

GEOSCIENCES, B.S.

Begin Campus: Any Penn State Campus

End Campus: University Park

Program Description

The geosciences are concerned with understanding Earth processes and the evolutionary history of the Earth. Geoscientists work to discover and develop natural resources such as groundwater, metals, and energy sources; to solve technology-generated environmental problems such as acid mine drainage and waste disposal; to predict geological events, such as the occurrence of earthquakes and volcanism; and to solve fundamental questions concerning the origin and evolution of Earth and life. Our degree programs stress data collection; investigation, analysis, and synthesis of information related to complex natural problems; and rigor of thought and clarity of oral and written expression. The B.S. provides a broad foundation in the physical and natural sciences for students who seek immediate employment or post-graduate education in several areas of the geosciences. Examples of careers include the petroleum and mining industries; local or federal resource management; water resources, treatment and management; energy and environmental industries; and academia. A senior thesis involving independent research is required of all students.

General Option

This option is designed to provide sufficient flexibility so that the student has the opportunity to prepare for graduate school by focusing on specialized areas in the geosciences. The option's flexibility also permits students to develop a broad background in the geosciences in preparation for postgraduate majors that require breadth, such as environmental law.

Hydrogeology Option

This option helps prepare the student for entry-level positions in environmental agencies and firms where a specialized knowledge of groundwater and related areas is required. The option is also appropriate for students wishing to pursue an advanced degree in the area of hydrogeology.

What is Geosciences?

Geoscientists want to know more about the big picture of Earth and why it exists the way it does today. They investigate natural disasters such as earthquakes and volcanoes, they explore life in extreme environments such as hydrothermal vents or in far-removed caves, and they examine processes such as water treatment and carbon cycling. This work involves understanding how geology, chemistry, physics, and biology intersect, both today and throughout the Earth's history. Geoscientists piece together a picture of both Earth's past environments and life throughout time. This work can involve field work, laboratory work, or a combination. Ultimately, geoscientists seek to understand how our Earth developed into the way it is today, which can help us understand what we can expect in the Earth's future.

You Might Like This Program If...

- You are fascinated by volcanoes, earthquakes, rocks, glaciers, climate change, fossils, tectonic plates, or the evolution of life.
- You like big picture thinking and want to explore Earth's developmental processes.

- You like applying basic science skills to explore the natural world.
- You enjoy working in nature or a laboratory (not all geosciences is outdoors!).
- You are analytical and like to piece together clues to paint a picture of the planet's past.

Entrance to Major

In addition to the minimum grade point average (GPA) requirements described in the University Policies, the Geosciences entrance-to-major requirement must also be completed with a minimum grade of C: MATH 140.

Degree Requirements

For the Bachelor of Science degree in Geosciences, a minimum of 121 credits is required:

Requirement	Credits
General Education	45
Requirements for the Major	97

21 of the 45 credits for General Education are included in the Requirements for the Major. This includes: 9 credits of GN courses, 6 credits of GQ courses, 6 credits of GWS courses.

Requirements for the Major

To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#82-44>).

Common Requirements for the Major (All Options)

Code	Title	Credits
Prescribed Courses		
BIOL 110	Biology: Basic Concepts and Biodiversity	4
CHEM 110	Chemical Principles I	3
CHEM 111	Experimental Chemistry I	1
CHEM 112	Chemical Principles II	3
CHEM 113	Experimental Chemistry II	1
EMSC 100S	Earth and Mineral Sciences First-Year Seminar ¹	3
GEOSC 1	Physical Geology ²	3
GEOSC 204	Geobiology	4
GEOSC 472A	Field Geology I (Introduction to Field Methods)	3
GEOSC 472B	Field Geology II (Advanced Field Methods)	3
GEOSC 494W	Senior Thesis	3
GEOSC 496	Independent Studies	1
MATH 141	Calculus with Analytic Geometry II	4
PHYS 211	General Physics: Mechanics	4
PHYS 213	General Physics: Fluids and Thermal Physics	2
<i>Prescribed Courses: Require a grade of C or better</i>		
GEOSC 201	Earth Materials	4
GEOSC 202	Chemical Processes in Geology	4
GEOSC 203	Physical Processes in Geology	4
GEOSC 310	Earth History	4
GEOSC 465	Structural Geology	4
MATH 140	Calculus With Analytic Geometry I	4

