# ENVIRONMENTAL SCIENCE, BS

**Banner Code: SC-BS-EVSC**

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The Environmental Science, BS provides students with rigorous training in the fundamental science of the environment, and in the application of the key scientific principles to the analysis of environmental processes and problems and to the development of practical responses to those problems. The program covers ecological systems, environmental policy and the fundamental techniques of environmental science and engineering, protection and improvement of environmental quality, and public and private decision-making processes. Graduates of the program are prepared to undertake careers in a variety of environmental science fields, and are also qualified to pursue advanced scientific/professional education.

This is a Green Leaf program.

### Concentrations

Students select a concentration in:

- Conservation
- Ecological Science
- Environmental Health
- Human and Ecosystem Response to Climate Change
- Marine, Estuarine and Freshwater Ecology

## Admissions & Policies

## 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 (https://www2.gmu.edu/admissions-aid/apply-now).

## Policies

Students must fulfill all Requirements for Bachelor's Degrees, including the Mason Core.

Students can fulfill the writing intensive requirement for this major by taking EVPP 337 Environmental Policy Making in Developing Countries.

For policies governing all undergraduate programs, see AP.5 Undergraduate Policies.

## Requirements

## Degree Requirements

Total credits: minimum 120

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

### Core Requirements

All students complete the following core courses:

#### Environmental Science

| | | |
|---|---|---|
| EVPP 210 | Environmental Biology: Molecules and Cells | 4 |
| EVPP 301 | Environmental Science: Biological Diversity and Ecosystems | 4 |
| EVPP 302 | Environmental Science: Biomes and Human Dimensions | 4 |
| EVPP 305 | Environmental Microbiology Essentials | 3 |
| EVPP 306 | Environmental Microbiology Essentials Laboratory | 1 |
| EVPP 337 | Environmental Policy Making in Developing Countries [1] | 3 |
| EVPP 361 | Introduction to Environmental Policy | 3 |
| EVPP 377 | Applied Ecology | 3 |
| EVPP 430 | Fundamentals of Environmental Geographic Information Systems | 3 |
| BIOL 214 | Biostatistics for Biology Majors | 4 |
| Select one from the following: | | 3 |
| EVPP 336 | Human Dimensions of the Environment | |
| EVPP 338 | Economics of Environmental Policy | |
| EVPP 362 | Intermediate Environmental Policy | |
| EVPP 475 | Global Biodiversity Governance | |
| Select one from the following: | | 3-4 |
| EVPP 378 | RS: Ecological Sustainability (Mason Core) | |
| EVPP 401 | Integrated Environmental Assessment | |
| EVPP 480 | Sustainability in Action (Mason Core) | |
| CONS 490 | RS: Integrated Conservation Strategies (Mason Core) [2] | |
| Total Credits | | 38-39 |

1 Fulfills the writing intensive requirement.

2 Only offered through the Smithsonian-Mason Semester.

#### Chemistry

| | | |
|---|---|---|
| CHEM 211 | General Chemistry I (Mason Core) | 3 |
| CHEM 213 | General Chemistry Laboratory I (Mason Core) | 1 |
| CHEM 212 | General Chemistry II (Mason Core) | 3 |
| CHEM 214 | General Chemistry Laboratory II (Mason Core) | 1 |
| Total Credits | | 8 |

#### Mathematics

| | | |
|---|---|---|
| Select two from the following: | | 7-8 |
| MATH 111 | Linear Mathematical Modeling (Mason Core) | |

| | | |
|---|---|---|
| MATH 113 | Analytic Geometry and Calculus I (Mason Core) | |
| MATH 114 | Analytic Geometry and Calculus II | |
| Total Credits | | 7-8 |

### Geology

| | | |
|---|---|---|
| GEOL 102 | Introductory Geology II (Mason Core) | 4 |
| Total Credits | | 4 |

### Information Technology

| | | |
|---|---|---|
| CDS 130 | Computing for Scientists (Mason Core) | 3 |
| Total Credits | | 3 |

