

Program Change Request

Date Submitted: 10/11/18 4:59 pm

Viewing: **SC-BS-ESCI : Earth Science, BS**

Last approved: 03/15/18 1:57 pm

Last edit: 11/12/18 3:24 pm

Changes proposed by: muhen

Catalog Pages Using this Program [Earth Science, BS](#)

In Workflow

1. **AOES Committee**
2. **AOES Chair**
3. **ESP Chair**
4. **SC Curriculum Committee**
5. SC Associate Dean
6. SC CAT Editor
7. Assoc Provost-Undergraduate
8. Registrar-Programs

Approval Path

1. 11/01/18 9:39 am
Barry Klinger (bklinger):
Approved for AOES Committee
2. 11/04/18 8:21 pm
Jim Kinter (ikinter):
Approved for AOES Chair
3. 11/06/18 2:55 pm
A. Alonso Aguirre (aaguirr3):
Approved for ESP Chair

History

1. Nov 28, 2017 by clmig-jwehrheim
2. Mar 15, 2018 by Jennifer Bazaz (jbazaz)

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

No

Effective Catalog: 2019-2020

Program Level: Undergraduate

Program Type: Bachelor's

Degree Type: Bachelor of Science

Title: Earth Science, BS

Banner Title: **Earth Science BS**

Registrar/OAPI Use Only – SCHEV Status: Approved

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SCHEV Letter

Concentration(s):

| | Associated Concentrations | Registrar's Office Use Only: Concentration Code |
|---|------------------------------------|---|
| 1 | Earth Surface Processes | EP |
| 2 | Environmental Geoscience | EVGS |
| 3 | Geology | GEOL |
| 4 | Oceanography and Estuarine Science | OEST |
| 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? Yes

| | | |
|----------------------------------|--|--------------------------------|
| Participating Colleges | | College |
| | 1 | College of Science |
| Participating Departments | | Department |
| | 1 | Environmental Science & Policy |
| Justification | BIOL 303 is being removed and replaced with BIOL 310 due to changes in the Biology curriculum and plan for teaching these classes. | |

Total Credits Required: Total credits: minimum 120

Registrar's Office Use Only - Program Code:
SC-BS-ESCI

Registrar/IRR Use Only – Program CIP Code

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 fulfills the writing intensive requirement for this major, with the exception of:

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

Students must complete all coursework with a minimum GPA of 2.00.

Core Science and Mathematics

| Code | Course List Title | Credits |
|---|---|---------|
| GEOL 101 | Introductory Geology I (Mason Core) | 4 |
| GEOL 309 or BIOL 309 | Introduction to Oceanography | 3 |
| GEOL 420 | Earth Science and Policy (Mason Core) | 3 |
| 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 |
| MATH 113 | Analytic Geometry and Calculus I (Mason Core) | 4 |
| MATH 114 | Analytic Geometry and Calculus II | 4 |
| STAT 250 | Introductory Statistics I (Mason Core) | 3 |
| Select one of the following options: | | 3-4 |
| Option A: | | |
| CLIM 111 | Introduction to the Fundamentals of Atmospheric Science (Mason Core) | |

| Code | Title | Credits |
|--------------------------|--|---------|
| CLIM 112 | Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core) | |
| Option B: | | |
| PHYS 111 | Introduction to the Fundamentals of Atmospheric Science (Mason Core) | |
| PHYS 112 | Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core) | |
| Option C: | | |
| GGS 309 | Meteorology and Climate | |
| Total Credits | | 32-33 |

Physics

| Code | Course List | Title | Credits |
|--|---|-------|---------|
| Select one 8-credit sequence from the following: | | | |
| PHYS 160 | University Physics I (Mason Core) | | 8 |
| & 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) | | |
| PHYS 243 | College Physics I (Mason Core) | | |
| & PHYS 244 | and College Physics Lab (Mason Core) | | |
| & PHYS 245 | and College Physics II (Mason Core) | | |
| & PHYS 246 | and College Physics Lab (Mason Core) | | |
| Total Credits | | | 8 |

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:

| Code | Course List | Title | Credits |
|--|--|-------|---------|
| GEOL 102 | Introductory Geology II (Mason Core) | | 4 |
| or EVPP 110 | The Ecosphere: An Introduction to Environmental Science I (Mason Core) | | |
| GEOL 302 | Mineralogy | | 4 |
| GEOL 303 | Field Mapping Techniques | | 3 |
| GEOL 306 | Soil Science | | 3 |
| GEOL 317 | Geomorphology 1 | | 4 |
| GGS 311 | Introduction to Geographic Information Systems | | 3 |
| Select 10-15 credits from the following: | | | 10-15 |
| GEOL 304 | Sedimentary Geology | | |
| GEOL 305 | Environmental Geology | | |
| GEOL 313 | Hydrogeology | | |
| GEOL 315 | Topics in Geology II | | |
| GEOL 363 | Coastal Morphology and Processes | | |
| GEOL 401 | Structural Geology | | |
| GEOL 403 | Geochemistry | | |
| GEOL 417 | Geophysics | | |
| Total Credits | | | 31-36 |

¹ Fulfills writing intensive requirement.

