Annual Academic Assessment Report Cover Sheet
Assessment reports are due the 1st Wednesday after the Fall Term
Email to: assessment@unlv.edu

Program Information:

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<th>Program Assessed</th>
<th>Geology BS</th>
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<td>Department</td>
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<td>College</td>
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<td>Date Submitted</td>
<td>December 7, 2017</td>
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Contact Person for This Report

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Please attach a narrative (not to exceed 4 pages, excluding appendices) addressing the following:

- What are the student learning outcomes? Please provide a numbered list.
- Which learning outcomes were assessed?
- How were they assessed? (Programs must use at least one direct assessment of student learning.)
- Undergraduate programs should assess at least one University Undergraduate Learning Outcome (UULO) each year, which may or may not overlap with a program learning outcome.
- Graduate programs should assess at least one outcome related to one of the following graduate level requirements each year:
  - student engagement in research, scholarship, creative expression and/or appropriate high-level professional practice.
  - activities requiring originality, critical analysis and expertise.
  - the development of extensive knowledge in the field under study.
- What was learned from the assessment results?
- How did the program respond to what was learned?

Please limit the narrative portion of your report to no more than four pages. You may attach appendices with data, tables, charts, or other materials as needed. Please explain the relevant conclusions from any appendices in your narrative. Please contact the Office of Academic Assessment if you have questions or need assistance.
Geology BS Degree Program
Learning Outcomes

1. Identify common rock-forming minerals in hand specimen and thin section, name major rock types, and describe the conditions under which each of them formed. This will include being able to describe the chemical characteristics of various types of rocks and the use of stable and radiogenic isotopes as environmental tracers and geochronologic tools.

2. Identify the common types of invertebrate and vertebrate fossils, their approximate age, and the environments in which they lived, and have a grounding in the historical development of the field of geology.

3. Recognize, in the field, various types of geologic structures, and be able to use these to reconstruct the structural history of a region.

4. Describe the major processes that determine the characteristics of the earth’s surface, and be able to examine a landscape and interpret its geomorphic history.

5. Describe the plate-tectonic history of the earth (when various supercontinents assembled and fragmented), the relationship between plate tectonic processes and mountain building, and the types of data that are used to reconstruct the position of a particular plate in the geologic past.

6. Understand the principles of sedimentation and stratigraphy. Learn to measure stratigraphic sections and describe sedimentary structures and textures required for facies analyses and interpretation. Demonstrate the ability to establish a stratigraphic framework for sedimentary successions.

7. Be facile in computer applications in geology including spatial and imagery analysis applications, quantitative skills, express themselves well in oral and written reports, and be able to demonstrate the ability to function independently, collaboratively, and ethically with others in the profession as colleagues and supervisors.

8. Apply the techniques of at least two specializations within the field of geology (e.g., geophysics, hydrogeology, GIS, geochronology, petroleum geology) to the solution of appropriate research or applied problems.

9. Demonstrate the ability to enter a new field area, construct a geologic map on a topographic base, interpret the geologic history of the area, and write a professional quality report on the geology of the area. This learning objective comprises the Capstone experience for this degree program and is fulfilled through the summer field geology course. It also includes the ability to recognize, formulate, employ, and interpret the scientific methodology, and employ critical thinking skills. Many other learning outcomes for this degree program are also reinforced through this capstone experience (For instance, outcomes 1-5, and 9).

For this Assessment:
UULOs Learning Outcome: Communication

Graduates are able to write and speak effectively to both general and specialized audiences, create effective visuals that support written or spoken communication, and use electronic media common to one's field or profession. Specific outcomes for all students include:

1. Demonstrate general academic literacy, including how to respond to the needs of audiences and to different kinds of rhetorical situations, analyze and evaluate reasons and evidence, and construct research-based arguments using Standard Written English.

2. Effectively use the common genres and conventions for writing within a particular discipline or profession.
3. Prepare and deliver effective oral presentations.
4. Collaborate effectively with others to share information, solve problems, or complete tasks.
5. Produce effective visuals using different media.
6. Apply the up-to-date technologies commonly used to research and communicate within one’s field.

New Assessment Matrices and Measurements Developed

During the Fall 2016-Spring 2017 (and summer 2017) academic year, the geoscience faculty held several meetings including a faculty retreat, in which assessment was discussed. We re-wrote/edited the Learning Objectives for the Geology major, and we re-did all the assessment matrices for this program. Major changes include the development of at least one direct, quantitative measurement and at least one indirect, qualitative measurement for each of our learning objectives. These new assessments have been implemented in this assessment report.

Assessment

Learning Outcome #4 is assessed through the following 2 measures:

1. GEOL 333: Specific questions based on photos of landscapes for each exam and final exam (Direct, Quantitative)

Exam 1 (includes Process geomorph, internal forces & climate, chemical weathering & soils, physical weathering & mass movement, drainage basin & hydrology, and fluvial processes)

Average grade (for 9 landscapes) = 95.2%.
   95.5% performed satisfactorily (21 out of a total of 22). Averaged 97.4%.
   5.5% performed unsatisfactorily (1 out of a total of 22), 1 F grade.

Exam 2 (includes fluvial landforms, wind processes/landforms & arid geomorph, glaciers & glacial mechanics, and glacial erosion, deposition, & landforms)

Average grade (for 10 landscapes) = 83.1%.
   72.7% performed satisfactorily (16 out of a total of 22), Averaged 93.5%.
   27.3% performed unsatisfactorily (6 out of a total of 22), with 1 C-; 2 D; 3 F.

