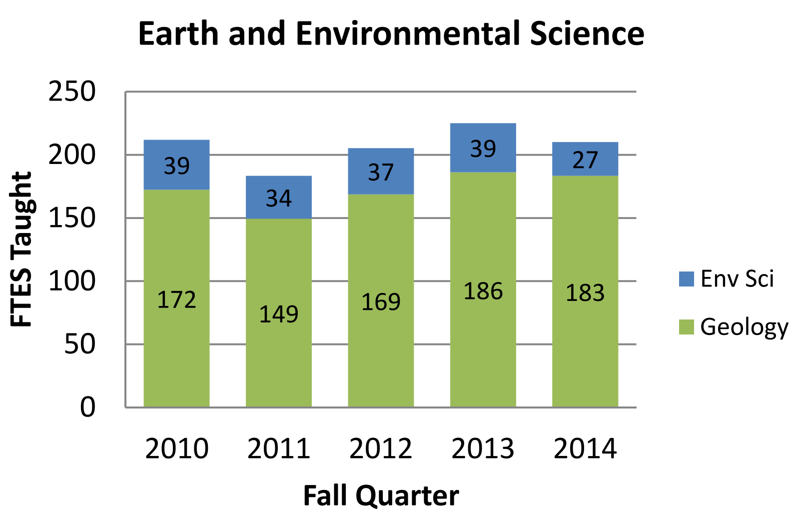
Geology BS and BA Program Annual Report 2014-15

Department of Earth and Environmental Sciences

The Department of Earth and Environmental Sciences in the College of Science offers degrees in Geology (BS, BA, MS) and Environmental Science (BS). The scope of this report is the Geology undergraduate (BS and BA) programs.

Enrollment

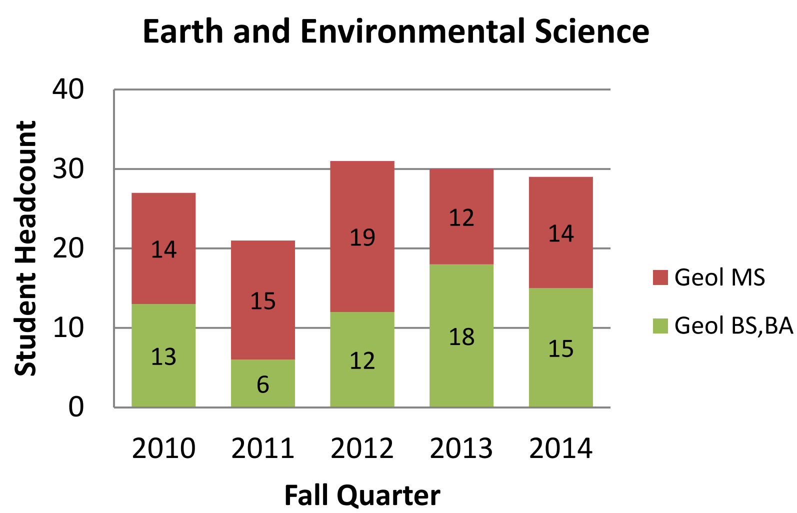
Enrollment in courses offered by the department as measured by Fall Quarter FTES was 210 for 2014 and has been relatively stable during the past two years (see figure below). The majority of the department's FTES are associated with Geology courses. A large portion of the department's enrollment is due to its participation in the General Education (GE) Program. This includes Freshman Learning Communities (clusters) and upper-division GE. The department taught in three GE clusters during AY 2014-15. The department offers a popular online class, GEOL 3401, The Oceans, which has a typical enrollment of about 160 students per quarter (four sections with 40 students each). The class is approved for upper-division Science GE credit.



FTES for courses in Geology and Environmental Science.

Number of Majors

The total number of majors, or student headcount, in undergraduate (BS and BA) Geology programs is currently 15, slightly above the five-year average from 2010-2014 of 12.8.



Number of majors in Geology programs, 2010-2014. Number of majors in undergraduate programs (BS and BA) shown in green.

Student Advising

Student advising for the Geology B.A. and B.S. programs is provided primarily by department faculty or the department chair.

Faculty

The department has five tenure-track or tenured faculty members; one Assistant Professor, two Associate Professors and two full Professors. Our newest faculty member, Michael Massey, joined the department in Fall 2013. His specialty is Environmental Science, and he serves as the Environmental Science Program Coordinator.

Due to the small number of regular faculty, we utilize ten lecturers to teach a variety of courses, including introductory courses for non-majors as well as upper-division and graduate level courses for majors. Most are part-time and have been teaching in the department for several years. All have at least an M.S. degree, and seven have a Ph.D. in Geology or a related field.

