Environmental, Soil and Water Sciences, B.S.

Degree Offered

- Bachelor of Science

Nature of the Program

This major prepares students for careers in areas which safeguard the quality of the environment. The curriculum is built on interdisciplinary training in a broad array of environmental, soil, and water sciences. Recent graduates in this option are employed by municipal, state, and federal governmental agencies; consulting firms, especially those specializing in land reclamation, water quality, or pest management; and companies associated with natural resource industries.

In addition to the required curriculum students can enhance their career qualifications by also completing some or all of the following options:

- A minor in a relevant field (Geology, Resource Economics, Wildlife Conservation, etc.)
- USDA Soil Scientist Certification: thirty hours in biological, physical or earth science, including at least fifteen hours in soils courses such as:
  
<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRN 410</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 415</td>
<td>Soil Survey and Land Use</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 417</td>
<td>Soil Genesis and Classification</td>
<td>4</td>
</tr>
<tr>
<td>AGRN 420</td>
<td>Soil Microbiology</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 425</td>
<td>Environmental Soil Management</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 430</td>
<td>Soil Physics</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 455</td>
<td>Reclamation of Disturbed Soils</td>
<td>3</td>
</tr>
</tbody>
</table>
- USDA Soil Conservationist Certification: thirty hours in natural resources or agricultural disciplines including at least twelve hours from soils, crops, or plant science.
- ENVP 415 Hazardous Waste Training. Equivalent to OSHA 40-hour HAZWOPER course.
- Information on academic requirements for other professional certifications may be obtained at https://www.agronomy.org/certifications or http://www.naep.org

Admissions

- First-Time Freshman are admitted directly into the Environmental Soil and Water major.
- Students transferring from another major within WVU are directly admitted to the Environmental Soil and Water major if they are in good academic standing (2.0 or higher GPA).
- Students transferring from another institution are directly admitted to the Environmental Soil and Water major if they are in good academic standing (2.0 or higher GPA).

ADMISSION REQUIREMENTS 2023-2024

The Admission Requirements above will be the same for the 2023-2024 Academic Year.

Major Code: 0782

Click here to view the Suggested Plan of Study (p. 3)

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (http://registrar.wvu.edu/gef/)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

General Education Foundations

<table>
<thead>
<tr>
<th>F1 - Composition &amp; Rhetoric</th>
<th>3-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGL 101 &amp; ENGL 102 or ENGL 103</td>
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</tr>
<tr>
<td>Introduction to Composition and Rhetoric</td>
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</tr>
<tr>
<td>and Composition, Rhetoric, and Research</td>
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</tr>
<tr>
<td>Accelerated Academic Writing</td>
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</table>

| F2A/F2B - Science & Technology            | 4-6   |
| F3 - Math & Quantitative Reasoning       | 3-4   |
F4 - Society & Connections 3
F5 - Human Inquiry & the Past 3
F6 - The Arts & Creativity 3
F7 - Global Studies & Diversity 3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree) 9
Total Hours 31-37