## Concentration in Conservation (CNSV)

| | | |
|---|---|---|
| Select 21 credits from the following: | | 21 |
| EVPP 318 | Conservation Biology | |
| EVPP 378 | RS: Ecological Sustainability (Mason Core) | |
| EVPP 395 | Undergraduate Research in Environmental Science and Policy [1] | |
| EVPP 396 | Directed Topic in Environmental Science and Policy [1] | |
| EVPP 419 | Marine Mammal Biology and Conservation | |
| EVPP 420 | Marine Mammal Biology and Conservation Field Course | |
| EVPP 421 | Marine Conservation | |
| EVPP 427 | Disease Ecology and Conservation | |
| EVPP 440 | Field Environmental Science [1] | |
| EVPP 475 | Global Biodiversity Governance | |
| EVPP 490 | Special Topics in Environmental Science and Policy [1] | |
| EVPP 494 | Internship [1] | |
| BIOL 310 & BIOL 330 | Biodiversity and Biodiversity Lab and Recitation | |
| BIOL 435 | Selected Topics in Biology [1] | |
| GGS 303 | Geography of Resource Conservation (Mason Core) | |
| GGS 307 | Sustainable Development | |
| CONS 320 | Conservation in Practice [2] | |
| CONS 401 | Conservation Theory [2] | |
| CONS 402 | Applied Conservation [2] | |
| CONS 403 | Ecology and Conservation Theory [2] | |
| CONS 404 | Biodiversity Monitoring [2] | |
| CONS 410 | Human Dimensions in Conservation (Mason Core) [2] | |
| CONS 411 | Science Communication for Conservation [2] | |
| CONS 420 | Human-Wildlife Conflict [2] | |
| CONS 490 | RS: Integrated Conservation Strategies (Mason Core) (Synthesis course) [2] | |
| CONS 491 | RS: Conservation Management Planning (Mason Core) [2] | |
| CONS 497 | Special Topics in Conservation [2] | |
| CONS 498 | Internship | |
| CONS 499 | Independent Study/Research | |
| INTS 311 | The Mysteries of Migration: Consequences for Conservation | |
| PRLS 300 | People with Nature | |
| PRLS 402 | Human Behavior in Natural Environments | |
| Additional courses as approved by the program coordinator | | |
| Total Credits | | 21 |

1. In a relevant topic
2. Only offered through the Smithsonian-Mason Semester

## Concentration in Ecological Science (ECSI)

| | | |
|---|---|---|
| Select 21 credits from the following: | | 21 |
| EVPP 309 | Introduction to Oceanography | |
| EVPP 350 | Freshwater Ecosystems | |
| EVPP 355 | Ecological Engineering and Ecosystem Restoration | |
| EVPP 378 | RS: Ecological Sustainability (Mason Core) | |
| EVPP 395 | Undergraduate Research in Environmental Science and Policy [1] | |
| EVPP 396 | Directed Topic in Environmental Science and Policy [1] | |
| EVPP 408 | Mushrooms, Molds and Society | |
| EVPP 427 | Disease Ecology and Conservation | |
| EVPP 440 | Field Environmental Science [1] | |
| EVPP 449 | Marine Ecology | |
| EVPP 490 | Special Topics in Environmental Science and Policy [1] | |
| EVPP 494 | Internship [1] | |
| BIOL 310 & BIOL 330 | Biodiversity and Biodiversity Lab and Recitation | |
| BIOL 345 | Plant Ecology | |
| BIOL 435 | Selected Topics in Biology [1] | |
| BIOL 459 | Fungi and Ecosystems | |
| GEOL 305 | Environmental Geology | |
| GEOL 306 | Soil Science | |
| GGS 307 | Sustainable Development | |
| Additional courses as approved by the program coordinator | | |
| Total Credits | | 21 |

