Program Change Request

Date Submitted: 12/04/24 4:00 pm

Viewing: SC-BS-GEOL : Geology, BS

Last approved: 05/28/24 2:39 pm

Last edit: 12/04/24 4:00 pm

Changes proposed by: jbazaz

Catalog Pages Using this Program

Geology, BS

Are you completing this form on someone else's behalf?

Yes

Requestor:

In Workflow

1. **AOES Curriculum Committee**
2. **AOES Chair**
3. **SC Curriculum Committee**
4. SC Assistant Dean
5. Assoc Provost-Undergraduate
6. Registrar-Programs

Approval Path

1. 01/17/25 4:14 pm Barry Klinger (bklinger): Approved for AOES Curriculum Committee
2. 01/20/25 7:46 am Mark Uhen (muhen): Approved for AOES Chair

History

1. Jul 22, 2020 by Tory Sarro (vsarro)
2. Jul 22, 2020 by Tory Sarro (vsarro)
3. Nov 24, 2020 by Jennifer Bazaz Gettys (jbazaz)
4. May 18, 2021 by Jennifer Bazaz Gettys (jbazaz)
5. May 10, 2022 by Jennifer Bazaz

Gettys (jbazaz)
6. Apr 29, 2024 by Jennifer Bazaz Gettys (jbazaz)
7. May 14, 2024 by Deborah Mcgarrah (dmcgarra)
8. May 28, 2024 by Tory Sarro (vsarro)

Name	Extension	Email
Barry Klinger	5302	bklinger@gmu.edu

Effective Catalog: 2025-2026

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Geology, BS

Banner Title: BS Geology

Registrar/OAPI Use Only – SCHEV Status Approved

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Registrar/OAPI Use Only – SACSCOC Status

Concentration(s):

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
1	Earth Surface Processes	EP
2	Environmental Geoscience	EVGS
3	General Geology	GGEO
4	Oceanography and Marine Science	OMAR

	Associated Concentrations	Registrar's Office Use Only: Concentration Code
5	Paleontology	PLEO

Registrar/IRR Use Only – Concentration CIP Code

College/School: College of Science

Department / Academic Unit: Atmospheric, Oceanic, & Earth Sciences

Jointly Owned Program? No

Justification

What: Updating the Environmental Geoscience and the Paleontology concentrations.

Why: TBA from department.

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code:

SC-BS-GEOL

Registrar/IRR Use Only – Program CIP Code 40.0601 - Geology/Earth Science, General.

Admission Requirements:

Admissions

University-wide admissions policies can be found in the Undergraduate Admissions Policies section of this catalog.
To apply for this program, please complete the George Mason University Admissions Application.

Program-Specific Policies:

Policies

Students must fulfill all Requirements for Bachelor's Degrees, including the Mason Core.
For policies governing all undergraduate degrees, see AP.5 Undergraduate Policies.

Writing Intensive Requirement

GEOL 317 Geomorphology (Mason Core) fulfills the writing intensive requirement for this major, with the exception of:

- The Environmental Geoscience Concentration, whereby GEOL 305 Environmental Geology (Mason Core) fulfills the writing intensive requirement.
- The Paleontology Concentration, whereby GEOL 334 Vertebrate Paleontology (Mason Core) fulfills the writing intensive requirement.

Degree Requirements:

This is a Green Leaf program.

Students should refer to the Admissions & Policies tab for specific policies related to this program.

Candidates for a degree in geology must complete all core courses with a minimum GPA of 2.30.

Core Courses

Geology & Earth Science		
GEOL 101 & GEOL 103	Physical Geology (Mason Core) and Physical Geology Lab (Mason Core)	4
GEOL 102 & GEOL 104	Historical Geology (Mason Core) and Historical Geology Laboratory (Mason Core)	4
GEOL 309	Oceanography	3
or BIOL 309	Oceanography	
or EVPP 309	Oceanography	
GEOL 420	Earth Science and Policy (Mason Core)	3
Chemistry		
CHEM 211 & CHEM 213	General Chemistry I (Mason Core) and General Chemistry Laboratory I (Mason Core)	4
CHEM 212 & CHEM 214	General Chemistry II (Mason Core) and General Chemistry Laboratory II (Mason Core)	4
Mathematics		
MATH 113	Analytic Geometry and Calculus I (Mason Core)	4-6
or MATH 123 & MATH 124	Calculus with Algebra/Trigonometry, Part A and Calculus with Algebra/Trigonometry, Part B (Mason Core)	
MATH 114	Analytic Geometry and Calculus II	4
STAT 250	Introductory Statistics I (Mason Core)	3
Physics		