Staff

The department normally has two staff members, an Administrative Support Assistant and Instructional Support Technician. The ASA provides office support and the technician prepares and maintains materials for labs. The technician position is currently vacant and a search is underway for a replacement.

Assessment

The department updated its assessment plan earlier this year to provide more details on the implementation for Geology BS and BA programs for a five-year period through 2017-2018. The revised materials and assessment results for the current academic year, 2014-2015, are attached.

Department of Earth and Environmental Sciences
California State University, East Bay

ASSESSMENT REPORT 2014-15

GEOLOGY B.S., B.A.

29 June 2015

Department of Earth and Environmental Sciences
California State University, East Bay

Assessment Report 2014-15
Geology B.S., B.A.

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Department of Earth and Environmental Sciences
California State University, East Bay

Program Learning Outcomes
Geology B.S., B.A.

Students graduating with a B.S or B.A. in Geology from Cal State East Bay will be able to:

1. identify and classify geologic materials, including minerals, rocks, and fossils, and know their material and/or biological properties or characteristics. (Geologic Materials)

2. collect, organize, and analyze qualitative and quantitative data from both field and laboratory investigations such as lithostratigraphic and biostratigraphic correlations, geologic maps, geophysical surveys, cross-sections, soil tests, and geochemical and groundwater quality analyses. (Data Collection and Analysis)

3. synthesize, interpret and critically analyze geologic datasets (2D and 3D) and reports using discipline-specific methods, techniques, and equipment. (Interpretation)

4. critically analyze geological and environmental issues through the evaluation of scientific literature, and present their positions clearly and persuasively in written and oral form. (Communication)

5. understand geologic time, evolution, Earth's place in the Universe, and global-scale processes such as plate tectonics, earth systems interactions, and climate change. (Geologic Time)

Department of Earth and Environmental Sciences
California State University, East Bay

ILO Alignment Matrix for Geology B.S., B.A. Programs

The table below shows which Institutional Learning Outcomes (ILOs) are addressed by each of the Program Learning Outcomes (PLOs).

	BSBA PLO 1 Geologic Materials	BSBA PLO 2 Data Analysis	BSBA PLO 3 Interpretation	BSBA PLO 4 Communication	BSBA PLO 5 Geologic Time
ILO 1: Thinking & Reasoning	X	X	X	X	X
ILO 2: Communication			X	X	
ILO 3: Diversity*				X	X
ILO 4: Collaboration		X		X	
ILO 5: Sustainability				X	X
ILO 6: Specialized Education	X	X	X	X	X

*diversity in the natural world, including evolutionary diversity, and ranging from microscopic to astronomic scales.

CSU East Bay, Dept. of Earth & Environmental Sciences

Geology BS, BA Program Assessment

Curriculum Map

			Program Learning Outcomes				
Course	**No**	**Name**	**1. Geol. Materials**	**2. Data Analysis**	**3. Interp.**	**4. Communi-cation**	**5. Geol. Time**
GEOL	2101	Physical Geology	I		I	I	I
GEOL	2102	Earth and Life Through Time	I	P	I		P
GEOL	2600	Introduction to GIS		I	P		P
GEOL	3110	Principles of Geomorphology		P	P		I
GEOL	3400	General Oceanography	P	P			I
GEOL	3500	Environmental Hydrology		M	P	P	
GEOL	3601	Mineralogy and Optical Crystallography	P		P	P	P
GEOL	3701	Igneous and Metamorphic Petrology	P	P	P	P	P
GEOL	3801	Sedimentology and Stratigraphy	P	P*	P	I	I
GEOL	3810	Structural Geology	P	P	I	P	P
GEOL	3910	Geologic Field Methods	P	P	M		M
GEOL	3999	Issues in Geological Sciences			P	P	M
GEOL	4010	Applied Geophysics		P	P		
GEOL	4130	Survey of Geochemistry	P	P	I	P	M
GEOL	4140	Hazardous Waste Management		P	P	M	I
GEOL	4200	Introduction to Planetary Science	P	P	I	P	M
GEOL	4320	Hydrogeology	P	M	P	P	
GEOL	4414	Earthquake Geology	P		P	M	M
GEOL	4600	GIS for Earth Sciences		M	M		P
GEOL	4800	Seminar				M	

Proficiency Level: I = Introductory; P = Practicing; M = Mastery

CSUEB Geology Programs – LABORATORY SKILLS / COURSE PROJECT RUBRIC

Laboratory skills and course projects and assignments are where the discipline-specific skills, methods, techniques and processes that are fundamental to the Earth Sciences are acquired and utilized.

This rubric or portions of it may be applied to student **laboratory and course assignments** and **projects** in order to assess how well the Geology Program Learning Outcomes have been achieved.

