

# GEOSCIENCES, B.A.

**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. The Bachelor of Arts degree program stresses data collection, investigation, analysis, and synthesis of information related to complex natural problems; rigor of thought; and clarity of oral and written expression. The B.A. provides a basic education in geosciences, and is designed for students who wish to prepare themselves for careers that interface among science, social science, and business. Examples of these careers include environmental law; national and international planning or resource management; and K-12 teaching.

## 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 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 the Earth's developmental processes.
- You enjoy understanding how organisms and species existed in past ecosystems.
- You are analytical and like to piece together clues to paint a picture of past life.
- You love physical science but struggle with calculus/physics.
- You would like to pursue a second B.A.

## Entrance to Major

In order to be eligible for entrance to this major, a student must:

1. attain at least a C (2.00) cumulative grade-point average for all courses taken at the University; and
2. have at least third-semester classification (<https://www.registrar.psu.edu/enrollment/semester-classification.cfm>).

READ SENATE POLICY 37-30: ENTRANCE TO AND CHANGES IN MAJOR PROGRAMS OF STUDY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/37-00-entrance-to-a-college-or-major/>)

## Degree Requirements

**For the Bachelor of Arts degree in Geosciences, a minimum of 120 credits is required:**

Requirement	Credits
General Education	45
Bachelor of Arts Degree Requirements	24
Requirements for the Major	72

**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.**

**3 of the 24 credits for Bachelor of Arts Degree Requirements are included in the Requirements for the Major, General Education, or Electives and 0-12 credits are included in Electives if foreign language proficiency is demonstrated by examination.**

## 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>).

Code	Title	Credits
<b>Prescribed Courses</b>		
EMSC 100S	Earth and Mineral Sciences First-Year Seminar <sup>1</sup>	3
<i>Prescribed Courses: Require a grade of C or better</i>		
GEOSC 1	Physical Geology <sup>2</sup>	3
GEOSC 201	Earth Materials	4
<b>Additional Courses</b>		
ENGL 15	Rhetoric and Composition	3
or ENGL 30H	Honors Rhetoric and Composition	
MATH 140	Calculus With Analytic Geometry I	4
or MATH 110	Techniques of Calculus I	
Select one of the following:		
GEOSC 202	Chemical Processes in Geology	4
GEOSC 203	Physical Processes in Geology	
GEOSC 204	Geobiology	
Select 2 of the following 3 sequences for 8 credits each and a third sequence for 4 credits:		
BIOL 110 & BIOL 220W	Biology: Basic Concepts and Biodiversity and Biology: Populations and Communities	20
CHEM 110 & CHEM 111 & CHEM 112 & CHEM 113	Chemical Principles I and Experimental Chemistry I and Chemical Principles II and Experimental Chemistry II	
PHYS 250 & PHYS 251	Introductory Physics I and Introductory Physics II <sup>3</sup>	
Select 2-4 credits of advanced mathematics in consultation with an adviser <sup>4</sup>		
Select 6 credits from 300- and 400-level GEOSC courses		
		6

Select 3 credits of appropriate field/laboratory experience in consultation with adviser 3

Select 3 credits of writing-intensive courses from within Earth and Mineral Sciences to include, but not limited to the following: 3

GEOG 310 Introduction to Global Climatic Systems

GEOG 412

GEOSC 402Y Natural Disasters

GEOSC 470W Introduction to Field Geology

METEO 471

*Additional Courses: Require a grade of C or better*

GEOSC 310 Earth History 3-4

or GEOSC 320 Geology of Climate Change

### Supporting Courses and Related Areas

Select 11-14 credits in consultation with adviser (students may apply 1-14 6 credits of ROTC)

<sup>1</sup> 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.

<sup>2</sup> If GEOSC 1 is not available, GEOSC 20 may be substituted.

<sup>3</sup> PHYS 211, PHYS 212, PHYS 213, PHYS 214 may substitute for up to 8 credits in Physics for students with MATH 140, MATH 141.