Select one option from the following:		8
Option One		
PHYS 160	University Physics I (Mason Core)	
& PHYS 161	and University Physics I Laboratory (Mason Core)	
& PHYS 260	and University Physics II (Mason Core)	
& PHYS 261	and University Physics II Laboratory (Mason Core)	
Option Two		
PHYS 243	College Physics I (Mason Core)	
& PHYS 244	and College Physics I Lab (Mason Core)	
& PHYS 245	and College Physics II (Mason Core)	
& PHYS 246	and College Physics II Lab (Mason Core)	
Additional Science		
Select one of the following three options:		3-4
Option One		
CLIM 111	Introduction to the Fundamentals of Atmospheric Science (Mason Core)	
& CLIM 112	and Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core)	
Option Two		
PHYS 111	Introduction to the Fundamentals of Atmospheric Science (Mason Core)	
& PHYS 112	and Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core)	
Option Three		
GGS 309	Introduction to Weather and Climate	
Total Credits		44-47

Concentration in Earth Surface Processes (EP)

This concentration focuses on a broad understanding of the physical processes and natural materials found at or near the Earth's surface that have produced the primary landforms and landscapes observed today. Fundamental concepts, methods and techniques of landscape analysis are also examined. Students choosing this concentration must complete the following coursework:

GEOL 302	Mineralogy	4
GEOL 306	Soil Science	3
GEOL 313	Hydrogeology	3

GEOL 317	Geomorphology (Mason Core) [1]	4
GEOL 403	Geochemistry	3
Select at least 9 credits from the following:		9
GEOL 303	Field Mapping Techniques	
GEOL 304	Sedimentary Geology	
GEOL 305	Environmental Geology (Mason Core)	
GEOL 308	Igneous and Metamorphic Petrology	
GEOL 320	Resource Geology	
GEOL 321	Geology of Energy Resources	
GEOL 340	Modern Methods in Geology	
GEOL 363	Coastal Morphology and Processes	
GEOL 392	Geology and Earth Science Seminar	
GEOL 401	Structural Geology	
GEOL 417	Geophysics	
GEOL 441	Great Events in Earth History	
GGS 311	Geographic Information Systems	
Total Credits		26

1 Fulfills writing intensive requirement.

Concentration in Environmental Geoscience (EVGS)

Environmental Geoscience is designed for students wanting their professional work to focus on understanding, preserving, and protecting the environment. This concentration provides the tools for applying geologic information to contemporary environmental topics. Increasing human population has led to intensified demand for natural resources including soils, minerals, water, and clean air, and geoscientists work to restore natural systems and solve problems before they occur. Environmental geologists also work to understand natural disasters such as floods, landslides, earthquakes, and tsunamis; human-caused problems such as climate change; and learn to mitigate the effects of these catastrophic events on humans. Students choosing this concentration must complete the following coursework:

~~This concentration provides the tools for applying geologic information (on soils, rocks, water, weather, and landscapes) to contemporary environmental problems (including: pollution, waste management, resource extraction, natural hazards, land-use, habitat restoration, species preservation, and human health). Environmental geoscience studies the physical environment in which biological interactions take place, whereby aiding the understanding of ecology. Students choosing this concentration must complete the following coursework:~~

~~GEOL 302~~	~~Mineralogy~~	~~4~~
GEOL 304	Sedimentary Geology	4
~~EVPP 336~~	~~Tackling Wicked Problems in Society the Environment (Mason Core)~~	
GEOL 305	Environmental Geology (Mason Core) [1]	3
GEOL 313	Hydrogeology	3
GEOL 403	Geochemistry	3
or CHEM 427	Aquatic Environmental Chemistry	
Select 9 credits from the following:		9
~~CLIM 101~~	~~Global Warming: Weather, Climate, and Society (Mason Core)~~	
~~CLIM 412~~	~~Physical Oceanography~~	
GEOL 301	Geological Field Experience	
GEOL 306	Soil Science	
GEOL 317	Geomorphology (Mason Core)	
GEOL 320	Resource Geology	
~~GEOL 321~~	~~Geology of Energy Resources~~	~~3~~
GEOL 406	Course GEOL 406 Not Found	
GEOL 485	Course GEOL 485 Not Found	
CLIM 312	Physical Climatology	
CLIM 440	Climate Dynamics	
EVPP 361	Introduction to Environmental Policy	
~~EVPP 432~~	~~Energy Policy~~	
~~EVPP 436~~	~~Politics of Climate Change Governance~~	
~~GGS 302~~	~~Global Environmental Hazards~~	
GGS 311	Geographic Information Systems [2]	
~~PHYS 331~~	~~Physics of Renewable Energy~~	
GGS 379	Remote Sensing [2]	
Total Credits		22

1
Fulfills writing intensive requirement for this concentration only.

2
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It is recommended that Bachelor's/Accelerated Master's students take the graduate version of these courses: GGS 553 Geographic Information Systems; GGS 379 Remote Sensing.