1. In a relevant topic

## Concentration in Environmental Health (EVHL)

| | | |
|---|---|---|
| **Required Courses** | | |
| EVPP 427 | Disease Ecology and Conservation | 3 |
| EVPP 445 | Principles of Environmental Toxicology | 3 |
| Select 15 credits from the following: | | 15 |
| EVPP 395 | Undergraduate Research in Environmental Science and Policy [1] | |
| EVPP 396 | Directed Topic in Environmental Science and Policy [1] | |
| EVPP 409 | Medical Mycology | |

| | |
|---|---|
| EVPP 440 | Field Environmental Science [1] |
| EVPP 490 | Special Topics in Environmental Science and Policy [1] |
| EVPP 494 | Internship [1] |
| EVPP 515 | Molecular Environmental Biology I |
| BIOL 305 & BIOL 306 | Biology of Microorganisms and Biology of Microorganisms Laboratory |
| BIOL 402 | Applied and Industrial Microbiology |
| BIOL 404 | Medical Microbiology |
| BIOL 465 | Histology |
| GGS 302 | Global Environmental Hazards |
| GGS 304 | Population Geography (Mason Core) |
| GGS 307 | Sustainable Development |
| GGS 319 | Air Pollution |
| GGS 322 | Issues in Global Change |
| GCH 205 | Global Health (Mason Core) |
| GCH 360 | Health and Environment |
| GCH 560 | Environmental Health |
| Additional courses as approved by the program coordinator | |
| Total Credits | 21 |

[1] In a relevant topic

## Concentration in Human and Ecosystem Response to Climate Change (HERC)

| **Required Course** | | |
|---|---|---|
| EVPP 336 | Human Dimensions of the Environment | 3 |
| Select 18 credits from the following: | | 18 |
| EVPP 309 | Introduction to Oceanography | |
| EVPP 355 | Ecological Engineering and Ecosystem Restoration | |
| EVPP 378 | RS: Ecological Sustainability (Mason Core) | |
| EVPP 395 | Undergraduate Research in Environmental Science and Policy [1] | |
| EVPP 396 | Directed Topic in Environmental Science and Policy | |
| EVPP 427 | Disease Ecology and Conservation | |
| EVPP 432 | Energy Policy | |
| EVPP 436 | The Human Dimensions of Global Climate Change | |
| EVPP 440 | Field Environmental Science | |
| EVPP 475 | Global Biodiversity Governance | |
| EVPP 490 | Special Topics in Environmental Science and Policy | |
| EVPP 494 | Internship | |
| CLIM 101 | Global Warming: Weather, Climate, and Society (Mason Core) | |
| CLIM 111 | Introduction to the Fundamentals of Atmospheric Science (Mason Core) | |
| CLIM 112 | Introduction to the Fundamentals of Atmospheric Science Lab (Mason Core) | |
| CLIM 312 | Physical Climatology | |
| CLIM 314 | Severe and Extreme Weather | |
| CLIM 319 | Air Pollution | |
| CLIM 412 | Physical Oceanography | |
| CLIM 438 | Atmospheric Chemistry | |
| GEOL 309 | Introduction to Oceanography | |
| GGS 121 | Dynamic Atmosphere and Hydrosphere (Mason Core) | |
| GGS 302 | Global Environmental Hazards | |
| GGS 304 | Population Geography (Mason Core) | |
| GGS 307 | Sustainable Development | |
| GGS 309 | Meteorology and Climate | |
| GGS 312 | Physical Climatology | |
| GGS 314 | Severe and Extreme Weather | |
| GGS 319 | Air Pollution | |
| GGS 321 | Biogeography | |
| GGS 322 | Issues in Global Change | |
| GGS 354 | Data Analysis and Global Change Detection Techniques | |
| GGS 456 | Introduction to Atmospheric Radiation | |
| Additional courses as approved by the program coordinator | | |
| Total Credits | | 21 |