Additional Courses		
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	

Requirements for the Option		
Select an option		28

¹ The following substitutions are allowed for students attending campuses where the indicated course is not offered: CAS 100 or ENGL 202C can be substituted for EMSC 100S.

² If GEOSC 1 is not available, GEOSC 20 may be substituted

Requirements for the Option

General Option (28 credits)

Code	Title	Credits
Additional Courses		
Select 14 credits of the following 300- and 400-level GEOSC courses: 14		
GEOSC 303	Introduction to Environmental Geology	
GEOSC 340	Geomorphology	
GEOSC 402Y	Natural Disasters	
GEOSC 416	Stable and Radioactive Isotopes in Geosciences: Introduction	
GEOSC 422	Vertebrate Paleontology	
GEOSC 424	Paleontology and Fossils	
GEOSC 434	Volcanology	
GEOSC 439	Principles of Stratigraphy	
GEOSC 440	Marine Geology	
GEOSC 451	Natural Resources: Origins, Economics and Environmental Impact	
GEOSC 452	Hydrogeology	
GEOSC 454	Geology of Oil and Gas	
GEOSC 470W	Introduction to Field Geology	
GEOSC 489	Dynamics of the Earth	

Supporting Courses and Related Areas

Select at least 2 credits in physics from approved departmental list	2
Select 3 credits of computer science, mathematics ¹ , or statistics	3
Select 9 credits, in consultation with advisor, supportive of the student's interest (students may apply 6 credits of ROTC)	9

¹ Above the level of MATH 141

Hydrogeology Option (28 credits)

Code	Title	Credits
Prescribed Courses		
GEOSC 452	Hydrogeology	3
Additional Courses		
Select one of the following:		3
CMPSC 201	Programming for Engineers with C++	
CMPSC 202		
CMPSC 203	Introduction to Spreadsheets and Databases	
STAT 250	Introduction to Biostatistics ¹	
Select one of the following:		3
ASM 327	Soil and Water Resource Management	
ERM 450	Wetland Science and Sustainability	
SOILS 101	Introductory Soil Science	

Select 9 credits from options A and B, with at least 3 credits from A and 3 credits from B: 9

Option A		
CHEM 202	Fundamentals of Organic Chemistry I	
CHEM 450	Physical Chemistry - Thermodynamics	
ERM 433	Transformation of Pollutants in Soils	
GEOSC 413W	Techniques in Environmental Geochemistry	
GEOSC 419	The Organic Geochemistry of Natural Waters and Sediments	
Option B		
ENVSE 408	Contaminant Hydrology	
GEOG 362	Image Analysis	
GEOSC 340	Geomorphology	
GEOSC 439	Principles of Stratigraphy	
GEOSC 454	Geology of Oil and Gas	
GEOSC 483	Environmental Geophysics	

Supporting Courses and Related Areas

Select at least 2 credits in Physics from approved departmental list	2
Select 8 credits, in consultation with advisor, supportive of the student's interest (students may apply 6 credits of ROTC)	8

¹ If STAT 250 is not available, STAT 200 may be substituted.

General Education

Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (<https://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program/>) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required and Inter-Domain courses do not meet this requirement.)

- Quantification (GQ): 6 credits
- Writing and Speaking (GWS): 9 credits

Breadth in the Knowledge Domains (Inter-Domain courses do not meet this requirement.)