Concentration in General Geology (GGEO)

This concentration is fashioned after traditional geology bachelor's degrees. It allows graduates to be employed as geologists in the field or to pursue graduate studies in geology. Students choosing this concentration must complete the following coursework:

GEOL 302	Mineralogy	4
GEOL 304	Sedimentary Geology	4
GEOL 308	Igneous and Metamorphic Petrology	4
GEOL 312	Invertebrate Paleontology	4
GEOL 317	Geomorphology (Mason Core) [1]	4
GEOL 401	Structural Geology	4
GEOL 404	Geological Field Techniques [2]	6
Total Credits		30

1 Fulfills writing intensive requirement.

2 A 6-credit geology field camp may be substituted for this requirement, see advisor for details.

Concentration in Oceanography and Marine Science (OMAR)

This concentration provides students with a comprehensive knowledge of oceanography. Additional coursework in physical and chemical oceanography give insight into the aquatic environment and its link to both ecosystems and climate. Within the concentration, students can choose an Open Ocean or Coastal Ocean option. The curriculum will emphasize local and regional case studies, in particular the Chesapeake Bay. The program will provide students with the basic training required to allow them to obtain entry level positions in oceanographic and estuarine career tracks or an appropriate graduate degree program. Students choosing this concentration must complete the following coursework:

GEOL 363	Coastal Morphology and Processes	4
GEOL 364	Marine Geology	3
GEOL 403	Geochemistry	3
GEOL 412	Physical Oceanography	3
or CLIM 412	Physical Oceanography	
Select one sequence from the following:		8

BIOL 102	Introductory Biology I-Survey of Biodiversity and Ecology (Mason Core)	
& BIOL 103	and Introductory Biology II-Survey of Cell and Molecular Biology (Mason Core)	
& BIOL 105	and Introductory Biology II Laboratory (Mason Core)	
EVPP 108	Ecosphere - Introduction to Environmental Science I-Lecture (Mason Core)	
& EVPP 109	and Ecosphere- Introduction to Environmental Science I- Lab (Mason Core)	
& EVPP 112	and Ecosphere: Introduction to Environmental Science II-Lecture (Mason Core)	
& EVPP 113	and Ecosphere: Introduction to Environmental Science II–Lab (Mason Core)	
Select at least 9 credits from the following:		9
GEOL 302	Mineralogy	
GEOL 304	Sedimentary Geology	
GEOL 308	Igneous and Metamorphic Petrology	
GEOL 312	Invertebrate Paleontology	
GEOL 332	Paleoclimatology	
GEOL 340	Modern Methods in Geology	
GEOL 392	Geology and Earth Science Seminar	
Total Credits		30

Concentration in Paleontology (PLEO)

This concentration focuses on a broad understanding of Earth's history and the evolution of life on Earth as revealed through the fossil record. Fundamental concepts, methods and techniques of historical geology and paleontological data and analysis are also examined. This concentration may not be taken in conjunction with the Paleontology Minor. Students choosing this concentration must complete the following coursework:

GEOL 302	Mineralogy	4
GEOL 304	Sedimentary Geology	4
GEOL 312	Invertebrate Paleontology	4
GEOL 334	Vertebrate Paleontology (Mason Core) [1]	4
BIOL 213	Cell Structure and Function	4
BIOL 300	BioDiversity	4
Select at least 9 credits from the following:		9
GEOL 301	Geological Field Experience	
GEOL 306	Soil Science	
GEOL 317	Geomorphology (Mason Core)	

GEOL 332	Paleoclimatology	
GEOL 340	Modern Methods in Geology	
GEOL 364	Marine Geology	
GEOL 392	Geology and Earth Science Seminar	
GEOL 403	Geochemistry	
GEOL 406	Course GEOL 406 Not Found	
GEOL 412	Physical Oceanography	
GEOL 441	Great Events in Earth History	
Select 3-4 credits from the following:		3-4
BIOL 320	Comparative Chordate Anatomy	
BIOL 331	Invertebrate Zoology	
BIOL 374	Biogeography: Space, Time, and Life	
or GGS 321	Biogeography	
BIOL 471	Evolution	
Total Credits		36-37

[1] Fulfills writing intensive requirement for this concentration only.

