Students concentrating in one of the three areas described below: natural resources, industrial systems or environmental policy. Students should be aware that some of the listed courses may have additional prerequisites.

The interdisciplinary environmental management minor prepares students to apply the principles of environmental science and engineering to contemporary environmental problems in natural resource, industrial and public policy contexts. The minor is particularly suitable for students interested in professional careers in industrial environmental management, natural resources management, and environmental policy and planning. After fulfilling prerequisite requirements in biology and statistics, students pursue the minor by completing core courses and electives.

The environmental management minor strives to develop graduates who can apply science and technology to a broad range of practical environmental problems in a variety of professional settings. Students completing the minor are expected to be literate and competent in the sciences and mathematics underlying environmental problem-solving.

The environmental management minor requires a total of 29 credits, including prerequisite courses. The prerequisites must have been completed successfully before the student may be enrolled in the environmental management minor. Prerequisite courses may be fulfilled as part of the student’s major. At least one elective course must be outside of the student’s major.

**Prerequisites**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIO 124, Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>Three hours from one of the following:</td>
<td>3</td>
</tr>
<tr>
<td>MATH 220, Elementary Statistics</td>
<td></td>
</tr>
<tr>
<td>ISAT 251, Topics in Statistics for ISAT</td>
<td></td>
</tr>
<tr>
<td>MATH 285, Data Analysis</td>
<td></td>
</tr>
<tr>
<td>MATH 318, Introduction to Probability and Statistics</td>
<td></td>
</tr>
<tr>
<td>MATH 307, Principles of Probability and Statistics</td>
<td></td>
</tr>
</tbody>
</table>

**Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISAT 320-321, Fundamentals of Environmental Science and Technology I-II</td>
<td>6</td>
</tr>
<tr>
<td>CHEM 221, Concepts of Organic Chemistry¹</td>
<td>3</td>
</tr>
<tr>
<td>ISAT 302, Instrumentation and Measurement of the Environment</td>
<td>1</td>
</tr>
<tr>
<td>ENVT 400, Capstone Seminar</td>
<td>3</td>
</tr>
<tr>
<td>Concentration</td>
<td></td>
</tr>
<tr>
<td>See descriptions below</td>
<td>9</td>
</tr>
</tbody>
</table>

1 May also be fulfilled by CHEM 341-342 sequence

**Concentrations**

Students completing the environmental management minor must concentrate in one of the three areas described below: natural resources, industrial systems or environmental policy. Students should be aware that some of the listed courses may have additional prerequisites.

**Natural Resources**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISAT 424, Natural Resource Management</td>
<td>24</td>
</tr>
</tbody>
</table>

Choose two of the following courses:

- BIO 456. Landscape Ecology
- BIO 457. Biological Applications of Geographic Information Systems
- BIO 459. Freshwater Ecology
- BIO 465. Environmental Toxicology
- CHEM 354. Environmental Chemistry Field Camp
- CHEM/GEOL 355. Geochemistry of Natural Waters
- GEOG 340. Biogeography
- GEOG 341. Wilderness Techniques
- GEOG 342. Management and Protection of Natural Resources
- GEOG 343. Wildlife Management
- GEOL 340. Soils and Land Use
- ISAT 420. Environmental Analysis and Modeling
- ISAT 425. Environmental Hydrology
- ISAT 429. Sustainability: An Ecological Process

**Industrial Systems**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISAT 422, Environmental Management</td>
<td>22</td>
</tr>
</tbody>
</table>

Choose two of the following courses:

- HTH 352. Environmental Health
- HTH 450. Epidemiology
- ISAT 423. Environmental Remediation
- ISAT 427. Industrial Hygiene
- ISAT 428. Industrial Ecology

**Environmental Policy**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISAT 422, Environmental Management or ISAT 424. Natural Resource Management</td>
<td></td>
</tr>
<tr>
<td>ISAT 421. Environmental Policy and Regulation</td>
<td></td>
</tr>
</tbody>
</table>