- Arts (GA): 3 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 3 credits
- Social and Behavioral Sciences (GS): 3 credits
- Natural Sciences (GN): 3 credits

Integrative Studies

- Inter-Domain Courses (Inter-Domain): 6 credits

Exploration

- **GN**, may be completed with Inter-Domain courses: 3 credits
- **GA, GH, GN, GS, Inter-Domain courses**. This may include 3 credits of World Language course work beyond the 12th credit level or the requirements for the student's degree program, whichever is higher: 6 credits

University Degree Requirements

First Year Engagement

All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult their academic adviser for these requirements.

Cultures Requirement

6 credits are required and may satisfy other requirements

- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum

3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits

A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work

Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition

The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80 (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/82-00-and-83-00-degree-requirements/#83-80>)). For more information, check the Suggested Academic Plan for your intended program.

Integrated B.S in Geosciences and M.S. in Geosciences

Requirements for the Integrated B.S in Geosciences and M.S. in Geosciences can be found in the Graduate Bulletin (<https://bulletins.psu.edu/graduate/programs/majors/geosciences/#integratedundergradgradprogramstext>).

Program Learning Objectives

- **Core Science Application:** To produce graduates who can apply knowledge of the mathematics, physics, chemistry, and biology of Earth processes to the solution of geologic problems.
- **Earth Systems Thinking:** To produce graduates who can integrate multiple aspects of the origin, evolution, and future of the Earth, including the geosphere, hydrosphere, biosphere, and atmosphere.
- **Observation & Measurement:** To produce graduates who can interpret Earth's history and dynamics by observing and measuring minerals, rocks, fluids, fossils, landforms, and structures.
- **Scientific Inquiry & Communication:** To produce graduates who possess the ability to pose questions, collect and interpret data, and solve geologic problems, communicating the results of this scientific inquiry through writing and speaking.

Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

University Park

Jacob Hoover

Undergraduate Program Coordinator
542 Deike Building
University Park, PA 16802
814-865-7791
undergrad@geosc.psu.edu

Suggested Academic Plan

The suggested academic plan(s) listed on this page are the plan(s) that are in effect during the 2023-24 academic year. To access previous years' suggested academic plans, please visit the archive (<https://bulletins.psu.edu/undergraduate/archive/>) to view the appropriate Undergraduate Bulletin edition (*Note: the archive only contains suggested academic plans beginning with the 2018-19 edition of the Undergraduate Bulletin*).

General Option: Geosciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits Spring	Credits
MATH 140 or 140G (GQ) ^{*†#}	4 MATH 141 or 141G (GQ) ^{††}	4
CHEM 110 (GN) [†]	3 CHEM 112	3
CHEM 111 (GN) [†]	1 CHEM 113	1
GEOSC 1	3 GEOSC 201 [*]	4
EMSC 100S (GWS) ^{††1}	3 ENGL 15, 30H, or ESL 15 (GWS) ^{††}	3
	14	15

Second Year

Fall	Credits Spring	Credits
PHYS 211 (GN) [†]	4 PHYS 212	4
GEOSC 202 [*]	4 General Education knowledge domain	3
BIOL 110 (GN) [†]	4 Advanced GEOSC Elective ³	3
General Education knowledge domain	3 General Education Health and Wellness (GHW)	1.5
General Education Health and Wellness (GHW)	1.5 Advanced MATH/STAT/ CMPSC/GEOSC 210 ²	3
	16.5	14.5

Third Year

Fall	Credits Spring	Credits Summer	Credits
GEOSC 203 [*]	4 GEOSC 465 [*]	4 GEOSC 472A	3
GEOSC 310 [*]	4 GEOSC 204	4 GEOSC 472B	3
Supporting Course ⁴	3 Advanced GEOSC elective ³	3	
General Education knowledge domain	3 General Education knowledge domain ³	3	
	14	14	6