Retroactive Requirements Updates:

Plan of Study:

Honors Information:

Honors in the Major

Geology majors who have completed 16 credits of math and science, including GEOL 302 Mineralogy, with a GPA of 3.00 or higher are eligible to enter the departmental honors program. Transfer students who have an incoming GPA of 3.10 or higher in math and science and a grade of 'B' or better in GEOL 302 Mineralogy are also eligible. To graduate with honors in Geology, students are required to maintain a minimum GPA of 3.00 in math and science courses and complete one of the two following sets of courses with an average GPA of 3.50 or better:

First Set of Courses		
GEOL 410	Research Proposal Preparation	1
GEOL 411	Geological Research	3

GEOL 420	Earth Science and Policy (Mason Core)	3
Second Set of Courses		
CLIM 408	Senior Research (Mason Core)	3
CLIM 409	Research Internship	3
GEOL 420	Earth Science and Policy (Mason Core)	3

Program Outcomes

Program Outcomes

1. Comprehend important earth-science concepts that reflect the complexity of the integrated earth-ocean-atmosphere system. These concepts include (but are not limited to) (1) Earth materials, (2) tectonics, (3) basic dynamics of the oceans and atmosphere, (4) surficial processes land-ocean-atmosphere interactions.
2. Demonstrate intellectual and technical ability to observe, develop questions, describe, measure, classify, interpret, assess problems, and critically evaluate hypotheses or plans in field and laboratory settings.
3. Appreciate both team and individual approaches to scientific problem solving, and work effectively, thoroughly, efficiently and competently in either situation.
4. Develop the ability to observe and analyze geoscience problems in three dimensions and time.
5. Know how to perform their own research and to efficiently track down and critically evaluate primary literature on earth science topics to help them answer (or pose) scientific questions in the geosciences.
6. Demonstrate the ability to communicate scientific ideas and findings effectively in both oral presentations and writing to a wide range of audiences.
7. Conduct themselves professionally, rationally, and ethically.
8. Have the appropriate knowledge base from their individual concentrations to enter the workforce or to continue on to graduate school to ultimately enter industry, academia, or government service as a geoscientist.
9. Value scientific information in and of itself, and the process through which scientific knowledge is generated.
10. Be an open-minded (open to new scientific concepts and information), independent, and analytical thinker.

Additional Program Information

This information is required by the Office of Accreditation and Program Integrity.

Courses offered via distance (if applicable):

What is the primary delivery format for the program? Face-to-Face Only

Does any portion of this program occur off-campus?

No

Are you working with a vendor / other collaborators to offer your program?

No

Related Departments

Could this program prepare students for any type of professional licensure, in Virginia or elsewhere?

No

Are you adding or removing a licensure component?

No

Additional SCHEV & SACSCOC Information

Is this change a simple retitling of an existing program, with no other changes, to any existing program content, curriculum requirements, etc?

No

Does this change represent a repackaging of content in an existing approved degree/certificate program at the same instructional level (i.e., baccalaureate, master's, or doctoral)?

No

Percentage of total credits containing new course content. ("New course content" is defined by SACSCOC as content that is not currently included in an existing approved degree/certificate program at the same instructiona level. Do not exclude gen ed credits in calculations for undergraduate programs.)

0%-24%

Does this change include the addition of a distance education or face-to-face method of delivery for this program

No

Does this change include the addition of a course/credit-based competency-based education delivery option?

No

Will any additional equipment/facilities be needed?

No

Will any additional faculty be required?

No

Will any additional financial resources be needed?

No

Additional library/learning resources needed?

No

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Green Leaf Program Designation

Is this a Green Leaf program? Yes

Green Leaf Designation Sustainability-focused designation

Sustainability-focused academic programs require at least one green leaf course. Either that course is itself sustainability-focused or else the program requires a set of sustainability-related courses with aggregated substance equivalent to a sustainability-focused course.

Relationship to Existing Courses

Relationship to Existing Programs

List sustainability-focused courses currently required in the degree program:

Does this program cover material which crosses into another department?

No

Additional Attachments RE_ Earth Science_Geology BS.pdf

SCHEV Proposal

Executive Summary

Reviewer Comments

Additional Comments

Is this course required of all students in this degree program?

%wi_required.eschtml%

Key: 864