Mission Statement
The WSU B.S. Environmental Science Program seeks to educate and train students in scientific methods and principles, producing students who are environmentally literate. Our program combines classroom, laboratory, and field experiences that prepare our graduates to address interdisciplinary environmental issues in both natural and urban settings.

Program Level Environmental Science Program Outcomes
Students successfully completing the WSU B.S. Environmental Science Program should be able to:
1. identify and explain environmental processes and human/environment interactions.
2. apply interdisciplinary perspectives and approaches to environmental problems.
3. critically assess and evaluate environmental problems at a local and global scale.
4. acquire the ability to monitor and sample environmental conditions.
5. design effective oral presentations and scientific papers.

2016-2017 Assessment Learning Outcomes
1. Students will correctly apply unit conversions in flow rates, fluxes, and mass balance calculations.
2. Students will convey ecological concepts effectively in written form.
3. Students will correctly interpret environmental data and relationships among environmental variables displayed in figures and charts.
4. Students will quantify uncertainty and propagation of error in environmental calculations.

Curriculum Map

<table>
<thead>
<tr>
<th>Course</th>
<th>LO1 unit conversion</th>
<th>LO2 ecological writing</th>
<th>LO3 data and relationships</th>
<th>LO4 uncertainty and error</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEL 1010 (physical geol)</td>
<td>I</td>
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<td>I</td>
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<tr>
<td>BIO 1500 (life diversity)</td>
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<tr>
<td>BIO 1510 (life mechanism)</td>
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<td>I</td>
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<tr>
<td>GEL 2130 (mineralogy)</td>
<td>D</td>
<td>-</td>
<td>D</td>
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<tr>
<td>GEL 3100 (env syst anal)</td>
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<td>D</td>
<td>I</td>
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<tr>
<td>BIO 4130 (ecology)</td>
<td>-</td>
<td>D</td>
<td>-</td>
<td>-</td>
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<tr>
<td>BIO 5100 (aquatic ecol)</td>
<td>D</td>
<td>M</td>
<td>M</td>
<td>M</td>
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<tr>
<td>GEL 5150 (soils)</td>
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<td>D</td>
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<tr>
<td>BIO 5440 (terrestrial ecol)</td>
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<td>M</td>
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<tr>
<td>GEL 5510 (fate&amp;transport)</td>
<td>M</td>
<td>-</td>
<td>M</td>
<td>M</td>
</tr>
</tbody>
</table>

I = Introduced; D = Developed, reviewed, practiced; M = Mastery demonstrate
Assessment 1 – unit conversions

Learning Outcome
Students will correctly apply unit conversions in flow rates, fluxes, and mass balance calculations.

Data Sources
a. student assignments and exams in GEL 3100 (formative)
   b. student assignments and exams in GEL 5510 (mastery)

Data Gathering and Timeline
ESP faculty will collect assignments and administer exams as part of normal class requirements. The following samples of student work will be evaluated:
   GEL 5510 (Winter 2017)
   a. One homework assignment or quiz involving unit conversion problems
   b. Repetition of the homework assignment or quiz within the same semester to assess students' learning during the course

Data Evaluation
Both stand-alone unit conversion problems as well as problems that include unit conversion as a necessary step will be analyzed. Student performance will be coded for
   a. Documentation of the unit conversion process
   b. Correct/incorrect unit conversion
   c. The type of mistake will be noted for incorrect answers to aid in the identification of patterns of incorrect mistakes.

Criteria for Acceptable Performance
In GEL 5510 assignments and exams, students will:
   a. document unit conversions 90% or more of the time
   b. correctly execute unit conversions 85% or more of the time.
**Assessment 2 – ecological writing**

**Learning Outcome**
Students will convey ecological concepts effectively in written form.

**Data Sources**
a. student term papers in BIO 4130 (formative)
b. written exam questions in BIO 5100 or BIO 5440 (mastery)

**Data Gathering and Timeline**
ESP faculty will collect assignments and administer exams as part of normal class requirements. The following samples of student work will be evaluated:
BIO 4130 (Winter 2017)
a. Final writing intensive term papers from environmental science majors
BIO 5440 (Fall 2016)
a. A comprehensive exam question with written responses addressing one or more of the environmental concepts listed below.

**Examples of Ecological Concepts**
- Trophic cascade
- Keystone species
- Succession
- Stability/Resilience
- Competitive exclusion
- Competitive coexistence
- Density dependence
- Others are possible

**Data Evaluation**
Student writing samples will be read by Environmental Science faculty and evaluated for understanding and effective communication of ecological concepts using the following rubrics:

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>Three of the following:</th>
<th>Two of the following:</th>
<th>One or none:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrated Understanding of Ecological Concept</td>
<td>student uses concept terminology correctly (definition)</td>
<td>student uses concept terminology correctly (definition)</td>
<td>student uses concept terminology correctly (definition)</td>
</tr>
<tr>
<td></td>
<td>student describes concept within appropriate ecological context</td>
<td>student describes concept within appropriate ecological context</td>
<td>student describes concept within appropriate ecological context</td>
</tr>
<tr>
<td></td>
<td>student connects concept to related concepts</td>
<td>student connects concept to related concepts</td>
<td>student connects concept to related concepts</td>
</tr>
<tr>
<td>Written Communication of Ecological Concept</td>
<td>Three of the following:</td>
<td>Two of the following:</td>
<td>One or none:</td>
</tr>
<tr>
<td></td>
<td>student uses correct writing mechanics</td>
<td>student uses correct writing mechanics</td>
<td>student uses correct writing mechanics</td>
</tr>
<tr>
<td></td>
<td>student expresses thoughts and ideas clearly</td>
<td>student expresses thoughts and ideas clearly</td>
<td>student expresses thoughts and ideas clearly</td>
</tr>
<tr>
<td></td>
<td>student synthesizes original and/or established ideas</td>
<td>student synthesizes original and/or established ideas</td>
<td>student synthesizes original and/or established ideas</td>
</tr>
</tbody>
</table>

**Criteria for Acceptable Performance**
In formative BIO 4130 work, 70% of students will meet or exceed expectations. In BIO 5100 exam responses, students will 85% of students will meet or exceed expectations.