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 have mastered and be able to demonstrate the following:

• Comprehension of the foundational scientific concepts that underpin understanding of the environment
• Comprehension of basic environmental policies that govern society's interactions with the environment
• Comprehension of quantitative skills required in environmental research, policy development and education
• The ability to communicate about environmental issues in a variety of contexts

Special requirements

The Bachelor of Science in Environmental Studies requires a minimum 2.0 cumulative average in all major course work and a minimum of 34 credits of upper-level (e.g., 3XX, 4XX, or 5XX) approved courses. To meet the University Core capstone (Tier III) requirement, students are required to complete ENVS 499 and an additional course as approved by the unit. This additional course credit will count toward the electives for this major.

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

General Education requirements

Course | Title | Hours
---|---|---
UNIV 111 Play course video for Focused Inquiry I | Focused Inquiry I | 3

UNIV 112 Play course video for Focused Inquiry II | Focused Inquiry II | 3

UNIV 200 | Inquiry and the Craft of Argument | 3

Approved humanities/fine arts | 3

Approved natural/physical sciences | 3-4

Approved quantitative literacy | 3-4

Approved social/behavioral sciences | 3-4

Total Hours | 21-24

Course | Title | Hours
---|---|---
STAT 210 | Basic Practice of Statistics | 3

or STAT 212 | Concepts of Statistics | 3

Completion of a foreign language through the 102 level or an equivalent course or by placement | 0-8

Total Hours | 3-11

Major requirements

Course | Title | Hours
---|---|---
Biol 151 & BIOZ 151 | Introduction to Biological Sciences I and Introduction to Biological Science Laboratory I | 4

Biol 152 & BIOZ 152 | Introduction to Biological Sciences II and Introduction to Biological Science Laboratory II | 4

Biol 317 | Ecology | 3

Chem 101 & CHEZ 101 | General Chemistry I and General Chemistry Laboratory I | 4

Chem 102 & CHEZ 102 | General Chemistry II and General Chemistry Laboratory II | 4

Econ 325 | Environmental Economics | 3

ENVS 101 | Introduction to Environmental Studies I | 3

ENVS 102 | Introduction to Environmental Studies II | 3

ENVS 105 | Physical Geology | 3

or URSP 204 | Physical Geography | 3

ENVS/POLI 311 | Politics of the Environment | 3

ENVS 330/Biol 332 | Environmental Pollution | 3

ENVS 335 & ENVZ 335 | Environmental Geology and Environmental Geology Laboratory | 4

ENVS 401 | Meteorology and Climatology | 3

ENVS 411 | Oceanography | 3

ENVS 499 | Environmental Studies Capstone Experience (Tier III Capstone) | 0

Math 151 | Precalculus Mathematics (by course or placement) | 4

Phys 201 | General Physics I | 4-5

or Phys 207 | University Physics I | 4

Stat 314 | Applications of Statistics | 4

Major electives | 12

Total Hours | 71-72

Open electives

Course | Title | Hours
---|---|---
Open elective credits (up to a total of 120 credits) | 13-25

Total Hours | 13-25

The minimum total of credit hours required for this degree is 120.

Possible major electives

Any ENVS or ENVZ course at the 300, 400 or 500 level or courses listed below.

Course | Title | Hours
---|---|---
Biol 103 | Environmental Science | 4

Biol 307 | Aquatic Ecology | 3

Biol 312 | Invertebrate Zoology | 3

Biol 313 | Vertebrate Natural History | 3

Biol 314 | Animal Reproduction | 3
### Freshman year

<table>
<thead>
<tr>
<th>Fall semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS 101 Introduction to Environmental Studies I</td>
<td>3</td>
</tr>
<tr>
<td>MATH 141 Algebra with Applications</td>
<td>3</td>
</tr>
<tr>
<td>UNIV 101 Introduction to the University</td>
<td>1</td>
</tr>
<tr>
<td>UNIV 111 Play course video for Focused Inquiry I</td>
<td>3</td>
</tr>
<tr>
<td>University Core course (natural/physical sciences)</td>
<td>3</td>
</tr>
<tr>
<td>University Core course (social/behavioral sciences)</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Hours:</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