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

**Curriculum Requirements**

**University Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tr>
<td>General Electives</td>
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<td>Total Hours</td>
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**Environmental, Soil and Water Major Requirements**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>ENGL 305</td>
<td>3</td>
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<tr>
<td>Select one of the following sequences (GEF 8):</td>
<td>8</td>
</tr>
<tr>
<td>BIOL 101</td>
<td>General Biology 1</td>
</tr>
<tr>
<td>&amp; BIOL 101L</td>
<td>and General Biology 1 Laboratory</td>
</tr>
<tr>
<td>&amp; BIOL 102</td>
<td>and General Biology 2</td>
</tr>
<tr>
<td>&amp; BIOL 102L</td>
<td>and General Biology 2 Laboratory</td>
</tr>
<tr>
<td>BIOL 115</td>
<td>Principles of Biology</td>
</tr>
<tr>
<td>&amp; BIOL 115L</td>
<td>and Principles of Biology Laboratory</td>
</tr>
<tr>
<td>&amp; BIOL 117</td>
<td>and Introductory Physiology</td>
</tr>
<tr>
<td>&amp; BIOL 117L</td>
<td>and Introductory Physiology Laboratory</td>
</tr>
<tr>
<td>Select one of the following pairs (GEF 2 &amp; 8):</td>
<td>8</td>
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<tr>
<td>CHEM 115</td>
<td>Fundamentals of Chemistry 1</td>
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<td>&amp; CHEM 115L</td>
<td>and Fundamentals of Chemistry 1 Laboratory</td>
</tr>
<tr>
<td>&amp; CHEM 116</td>
<td>and Fundamentals of Chemistry 2</td>
</tr>
<tr>
<td>&amp; CHEM 116L</td>
<td>and Fundamentals of Chemistry 2 Laboratory</td>
</tr>
<tr>
<td>CHEM 111</td>
<td>Survey of Chemistry 1</td>
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<tr>
<td>&amp; CHEM 111L</td>
<td>and Survey of Chemistry 1 Laboratory</td>
</tr>
<tr>
<td>&amp; CHEM 112</td>
<td>and Survey of Chemistry 2</td>
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<tr>
<td>&amp; CHEM 112L</td>
<td>and Survey of Chemistry 2 Laboratory</td>
</tr>
<tr>
<td>GEOL 101</td>
<td>Planet Earth</td>
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<tr>
<td>&amp; GEOL 101L</td>
<td>and Planet Earth Laboratory</td>
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<td>Select one of the following (GEF 3):</td>
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<tr>
<td>MATH 124</td>
<td>Algebra with Applications</td>
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<tr>
<td>MATH 150</td>
<td>Applied Calculus</td>
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<tr>
<td>AEM 341</td>
<td>General Microbiology</td>
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<tr>
<td>&amp; AEM 341L</td>
<td>and General Microbiology Laboratory</td>
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<tr>
<td>AGRN 202</td>
<td>Principles of Soil Science</td>
</tr>
<tr>
<td>AGRN 202L</td>
<td>Principles of Soil Science Laboratory</td>
</tr>
<tr>
<td>ENVP 155</td>
<td>Elements of Environmental Protection</td>
</tr>
<tr>
<td>Plant Science Elective:</td>
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<tr>
<td>AGRN 451</td>
<td>Principles of Weed Science</td>
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<tr>
<td>Course/Title</td>
<td>Hours</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>FNRS 212 Forest Ecology</td>
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<tr>
<td>HORT 260L Woody Plant Materials Laboratory</td>
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<tr>
<td>PLSC 206 Principles of Plant Science</td>
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<tr>
<td>STAT 211 Elementary Statistical Inference</td>
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<tr>
<td>WMAN 150 Principles of Conservation Ecology (GEF 7)</td>
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<tr>
<td>ENVP/AGR 425 Environmental Soil Management (Capstone Experience)</td>
<td>3</td>
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<tr>
<td><strong>Restricted Electives</strong></td>
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<tr>
<td>AEM/ENVP 401 Environmental Microbiology</td>
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<td>AGEE 110 Microcomputer Applications in Agricultural Education</td>
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<td>AGEE 220 Group Organization and Leadership (GEF 4)</td>
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<tr>
<td>AGRN 455 Reclamation of Disturbed Soils</td>
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<tr>
<td>AEM 420 Soil Microbiology</td>
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<tr>
<td>AGBI 410 Introductory Biochemistry</td>
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<tr>
<td>AGRN 125L Soil Judging Laboratory</td>
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<tr>
<td>AGRN 415 Soil Survey and Land Use</td>
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<tr>
<td>AGRN 430 Soil Physics</td>
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<td>ARE 204 Agribusiness Management</td>
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<td>BIOL 361 Plant Ecology</td>
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<td>CE 347 Introduction to Environmental Engineering</td>
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<tr>
<td>CE 351 Introductory Soil Mechanics</td>
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<tr>
<td>CHEM 231 &amp; 231L Organic Chemistry: Brief Course and Organic Chemistry: Brief Course Laboratory</td>
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<tr>
<td>ENVP 355 Environmental Sampling and Analysis</td>
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<tr>
<td>ENVP 460 Environmental Impact Assessment</td>
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<tr>
<td>FNRS 444 Watershed Management</td>
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<td>GEOL 321 Geomorphology</td>
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<td>GEOL 365 Environmental Geology</td>
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<tr>
<td>GEOL 462 Introductory Hydrogeology</td>
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<tr>
<td>GEOL 463 Physical Hydrogeology</td>
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<tr>
<td>GEOL 488 Environmental Geochemistry</td>
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<tr>
<td>PHYS 101 &amp; 101L Introductory Physics 1 and Introductory Physics 1 Laboratory</td>
<td></td>
</tr>
<tr>
<td>PHYS 102 &amp; 102L Introductory Physics 2 and Introductory Physics 2 Laboratory</td>
<td></td>
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<tr>
<td>PLSC 491 Professional Field Experience</td>
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<td>POLS 338 Environmental Policy</td>
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<td>RESM 440 Foundations of Applied Geographic Information Systems</td>
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<tr>
<td>RESM 480 Environmental Regulation</td>
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<tr>
<td>WMAN 446 Freshwater Ecology</td>
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<td>WMAN 449 Stream Ecosystem Assessment</td>
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<tr>
<td><strong>Area of Emphasis</strong></td>
<td>12-17</td>
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<tr>
<td>Environmental Assessment and Reclamation (12 Hours)</td>
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<tr>
<td>Soil and Water Sciences (17 Hours)</td>
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<td><strong>Total Hours</strong></td>
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**SUGGESTED PLAN OF STUDY**

