## Geology/Geography Honours Program

In addition to the above requirements, Honours students must complete:

| Code  | Title                         | Credit Hours |
|---|-------------------------------|--------------|
| GEOL 4550   | Honours Project GEOL          | 3,6          |
| or GEOG 4526 Honours Thesis   |                               |              |
| Select six additional credit hours in geology from the list of geology courses under “Double Major and Honours” |                               | 6            |
| GEOG 4406   | Capstone Seminar in Geography | 3            |
| GEOG 4416   | Seminar in Applied Geography  | 3            |
| Total Credit Hours  |                               | 15-18        |

In the Honours Bachelor of Science geology/geography program, topics for Honours projects should be approved by both Departments and may be carried out in either Department.

## Geology/Business Studies Combined Programs

The Department of Geology and the Faculty of Commerce offer a double major/Honours science degree combining a major/Honours program in geology with a major program of business studies in the Faculty of Commerce.

This program offers Bachelor of Science major and Bachelor of Science Honours degrees, under the general requirements of the Faculty of Science. For a combined major degree, students will be required to take a minimum of forty-two (42) credit hours in the Faculty of Commerce in addition to at least thirty-six (36) credit hours in geology. In the Honours program, a thesis on a field interrelating the two disciplines will be required. Students enrolled in the combined geology/business studies major/Honours may also pursue a co-op option in this dual program. The program appeals to geology students with an interest in the business-related aspects of their major. The geology/business studies major program requires a minimum grade point average (GPA) of 2.20 in all Geology and commerce courses while the geology/business studies Honours program requires (a) a minimum grade of C in all geology and commerce courses; and (b) a minimum GPA of 3.00 in these same courses.

The following courses are required for the Geology/Business Studies Major (B.Sc.):

## Commerce Faculty Requirements

| Code               | Title                               | Credit Hours |
|--------------------|-------------------------------------|--------------|
| ACCT 2241          | Introductory Financial Accounting   | 3            |
| ACCT 2242          | Introductory Managerial Accounting  | 3            |
| ACCT 3332          | Planning and Control                | 3            |
| CMLW 2201          | Legal Aspects of Business - Part I  | 3            |
| COMM 2293          | Communications                      | 3            |
| ECON 1201          | Principles of Economics: Micro      | 3            |
| ECON 1202          | Principles of Economics: Macro      | 3            |
| FINA 2360          | Business Finance I                  | 3            |
| FINA 3361          | Business Finance II                 | 3            |
| MGMT 1281          | Introduction to Business Management | 3            |
| MGMT 2383          | Micro Organizational Behavior       | 3            |
| MGMT 2384          | Macro Organizational Behavior       | 3            |
| MGMT 4489          | Strategic Management                | 3            |
| MKTG 2270          | Introduction to Marketing           | 3            |
| Total Credit Hours |                                     | 42           |

## Geology Requirements

| Code                                | Title  | Credit Hours |
|-------------------------------------|--|--------------|
| Select 36 credits of the following: |  | 36           |
| GEOL 1200                           | Understanding the Earth                            |              |
| GEOL 1201                           | The Dynamic Earth                                  |              |
| GEOL 1208                           | Environmental Geology: Atlantic Canada Perspective |              |
| GEOL 2301                           | Mineralogy   |              |
| GEOL 2302                           | Optical Mineralogy                                 |              |
| GEOL 2305                           | Geophysics   |              |
| GEOL 2325                           | Sedimentology                                      |              |
| GEOL 2373                           | Geomorphology                                      |              |
| GEOL 3300                           | Field Methods                                      |              |
| GEOL 3305                           | Geomatics  |              |
| GEOL 3312                           | Igneous Petrology                                  |              |
| GEOL 3313                           | Metamorphic Petrology                              |              |
| GEOL 3323                           | Palaeontology: History of Life                     |              |
| GEOL 3340                           | Principles of Hydrogeology                         |              |
| GEOL 3410                           | Environmental Impact Assessment                    |              |
| GEOL 3413                           | Structural Geology                                 |              |
| GEOL 3453                           | Principles of Geochemistry                         |              |
| GEOL 3454                           | Applied Geochemistry                               |              |
| GEOL 4301                           | Geological Mapping                                 |              |
| GEOL 4400                           | International Field Camp                           |              |
| GEOL 4414                           | Tectonics  |              |
| GEOL 4423                           | Advanced Palaeontology                             |              |
| GEOL 4441                           | Mineral Resources                                  |              |
| GEOL 4442                           | Economic Geology Field School                      |              |
| GEOL 4450                           | Advanced Igneous and Metamorphic Petrology         |              |
| GEOL 4465                           | Advanced Sedimentology                             |              |
| GEOL 4466                           | Petroleum Geology                                  |              |

GEOL 4475    Glaciers and Glaciation

Total Credit Hours 36

## Other Requirements

| Code  | Title                      | Credit Hours |
|---|----------------------------|--------------|
| ENGL 1205   | Introduction to Literature | 3            |
| Select three credit hours in humanities                   |                            | 3            |
| MATH requirement <sup>1</sup>                             |                            |              |
| Select 12 credit hours in science <sup>2</sup>            |                            | 12           |
| Select three credit hours in statistics <sup>3</sup>      |                            | 3            |
| Select six credit hours from Faculty of Arts <sup>4</sup> |                            | 6            |
| Select nine credit hours in electives from any Faculty    |                            | 9            |

- 1 See Faculty of Science regulations, Section 3 of this *Academic Calendar*.
- 2 Other than Geology, e.g., Biology, Psychology, Chemistry, Physics, and Mathematics excluding Biostatistics (BIOL 3308).
- 3 That covers probability theory including Introductory Statistics (MGSC 2207), Statistical Methods in Geography (GEOG 3326), Biostatistics (BIOL 3308) and Intermediate Economic Statistics (ECON 3303).
- 4 Offering including Statistical Methods in Geography (GEOG 3326) and Intermediate Economic Statistics (ECON 3303).

### Notes:

1. Students must take (FINA 2361), Introduction to Marketing (MKTG 2270) and Macro Organizational Behavior (MGMT 2384) before registering for Strategic Management (MGMT 4489). The other prerequisites for this course are waived for students in this combined program.
2. Students must register no later than the beginning of Year 2 in the science program and will be under the general requirements of the Faculty of Science.

In addition to the above requirements, Geology/Business Studies Honours students must complete Honours Project GEOL (GEOL 4550) as one of the Geology requirements.

## Combined Cooperative Education in Geology/Geography

The students enrolled in the combined geology/geography major/Honours may also pursue a Co-op option in this dual program. Application to and completion of this combined option is the same as those for other Science Co-op major programs.

Further details and regulations on the Cooperative Education program (<https://smu-ca-public.courseleaf.com/undergraduate/faculties/faculty-science/cooperative-education-programs-major-honours/>) are found in the Faculty of Science listing of this Calendar.

## Combined Cooperative Education Program in General Business Studies/Geology

The students enrolled in the combined geology/business studies major/Honours programs may pursue a Co-op option in these dual programs. Applications to and completion of this combined option is the same as those for other Science Co-op major/Honours programs.