

Weber State University  
Annual Assessment of Evidence of Learning

**DEPARTMENT OF GEOSCIENCES**

College of Science  
2015-2016 Academic Year

Department/Program: GEOSCIENCES  
Academic Year of Report: 2015-2016  
Date Submitted: November 18, 2016  
Report author: RICK FORD

Contact Information:

Phone: 801.626.6942

Email: [rford@weber.edu](mailto:rford@weber.edu)

## **I. Verification of Information at the Assessment Site**

### **A. Brief Introductory Statement**

Please review the Introductory Statement and contact information for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if this information is current, please indicate as much. No further information is needed. We will indicate “Last Reviewed: [current date]” on the page.

If the information is not current, please provide an update:

*Information on the assessment site is current, as of November 17, 2016.*

### **B. Mission Statement**

Please review the Mission Statement for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if it is current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

If the information is not current, please provide an update:

*Information on the assessment site is current, as of November 17, 2016.*

### **C. Student Learning Outcomes**

Please review the Student Learning Outcomes for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if they are current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

If they are not current, please provide an update:

*Information on the assessment site is current, as of November 17, 2016.*

### **D. Curriculum**

Please review the Curriculum Grid for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if it is current, please indicate as much; we will mark the web page as “Last Reviewed: [current data]”. No further information is needed. If the curriculum grid is not current, please provide an update:

*Information on the assessment site is current, as of November 17, 2016.*

### **E. Assessment Plan**

Please review the Assessment Plan for your department displayed on the assessment site: <http://www.weber.edu/portfolio/departments.html> - if the plan is current, please indicate as much; we will mark the web page as “Last Reviewed [current date]”. No further information is needed.

If the plan is not current, please provide an update: **Please see updated plan below.**

The site should contain an up-to-date assessment plan with planning going out a minimum of three years beyond the current year. Please review the plan displayed for your department at the above site. The plan should include a list of courses from which data will be gathered and the schedule, as well as an overview of the assessment strategy the department is using (for example, portfolios, or a combination of Chi assessment data and student survey information, or industry certification exams, etc.).

*Please be sure to include your planned assessment of any general education courses taught within your department. This information will be used to update the General Education Improvement and Assessment Committee's planning documentation.*

### **Department of Geosciences Assessment Plan**

*4-Year Cycle presented below was approved in January 2015 and updated for this report.*

Persons Responsible for Collecting and Analyzing the Data: The tenure-track faculty of the Department of Geosciences will serve as the Assessment Committee to oversee and implement the department's assessment plan, with the Chair of Geosciences serving as the committee chair.

Assessment Measures to be Used: The Geosciences assessment plan examines the Physical Science (PS) outcomes in each of the general education courses offered by the department. The plan also examines the program-level learning outcomes for geoscience majors, including a separate assessment of the high-impact learning practices utilized in the department's various curricula. Each general-education and department-level intended learning outcome (ILO) will be assessed by at least one direct measure (DM), typically a course-specific assessment instrument or assignment. In some cases, indirect measures, such as exit surveys of program graduates, will be used to supplement the direct measures.

#### Four-Year Assessment Cycle:

1. 2015-2016 (data collected); **subject report submitted November 2016**  
High-Impact Educational Practices: Undergraduate Research; Internships; Study Abroad;  
Capstone courses (GEO 4060, 4510)
2. 2016-2017 (data collected); report to be submitted Fall 2017  
General Education: Physical Science Intended Learning Outcomes (ILOs) 1-4  
Courses: GEO 1030; 1060; 1110, 1130; 1350
3. 2017-2018 (data collected); report to be submitted Fall 2018  
General Education: Physical Science Intended Learning Outcomes (ILOs) 5-8  
Courses: GEO 1030; 1060; 1110, 1130; 1350
4. 2018-2019 (data collected); report to be submitted Fall 2019  
Program-Level Learning Outcomes 1-9  
Courses: GEO 1110, 1220, 2050, 3150, 3550, 4210, 4060  
Summary of exit interviews

Repeat beginning 2019-2020.