One of the following courses:

- BIO 465. Environmental Toxicology
- ECON 305. Environmental Economics
- ECON 340. Economics of Natural Resources
- GEOG 325. Environmental Ethics
- GEOG/ISAT 429. Sustainability, An Ecological Process
- HIST 427. US Environmental History
- ISAT 420. Environmental Analysis and Modeling
- ISAT 423. Environmental Remediation
- ISAT 471. Transportation: Energy, Environment, and Society
- ISAT 472. Transportation: Air Quality Monitoring and Regulation
- ISCM 354. Communication, Environment, and Environmentalism
- SOCI 311. Sociology of the Environment

Other courses may apply to the concentration by permission of the coordinator.

**Environmental Science**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Bruce Wiggins, Coordinator</td>
<td></td>
</tr>
</tbody>
</table>

The environmental science minor is a multidisciplinary program that can be elected by any student. For example, students pursuing programs ranging from the physical, natural or social sciences, to education, journalism, or business, all benefit from this broadly based environmental curriculum. The program draws from courses that focus on the application of scientific concepts and principles to the understanding of environmental problems and their solutions. The minor draws upon the expertise of faculty in the areas of biology, chemistry, geography, physics, and integrated science and technology.
The environmental science minor:
- provides a scientific background to those students interested in environmental law, environmental economics and environmental sustainability.
- broadens the student’s understanding of how sciences are linked to environmental questions.
- complements any major by focusing on courses related to environmental issues.

The minimum requirement for a minor in environmental science is 24 credit hours taken from the four categories outlined below. Students wishing to complete more than one of the environmental minors (environmental management, environmental science and environmental studies) may receive dual credit for the capstone course (ENVT 400), but may not receive dual credit for any other courses that might be shared by the minors.

A score of four or greater in AP Environmental Science substitutes for GEOL 115 or ISAT 112.

Courses Credit Hours
One of the following:
- GEOL 115 or ISAT 112.

Courses Credit Hours
Fifteen credit hours from the following:
- BIO 124. Ecology and Evolution 4
- GEOL 102. Environment: Earth 3
- GEOL 115. Earth Systems and Climate Change 3
- GSAT 112. Environmental Issues in Science and Technology 4
- GEG 210. Physical Geography 4

One of the following courses:
- ENVT 400. Capstone Seminar 3

All students must complete the capstone course ENVT 400.
Students must have completed 15 hours of their environment minor in order to enroll in the capstone.

Environmental Studies
Dr. Pete Bsumek, Coordinator
Phone: (540) 568-3386
E-mail: bsumekp@jmu.edu
Web site: http://www.jmu.edu/environment/studies.shtml

The environmental studies minor provides an interdisciplinary education engaging socio-cultural, scientific and technical issues raised by the oft-conflicting needs and desires of globally interacting societies. Designed to complement any major, the goals of the environmental studies minor include:
- to help undergraduates develop an awareness of the cultural, political and scientific aspects of the world’s environmental problems.
- to better prepare students for further study at the graduate or professional school level and careers in the expanding field of environmental professions.

The minimum requirement for a minor in environmental studies is 24 credit hours taken from the four categories outlined. No more than three courses from a single subject (e.g., GEOG, GEOL, ANTH, ENG, etc.) may count toward completion of the environmental studies minor. Students wishing to complete more than one of the environment minors (environmental management, environmental science and environmental studies) may receive dual credit for the capstone course (ENVT 400), but may not receive dual credit for any other courses that might be shared by the minors.

Introduction to Environmental Literacy
Minimum of three credit hours; can be double-counted with GenEd credits.

Courses Credit Hours
- GANTH 196. Biological Anthropology 3
- GBIO 103. Contemporary Biology 3
- ENVT 200. Environmental Systems Theory 3
- GEOL 102. Environment: Earth 3
- GEOL 115. Earth Systems and Climate Change 3