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>
<td>Geoscience</td>
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<td>College</td>
<td>Sciences</td>
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<td>Department Chair</td>
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<td>Assessment Coordinator</td>
<td>Brenda Buck</td>
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Date Submitted: December 1, 2016

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.
Learning Outcomes

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

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 rocks using well-exposed rock record in the southern Great Basin as examples.

7. Be facile in computer applications in geology including spatial and imagery analysis applications, quantitative skills, and express themselves well in oral and written reports.

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. Able to demonstrate the ability to function independently, collaboratively, and ethically with others in the profession as colleagues and supervisors.

10. 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).

Results of Assessment:

Learning Outcome 1

GEOL 220 Mineralogy Cumulative Pop-Quizzes on Rock/Mineral Identification.

Geology Majors: Enrollment 14, Average Grade D.
43% performed satisfactorily (6/14). These students averaged B-.
57% performed unsatisfactorily (8/14) with average quiz grades C- or lower.
GEOL 220 Mineralogy Laboratory Final Exam Rock/Mineral Identification
Geology Majors: Enrollment 14, Average Grade C-
79% performed satisfactorily (11/14). These students average grade C
21% performed unsatisfactorily (3/14) with exam grade C- or lower.

GEOL 372 Field Geology: Introduction to Rock Units Identification
Geology Majors: Enrollment 24, Average grade B, not counting those 5 students who did not complete work. Of those who completed work (19), Average grade B; ~26% earned C- (5/19);
~74% performed satisfactorily (14/19).

GEOL 372 Field Geology: Introduction to Geologic Map and Cross Section Projects
Geology Majors: Enrollment 24, Average grade C.
~58% performed satisfactorily (14/24), these students average grade B+
~42% performed unsatisfactorily (10/24) with grades C- or lower (4 C-; 4 D; 1 F; 1 never completed project)

GEOL 427 Petrology Lab 6 Exercise: Mafic and Ultramafic Rocks in Thin Section.
Geology Majors: Enrollment 19, Average grade C
74% performed satisfactorily (14/19). These students averaged grade B
26% performed unsatisfactorily (5/19) with grades C- or lower.

GEOL 427 Petrology Lab 7 Exercise: Intermediate and Felsic Rocks in Thin Section
Geology Majors: Enrollment 19, Average grade C
58% performed satisfactorily (11/19). These students averaged grade B-
42% performed unsatisfactorily (8/19) with grades C- or lower.

GEOL 462: Laboratory Exercise 4: Mudrock/Sandstone/Conglomerate Classification
Geology Majors: Enrollment 15.
100% performed satisfactorily (15/15). Average grade A.

GEOL 462: Laboratory Exercise 6: Siliciclastic Rocks in Thin Section
Geology Majors: Enrollment 15.
100% performed satisfactorily (15/15). Average grade A.

GEOL 462: Laboratory Exercise 7: Carbonate Classification in Hand Samples
Geology Majors: Enrollment 15.
100% performed satisfactorily (15/15). Average grade A.

GEOL 462: Laboratory Exercise 8: Carbonate Rocks in Thin Section
Geology Majors: Enrollment 15.
100% performed satisfactorily (15/15). Average grade A.
UNLV UULO Assessed: Inquiry and Critical Thinking

Graduates are able to identify problems, articulate questions, and use various forms of research and reasoning to guide the collection, analysis, and use of information related to those problems. Specific outcomes for all students include:

1. Identify problems, articulate questions or hypotheses, and determine the need for information.
2. Access and collect the needed information from appropriate primary and secondary sources.
3. Use quantitative and qualitative methods, including the ability to recognize assumptions, draw inferences, make deductions, and interpret information to analyze problems in context, and then draw conclusions.
4. Recognize the complexity of problems, and identify different perspectives from which problems and questions can be viewed.
5. Evaluate and report on conclusions, including discussing the basis for and strength of findings, and identify areas where further inquiry is needed.
6. Identify, analyze, and evaluate reasoning, and construct and defend reasonable arguments and explanations.

The UNLV UULO assessed this year is Inquiry and Critical Thinking. This is assessed through performance in 2 separate research projects (1) GEOL 430 Research project and poster presentation at the annual Geosymposium, and (2) Independent Research under various faculty members’ supervision. These projects also can be used to assess Learning Objective #7.

GEOL 430. Scientific Poster at Annual Geosymposium Event

Geology Majors: Enrollment 10, 1 withdrew.
100% performed satisfactorily (9/9). Average grade A

GEOL 430. Methods and Analyses of Research Project

Geology Majors: Enrollment 10, 1 withdrew
100% performed satisfactorily (9/9). Average grade B+

GEOL 495: Independent Research Project

Geology Majors: Enrollment 10
100% performed satisfactorily (10/10). Average grade A

Summary/Analysis

Graduate exit interviews indicated positive and enthusiastic interactions among faculty, staff, and students, including many extracurricular activities that the department provides for undergraduates. Students especially commented positively on Geosymposium. Approximately 40% of students are planning to continue their education in graduate school, ~26% had already found employment, and the remaining ~34% were looking for employment. Students complaints were largely focused around class sizes being too large, especially those that include a field component. The faculty believe this was an anomaly of a particularly large class size moving through the program. If that occurs again, the faculty will discuss mechanisms to avoid the problems encountered having very large field classes.
Learning objective #1 (LO#1) was assessed through a large number of projects, exercises, and exams in several different classes starting from early in the program and moving through until the end. Exercises early in the degree program show a high percentage of students struggling with this learning objective. In the introductory mineralogy course (GEOL 220), some improvement is found when comparing quizzes during the semester to their final rock/mineral laboratory exam: 43% satisfactory on quizzes improved to 79% satisfactory performance on the final laboratory exam. The next class (GEOL 372) still had a high percentage of students either doing poorly or not completing at least one of the assessed assignments – of those who completed the assignment 74% did so satisfactorily. However, by the time the students progressed to the end of their degree program, their performances were much better, ending with 100% satisfactory performance. The assessment committee met and discussed these results, and action items for early next year (Spring 2017) are for the department faculty as a whole, to consider mechanisms with which to help improve early program success in this learning objective.

UULO Critical Thinking, and Learning objective #7 (LO#7) are assessed by examining the GEOL 430 research project, poster creation, and presentation at the Annual Geosymposium meeting, and GEOL 495 Independent Research, which is also presented at the Annual Geosymposium meeting. These projects require teamwork, the ability to develop a hypothesis, collect data and interpret it, quantitative skills (data collection and analyses), computer skills (GIS modeling and poster creation), and presentation/communication (oral and poster). This is also the EES Major’s Capstone Course. The Annual Geosymposium meeting is attended by local and national employers, government agencies, UNLV faculty and students, and is entirely student-produced. The student poster presentations used in this assessment, are graded by attendees of this meeting. The results are positive with 100% of students being successful.

Feedback from the faculty instructor indicates that students get too stuck on finding a suitable topic/hypothesis to test which results in less time available to fully work on the GIS modeling and final project presentation. The assessment committee believes that there are minor adjustments that could be made to ensure even greater student success. Changes that will be implemented next year in the GEOL 430 course include giving the students additional examples of previously-successful work to help students better understand the scope of this research project. Action items include requiring students to have preliminary GIS maps prepared at an earlier date which will allow for feedback from faculty. The students can use this feedback to improve their final project.

Lastly, the assessment committee discussed our 3yr assessment plan with recommendations for changes and improvements to be developed and incorporated into the next plan. Action items are to take these suggestions to the entire department faculty during the Spring 2017 semester for their consideration and implementation.