This proposed assessment cycle is meant to be flexible and can change as needed. For example, if data from one year indicate a need to improve student learning with respect to a particular set of ILOs, the plan would be adjusted in such a way to allow the department to collect and analyze data shortly after making changes to course materials or assessment instruments related to the ILOs in question. We will continue to explore ways to improve learning and teaching in the Department of Geoscience.

## II. Report of Assessment Results for the 2015-2016 Academic Year:

### A. Evidence of Learning: High-Impact Educational Practices

During the 2015-2016 academic year the Department of Geosciences collected assessment data related to high-impact learning experiences -- as defined by the American Association of Colleges and Universities (AAC&U), based on the work of George Kuh (2008) (<https://www.aacu.org/leap/hips>). These practices include internships, global learning/study abroad experiences, undergraduate research, and capstone courses. These learning activities share several traits: they are experiential in nature; demand considerable time and effort; facilitate peer learning; require meaningful interactions with faculty and fellow students; encourage collaboration between diverse groups, and develop so-called “soft” or workforce skills. As a result, participation in these educational experiences can be life changing (Kuh, 2008).

The Department of Geosciences has a long history of using a variety of high-impact educational practices as part of its various curricula for departmental majors:

- **Capstone Courses:** Each of our three (3) degree programs (Geology, Applied Environmental Geosciences, Earth Science Teaching) has always had a capstone course that requires students nearing the end of their program of study to complete a project that integrates and applies their knowledge and skills from previous coursework. Applied Environmental Geoscience majors are required to complete GEO 4060 (*Geoscience Field Methods*) and Earth Science Teaching majors spend their final semester in “student teaching” (EDUC 4940/4950). Assessment of the two education courses related to student teaching is beyond the scope of this report. Geology majors are required to complete summer *Geology Field Camp* (GEO 4510) during the first block of summer term. “Field Camp” is widely recognized as a key capstone experience for most geology majors in the United States and it is this course that we focused on during this assessment cycle. The Department of Geosciences has traditionally offered the field camp course during alternate summers in a collaborative effort with the Department of Geology at Utah State University. The course description for GEO 4510 is:

*Integrated approach to collecting field data and interpreting geologic processes and history. Includes geologic mapping and analysis of bedrock, surficial deposits, geologic structures using aerial photographs, topographic maps, and surveying techniques. Results presented in written reports, maps, and graphical formats. About forty hours of lab per week for about 4 weeks. (4 credit hours)*

Two projects in GEO 4510 (Summer Term 2016) were used to assess this capstone course as a high-impact educational practice:

Project 1. Analysis of Absaroka thrust fault and Little Muddy Creek Conglomerate in southern Wyoming. This project required students to integrate geologic mapping, measurement and geometric analyses of structural features, and measurement of stratigraphic section with clast counts. The final product was a written report, with graphical representations of the various data sets, and interpretation of geologic history.

Project 2. Analysis of Wasatch fault and related geologic hazards near Willard, UT. This project required students to integrate geologic mapping, measurement of fault scarps, and measurement of

alluvial-fan characteristics, again leading to a final written report – this time focused on geologic-hazard identification/documentation and Quaternary geologic history.

The instructors used three three of the VALUE rubrics developed by the AAC&U to assess student learning during the two projects: (1) Inquiry and Analysis; (2) Problem Solving; and (3) Written Communication {VALUE = Valid Assessment of Learning in Undergraduate Education}. In addition, two geoscience-specific rubrics were used to assess the students' ability to accurately and appropriately integrate geoscience concepts into their final report. Each rubric is organized around a rating scale from 1 (Benchmark) to 4 (Capstone). Average values for the class are listed below:

### **Project 1**

Scientific Inquiry/Analysis	2.9
Problem Solving/Integration	3.0
Written Communication	2.8
Tectonic Processes knowledge area	3.1
Earth History knowledge area	2.8

### **Project 2**

Scientific Inquiry/Analysis	3.3
Problem Solving/Integration	3.1
Written Communication	3.2
Surface Processes knowledge area	3.1
Earth History knowledge area	3.2

**Interpretation:** These projects are effective tools in the capstone setting, as they require students to use many skills and integrate multiple fields of knowledge. The assessment data indicate that all the students performed at “milestone” levels (2 or 3 on the 4-point scale), and therefore no curricular change is needed at this time. However, the instructors noted that some students had difficulty organizing their final report in such a way as to integrate all the aspects that were requested in the project. “Writing for the geosciences” is now a point of emphasis in our department and we will continue to look for methods and practices that we can share with our students to improve their writing skills. To this end, we are offering an experimental course next semester (Spring 2017), *Geoscience Methods & Careers*, that will include several modules focused on developing the students scientific-writing skills. As a department, we are also beginning a comprehensive curriculum review and revision. In our skills-based approach to curriculum development, a course such as this is likely to become a requirement in the near future.