<sup>4</sup> List includes:

- MATH 111
- MATH 141
- STAT 200
- STAT 250

## 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.

## B.A. Degree Requirements

**Foreign Language** (0-12 credits): Student must attain 12th credit level of proficiency in one foreign language. See the Placement Policy for Penn State Foreign Language Courses (<https://bulletins.psu.edu/undergraduate/general-information/academic-information/advising-planning-degree-program/course-placements/placement-policy-world-language-courses/>).

**B.A. Fields** (9 credits): Humanities, Social and Behavioral Sciences, Arts, Foreign Languages, Natural Sciences, Quantification (may not be taken in the area of the student's primary major; foreign language credits in this category must be in a second foreign language or beyond the 12th credit level of proficiency in the first language)

**Other Cultures** (0-3 credits): Select 3 credits from approved list. Students may count courses in this category in order to meet other major, minor, elective, or General Education requirements, except for the General Education US/IL requirement.

## 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

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## 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*).

## Geosciences, B.A. 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 110, 140, or 140G (GQ) <sup>††</sup>	4 ENGL 15, 30H, or ESL 15 (GWS) <sup>††</sup>	3
CHEM 110 (GN) <sup>†</sup>	3 PHYS 250 (GN) <sup>†</sup>	4
CHEM 111 (GN) <sup>†</sup>	1 General Education Knowledge Domain	3
GEOSC 1 <sup>*</sup>	3 MATH 141, 141G, 111, STAT 200, or STAT 250 (GQ) <sup>††</sup>	4
EMSC 100S <sup>††1</sup>	3	
	<b>14</b>	<b>14</b>

### Second Year

Fall	Credits Spring	Credits
GEOSC 201 <sup>*</sup>	4 GEOSC 310 or 320 <sup>*</sup>	3-4
BIOL 110 (GN) <sup>†</sup>	4 BIOL 220W, PHYS 251, or CHEM 112 <b>and</b> CHEM 113	4
World Language level 1	4 General Education Knowledge Domain	3
General Education Knowledge Domain	3 World Language level 2	4
	General Education Health and Wellness (GHW)	1.5
	<b>15</b>	<b>15.5-16.5</b>

### Third Year

Fall	Credits Spring	Credits
GEOSC 202, 203, or 204	4 General Education Foundation selection (GWS) <sup>†</sup>	3
World Language level 3	4 Supporting Course	3
BIOL 220W, PHYS 251, or CHEM 112 <b>and</b> CHEM 113	4 Bachelor of Arts Course	3
General Education Knowledge Domain	3 Bachelor of Arts Course	3
	General Education Knowledge Domain	3
	<b>15</b>	<b>15</b>

### Fourth Year

Fall	Credits Spring	Credits
Supporting Course	3 Advanced 300/400 level GEOSC course	3
Supporting Course	3 Field/lab experience	3
Advanced 300/400 level GEOSC course	3 Writing intensive course from within Earth and Mineral Sciences	3
General Education Knowledge Domain	3 Other cultures course	3
Bachelor of Arts Course	3 Supporting Course	3

General Education Health and Wellness (GHW)	1.5	
	<b>16.5</b>	<b>15</b>

**Total Credits 120-121**

- \* 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.

**Bachelor of Arts Requirements:**

Bachelor of Arts students must take 9 credits in Bachelor of Arts (B.A.) Fields (Humanities; Social and Behavioral Sciences; Arts; World Languages [2nd language or beyond the 12th credit level of proficiency in the 1st]; Natural Sciences; Quantification). The B.A. Fields courses may not be taken in the area of the student's primary major. See your adviser and the Degree Requirements section (<https://bulletins.psu.edu/undergraduate/general-information/academic-information/>) of this Bulletin.

Bachelor of Arts students must take 3 credits in Other Cultures. See your adviser and the full list of courses approved as Other Cultures courses (<https://bulletins.psu.edu/undergraduate/general-education/course-lists/ba-other-cultures/>).