**First Year**

<table>
<thead>
<tr>
<th></th>
<th><strong>Fall</strong></th>
<th><strong>Spring</strong></th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td>Hours</td>
<td>Hours</td>
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<tr>
<td>ANRD 191</td>
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<td>1 ENVP 155</td>
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<tr>
<td>ENGL 101 (GEF 1)</td>
<td>3 BIOL 102 &amp; 102L (GEF 8)</td>
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<tr>
<td>BIOL 101 &amp; 101L (GEF 8)</td>
<td>4 WMAN 150 (GEF 7)</td>
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</table>
Environmental, Soil and Water Sciences, B.S.

Select one of the following (GEF 3):
- MATH 124
- MATH 126
- MATH 150
- GEOL 101
- & 101L

Second Year

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<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
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<tbody>
<tr>
<td>Select one of the following (GEF 2):</td>
<td>4</td>
<td>Plant Science Elective</td>
<td>3</td>
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<tr>
<td>CHEM 111 &amp; 111L</td>
<td></td>
<td>CHEM 112 &amp; 112L</td>
<td></td>
</tr>
<tr>
<td>CHEM 115 &amp; 115L</td>
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<td></td>
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<tr>
<td>ENGL 102 (GEF 1)</td>
<td>3</td>
<td>CHEM 116 &amp; 116L</td>
<td>3</td>
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<tr>
<td>STAT 211</td>
<td>3</td>
<td>GEF 6</td>
<td>3</td>
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<td>GEF 5</td>
<td>3</td>
<td>AGRN 202</td>
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<tr>
<td>Restricted Elective</td>
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<td>AGRN 202L</td>
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<tr>
<td>General Elective</td>
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Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEM 341 &amp; 341L</td>
<td>4</td>
<td>Area of Emphasis Required Course</td>
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<tr>
<td>ENGL 305</td>
<td>3</td>
<td>Restricted Electives</td>
<td>7</td>
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<tr>
<td>Area of Emphasis Required Course</td>
<td>3</td>
<td>General Electives</td>
<td>4</td>
</tr>
<tr>
<td>Restricted Elective</td>
<td>3</td>
<td>General Elective</td>
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Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Hours</th>
<th>Spring</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVP 425 or AGRN 425</td>
<td>3</td>
<td>Area of Emphasis Required Course</td>
<td>3</td>
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<tr>
<td>GEF 4</td>
<td>3</td>
<td>Restricted Electives</td>
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<td>Area of Emphasis Required Course</td>
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<td>General Electives</td>
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<tr>
<td>General Electives</td>
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</table>