[1] In a relevant topic

## Concentration in Marine, Estuarine and Freshwater Ecology (MEFC)

| **Required Courses** | | |
|---|---|---|
| EVPP 309 | Introduction to Oceanography | 3 |
| EVPP 350 | Freshwater Ecosystems | 4 |
| EVPP 421 | Marine Conservation | 3 |
| EVPP 449 | Marine Ecology | 3 |
| Select 8 credits from the following: | | 8 |
| EVPP 318 | Conservation Biology | |
| EVPP 363 | Coastal Morphology and Processes | |
| EVPP 380 | Wetlands of the World | |
| EVPP 395 | Undergraduate Research in Environmental Science and Policy [1] | |
| EVPP 396 | Directed Topic in Environmental Science and Policy [1] | |
| EVPP 419 | Marine Mammal Biology and Conservation | |
| EVPP 420 | Marine Mammal Biology and Conservation Field Course | |
| EVPP 427 | Disease Ecology and Conservation | |
| EVPP 440 | Field Environmental Science [1] | |
| EVPP 490 | Special Topics in Environmental Science and Policy [1] | |
| EVPP 494 | Internship [1] | |
| BIOL 331 | Invertebrate Zoology | |
| BIOL 480 | The Diversity of Fishes | |
| GEOL 364 | Marine Geology | |
| GEOL 458 | Chemical Oceanography | |
| GGS 307 | Sustainable Development | |

| | | |
|---|---|---|
| CLIM 412 | Physical Oceanography | |
| INTS 318 | Exploring Virginia's Watersheds | |
| Additional courses as approved by the program coordinator | | |
| Total Credits | | 21 |

[1] In a relevant topic

## Mason Core and Elective Credits

In order to meet a minimum of 120 credits, this degree requires an additional 37-39 credits, which may be applied toward any remaining Mason Core requirements (outlined below), Requirements for Bachelor's Degrees, and elective courses. Students are strongly encouraged to consult with their advisors to ensure that they fulfill all requirements.

### Mason Core

Note: Some Mason Core requirements may already be fulfilled by the major requirements listed above. Students are strongly encouraged to consult their advisors to ensure they fulfill all remaining Mason Core requirements.

| Code | Title | Credits |
|---|---|---|
| **Foundation Requirements** | | |
| Written Communication | | 6 |
| Oral Communication | | 3 |
| Quantitative Reasoning | | 3 |
| Information Technology | | 3-7 |
| **Core Requirements** | | |
| Arts | | 3 |
| Global Understanding | | 3 |
| Literature | | 3 |
| Natural Science | | 7 |
| Social and Behavioral Sciences | | 3 |
| Western Civilization/World History | | 3 |
| **Synthesis/Capstone Requirement** [1] | | |
| Synthesis/Capstone | | 3 |
| Total Credits | | 40 |

[1] minimum 3 credits

# Accelerated Master's

# Bachelor's Degree (Green Leaf)/ Environmental Science and Policy, Accelerated MS

## Overview

This degree option allows highly qualified George Mason University students to earn an Environmental Science and Policy, MS in less time than if they had first graduated with an environmentally-focused Green Leaf-designated BA or BS degree and then applied to the MS program sequentially.

For more detailed information, see AP.6.7 Bachelor's/Accelerated Master's Degrees. For policies governing all graduate programs, see AP.6 Graduate Policies.

## Admission Requirements

Students with an overall GPA of at least 3.20 who are pursuing any Green Leaf-designated major or minor may apply for provisional acceptance into this accelerated master's program after completing two semesters of chemistry (including CHEM 211 General Chemistry I (Mason Core) and CHEM 212 General Chemistry II (Mason Core)) and three semesters of biology, including a course in ecology, or the equivalent, for example:

