Environmental Studies, Bachelor of Science (B.S.)

The Bachelor of Science in Environmental Studies requires a minimum of 120 credits.

Along with the general education requirements of VCU Life Sciences, this curriculum requires 32-33 credits in core science and mathematics courses and 37-38 credits in environmental studies core courses.

Learning outcomes

Upon completing this program, students will know and know how to do the following:

- Demonstrate comprehension of basic biological concepts and their integration
- Demonstrate comprehension of basic earth science concepts and their integration
- Demonstrate comprehension of basic ecological concepts and their integration
- Relate the principles of environmental science and policy
- Use basic environmental skills within the research process

Special requirements

The Bachelor of Science in Environmental Studies requires a minimum 2.0 cumulative average in all major course work.

Degree requirements for Environmental Studies, Bachelor of Science (B.S.)

General Education requirements

University Core Education Curriculum (minimum 21 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNIV 111</td>
<td>Focused Inquiry I</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 112</td>
<td>Focused Inquiry II</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 200</td>
<td>Inquiry and the Craft of Argument</td>
<td>3</td>
</tr>
<tr>
<td>Approved humanities/ fine arts</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Approved natural/physical sciences</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved quantitative literacy</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Approved social/behavioral sciences</td>
<td>3-4</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>21-24</td>
<td></td>
</tr>
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</table>

Additional general education requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFSC 301</td>
<td>Integrative Life Sciences Research</td>
<td>3</td>
</tr>
<tr>
<td>STAT 210</td>
<td>Basic Practice of Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or STAT 212</td>
<td>Concepts of Statistics</td>
<td></td>
</tr>
<tr>
<td>Completion of a foreign language through the 102 level or an equivalent course or by placement</td>
<td>0-8</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>6-14</td>
<td></td>
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</tbody>
</table>

Collateral requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS 201</td>
<td>Earth System Science (satisfies University Core natural/physical sciences)</td>
<td>3</td>
</tr>
</tbody>
</table>

Major requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 151 &amp; BZIO 151</td>
<td>Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 152 &amp; BZIO 152</td>
<td>Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 317</td>
<td>Ecology</td>
<td>3</td>
</tr>
<tr>
<td>CHEM 101 &amp; CHEZ 101</td>
<td>General Chemistry and General Chemistry Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 102 &amp; CHEZ 102</td>
<td>General Chemistry and General Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>ECON 325</td>
<td>Environmental Economics</td>
<td>3</td>
</tr>
<tr>
<td>Select one of the following:</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>ENVS 105 &amp; ENVZ 105</td>
<td>Physical Geology and Physical Geology Laboratory</td>
<td></td>
</tr>
<tr>
<td>URSP 204 &amp; URSZ 204</td>
<td>Physical Geography: Geomorphology and Soils and Physical Geography Laboratory: Geomorphology and Soils</td>
<td></td>
</tr>
<tr>
<td>ENVS/POLI 311</td>
<td>Politics of the Environment</td>
<td>3</td>
</tr>
<tr>
<td>ENVS 330/BIOZ 332</td>
<td>Environmental Pollution</td>
<td>3</td>
</tr>
<tr>
<td>ENVS 335 &amp; ENVZ 335</td>
<td>Environmental Geology and Environmental Geology Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>ENVS 401</td>
<td>Meteorology and Climatology</td>
<td>3</td>
</tr>
<tr>
<td>ENVS 411</td>
<td>Oceanography</td>
<td>3</td>
</tr>
<tr>
<td>ENVS 490</td>
<td>Research Seminar in Environmental Studies (capstone)</td>
<td>3</td>
</tr>
<tr>
<td>MATH 151</td>
<td>Precalculus Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>PHYS 201 &amp; PHYS 207</td>
<td>General Physics and University Physics I</td>
<td>4-5</td>
</tr>
<tr>
<td>PHYS 202 &amp; PHYS 208</td>
<td>General Physics and University Physics II</td>
<td>4-5</td>
</tr>
<tr>
<td>SOCY/POLI 320</td>
<td>Research Methods in the Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td>STAT 314</td>
<td>Applications of Statistics</td>
<td>4</td>
</tr>
<tr>
<td>Select one additional environmental studies course chosen with adviser’s approval</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total Hours</td>
<td>67-69</td>
<td></td>
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Open electives

Select 14-27 open elective credits                                           14-27

Total minimum requirement 120 credits

What follows is a sample plan that meets the prescribed requirements within a four-year course of study at VCU. Please contact your adviser before beginning course work toward a degree.