Total credit hours: 120

Areas of Emphasis

- Environmental Assessment and Reclamation
- Soil and Water Sciences

ENVIRONMENTAL ASSESSMENT AND RECLAMATION AREA OF EMPHASIS

| ENVP 255 | Elements of Environmental Management | 3 |
| ENVP 355 | Environmental Sampling and Analysis | 3 |
| ENVP 455 | Reclamation of Disturbed Soils | 3 |
| ENVP 460 | Environmental Impact Assessment | 3 |

Total Hours 12
SOIL AND WATER SCIENCES AREA OF EMPHASIS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AEM 470</td>
<td>Microbes and Global Change</td>
<td>3</td>
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<tr>
<td>AGRN 125L</td>
<td>Soil Judging Laboratory</td>
<td>1</td>
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<tr>
<td>AGRN 410</td>
<td>Soil Fertility</td>
<td>3</td>
</tr>
<tr>
<td>AGRN 415</td>
<td>Soil Survey and Land Use</td>
<td>3</td>
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<tr>
<td>AGRN 417</td>
<td>Soil Genesis and Classification</td>
<td>4</td>
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<tr>
<td>AGRN 430</td>
<td>Soil Physics</td>
<td>3</td>
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<td></td>
<td>Total Hours</td>
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Major Learning Outcomes

ENVIRONMENTAL, SOIL AND WATER SCIENCES

The learning outcomes of the environmental protection major center on developing individuals who are effective stewards of soil and water resources. A thorough science-based curriculum will allow students - after completion of the major - to assess, evaluate, manage, and safeguard soil and water resources and develop plans to use and/or mitigate impacts on these resources. The major emphasizes long term sustainability, conservation, and stewardship balanced with the need to develop soil and water resources for current and future human use.

Soil & Water Sciences Area of Emphasis

- Describe the important roles of soil and water in the environment in agricultural and non-agricultural systems.
- Design and implement sustainable soil and water management practices.
- Evaluate existing soil, water and landscape resources to develop recommendations for sustainable land use practices.

WVUTeach: Earth and Space Science

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ARSC 120</td>
<td>Inquiry Approaches to Teaching</td>
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</tr>
<tr>
<td>ARSC 220</td>
<td>Inquiry-Based Lesson Design</td>
<td>1</td>
</tr>
<tr>
<td>GEOL 376L</td>
<td>Research Methods Laboratory</td>
<td>3</td>
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<tr>
<td>MATH 318</td>
<td>Perspectives on Mathematics and Science</td>
<td>3</td>
</tr>
<tr>
<td>UTCH 221</td>
<td>Knowing and Learning in Mathematics and Science</td>
<td>3</td>
</tr>
<tr>
<td>UTCH 322</td>
<td>Classroom Interactions in Math and Science</td>
<td>3</td>
</tr>
<tr>
<td>UTCH 420</td>
<td>Project-Based Instruction in Mathematics and Science</td>
<td>3</td>
</tr>
<tr>
<td>UTCH 430</td>
<td>Apprentice Teaching in Math and Science</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Total Hours</td>
<td>27</td>
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</tbody>
</table>

ENVP 119. Soil in the City. 3 Hours.
PR: Corequisite of ENVP 119L. Study of soil as a natural resource in urban environments; influence of soils on urban development; study of environmental problems related to soils in urban land uses.

ENVP 119L. Soil in the City Laboratory. 0 Hours.
Coreq: ENVP 119. Soil in the City - ENVP 119 Laboratory.

ENVP 155. Elements of Environmental Protection. 3 Hours.
An introduction to land and water resources and their management and protection. An evaluation of the relationships between human activities and natural environments and the interaction between natural resource utilization and development.

ENVP 191. First-Year Seminar. 1-3 Hours.
Engages students in active learning strategies that enable effective transition to college life at WVU. Students will explore school, college and university programs, policies and services relevant to academic success. Provides active learning activities that enable effective transition to the academic environment. Students examine school, college and university programs, policies and services.

ENVP 255. Elements of Environmental Management. 3 Hours.
PR: ENVP 155. An introduction to the various regulations promulgated by the United States Environmental Protection Agency. The main goal of this course is to provide the student with a foundation of knowledge that will allow them to read and interpret environmental regulations as well as all types of regulations and codes.

