

Academic Program Assessment Plan Geology BS

May 2017

Students are evaluated individually in each course required to complete the major for the BS in Geology including 80-82 required hours of instruction. These courses consist of 44 hours in Geosciences (geology), 8 hours of chemistry, 8 hours of calculus, and 8 hours of physics. Evaluation of student success and learning is described in the syllabus for each course, which includes goals/objectives and specified learning outcomes. Generally, student learning is assessed by examination, written reports, and oral presentation of assigned projects.

Student progress and learning is assessed by the geology faculty at least annually through review of the required curriculum for the degree program.

Program Goals

It is emphasized that students wishing to become practicing professional geologists should hold the Bachelor of Science degree in geology at a minimum. It is further recognized that practicing professional geologists typically hold a Master of Science degree.

The goal of the program leading to the Bachelor of Science degree in geology is to provide students with a broad spectrum of the various subdisciplines of geology, while at the same time honoring an emphasis in the traditional areas of mineralogy, igneous, metamorphic and sedimentary petrology, structural geology and stratigraphic principles. This curriculum will prepare students to enter graduate programs without deficiencies at the University of Arkansas or other established programs.

Student Learning Outcomes

Students earning the BS in Geology will:

- Have an appreciation for the environmental aspects of earth systems and potential impacts and hazards associated with human occupation.
- Understand the mineralogy and petrology of the earth.
- Be able to conceptualize the stratigraphic character of rocks in outcrop and from subsurface data.
- Recognize and understand the structural features of the earth in outcrop and in the subsurface.
- Have the ability to map these features and prepare cross-sections of the earth, and interpret the forces that caused the deformation of the rocks.
- Understand the geomorphic characteristics of the earth's surface and the mechanisms forming the earth's surface features.
- Understand the concepts of geologic time, the succession of life on earth through geologic time, and the tectonic forces acting on earth through geologic time.

- Have sufficient mathematical, chemistry and physics knowledge to be able to apply these fields to geologic settings and problems, as well as resource identification, development and management.
- Have the ability to communicate results of their efforts in written reports and orally to diverse audiences.

Assessment of Student Learning

Assessment Methods of Assessing Student Learning

Direct Methods

- GEOS 4686 is a 6-credit hour required field course conducted in the northern Rocky Mountains, southwestern Montana, northern Montana, and Wyoming. This six-week capstone course is project based and incorporates all aspects of geology that the students have learned throughout their program of study. Projects include rock and mineral identification, stratigraphic and structural mapping, preparation of detailed geologic maps and cross-sections, identification of mineral and ore emplacement, mapping and evaluation of geomorphic features resulting from glacial and stream erosion and deposition, and environmental investigation of acid mine drainage impacts associated with ore mineral development. Written reports presenting the data collected and detailing the students findings and interpretations are required for several of the field based projects throughout the six-week period. Some of these are individual written reports and others are team reports, exposing the students to working in diverse teams such as they will encounter when they join the workforce.
- Score gains from pre and post tests are used as a primary assessment mechanism for students in GEOS 1113 – introductory geology and for GEOS 1133 – earth science.

Indirect Methods

- Course grades – standard routine method used in each course in our program.
- Admission rates into graduate programs and quality of the graduate program accepting our students.
- Placement rates of graduates into appropriate career positions and starting salaries.
- Student/alumni satisfaction with learning, collected through surveys, exit interviews, or focus groups – track our students to the extent possible. We also have an external advisory board that provides feedback annually on our curriculum and the quality of the students graduating from our program.
- Student participation rates in faculty research, publications and conference presentations.
- Honors, awards, and scholarships earned by students and alumni.

Timelines for Data Collection and Analysis

Assessment data for our introductory courses are collected each academic semester. These data are compiled annually and reviewed by a faculty committee.

Department of Geosciences

Assessment of the Capstone field course in geology (GEOS 4686) occurs annually. This is a team-taught course led by 3 to 5 faculty in various aspects each year, as well as 4 to 5 graduate teaching assistants. Successes and issues for the course are reviewed each year and modifications are implemented to resolve issues and ultimately enhance overall student learning.

Our external advisory committee, which is composed of representatives from industry and local, state and federal government representatives, meets annually and provides feedback on our curriculum relative to their needs, as well as the quality of the students graduating from our program.

Use of Results

Results of data analysis are reviewed and discussed by faculty annually. Modifications to curriculum do occur as a result of these analyses, and as a result of feedback provided by our external partners. As example, in 2008 one of our external partners indicated that our students were not sufficiently quantitatively prepared to compete with students in industry internships from other R1 universities. As a result we modified our curriculum to incorporate a new required course on Geologic Data Analysis. We also focused our faculty hires in areas that emphasize more quantitative skills (math, physics, chemistry), and faculty who are conversant with the latest technological advances. As a result, the students now taking internships with these industry partners are now able to compete on a level playing field with their peers.

Another example of program assessment and review occurred in 2010 when the faculty teaching the introductory geology course (GEOS 1113) indicated that the text book had become outdated. We formed a faculty committee, reviewed our student assessment data, and our course goals/objectives and learning outcomes for the course, and selected a new text which better met the needs of the students participating in this university core course. The committee has provided feedback each year on the success of the new text in this introductory course, an ongoing assessment and review process.

These examples indicate that ongoing assessment, analysis and review combined with implementation of course and program modifications are critical to maintaining a healthy viable program to meet our student learning goals/objectives and outcomes.

Annual Academic Assessment Report

BS Geology

(May 2017)

Report annually to the Dean of the college/school the following:

- **Results of analysis of assessment of Student Learning Outcome**
 - Participation in GEOS 4686 during summer 2016 was 23 UA students and 10 students from other institutions. Grades for the course ranged from A to C with the majority of the grades in the A and B category. Students were all active participants throughout the course. The faculty involved with the course reviewed each project and made minor modifications as needed to better facilitate course objectives and learning outcomes. No wholesale changes to the course format or scheduling resulted from the review process in 2015.
 - Assessment and analysis of pre- and post-test results will be reported in a separate report related to Geosciences Core Course Assessments. In general, results remain similar to previous years. For this assessment period, GEOS 1113 General Geology students scored 43.5% on the pre-test and improved to 59.6% on the post-test. In GEOS 1133 Earth Science students scored 46% on the pre-test and improved to 74% on the post-test. This occurs because many of the students in GEOS 1133 have already taken GEOS 1113 and therefore the group tends to be high-graded from the previous course. Better, more engaged, students with significant additional background are participating in GEOS 1133.
 - Graduate placement is tracked to the extent possible, and reported annually to our external advisory board. These data are tabulated in written reports to the advisory board since 2007.
 - Our external advisory board met and provided feedback on our programs in May 2017.
- **Any changes to degree/certificate planned or made on the basis of the assessment and analysis**
 - None planned based on the 2016-2017 assessment period
- **Any changes to the assessment process made or planned.**
 - We plan to implement the following change for the 2017-8 assessment period
 - Exit survey for graduating seniors fashioned after undergraduate SOCI exit survey