Fourth Year

Fall	Credits Spring	Credits
GEOSC 496	1 GEOSC 494W	3
Advanced GEOSC elective ³	3 Advanced GEOSC elective ³	2
Advanced GEOSC elective ³	3 Supporting Course ⁴	3
Supporting Course ⁴	3 General Education knowledge domain	3

General Education Foundation selection (GWS) [†]	3 General Education knowledge domain	3
	13	14

Total Credits 121

- * Course requires a grade of C or better for the major
 ‡ Course requires a grade of C or better for General Education
 # Course is an Entrance to Major requirement
 † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

¹ Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A, CAS 100B, or CAS 100C; or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

² Select 3 credits in Math (beyond the MATH 141 level), CMPSC, or STAT.

³ Select 14 credits from 300- and 400-level GEOSC courses from GEOSC 303(3), GEOSC 340(3), GEOSC 402Y(3), GEOSC 416(3), GEOSC 421(3), GEOSC 422(3), GEOSC 423(4), GEOSC 424(3), GEOSC 426(3), GEOSC 434(3), GEOSC 439(3), GEOSC 440(3), GEOSC 451(3), GEOSC 452(3), GEOSC 454(3), GEOSC 461(3), GEOSC 470W(3), GEOSC 471(3), GEOSC 489(4).

⁴ Select 9 credits supportive of student's interest, in consultation with an adviser (students may apply 6 credits of ROTC).

General Option: Geosciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140 (GQ) ^{*‡#†}	4	MATH 141 (GQ) ^{††}	4
CHEM 110 (GN) [†]	3	CHEM 112	3
CHEM 111 (GN) [†]	1	CHEM 113	1
ENGL 15, 30H, or ESL 15 (GWS) ^{††1}	3	General Education Foundation selection (GWS) ^{†1}	3
General Education knowledge domain	3	General Education knowledge domain	3
14		14	

Second Year

Fall	Credits	Spring	Credits
PHYS 211 (GN) [†]	4	PHYS 212	4
BIOL 110 (GN) [†]	4	GEOSC 1 or 20	3
General Education knowledge domain	3	General Education Foundation selection (GWS) ^{†1}	3
General Education knowledge domain	3	General Education knowledge domain	3
General Education Health and Wellness (GHW)	1.5	General Education Health and Wellness (GHW)	1.5
15.5		14.5	

Third Year

Fall	Credits	Spring	Credits	Summer	Credits
GEOSC 201 [*]	4	GEOSC 203 [*]	4	GEOSC 472A	3
Supporting Course ⁴	3	GEOSC 204	4	GEOSC 472B	3
Advanced MATH/STAT/ CMPSC/GEOSC 210 ²	3	GEOSC 465 [*]	4		

General Education knowledge domain	3	Advanced GEOSC Elective ³	3
13		15	
Fourth Year			
Fall	Credits	Spring	Credits
GEOSC 202 [*]	4	GEOSC 494W	3
GEOSC 310 [*]	4	Advanced GEOSC elective ³	2
GEOSC 496	1	Advanced GEOSC elective ³	3
Advanced GEOSC elective ³	3	Advanced GEOSC elective ³	3
Supporting Course ⁴	3	Supporting Course ⁴	3
15		14	

Total Credits 121

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

¹ Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A, CAS 100B, or CAS 100C; or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

² Select 3 credits in Math (beyond the MATH 141 level), CMPSC, or STAT.

³ Select 14 credits from 300- and 400-level GEOSC courses from GEOSC 303(3), GEOSC 340(3), GEOSC 402Y(3), GEOSC 416(3), GEOSC 421(3), GEOSC 422(3), GEOSC 423(4), GEOSC 424(3), GEOSC 426(3), GEOSC 434(3), GEOSC 439(3), GEOSC 440(3), GEOSC 451(3), GEOSC 452(3), GEOSC 454(3), GEOSC 461(3), GEOSC 470W(3), GEOSC 471(3), GEOSC 489(4).