ENVP 293. Special Topics. 1-6 Hours.
PR: Consent. Investigation of topics not covered in regularly scheduled courses.
ENVP 325. Principles of Water Resources. 3 Hours.
PR: MATH 124 or higher. This course provides students an opportunity to increase their knowledge pertaining to the role(s) that water plays in human and environmental systems by examining the geographic distribution/redistribution, quantity, and quality of water resources. Students are introduced to water management evaluation policies, law and economics used to explore the decision-making challenges surrounding water resources.

ENVP 355. Environmental Sampling and Analysis. 3 Hours.
PR: BIOL 101 and BIOL 102 and BIOL 103 and BIOL 104 and CHEM 115 and CHEM 116. Introduction to environmental sampling methods and analysis. Lecture and hands-on experience will include sampling plan development, sample point selection, sampling equipment use, containers and preservatives, sample analysis, chain-of-custody and protective equipment.

ENVP 401. Environmental Microbiology. 3 Hours.
PR: AEM 341 or consent and PR or CONC: ENVP 401L. Microbiology as applied to soil, water, wastewater, sewage, air, and the general environment. Occurrence, distribution, ecology, and detection of microorganisms in these environments. (Also listed as AEM 401.).

ENVP 401L. Environmental Microbiology Laboratory. 1 Hour.
PR or CONC: ENVP 401. Environmental Microbiology - ENVP 401 Laboratory.

ENVP 412. Pest Management. 3 Hours.
PR: ENTO 404 or consent. An in-depth look at current problems and solution in controlling insect pests in an environmentally compatible manner. Management techniques include cultural, mechanical, physical, biological, regulatory, and chemical practices. (Also listed as ENTO 412.).

ENVP 415. Hazardous Waste Training. 3 Hours.
PR: Corequisite of ENVP 415L. Introduction to hazardous waste training. Lectures and hands-on experience with health and safety plan development, selecting personal protective equipment, air monitoring, incident command, site characterization, decontamination and toxicology. Includes two full-scale disaster exercises.

ENVP 415L. Hazardous Waste Training Laboratory. 0 Hours.
Coreq: ENVP 415. Hazardous Waste Training - ENVP 415 Laboratory.

ENVP 420. Soil Microbiology. 3 Hours.
PR: AEM 341. Microbiology and biochemistry of the soil environment. Occurrence, distribution, ecology, and detection of microorganisms in soil. (Also listed as AEM 420 and AGRN 420.).

ENVP 425. Environmental Soil Management. 3 Hours.
PR: AGRN 202 and (AGRN 202L or AGRN 203) and Coreq: ENVP 425L. This course provides a foundation for utilizing creative solutions and technical knowledge in preserving and enhancing soil and water quality. Soil conservation, precision agriculture and nutrient management for protection of soil and water quality are covered. (Also listed as AGRN 425).

ENVP 425L. Environmental Soil Management Laboratory. 0 Hours.
Coreq: ENVP 425. Environmental Soil Management - ENVP 425 Laboratory.

PR: AGRN 202 and AGRN 203 and PLSC 206 or consent and PR or CONC: ENVP 451L. Fundamental principles of weed science including identification, ecology and control in crops. (Also listed as AGRN 451.).

ENVP 451L. Principles of Weed Science Laboratory. 1 Hour.

ENVP 455. Reclamation of Disturbed Soils. 3 Hours.
PR: Junior standing or above. Principles of soil science, geology, hydrology, and engineering will be applied to surface mine planning, overburden handling during mining, soil replacement and amendments, revegetation practices, acid mine drainage control and treatment, hazardous wastes, and land management of disturbed areas. (Field trip required.) (Also listed as AGRN 455.).

ENVP 460. Environmental Impact Assessment. 3 Hours.
PR: (BIOL 101 and BIOL 101L and BIOL 102 and BIOL 102L) or (BIOL 115 and BIOL 115L and CHEM 115 and CHEM 116) and Coreq: ENVP 460L. Application of physical, biological and social science principles to assess environmental impacts. Review and prepare environmental assessments, permits, site assessments and ecological risk assessments for environmental decision-making.

ENVP 460L. Environmental Impact Assessment Laboratory. 0 Hours.
Coreq: ENVP 460. Environmental Impact Assessment - ENVP 460 Laboratory.