**Action Plan:** Going forward, we will use the same VALUE rubrics to assess student learning in our *Geoscience Field Methods* course (GEO 4060), which is the capstone course for the Applied Environmental Geoscience major.

• **Internships:** Over the years, a good number of our students have participated in geoscience-related internships, both paid and unpaid, with local companies and governmental agencies. Students are able to receive academic credit for these experiences through our *Cooperative Work Experience* course (GEO 4890). Unfortunately, we have not collected systematic assessment data for past internships.

**Action Plan:** We will institute data-collection procedures to track and document the internships completed by departmental majors. We will also work with the Office of Institutional Effectiveness to identify an appropriate assessment instrument and/or student evaluation for these high-impact experiences.

• **Undergraduate Research:** Supporting undergraduate research is an important part of our departmental culture. However, in terms of assessment data related to student learning and skill development, the situation here is similar to that for internships.

**Action Plan:** Using faculty annual reports, we will work to compile a comprehensive list of undergraduate research projects completed over the past three (3) years. We will also work with the Office of Institutional Effectiveness to identify an appropriate assessment instrument and/or student evaluation for these high-impact experiences.

• **Global Learning/Study Aboard:** Although this type of experience is not routinely offered by the Department of Geosciences, on occasion faculty have planned and executed substantial geoscience – related travel experiences through WSU Continuing Education (Study Abroad). Most recently, the department sponsored student trips to Hawaii and Iceland during Summer Term 2015. However, we do not have assessment data for these experiences beyond the basic course evaluations that students completed at the end to the term.

**Action Plan:** Any future study-abroad trips sponsored by the department will be required to have an assessment plan focused on the high-impact learning practices that students will encounter during their travel. We will also work with the Office of Institutional Effectiveness to identify an appropriate assessment instrument and/or student evaluation for study-abroad experiences.

## **B. “Next-Step” Success of Geoscience Graduates**

Arguably, the best assessment of program-level learning outcomes is the “next-step” success of program graduates, in terms of their ability to enter the workforce and/or their acceptance into graduate programs. Beginning in 2012, the Department of Geosciences began compiling an alumni database to determine where (both in terms of geography and subspecialty) in the geoscience workforce our graduates landed. We now have data (Table 1) on the majority (> 85 %) of our graduates going back to 2003. Over this time period, Geoscience graduates have been very successful in finding employment within the geoscience workforce and/or being accepted into geoscience graduate programs. We are very proud of the 80+ % placement. The data summarized in Table 1 also indicate that a WSU Geoscience degree has provided entry into a wide variety of geoscience positions. The top two employment sectors (other than secondary science education, where our graduates have had essentially 100% placement) are mineral resources/mining and environmental geoscience. We recognize that, with the downturn in oil and mineral-commodity prices, some of our graduates who found work in these areas shortly after graduation may be now looking for employment in other geoscience sectors. In addition, we were surprised to learn that only 13 % of our recent graduates went on to graduate programs. This statistic will be addressed during future program-level strategic planning, as we all would like to see this number increase for the long-term success of our graduates over their careers.

**Table 1: Dept of Geosciences: Demographics & Graduate Data  
(updated 9/30/2016)**

<b>Geoscience Majors: Fall Semester 2016 (9/30/16)</b>			
<b>Degree Program</b>	<b>Total</b>	<b>Males</b>	<b>Females</b>
Geology BS/BA	80	40	40
Applied Environmental Geosciences BS	54	35	19
Earth Science Teaching BS	16	8	8
<b>TOTAL</b>	<b>150</b>	<b>83</b>	<b>67</b>
Enrolled Fall 2015	101		