| Code | Title | Credits |
|---|---|---|
| Select one of the following options: | | 13 |
| **Option 1:** | | |
| BIOL 213 | Cell Structure and Function (Mason Core) | |
| BIOL 214 | Biostatistics for Biology Majors | |
| BIOL 308 | Foundations of Ecology and Evolution | |
| **Option 2:** | | |
| EVPP 210 | Environmental Biology: Molecules and Cells | |
| EVPP 301 | Environmental Science: Biological Diversity and Ecosystems | |
| EVPP 302 | Environmental Science: Biomes and Human Dimensions | |
| EVPP 305 | Environmental Microbiology Essentials | |
| EVPP 306 | Environmental Microbiology Essentials Laboratory | |
| **Option 3:** | | |
| CONS 401 | Conservation Theory | |
| CONS 402 | Applied Conservation | |
| 6 credits of 6 credits of BIOL or CONS electives | | |
| **Option 4:** | | |
| CONS 403 | Ecology and Conservation Theory | |
| CONS 404 | Biodiversity Monitoring | |
| BIOL or CONS electives | | |

By the beginning of the undergraduate's senior year, they should first submit a Graduate Application for Accelerated Master's Program form (obtained from the Office of Academic and Student Affairs (https://cos.gmu.edu/about/contact-us)). Secondly, in their senior year accelerated master's students must complete the two graduate courses indicated on their Accelerated Master's Program Application with a minimum grade of 3.00 in each course. They must maintain a minimum GPA of 3.00 in all coursework and in coursework applied to their major. Upon completion and conferral of the undergraduate degree in a Green Leaf-designated program, in the semester indicated in the application, they must additionally submit the Bachelor's/Accelerated Master's Transition form (found on the Office of the University Registrar website (http://registrar.gmu.edu/forms)) and will subsequently be admitted into graduate status.

By at least the beginning of their senior year, they should seek out a faculty member in the Department of Environmental Science and Policy who is willing to serve as their advisor (unless the student is planning to enroll in the MS concentration in Environmental Management). This advisor will aid the student in choosing the appropriate graduate courses to take and help to prepare the student for graduate studies. Admission into a research-oriented master's concentration is dependent upon securing the agreement of a faculty advisor. Faculty from a variety of departments and colleges at George Mason (called "program faculty") can serve as master's advisors.

Potential students are encouraged to speak with the graduate program coordinator in the department to obtain guidance on this issue.

## Application Requirements

Applicants to all graduate programs at Mason must meet the admission standards and application requirements for graduate study as specified in the Graduate Admission Policies section of this catalog, *excluding* the GRE exam requirement (which is not required for those enrolled in the accelerated program). This includes three letters of recommendation (at least one from a former professor or someone with a PhD), a recent resume, a statement of interest/research goals and interests (including information on the candidate's proposed MS research), and a letter from their advisor stating that the advisor agrees to take on the candidate as an MS student, how the candidate would be a good fit for them and why candidate's research topic would be suitable (please note that a letter of endorsement from an advisor not necessary for candidates taking the Environmental Management concentration).

For information specific to the accelerated Environmental Science and Policy, MS, see Graduate Admissions on the department's website (http://esp.gmu.edu/academic-programs/graduate/admissions).

## Reserve Graduate Credits

Students admitted to this program may take graduate courses after completing 90 undergraduate credits, and up to 6 credits of appropriate environmentally-focused graduate coursework may be used in partial satisfaction of the requirements for the undergraduate degree. If students earn at least a 3.00 GPA in these classes, they are granted advanced standing in the master's program and must then complete an additional 27-31 credits to receive the master's degree.

To apply these credits to the master's degree, students must request that the credits be moved from the undergraduate degree to the graduate degree using the Bachelor's/Accelerated Master's Transition form found on the Office of the University Registrar website (http://registrar.gmu.edu/forms) (as noted above).

Students may take up to 6 additional environmentally-focused graduate credits as reserve graduate credit. These credits do not apply to the undergraduate degree but will reduce the subsequent master's degree credits accordingly (e.g., with 6 credits counted towards undergraduate degree plus the maximum 6 reserve credits, an MS could be completed with 21 post-bachelor's credits). The ability to take courses for reserve graduate credit is available to all high achieving undergraduates with the permission of the department.