⁴ Select 9 credits supportive of student's interest, in consultation with an adviser (students may apply 6 credits of ROTC).

Hydrogeology Option: Geosciences, B.S. at University Park Campus

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140 or 140G (GQ) ^{*†#††}	4	MATH 141 or 141G (GQ) ^{††}	4
CHEM 110 (GN) [†]	3	CHEM 112	3
CHEM 111 (GN) [†]	1	CHEM 113	1
GEO SC 1	3	GEO SC 201 [*]	4
EMSC 100S (GWS) ^{††1}	3	ENGL 15, 30H, or ESL 15 (GWS) ^{††}	3
14		15	

Second Year

Fall	Credits	Spring	Credits
PHYS 211 (GN) [†]	4	PHYS 212	4
BIOL 110 (GN) [†]	4	GEO SC 202 [*]	4
General Education knowledge domain	3	General Education knowledge domain	3
General Education Health and Wellness (GHW)	1.5	General Education Health and Wellness (GHW)	1.5
General Education knowledge domain	3	HYDRO Option Elective ²	3
15.5		15.5	

Third Year

Fall	Credits	Spring	Credits	Summer	Credits
GEO SC 203 [*]	4	GEO SC 465 [*]	4	GEO SC 472A	3
GEO SC 310 [*]	4	HYDRO Option elective ²	3	GEO SC 472B	3
GEO SC 452	3	CMPSC 201, 202, CMPSC 203, STAT 250, or STAT 200	3-4		
Supporting Course ⁴	3	General Education knowledge domain ³	3		
14		13-14		6	

Fourth Year

Fall	Credits	Spring	Credits
GEO SC 496	1	GEO SC 494W	3

SOILS 101, ASM 327, or ERM 450	3	GEO SC 204	4
HYDRO Option elective ²	3	Supporting Course ³	2
Supporting Course ³	3	General Education knowledge domain	3
General Education Foundation selection (GWS) [†]	3	General Education knowledge domain	3
13		15	

Total Credits 121-122

- * Course requires a grade of C or better for the major
- ‡ Course requires a grade of C or better for General Education
- # Course is an Entrance to Major requirement
- † Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

All incoming Schreyer Honors College first-year students at University Park will take ENGL 137H/CAS 137H in the fall semester and ENGL 138T/CAS 138T in the spring semester. These courses carry the GWS designation and satisfy a portion of that General Education requirement. If the student's program prescribes GWS these courses will replace both ENGL 15/ENGL 30H and CAS 100A/CAS 100B/CAS 100C. Each course is 3 credits.

- ¹ Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A, CAS 100B, or CAS 100C; or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.
- ² Select 9 credits from A and B. Students must select at least 3 credits from A and 3 credits from B.
 - A. CHEM 202(3), CHEM 450(3), ERM 433(3), GEO SC 413W(3), GEO SC 419(3) (Sem: 3-8)
 - B. ENVSE 408(3), GEOG 362(3), GEO SC 340(3), GEO SC 439(3), GEO SC 454(3), GEO SC 483(3)
- ³ Select 8 credits supportive of student's interest, in consultation with an adviser (students may apply 6 credits of ROTC).

Hydrogeology Option: Geosciences, B.S. at Commonwealth Campuses

The course series listed below provides **only one** of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an **Academic Requirements** or **What If** report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

First Year

Fall	Credits	Spring	Credits
MATH 140 (GQ) ^{*‡#†}	4	MATH 141 (GQ) ^{††}	4
CHEM 110 (GN) [†]	3	CHEM 112	3
CHEM 111 (GN) [†]	1	CHEM 113	1
ENGL 15, 30H, or ESL 15 (GWS) ^{††1}	3	General Education knowledge domain	3
General Education knowledge domain	3	General Education Foundation selection (GWS) ^{†1}	3
14		14	