Freshman year

**Fall semester**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 100</td>
<td>Introductory Chemistry</td>
<td>3</td>
</tr>
</tbody>
</table>
ENVS 201 Earth System Science (satisfies University Core natural/physical sciences) 3
MATH 141 Algebra with Applications 3
POLI 103 U.S. Government (satisfies University Core social/behavioral sciences) 3
UNIV 111 Focused Inquiry I 3
Play course
video for
Focused Inquiry I

Term Hours: 15

Spring semester
BIOL 151 & BIOZ 151 Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I 4
CHEM 101 & CHEZ 101 General Chemistry and General Chemistry Laboratory I 4
MATH 151 Precalculus Mathematics (satisfies University Core quantitative literacy) 4
UNIV 112 Focused Inquiry II 3
Play course
video for
Focused Inquiry II

Term Hours: 15

Sophomore year
Fall semester
BIOL 152 & BIOZ 152 Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II 4
CHEM 102 & CHEZ 102 General Chemistry and General Chemistry Laboratory II 4
UNIV 200 Inquiry and the Craft of Argument 3
Foreign language (101-level) 4

Term Hours: 15

Spring semester
BIOL 317 & BIOZ 317 Ecology and Ecology Laboratory 5
ENGL 215 Reading Literature (satisfies University Core humanities/fine arts) 3
LFSC 301 Integrative Life Sciences Research 3
Foreign language (102-level) 4

Term Hours: 15

Junior year
Fall semester
ENVS 103. Environmental Science. 4 Hours.
Hybrid semester course taught mostly online; 3 lecture and 2 laboratory hours. 4 credits. Online presentations, assignments, debates and exams require students to understand situations and ideas that involve scientific, social and economic concepts associated with Earth’s environment. Laboratory exercises reinforce major course concepts. Integrates aspects of biology, chemistry, geology, physics and sociology. Topics include ecology, evolution, natural resources, air and water resources, energy and recycling, population biology, and sustainable global societies. Not applicable as a prerequisite for any biology course at the 200 level or above, nor for credit toward the B.S. in Biology. Crosslisted as: BIOL 103.
ENVS 105. Physical Geology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. A descriptive approach to physical geology dealing with the history and structure of the earth, catastrophic events and geology as it relates to the contemporary environment. An optional laboratory, ENVZ 105, may be taken with this course.
ENVS 201. Earth System Science. 3 Hours.
Semester course; 2 lecture and 2 laboratory hours. 3 credits. An introduction to the processes of and linkages among the major systems that drive planet Earth. The biosphere, geosphere, hydrosphere, atmosphere and sociosphere are presented as dynamic and interdependent systems. Labs/discussion sections will include both computer modeling of integrated systems and lab activities/field trip(s) at the Rice Center for Environmental Life Sciences.

ENVS 201 Earth System Science (satisfies University Core natural/physical sciences) 3
ENVS 311 or POLI 311 Politics of the Environment or Politics of the Environment 3
PHYS 202 General Physics 4
ENVS 335 Environmental Geology & ENVZ 335 and Environmental Geology Laboratory 4

Term Hours: 14

Senior year
Fall semester
ENVS 490 Research Seminar in Environmental Studies 3
SOCY 320 or POLI 320 Research Methods in the Social Sciences or Research Methods in the Social Sciences 3
STAT 314 Applications of Statistics 4
Open electives 6

Term Hours: 16

Spring semester
ENVS 401 Meteorology and Climatology 3
ENVS 411 Oceanography 3
Open electives 10

Term Hours: 16

Total Hours: 120

• Environmental Studies (ENVS) (p. 2)
• Life Sciences (LFSC) (p. 3)

Environmental Studies
ENVS 103. Environmental Science. 4 Hours.

ENVS 105. Physical Geology. 3 Hours.

ENVS 201. Earth System Science. 3 Hours.
ENVS 300. Sustainable Societies: James River Basin. 3 Hours. Semester course; 3 lecture hours. 3 credits. This course explores the 25 most critical social, economic and environmental issues in the region in a global context. It examines how people are tackling the issues of sustainably and turning them into opportunities.

ENVS 301. Introduction to Meteorology. 3 Hours. Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide the student with an overview of the structures and processes that cause weather. These include atmospheric circulations and the weather patterns that we observe. Emphasis will be placed upon the tracking and display of weather phenomena, as well as their forecast movement and impact.

ENVS 309. Introduction to Oceanography. 3 Hours. Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide the student with an overview of the structures and processes of the world's oceans. These include the systems that impact the oceans: the hydrosphere, the atmosphere, the geosphere, the biosphere and the sociosphere. Emphasis will be placed upon hands-on techniques for understanding these systems, including online simulations and in-class activities.

ENVS 311. Politics of the Environment. 3 Hours. Semester course; 3 lecture hours. 3 credits. An exploration of the current controversy about environmental politics and the issues and crises it centers on. Special attention will be given to the constitutional, political and geographical factors in the development of environmental policy and the organized effort to deal with governmental actions and inaction and its impact on policy outcomes. Crosslisted as: POLI 311.

ENVS 314. Man and Environment. 3 Hours. Semester course. 3 lecture hours. 3 credits. A comparative study of the ecology and natural history of human populations, including the environments as determining factors in the evolution of human institutions and technology, resources management, and population crises; cultural traditions as mechanisms of population control; basic theory of population biology. Crosslisted as: INTL 314.