<sup>1</sup> 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) or EM SC 100S (GWS). EM SC 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.

**Advising Notes:**

Supporting Courses should be selected in consultation with an adviser. Students may use up to 6 credits of ROTC.

## Geosciences, B.A. 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 110 or 140 (GQ) <sup>††</sup>	4 PHYS 250 (GN) <sup>†</sup>	4
CHEM 110 (GN) <sup>†</sup>	3 MATH 141, 111, STAT 200, or STAT 250 (GQ) <sup>††</sup>	4
CHEM 111 (GN) <sup>†</sup>	1 World Language Level 2	4
World Language Level 1	4 General Education Knowledge Domain	3
ENGL 15, 30H, or ESL 15 (GWS) <sup>‡</sup>	3	
	<b>15</b>	<b>15</b>

### Second Year

Fall	Credits Spring	Credits
BIOL 110 (GN) <sup>†</sup>	4 BIOL 220W, PHYS 251, or CHEM 112 <i>and</i> CHEM 113	4
CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS) <sup>‡1</sup>	3 ENGL 202C (GWS) <sup>‡1</sup>	3
World Language level 3	4 General Education Knowledge Domain	3
General Education Knowledge Domain	3 Bachelor of Arts Course	3
General Education Health and Wellness (GHW)	1.5 General Education Health and Wellness (GHW)	1.5
	<b>15.5</b>	<b>14.5</b>

### Third Year

Fall	Credits Spring	Credits
GEOSC 1 or 20 <sup>*</sup>	3 GEOSC 201 <sup>*</sup>	4
BIOL 220W, PHYS 251, or CHEM 112 <i>and</i> CHEM 113	4 Supporting Course	3
General Education Knowledge Domain	3 Bachelor of Arts Course	3
Other cultures	3 Bachelor of Arts Course	3
	General Education Knowledge Domain	3
	<b>13</b>	<b>16</b>

### Fourth Year

Fall	Credits Spring	Credits
GEOSC 202, 203, or 204	4 GEOSC 310 or 320 <sup>*</sup>	3-4
Advanced 300/400 level GEOSC course	3 Advanced 300/400 level GEOSC course	3
Supporting Course	3 Field/lab experience	3
Supporting Course	3 Writing intensive course from within Earth and Mineral Sciences	3

General Education Knowledge Domain	3 Supporting Course	3
	<b>16</b>	<b>15-16</b>

### Total Credits 120-121

- \* Course requires a grade of C or better for the major
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- # 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.

### Bachelor of Arts Requirements:

Bachelor of Arts students must take 9 credits in Bachelor of Arts (B.A.) Fields (Humanities; Social and Behavioral Sciences; Arts; World Languages [2nd language or beyond the 12th credit level of proficiency in the 1st]; Natural Sciences; Quantification). The B.A. Fields courses may not be taken in the area of the student's primary major. See your adviser and the Degree Requirements section (<https://bulletins.psu.edu/undergraduate/general-information/academic-information/>) of this Bulletin.

Bachelor of Arts students must take 3 credits in Other Cultures. See your adviser and the full list of courses approved as Other Cultures courses (<https://bulletins.psu.edu/undergraduate/general-education/course-lists/ba-other-cultures/>).

<sup>1</sup> 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) or EM SC 100S (GWS). EM SC 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.

### Advising Notes:

Supporting Courses should be selected in consultation with an adviser. Students may use up to 6 credits of ROTC.

## Career Paths

The versatile Geosciences degree provides a broad knowledge base that can be applied to careers in many industries, as well as further 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, in hydrogeology or geotechnical fields, or continue to graduate school.

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 geosciences or other Earth science-related disciplines. Some may be inclined to pursue master of business administration, master of education, or environmental law degrees.

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/>)
- EcoAction (<https://sites.psu.edu/ecoaction/>)

## Contact

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