	Exemplary **3**	**Accomplished** **2**	**Competent** **1**	**Insufficient Evidence** **0**
1. Organization	Organization is **clear, consistent, observable** and **skillful** and content is **cohesive**.	Organization is **clear**, **consistent** & **observable**.	Organization is **intermittently observable**.	Organization is **poor** or **not observable**.
2. Presentation	Work is **attractive**, **clean**, **clear**, **accurate**, visually **strong**	Work is **well produced**, **clear**, **mostly-accurate**, visually **effective**	Work is adequate with **minor errors**, visually **inert**	Work is **unclear**, **informal, minimally** conveys intent and **error prone**
3. Quantitative Skills	Applied **innovative** and **insightful** mathematical methods and techniques. Demonstrates mathematical **mastery**.	Applied **situation-appropriate** mathematical methods and techniques. Demonstrates **solid** math skills.	Applied **basic** mathematical methods. Demonstrates **modest** math skills.	**Unable** to apply basic mathematical methods and techniques. Insufficient math skills.
4. Execution	Work is complete to levels **above expectation** and turned in **early or on time**	Work is **strong**, **complete** and turned in **on time**	Work is **adequate**, **complete** and turned in **on time**	Work is **incomplete** or not turned in **on time**
5. Connection, Synthesis, Transformation	**Synthesizes** ideas or solutions into a coherent whole. **Creates** connections to higher-level discipline-specific concepts and practices.	**Connects** ideas or solutions in novel ways. **Recognizes** connections to higher-level discipline-specific concepts and practices.	**Acknowledges** existing connections among ideas or solutions.	**No recognition** of significance of exercise to discipline or global context.

Modified from: AAC&U

CSUEB Geology B.S., B.A. Program - CRITICAL THINKING VALUE RUBRIC

Creative thinking is both the capacity to combine or synthesize existing ideas, images, or expertise in original ways and the experience of thinking, reacting, and working in an imaginative way characterized by a high degree of innovation, divergent thinking, and risk taking.

This rubric may be applied to student **writing assignments** and **projects** in order to assess how well the Geology B.S., B.A. Program Learning Outcomes have been achieved.

	Exemplary **3**	**Accomplished** **2**	**Competent** **1**	**Insufficient Evidence** **0**
1. Competencies *Strategies and skills that apply to geological problem solving (i.e. discipline-specific lab & field exercises).*	**Clearly understands purpose** and role of the exercise and its importance and context within the Earth Sciences and/or related subfield. Proposes/develops **new means methods** to address the problem.	**Strong understanding of purpose** and role of the exercise and its importance and context within the Earth Sciences and/or related subfield. Uses discipline-appropriate means to address the problem.	**Understanding** of the purpose and role of the exercise and **some insight** into its importance and context within the Earth Sciences and/or related subfield. **Follows** instructions and **understands** the steps.	**Poor understanding** of the purpose and role of the exercise with **little/no insight** into its importance and context within the Earth Sciences and/or related subfield. Unable to follow instructions.
2. Problem Solving	Develops a **logical, consistent plan** to solve problem, and **recognizes consequences** of solution and **can articulate** reason for choosing solution.	Develops a **plan** to solve the problem. Has some **insight into consequences** and **some ability to articulate** reason for choosing solution.	**Considers and rejects less acceptable approaches** to solving problem.	Only a **single approach** is considered and used to solve the problem.
3. Embracing Contradictions	**Integrates** alternate, divergent, or contradictory perspectives or ideas **fully**. **Proposes/uses** multiple working hypotheses.	**Incorporates** alternate, divergent, or contradictory perspectives or ideas in a **exploratory** way. **Applies** multiple working hypotheses	**Includes** (**recognizes** value) alternate, divergent, or contradictory perspectives or ideas in a limited way. Has **difficulty** creating multiple working hypotheses	**Fails to Acknowledge** alternate, divergent, or contradictory perspectives or ideas. **No use** of multiple working hypotheses
4. Innovative Thinking	**Creates** a novel/unique idea, method, hypothesis, format, or product.	**Imagines/conceives** a novel/unique idea, method, hypothesis, format, or product.	**Reformulates** a collection of available ideas.	**No new ideas**
5. Connections, Synthesis, Transformation	**Synthesizes** ideas or solutions into a **coherent whole**.	**Connects** ideas or solutions in novel ways.	**Recognizes** existing connections among ideas or solutions.	**No recognition** of significance of exercise to discipline or global context.

Modified from: Critical Thinking Value Rubric, AAC&U http://www.aacu.org/value/rubrics/WrittenCommunication.cfm

Assessment Summaries, Geology BS and BA, 2014-2015

Overview

We present two assessments from the Geology BS & BA program that evaluate two of our Program Learning Outcomes; 1) Geologic Materials, and 4) Communication.