Concentration in Environmental Geoscience (EVGS)

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:

| Code | Course List | Title | Credits |
|--------------------------|--|-------|---------|
| GEOL 102 | Introductory Geology II (Mason Core) | | 4 |
| GEOL 302 | Mineralogy | | 4 |
| GEOL 305 | Environmental Geology 1 | | 3 |

| Code | Title | Credits |
|---|---|---------|
| GEOL 306 | Soil Science | 3 |
| GEOL 313 | Hydrogeology | 3 |
| GEOL 320 | Geology of Earth Resources | 3 |
| GEOL 321 | Geology of Energy Resources | 3 |
| GEOL 403 | Geochemistry | 3 |
| or CHEM 427 | Aquatic Environmental Chemistry | |
| EVPP 336 | Human Dimensions of the Environment | 3 |
| or EVPP 361 | Introduction to Environmental Policy | |
| Select 6-12 credits from the following: | | 6-12 |
| CLIM 101 | Global Warming: Weather, Climate, and Society (Mason Core) | |
| CLIM 412 | Physical Oceanography | |
| GEOL 304 | Sedimentary Geology | |
| EVPP 201 | Environment and You: Issues for the Twenty-First Century (Mason Core) | |
| EVPP 336 | Human Dimensions of the Environment | |
| EVPP 361 | Introduction to Environmental Policy | |
| EVPP 432 | Energy Policy | |
| EVPP 436 | The Human Dimensions of Global Climate Change | |
| GG5 302 | Global Environmental Hazards | |
| GG5 311 | Introduction to Geographic Information Systems | |
| GG5 322 | Issues in Global Change | |
| PHYS 331 | Fundamentals of Renewable Energy | |
| CONF 101 | Conflict and Our World (Mason Core) | |
| INTS 211 | Introduction to Conservation Studies (Mason Core) | |
| PRLS 300 | People with Nature | |
| PRLS 402 | Human Behavior in Natural Environments | |

Total Credits 35-41

1 Fulfills writing intensive requirement for this concentration only.

Concentration in Geology (GEOL)

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:

| Course List | | |
|--------------------------|--|---------|
| Code | Title | Credits |
| GEOL 102 | Introductory Geology II (Mason Core) | 4 |
| GEOL 302 | Mineralogy | 4 |
| GEOL 304 | Sedimentary Geology | 4 |
| GEOL 308 | Igneous and Metamorphic Petrology | 4 |
| GEOL 312 | Invertebrate Paleontology | 4 |
| GEOL 317 | Geomorphology 2 | 4 |
| GEOL 401 | Structural Geology | 4 |
| Six credits of | | 6 |
| GEOL 404 | Geological Field Techniques 3 | |

Total Credits 34

2 Fulfills writing intensive requirement.

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

Concentration in Oceanography and Estuarine Science (OEST)

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:

| Course List | | |
|-----------------------------|--|---------|
| Code | Title | Credits |
| CLIM 412 | Physical Oceanography | 3 |
| or GEOL 412 | Physical Oceanography | |
| GEOL 102 | Introductory Geology II (Mason Core) | 4 |

| Code | Title | Credits |
|---|---|------------|
| GEOL 458 | Chemical Oceanography | 3 |
| or CHEM 458 | Chemical Oceanography | |
| Select one of the following 8-credit sequences: | | 8 |
| Select one of the following 7-8 credit sequences: | | 7-8 |
| BIOL 103 | Introductory Biology I (Mason Core) | |
| & BIOL 107 | and Intro Biology II Lecture (Mason Core) | |
| & BIOL 106 | and Introductory Biology II Laboratory (Mason Core) | |
| BIOL 213 | Cell Structure and Function (Mason Core) | |
| & BIOL 310 | and Biodiversity | |
| EVPP 110 | The Ecosphere: An Introduction to Environmental Science I (Mason Core) | |
| & EVPP 111 | and The Ecosphere: An Introduction to Environmental Science II (Mason Core) | |
| Select one of the following options: | | 15-16 |
| Open Ocean Option: | | |
| GEOL 364 | Marine Geology | |
| BIOL 449 | Marine Ecology | |
| Three additional courses from the electives list below (minimum of 9 credits) | | |
| Coastal Ocean Option: | | |
| GEOL 363 | Coastal Morphology and Processes | |
| EVPP 581 | Estuarine and Coastal Ecology | |
| Three additional courses from the electives list below (minimum of 9 credits) | | |
| Total Credits | | 32-34 |

