Assessment and Improvement Report: 2015

Department: Geology

Assessment Coordinator: Thor Hansen

Departmental Mission

The Geology Department at WWU is committed to excellence in both teaching and research. Our goal is to offer the highest possible quality education in the geological sciences at the undergraduate and graduate levels. The mission of our department is to serve three main populations: graduate students, undergraduate geology majors, and undergraduates from other departments for their general education courses. For all of these students we strive to create excitement about discovery and the process of geologic inquiry. We want to develop in all students an appreciation of how geological processes affect the earth and society so that they will be environmentally responsible, scientifically literate citizens. We strive to produce majors with an interdisciplinary content background in geology and the physical sciences who are competent in the field, who can work collaboratively, conduct original research, and effectively communicate their results.

Geology BA Degree

Department Student Learning Outcomes

Cognitive outcomes

Our students will have a deep understanding of the following foundational geologic principles:

1. Earth has a history of biological and physical change over billions of years.
2. Earth's surface is affected by dynamic processes on a range of timescales.
3. Earth's composition varies and these compositions provide the raw materials for the rock cycle.
4. Earth's interior is dynamic and drives plate tectonics.
5. Earth scientists use repeatable observations and testable ideas to understand and explain our planet.
6. Geology and society are fundamentally inter-related.

Skills

Our students will have critical skills required by professional geologists. Graduates:

7. Have developed their observational, analytical and quantitative skills.
Geology BS degree

Department Student Learning Outcomes (all of the above plus):

Skills:
8. Can create maps and understand what they tell us about the Earth.
9. Will be able to apply physics, chemistry, and mathematics concepts to the study of Earth.
10. Will be able (alone or in teams) to present geological information clearly.

Geophysics BS Degree

Department Student Learning Outcomes (all of the above plus):

Skills:
11. Will be able to demonstrate general proficiency with concepts and quantitative problems involving Newtonian mechanics, energy and momentum
### Student Learning Outcomes Assessed This Year:

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<th>Assessment Measures</th>
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<td>Geol 212: Quizzes and exams that cover the geological time scale will be used to assess the mastery of concepts important to Earth history, including an understanding of &quot;deep time&quot;.</td>
<td>1</td>
<td>Geology BA</td>
<td>Quizzes and exam questions based on the geologic time scale were used to assess the outcome “Earth has a history of biological and physical change over billions of years” in geology 212. The initial way this outcome is assessed is by a time-scale quiz during the second week of class. Students are aware of the quiz format and given worksheets to practice. Average has been 94% over the past 2 years. Approximately 60% of the students get 100%. Quite a few students miss a few points on spelling errors and a few who don’t study do very poorly. I also ask students to reproduce some portion of the time scale on each mid-term. In these cases I don’t give them the format ahead of time. The scores on the time-scale portion of exams are ~84%. This score gives a truer sense of student knowledge of the time scale.</td>
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<td>Geol 318: Understand the geometry of geological structures in deformed continental regions as assessed by the grade on cross sections.</td>
<td>4</td>
<td>Geology BS</td>
<td>GEOL 318 includes two opportunities to assess student learning through evaluation of geological cross sections. Students first complete a new (as of W15) field-based cross section assignment to learn the basic formatting and techniques for a relatively simple area (local folds in the Chuckanut Mountains). Students then complete a standardized cross section assignment based on a more complex geologic map (Bree Creek). The average score on the first assignment for all enrolled students during winter quarter 2015 (n = 20) was 78%. This score represents an average of 77%, 78%, and 83% for BS Geology (n = 16), BS Geophysics (n = 2), and BA Geology (n = 2) majors, respectively. The average score on the second cross section assignment for W15 was 75%, representing average scores of 77%, 66%, and 71% for BS Geology, Geophysics, and BA Geology majors, respectively. Scores above 70% constitute passing grades. 3/20 students received non-passing grades on the first assignment and 4/20 received non-passing grades on the second (with one student failing the class due to non-completion).</td>
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<td>Geol 352: Student understanding of mantle structure and convection will be assessed based on the plate tectonics problem set.</td>
<td>4</td>
<td>Geophysics BS</td>
<td>Students were evaluated on their understanding of this topic via their score on two problem sets in Geology 352 (Introduction to Geophysics) that focus on mantle dynamics and plate tectonics. This assessment was performed for each of the three times that Geology 352 was taught in the 2014-2015 academic year. Students in the Geophysics BS earned average scores of 90%, 89% and 81% on these problem sets in fall 2014, winter 2015 and spring 2015, respectively.</td>
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Changes based on assessment findings:

**Geology BA Degree (Geology 212):** While the overall outcome in this assessment is good, I would like to improve on it. In the future I hope to re-emphasize this outcome before each exam and possibly do an in-class activity stressing key periods and dates. I have been considering giving pop quizzes on the time scale to see if they retain this information.

**Geology BS Degree (Geology 318):** Student performance generally mirrors past quarters on the second assignment. I hope that inclusion of the new, first cross section assignment will produce an overall increase in student learning for this SLO. I will continue to develop this new lab to prepare students for cross-section analysis in geologically complex areas.

**Geophysics BS Degree (Geology 352):** Average grades in spring 2015 were strongly affected by the performance of one student in the Geophysics BS who failed to do several of the problems on one set; without his grades the average rises to 89%. Overall students in the Geophysics BS did extremely well on this assignment, reflecting their solid understanding of outcome #4.

**Other program changes:**

The department added two new courses (Geol 497, Paleoclimatology; and Geol 497F, Planetary Geology) to reflect the interests of two new faculty members, and upgraded another 497 to permanent status (Geol 485/585: Geothermal Energy) to address increased interest in sustainable energy sources. We also revised the Geology BA to make it more flexible and changed its catalog description to better reflect its purpose.

**GUR Assessment:** GUR assessment was waived this year.