### Spring semester

| CHEM 101 General Chemistry I & CHEZ 101 and General Chemistry Laboratory I  | 4 |
| ENVS 102 Introduction to Environmental Studies II  | 3 |
| MATH 151 Precalculus Mathematics (satisfies University Core quantitative literacy)  | 4 |
| UNIV 112 Play course video for Focused Inquiry II  | 3 |

### Sophomore year

<table>
<thead>
<tr>
<th>Fall semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 151 Introduction to Biological Sciences I &amp; BIOZ 151 and Introduction to Biological Science Laboratory I</td>
<td>4</td>
</tr>
<tr>
<td>CHEM 102 General Chemistry II &amp; CHEZ 102 and General Chemistry Laboratory II</td>
<td>4</td>
</tr>
<tr>
<td>UNIV 200 Inquiry and the Craft of Argument</td>
<td>3</td>
</tr>
<tr>
<td>Foreign language (101-level)</td>
<td>4</td>
</tr>
<tr>
<td><strong>Term Hours:</strong></td>
<td><strong>14</strong></td>
</tr>
</tbody>
</table>

### Spring semester

| BIOL 152 Introduction to Biological Sciences II & BIOZ 152 and Introduction to Biological Science Laboratory II  | 4 |
| ENVS 105 or URSP 204 Physical Geology or Physical Geography  | 3 |
| STAT 210 Basic Practice of Statistics  | 3 |
| Foreign language (102-level)  | 4 |
| **Term Hours:**  | **14** |

### Junior year

<table>
<thead>
<tr>
<th>Fall semester</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 317 Ecology</td>
<td>3</td>
</tr>
<tr>
<td>ENVS/POLI 311 Politics of the Environment</td>
<td>3</td>
</tr>
<tr>
<td>ENVS 330/BIOZ 332 Environmental Pollution</td>
<td>3</td>
</tr>
<tr>
<td>PHYS 201 General Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Open elective</td>
<td>3</td>
</tr>
<tr>
<td><strong>Term Hours:</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

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.
Environmental Studies

ENVS 101. Introduction to Environmental Studies I. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to environmental studies focusing on sustainability, global change, and the development of environmental policy. Prerequisite: ENVS 101. Enrollment is restricted to environmental studies majors. Study of contemporary issues related to environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 102. Introduction to Environmental Studies II. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to environmental studies focusing on sustainability, global change, and the development of environmental policy. Prerequisite: ENVS 101 or permission of instructor. Enrollment is restricted to environmental studies majors. Study of contemporary issues related to environmental policy and environmental issues at local to global scales.

ENVS 103. Environmental Science. 4 Hours.
Semester course; 3 lecture and 2 laboratory hours (delivered mostly online). 4 credits. An introduction to environmental science. The course covers topics such as the structure and function of ecosystems, the impact of human activities on the environment, and the scientific methods used to study environmental systems. Prerequisite: ENVS 101.

ENVS 105. Physical Geology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introduction to physical geology and the history and structure of the earth. Covers the history and structure of the earth, catastrophic events and geology, and 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 and lab activities/field trip(s) at the Rice Center for Environmental Life Sciences.

ENVS 205. 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 210. Politics of the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 211. Politics of the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 260. Outdoor Leadership. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 291. Special Topics in Environmental Studies. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 300. Sustainable Societies: James River Basin. 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 301. Introduction to Meteorology. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 305. Scientific Issues in Environmental Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 310. Introduction to Oceanography. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 311. Politics of the Environment. 3 Hours.
Semester course; 3 lecture hours. 3 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

ENVS 410. Meteorology and Climatology. 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 411. Oceanography. 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 499. Environmental Studies Capstone. 0 Hours.
Semester course; 0 lecture hours. 0 credits. An introductory course designed to provide an introduction to the concepts and skills needed to work and lead teams in outdoor settings. Topics include environmental studies including sustainability, global change, and an overview of the core earth systems.

University Core course (humanities/fine arts) 3

The minimum total of credit hours required for this degree is 120.

- Environmental Studies (ENVS) (p. 3)
- Life Sciences (LFSC) (p. 5)
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: 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: ENVS 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 360. Outdoor Programming and Event Management. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to provide students with information and practical experience required to successfully design, promote, implement and evaluate outdoor experiential programming across a range of contexts.