<b>Geosciences Graduates 2003-Summer 2016 / Placement After Graduation</b>		
<b>Employment Sector</b>	<b>#</b>	<b>Percent</b>
Teaching/Science Education (K-12)	22	20.4 %
Mining geologist/mining support services	18	16.7 %
Environmental geologist/scientist/professional	16	14.8 %
Petroleum geology / oil & gas tech service	10	9.3 %
Geologist/hydrologist (non-mining, non-o&g)	8	7.4 %
GIS Analyst/Technician	8	7.4 %
Presently in graduate school (geosciences)	6	5.6 %
Higher Education (geosciences)	3	2.8 %
<b>Subtotal (Geoscience Positions)</b>	<b>91</b>	<b>84 %</b>
Presently looking for geoscience position	3	52.8 %
Employed in a non-geoscience position	12	11.1 %
Not working outside the home	2	1.9 %
<b>TOTAL</b>	<b>108</b>	<b>100%</b>
Attended graduate school	14	13.0 %
Unknown	15	

<b>Geoscience Degrees Awarded: 2003-2016</b>		
Geology	55	44.0 %
Applied Environmental Geoscience	46	36.8 %
Earth Science Teaching	24	19.2 %
Total	125	100%

### III. Summary (Responses to the following questions):

- 1) *Based on your program's assessment findings, what subsequent action will your program take?*

The faculty will discuss this report at a departmental meeting during Spring 2107 and it will become essential background data for our ongoing curriculum review and revision efforts. Nationally, the geoscience community has been engaged in a comprehensive evaluation, sponsored by the National Science Foundation, of the future of undergraduate geoscience education (<http://www.jsg.utexas.edu/events/future-of-geoscience-undergraduate-education/>). The Department of Geosciences has been represented at each of the meetings during this process and is committed to using the results of this national effort to evaluate and revise its courses and curricula to better prepare our students. One of the most important aspects of this work is that geoscience employers, in all sectors, have been engaged in the process and we now have a broad consensus on the content knowledge and skills that a 21<sup>st</sup>-century geoscientist needs. With the recent retirement of a third of the Geosciences faculty (2 out of 6) and the hiring of two new colleagues with new expertise and perspectives, combined with the national-level work described above, we have a wonderful opportunity with respect to the evaluation and revision of our high-impact educational practices, curricula, and teaching methods to better prepare our graduates.

- 2) *We are interested in better understanding how departments/programs assess their graduating seniors. Please provide a short narrative describing practices/curricula in place for your department/program. Please include both direct and indirect measures employed.*

The Department of Geosciences routinely conducts exit interviews with all of its graduating seniors. During the interviews the graduates are asked about their satisfaction with college- and department-level advising and their perceptions of the strengths and weaknesses of our programs. In addition, they are asked to self-report, using a Likert-type scale, on their level of mastery of the nine (9) program-level learning outcomes (see 2014-2015 assessment report, dated January 2016). Data from academic years 2012-2013 to 2014-2015 are presented in Appendix A. The average of all responses is a robust 4.22, on a scale of 1-5. The averages for the individual learning outcomes range from a low of 3.99 (PLLO #3: Technology Skills) to a high of 4.46 (PLLO #6: Surface Processes). Overall, these data support the direct measures of student learning from course-level assessments, as documented in our 2014-2015 report.