Final Exam (includes karst processes & landforms, coastal processes & landforms, and old material)

Average grade (for 10 landscapes) = 82.6%.
   68.2% performed satisfactorily (15 out of a total of 22). Averaged 92.1%.
   31.8% performed unsatisfactorily (7 out of a total of 22), with 2 C-; 2 D; 3 F

Overall Average Score (Specific questions on Exam 1, Exam 2, and Final Exam): Average grade: 86.9%.
   86.4% performed satisfactorily (19 out of a total of 22). Averaged 91.5%.
   13.6% performed unsatisfactorily (3 out of a total of 22), with 2 D; 1 F.

Exam 1 followed the mandatory field trip to the Valley of Fire where students observed some landform examples similar to those on Exam 1. Exam 2 followed an optional field trip to Red Rock where students observed some landform examples similar to those on Exam 2. No field
trips were scheduled for material covered on the Final Exam. Too few GEOL students attended the optional second fieldtrip (~ 5/22).

Actions: Faculty suggest covering fewer chapters per exam and make the second field trip mandatory. If students can see these landscapes in the field, it is more likely they will understand the processes that created them and perform better on exams where landscape photos are used. Lastly, faculty plan to add even more photos and landform recognition slides as in-class exercises for practice during the semester.

2. GEOL 333: Faculty Questionnaire (Indirect, Qualitative)
Overall, this assessment indicates a satisfactory level of performance by the students. Faculty reported that students demonstrated an excellent proficiency in their ability to: (1) read and interpret aerial photographs; (2) identify intrinsic and extrinsic thresholds in geomorphic systems; (3) identify common landforms visually, on topographic maps, and on aerial photographs; (4) comprehend and recall an in-depth vocabulary of geomorphic terms; (5) apply critical thinking skills to solve Earth surface problems; (6) demonstrate a competent level of ability to read, interpret, and make topographic maps, and understand coordinate systems and scale; (7) apply critical thinking skills to solve Earth surface problems; and (8) link understanding of geomorphic processes to landforms. Faculty felt students performed less well in (1) applying their knowledge of physical and chemical weathering processes to interpret landforms, and (2) understanding the concepts of dynamic equilibrium in geomorphology.

Actions: This information has been shared with the tenured faculty that regularly teaches this course, as he was on sabbatical during this assessment period. Specific actions have not yet been agreed upon, however the department is participating in the UNLV Curricular Coherence Committee, and as part of that we have begun to discuss in more depth how chemical weathering (among other topics) might be better incorporated either in GEOL 333 or in other courses in the curriculum.

Assessment

Learning Outcome #7, and the UULO Communication are assessed through the following measures:

1. GEOL 348: Final Project (Direct, Quantitative)

Average grade 88% B.
94% performed satisfactorily (17 out of a total of 18). Averaged 91%.
6% performed unsatisfactorily (1 out of a total of 18), One student did not complete the final project and had 40% on the part completed. This student earned an incomplete.

The UULOs Learning Outcome: Communication can also be partially assessed through this measure (written portion of final project). All students performed satisfactory in their written portion of their final project. This project includes producing a geologic map from data they collect during the semester, and a written report of their interpretations. In completing this project, the students demonstrated an effective use of geoscience conventions for writing. Faculty note that while the report quality varied widely, all but one student performed acceptably, and that student was unable to complete the course during the semester, receiving an incomplete.
2. GEOL 348: Faculty Assessment (Indirect, Qualitative)
3. GEOL 348: Student Survey Before/After (indirect, Qualitative)

The faculty teaching this course collected data on student opinions at the beginning and at the end of the course. Students report that they felt they learned a great deal about geologic maps, imagery analysis, report writing, and working in teams during the course. The Faculty reported that the students became familiar with and used a graphics program, and learned to locate themselves and geologic features on topographic maps and NAIP imagery. All students performed at acceptable levels in this spatial and imagery analysis. Throughout the semester, students wrote brief geologic reports from the data that they collected. Students are required to work in teams during data collection and independently during analysis and report writing. The teamwork was a useful experience. By the end of the course students understood better how to work in and select a team. Some students struggled with the data analysis, but gained many insights over the duration of the course. This was a particularly good group of students both academically and in professional behavior.

However, faculty noted that it is physically very difficult to be present throughout the various field areas where students are mapping in order to answer all of their questions. An additional TA would significantly improve student learning.

The UULOs Learning Outcome: Communication can also be partially assessed through this measure (written reports throughout semester). As noted above, the GEOL majors this year demonstrated an effective use of producing many scientific reports wherein they interpreted the data they collected during the semester. Students performed satisfactorily at analyzing and evaluating reasons and evidence, and constructing research-based arguments using Standard Written English. They effectively used the common genres and conventions for geoscience writing. They learned to collaborate effectively with other students to collect the field data, and they produced effective geologic maps (visuals) using graphic computer programs. Lastly students applied up-to-date technologies common to geoscience. The faculty were pleased with this learning outcome this year.

This two indirect, qualitative assessment measures agrees with the other two direct/quantitative measures in indicating that students are doing well for both Learning Objective #7, and the UULO: Communication.

**Summary**

In summary, our GEOL students demonstrated satisfactory performance in Learning Objectives 4 and 7, and in the UULO Learning Objective of Communication. Faculty expect possible changes may occur next year since we are participating in the UNLV Curricular Coherence Committee and will be reviewing and potentially revising our programs during this process.