ENVS 361. Outdoor Team Building and Group Facilitation. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is designed to provide students with the theory and practice of developing and deploying a successful outdoor recreational, educational, interpretive or adventure experience. In doing so, students will learn about group dynamics, team building, risk management and inquiry-based learning techniques.

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 391. Special Topics in Environmental Studies. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated with different topics for a maximum of 12 credits. A detailed investigation into a selected topic salient to environmental studies. See the Schedule of Classes for specific topics being offered each semester.

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 421. Environmental Data Visualization. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: STAT 314. This is an introductory course in using databases and geospatial technology. The course will introduce students to computer technology, project development and management skills, database management skills, and geospatial technology. Students will use in-class applied environmental analyses to guide skill-set development. The course will introduce the students to working with data in various formats and using the ArcGIS software suite to visualize the data. Students will be introduced to Microsoft Excel, Microsoft Access, ESRI ArcGIS software suite and ESRI ArcGIS Online.

ENVS 460. Wilderness First Responder. 3 Hours.
Semester course; 3 lecture hours. 3 credits. This course is intended for anyone working in a position of leadership in an outdoor setting or for individuals who want a high level of wilderness medical training for working in remote field settings, extended personal backcountry trips or expeditions. The course is a comprehensive and in-depth look at the standards and skills of dealing with response and assessment, musculoskeletal injuries, environmental emergencies and survival skills, soft tissue injuries, and medical emergencies. Additional topics, such as CPR, are also included. Wilderness First Responder training is the industry standard for those who work as government and nongovernment field technicians, backcountry trip leaders, camp counselors, mountain guides, river guides and ski patrollers.

ENVS 461. Wilderness Policy and Practice. 3 Hours.
Semester course; 2 lecture and 1 field experience hours. 3 credits. This course takes a multidisciplinary and experiential look at the concept of wilderness. Learning spans from the classroom to a first-hand wilderness experience, and materials include environmental law, natural resources management, environmental philosophy and ethics, regional and local history, and conservation science. Throughout students will focus on the intersection between society, biodiversity and the wilderness concept in principle and practice.

ENVS 490. Research Seminar in Environmental Studies. 3 Hours.
Semester course; 3 lecture hours. 3 credits. Prerequisite: 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 491. Topics in Environmental Studies. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated with different topics for a maximum of 12 credits. 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 492. 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 493. 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.

ENVS 499. Environmental Studies Capstone Experience. 0 Hours.
Semester course; variable hours. 0 credits. Corequisite: ENVS 490,
ENVS 491 (when topics implement core competencies required for a
capstone experience and are approved by the director of the Center for
Environmental Studies), ENVS 492 or ENVS 493. Enrollment restricted to
students who have completed 90 hours of undergraduate course work.
Any of the corequisite courses qualify as a capstone experience if taken
with this course. Graded as pass/fail.

Life Sciences

LFSC 101. Academic and Career Options in Life Sciences. 1 Hour.
Semester course; 1 lecture hour. 1 credit. Students interested in the life
sciences at VCU are faced with an enormous variety of academic options
from bioinformatics and biomedical engineering to exercise science
and nursing. Students outside of these programs have post-graduate
opportunities in the life sciences, such as health care administration and
government policy. This course will introduce students to an overview of
all of the academic programs in life sciences available at VCU and their
associated potential career options. Graded as pass/fail.

LFSC 191. Special Topics in Integrative Life Sciences. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated
for credit with different topics. A 100-level study of a selected topic
in integrative life sciences. Students will find specific topics and
prerequisites for each special topics course listed in the Schedule of
Classes. If multiple topics are offered, students may elect to take more
than one.

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
genoine 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 391. Special Topics in Integrative Life Sciences. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated
for credit with different topics. A 300-level study of a selected topic
in integrative life sciences. Students will find specific topics and
prerequisites for each special topics course listed in the Schedule of
Classes. If multiple topics are offered, students may elect to take more
than one.

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.

LFSC 491. Special Topics in Integrative Life Sciences. 1-4 Hours.
Semester course; 1-4 lecture hours. 1-4 credits. May be repeated
for credit with different topics. A 400-level study of a selected topic
in integrative life sciences. Students will find specific topics and
prerequisites for each special topics course listed in the Schedule of
Classes. If multiple topics are offered, students may elect to take more
than one.