Second Year

Fall	Credits	Spring	Credits
PHYS 211 (GN) [†]	4	PHYS 212	4
BIOL 110 (GN) [†]	4	General Education Foundation selection (GWS) ^{†1}	3
General Education knowledge domain	3	General Education knowledge domain	3
General Education knowledge domain	3	GEOSC 1 or 20	3
General Education Health and Wellness (GHW)	1.5	General Education Health and Wellness (GHW)	1.5
15.5		14.5	

Third Year

Fall	Credits	Spring	Credits	Summer	Credits
GEOSC 201 [*]	4	GEOSC 465 [*]	4	GEOSC 472A	3
CMPSC 201, 201, 202, CMPSC 203, STAT 250, or STAT 200	3-4	GEOSC 203 [*]	4	GEOSC 472B	3

Supporting Course ³	3	HYDRO Option elective ²	3
General Education knowledge domain	3	HYDRO Option elective ²	3
13-14		14	
6			
Fourth Year			
Fall	Credits	Spring	Credits
GEOSC 452	3	GEOSC 494W	3
GEOSC 496	1	GEOSC 204	4
GEOSC 202 [*]	4	Supporting Course ³	2
GEOSC 310 [*]	4	Supporting Course ³	3
SOILS 101, ASM 327, or ERM 450	3	HYDRO Option elective ²	3
15		15	

Total Credits 121-122

* Course requires a grade of C or better for the major

‡ Course requires a grade of C or better for General Education

Course is an Entrance to Major requirement

† Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy Cultural Diversity Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

General Education includes Foundations (GWS and GQ), Knowledge Domains (GHW, GN, GA, GH, GS) and Integrative Studies (Inter-domain) requirements. N or Q (Honors) is the suffix at the end of a course number used to help identify an Inter-domain course, but the inter-domain attribute is used to fill audit requirements. Foundations courses (GWS and GQ) require a grade of 'C' or better.

¹ Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100 (GWS), CAS 100A, CAS 100B, or CAS 100C; or ENGL 202C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

² Select 9 credits from A and B. Students must select at least 3 credits from A and 3 credits from B.

A. CHEM 202(3), CHEM 450(3), ERM 433(3), GEOSC 413W(3), GEOSC 419(3) (Sem: 3-8)

B. ENVSE 408(3), GEOG 362(3), GEOSC 340(3), GEOSC 439(3), GEOSC 454(3), GEOSC 483(3)

³ Select 8 credits supportive of student's interest, in consultation with an adviser (students may apply 6 credits of ROTC).

Career Paths

The versatile Geosciences degree provides a broad knowledge base that can be applied to professional careers in many industries, as well as graduate study in many Earth science-related disciplines.

Careers

Our degree offers a comprehensive background in traditional geology and is suitable for students who wish to work in the environmental or oil and gas industries, natural resource exploration, geothermal energy development, hydrogeology or geotechnical fields, or continue to graduate school. In the public sector, this degree is good preparation for future work in the National Park Service, the United States Geological Survey, the National Oceanographic and Atmospheric Administration, the Environmental Protection Agency, and various state and local regulatory agencies.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE GEOSCIENCES PROGRAM (<https://www.geosc.psu.edu/undergraduate/why-geosciences/career-outlook/>)

Opportunities for Graduate Studies

Graduates may be well suited to pursue graduate-level degrees in geophysics, geochemistry, mineralogy, paleontology, climate change modeling, oceanography, volcanology, environmental science, or other Earth science-related disciplines.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (<https://www.geosc.psu.edu/graduate/>)

Professional Resources

- Geosciences Club (<https://www.facebook.com/groups/46384419817/>)
- Association for Women Geoscientists (<https://sites.psu.edu/awgpennstate/>)
- American Water Resources Association (<https://agsci.psu.edu/students/clubs/list/other/>)

Contact

University Park

DEPARTMENT OF GEOSCIENCES
503 Deike Building
University Park, PA 16802
814-865-6711
contact@geosc.psu.edu

<https://www.geosc.psu.edu>