ENVS 315. Energy and the Environment. 3 Hours. Semester course; 3 lecture hours. 3 credits. Enrollment restricted to non-physics majors with junior or senior standing; not applicable to the physics major. A study of society's demands for energy, how it is currently being met, the environmental consequences thereof and some discussion of alternatives. Crosslisted as: PHYS 315.

ENVS 330. Environmental Pollution. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisites: eight credits in biology. The study of pollution in the environment with emphasis on the procedures for detection and abatement. Crosslisted as: BIOL 332.

ENVS 332. Environmental Management. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisite: GEOG 204 or URSP 204. An interdisciplinary review of domestic and international environmental problems and their underlying causes, current management frameworks, alternative management approaches and strategies, and barriers to their implementation. Other topics include: environmental history and economics, population growth, natural resources use, biodiversity, pollution. Crosslisted as: URSP 332.

ENVS 335. Environmental Geology. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisite: ENV 105 or URSP 204. The relationship between humankind and the physical environment, Earth materials and processes, geological hazards, water, mineral and energy resources, land use and environmental health and law.

ENVS 368. Nature Writing. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisite: ENGL 201, 202, 203, 204, 205, 206, 211, 215, 236, 291 or 295. A study of the literary genre of nature writing in English. Crosslisted as: ENGL 368.

ENVS 401. Meteorology and Climatology. 3 Hours. Semester course; 3 lecture hours. Prerequisite: PHYS 201 or PHYS 207. A basic, semiquantitative course in the elements of weather and climate, their driving forces and their spatial and temporal distribution and variability. Atmospheric motions and circulation, weather forecasting, human impact on weather and climate.

ENVS 411. Oceanography. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisites: BIOL 151, BIOL 152 and CHEM 102. A basic course in the physical, chemical and geological properties of oceans and ocean basins. Origin and character of ocean basins, properties of oceanic waters, oceanic circulation, land-sea interactions, marine environments and ecology.

ENVS 419. Research Seminar in Environmental Studies. 3 Hours. Semester course; 3 lecture hours. 3 credits. Prerequisites: senior standing and at least 12 hours of approved environmental studies course work. An interdisciplinary examination of problems and issues central to environmental studies. Environmental research of VCU faculty will be reviewed, and selected local environmental problems will be studied. Each student will complete a research project focusing on a specific environmental question.

ENVS 421. Topics in Environmental Studies. 1-3 Hours. Semester course; variable hours. 1-3 credits per semester. May be repeated with different topics for a maximum of 6 credits. Prerequisites vary by topic. An in-depth study of a selected environmental topic. See the Schedule of Classes for specific topics to be offered each semester and prerequisites.

ENVS 422. Independent Study. 1-3 Hours. Semester course; variable hours. Variable credit. Maximum of 3 credits per semester; maximum total of 6 credits for all topics courses. Prerequisite: junior or senior standing, and permission of instructor.

ENVS 423. Environmental Studies Internship. 1-3 Hours. Semester course; variable hours. 1-3 credits per semester. Maximum total of 6 credits. Prerequisite: junior or senior standing, and permission of instructor. Graded as pass/fail.

Life Sciences

LFSC 251. Phage Discovery I. 2 Hours. Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will purify phage from soil, visualize phage using electron microscopy and isolate genomic material for nucleic acid sequencing. Registration by override only. Crosslisted as: BNFO 251.

LFSC 252. Phage Discovery II. 2 Hours. Semester course; 4 laboratory hours. 2 credits. Corequisite: BIOL 151 or 152. An exploratory laboratory where students will learn about the genomes of viruses infecting bacteria. Students will be given the genome sequence of a novel virus, which will be the basis for a series of computer-based analyses to understand the biology of the virus and to compare it with other viruses that infect the same host. Registration by override only. Crosslisted as: BNFO 252.
LFSC 301. Integrative Life Sciences Research. 3 Hours.
Semester course; 2 lecture and 1 recitation hours. 3 credits. Pre- or corequisite: UNIV 200 or HONR 200. Students will leave this course knowing enough about science and the process of science to feel confident in critically evaluating scientific information and/or embarking on their own process of discovery with a faculty mentor. They will gain an appreciation of the interdisciplinary and complex nature of life sciences and will hone their critical thinking about how science interacts with and informs society.

LFSC 307. Community Solutions: Multiple Perspectives. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: PSYC 101. Explores possibilities for addressing social concerns of the Richmond community by understanding the complex nature of social issues as essential to their successful amelioration via perspectives of life and social sciences. Toward this end, expertise from the social sciences, the life sciences and the community are integrated. Includes a service-learning experience (a 20-hour volunteer requirement). Crosslisted as: PSYC 307.

LFSC 401. Faith and Life Sciences. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: UNIV 200 or HONR 200. Open to students of any school or program. Explores the complex relationships between faith traditions and the life sciences. Topics include epistemology, impact of life sciences on ideas of fate and responsibility, limits of science and technology, and scientific and religious perspectives on human origins, consciousness, aggression, forgiveness, health, illness and death. Crosslisted as: RELS 401.