Electives

| Code | Course List Title | Credits |
|--------------------------|--|---------|
| GEOL 302 | Mineralogy | 4 |
| GEOL 304 | Sedimentary Geology | 4 |
| GEOL 308 | Igneous and Metamorphic Petrology | 4 |
| GEOL 312 | Invertebrate Paleontology | 4 |
| GEOL 363 | Coastal Morphology and Processes | 4 |
| GEOL 364 | Marine Geology | 3 |
| GEOL 565 | Paleoceanography | 3 |
| BIOL 440 | Field Biology 1 | 4 |
| BIOL 449 | Marine Ecology | 3 |
| EVPP 350 | Freshwater Ecosystems | 4 |
| EVPP 377 | Applied Ecology | 3 |
| EVPP 419 | Marine Mammal Biology and Conservation | 3 |
| EVPP 581 | Estuarine and Coastal Ecology | 3 |
| EVPP 582 | Estuarine and Coastal Ecology Laboratory | 1 |
| INTS 395 | Field-Based Work 2 | 1-18 |

Additional recommended course:

| | | |
|--------------------------|---------------------|---|
| RECR 161 | Scuba Diving: Basic | 2 |
|--------------------------|---------------------|---|

- 1 When topic is Coral Reef Ecology
- 2 When topic is Exploring Underwater Ecology.

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:

| Code | Course List Title | Credits |
|-----------------------------|--|---------|
| GEOL 102 | Introductory Geology II (Mason Core) | 4 |
| GEOL 302 | Mineralogy | 4 |
| GEOL 304 | Sedimentary Geology | 4 |
| GEOL 312 | Invertebrate Paleontology | 4 |
| GEOL 334 | Vertebrate Paleontology 1 | 4 |
| BIOL 103 | Introductory Biology I (Mason Core) | 4 |
| or BIOL 213 | Cell Structure and Function (Mason Core) | |

| Code | Title | Credits |
|--|-------------------------------------|---------|
| Select 9-10 credits from the following additional courses: | | |
| GEOL 306 | Soil Science | 9-10 |
| GEOL 317 | Geomorphology | |
| GEOL 332 | Paleoclimatology | |
| GEOL 364 | Marine Geology | |
| GEOL 403 | Geochemistry | |
| GEOL 412 | Physical Oceanography | |
| GEOL 458 | Chemical Oceanography | |
| GEOL 565 | Paleoceanography | |
| Select 3-5 credits from the following additional course: | | |
| BIOL 310 | Biodiversity | 3-5 |
| & BIOL 330 | and Biodiversity Lab and Recitation | |
| BIOL 320 | Comparative Chordate Anatomy | |
| BIOL 331 | Invertebrate Zoology | |
| BIOL 374 | Biogeography: Space, Time, and Life | |
| or GGS 321 | Biogeography | |
| BIOL 468 | Vertebrate Natural History | |
| BIOL 470 | Dinosaur Biology | |
| BIOL 471 | Evolution | |
| Total Credits | | |

1 Fulfills writing intensive requirement for this concentration only.

Retroactive Requirements Updates:
Plan of Study:
Honors Information:

Honors in the Major

Earth science and 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 Earth Science, 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:

| Code | Course List Title | Credits |
|--------------------------|---|---------|
| 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 | 3 |
| CLIM 409 | Research Internship | 3 |
| GEOL 420 | Earth Science and Policy (Mason Core) | 3 |

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

Are you changing the total number of credits required for this program?

Are you changing the delivery format in any way (e.g adding an online option)?

Are you adding/removing a licensure option which was approved by SCHEV?

Will any portion of this program be offered at an off-campus location?

Are you adding significant new content areas to the program?

Will this program change affect any specialized accreditation?

Green Leaf Program DesignationIs this a Green Leaf
program? YesGreen 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 CoursesRelationship to
Existing ProgramsList sustainability-
focused courses
currently required
in the degree
program:

Does this program cover material which crosses into another department?

No

Additional
Attachments

SCHEV Proposal

Executive
SummaryReviewer
Comments

**Additional
Comments**

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

%wi_required.eshtml%

Key: 619