## APPENDIX A: Graduation Exit Interview Data

Department of Geosciences

1/27/16

Date	Program	BA/BS	Problem-solving Skills	Communication Skills	Technology Skills	Earth Materials	Earth History	Surface Processes	Tectonic Processes	Earth Systems/Cycles	Scientific Method/Capstone
10/04/12	Geol	BS	4	3.5	3.5	4	4	3.5	4.5	4	3.5
10/04/12	Geol	BS	4	4.5	3	3.5	3.5	4	4.5	4.5	4
10/11/12	AEG	BS	5	5	3	4.5	4	5	5	4	5
10/11/12	Geol	BS	5	4	5	4	5	5	4	5	5
01/14/13	AEG	BS	4	5	4	3	4	5	5	4	4
01/15/13	Geol	BS	4	5	4	3.5	4.5	5	5	5	5
01/17/13	AEG	BS	4	4	4	4	4	5	4	5	4
01/29/13	Geol	BA	3	4	3	4	4	5	4	3	3
02/04/13	AEG	BS	4	3	5	3.5	4	4	5	4	5
02/08/13	AEG	BS	4	3	4	3	3	4	4	5	4
03/25/13	EST	BS	4	3	2	4	4	4	5	5	4
04/02/13	EST	BS	5	5	3	3.5	3	4.5	5	5	4
04/09/13	EST	BS	5	5	5	5	5	4.5	5	5	5
08/14/13	AEG	BS	5	4	5	5	5	5	5	5	5
08/30/13	AEG	BS	3.5	3	4	4	3	4.5	2	4	3.5
09/05/13	AEG	BS	3.5	4	4	5	4.5	4	4.5	5	4
10/24/13	AEG	BS	5	4	5	4	5	5	5	5	5
01/15/14	Geol	BS	4.5	4	4	5	4	5	4	4	5
01/15/14	Geol	BS	4	5	5	5	4	5	5	2	5
01/27/14	Geol	BS	4.5	4	3	5	3.5	4	4.5	3.5	5
03/03/14	Geol	BS	4	4	3	3	4	4.5	4	3.5	4
03/19/14	Geol	BS	4	4	5	4	4.5	4	5	4.5	4
03/25/14	Geol	BS	5	4	4	4	4	4	3	4	4
11/25/14	Geol	BS	4	4	2.5	4	3.5	4	4	4	4.5
01/21/15	AEG	BS	4	5	3	4	3.5	5	4.5	5	3.5
01/21/15	Geol	BS	5	4.5	5	5	5	4.5	5	4	4
02/12/15	Geol	BS	4.5	4	5	4	4	4	4	4	4
02/17/15	AEG	BS	5	4	4	4	3.5	4	4	4	4
03/04/15	Geol	BS	4.5	4	3.5	5	4.5	5	4.5	5	4
03/06/15	Geol	BS	5	4	4	4	4.5	5	5	4	5
03/06/15	Geol	BS	4	4	5	4	4	5	4.5	5	4.5
03/24/15	Geol	BS	4	3.5	3.5	4	4	3.5	3.5	5	4
04/28/15	AEG	BS	4	4	4.5	4	4	4.5	3.5	4.5	4
04/28/15	AEG	BS	5	5	5	5	5	5	4.5	5	5
04/28/15	Geol	BS	4	4	5	4	3	4	3.5	4	4
04/29/15	Geol	BS	5	4.5	3.5	4.5	4.5	5	5	4	4.5
07/20/15	EST	BS	5	5	4.5	5	4.5	4.5	5	4	4.5
09/08/15	Geol	BA	4	5	3	4	5	4	3	5	n/a
09/09/15	AEG	BS	4.5	4	5	3.5	4	4	3	5	3
09/23/15	Geol	BS	4	4	3	5	5	5	5	4	5
10/07/15	AEG	BS	3	4.5	4	4	3.5	3.5	3.5	4	3
<b>Averages</b>			<b>4.30</b>	<b>4.17</b>	<b>3.99</b>	<b>4.16</b>	<b>4.11</b>	<b>4.46</b>	<b>4.32</b>	<b>4.35</b>	<b>4.16</b>

## Appendix B

Please provide the following information about the full-time and adjunct faculty contracted by your department during the last academic year (summer through spring). Gathering this information each year will help with the headcount reporting that must be done for the final 5-Year Program Review document that is shared with the State Board of Regents.

Faculty: <b>Department of Geosciences</b> College of Science	2015-2016
Headcount	
With Doctoral Degrees (Including MFA and other terminal degrees, as specified by the institution)	6
Full-time Tenured	5
Full-time Non-Tenured (includes tenure-track)	0
Part-time	1
With Master's Degrees	3
Full-time Tenured	0
Full-time Non-Tenured	1
Part-time	2
With Bachelor's Degrees	0
Full-time Tenured	0
Full-time Non-tenured	0
Part-time	0
Other	0
Full-time Tenured	0
Full-time Non-tenured	0
Part-time	0
<b>Total Headcount Faculty</b>	<b>9</b>
Full-time Tenured	<b>5</b>
Full-time Non-tenured	<b>1</b>
Part-time	<b>3</b>

END