The assessments presented here are derived from both laboratory-based and written assignments. In geology, capstone and other milestone experiences necessarily integrate traditional reading, critical analysis, and subsequent written communication (our PLOs 2, 3 and 4), but also the applied experience of working with *geologic materials* and maps, and using geologic techniques in the laboratory and the field. The assessment for GEOL 3701 was conducted based on results from an exercise in which each student carries out a detailed study of a different rock suite. Final products include a written report and an oral presentation. The Laboratory Skills/Course Project rubric was used for assessment of this exercise. Assessment was also conducted based on student work from GEOL 4800, a course that focused on readings on a wide range of topics in the Earth Sciences. Assigned readings were typically outside the comfort range of some portion of the students owing to the wide range of interests and experiences in the combined Geology and Environmental Sciences majors enrolled in the class. A modified rubric, altered to apply to the strict conventions of the précis form, was used to assess student work.

These two assessments analyze 16 separate pieces of student work derived from two courses that progress in complexity. In the 'lower-level' class (GEOL 3701), overall class results are strong, however, one student fell below the minimum competence level, likely as a function of external or family pressures. Otherwise students here are operating at or above the 'accomplished' level in these areas. The 'upper-level' class (GEOL4800) is a Senior Seminar course that for the first time merged students from both the Geology and Environmental Science programs into a California-centered class that read, critically analyzed in précis form, presented, and discussed the article of the day. Focus is on précis writing, where critical thinking is fundamental in determining the most important aspects of all arguments posed in the works we read. Students write especially abbreviated weekly précis on papers that they choose with approval, and write a final 'full-length' précis on the papers they themselves deliver to the class as an oral presentation. The strong results on this assessment are likely a function of the student's increasing comfort and familiarity with the task and form of the précis.

Course assessments are briefly summarized below. Assessments were performed using the departmental rubrics, modified as needed to take into account the requirements of the assignment.

GEOL 3701 Igneous & Metamorphic Petrology - Winter 2015

PLO 1. Geologic Materials

Rock Suite Project. Term-long comprehensive study of a suite of rocks.

This project assesses a significant portion of the Geology Core: a strong foundation in both Mineralogy (GEOL3601) and Igneous & Metamorphic Petrology (GEOL3710) is required to demonstrate competence in this task. The project serves as an early capstone to the 'hard rock' geology content that we provide, which in turn serves as a fundamental part of a geologist's understanding of the Earth's chemical and physical make-up. It builds and tests the strength of a student's foundation of knowledge of Earth materials.

Course average of 11/15, where 5/15 indicates "competence" and 10/15 indicates "accomplishment". The large standard deviation (4.31) may be the result of a wide range of abilities. The lowest average scores are in the areas of 'Supporting Materials' and "Central Message", and is consistent with early- and mid-level students with weak writing skills and with difficulty in analysis and integration. This project provides an excellent introduction to the methods used by and skills required of a professional geologist. It incorporates all of the Geology BS/BA PLOs, and the students greatly value the experience.

GEOL 4800 Senior Seminar (Topic: Geology & Environmental Issues in California) Winter 2015

PLO 4. Communication

Final Précis of a Journal Article.

This class was a first-time attempt to offer a Senior Seminar that was accessible to both Geology and Environmental Science majors, thus providing a much needed degree requirement to a larger community, but perhaps more importantly, it promoted important cross-discipline dialogue that we recognize as being fundamental to solving many of the existing and impending environmental challenges that we now face. Students presented both oral presentations and précis (assessed here) on a subject of their choice. Topics ranged from volcanic hazards and desert species.

Course average is 8.9/12, where 4/15 is 'competent' and 8/15 is 'accomplished'. With the exception of 1 student (#4) who barely met the competence threshold (4/12), the results are strong. This was the ultimate in a series of précis, and as such the strong results speak to a familiarity with the requirements of the précis form. Anecdotal evidence and post-class student comments indicate the exercise of writing précis is valuable and will likely be continued in this seminar.

CSUEB Geology BA/BS. Program - GEOLOGIC MATERIALS –Lab Project Rubric

APPLIED TO: GEOL3701 - Igneous & Metamoprphic Petrology, Winter 2015: Rock Suite Project

8 students evaluated

Class total average: 11.0 out of 15, (5 is meeting PLO), class total standard deviation: 4.31

Student	Organization	Language	Delivery	Supporting Materials	Central Message	Total
1	1	1	0	0	0	2
2	3	3	3	3	3	15
3	3	3	3	2	2	13
4	2	2	3	2	2	11
5	3	3	3	3	3	15
6	3	3	3	2	2	13
7	2	2	2	1	1	8
8	2	2	3	2	2	11
Class average	**2.4**	**2.4**	**2.5**	**1.9**	**1.9**	**11.0**
Standard deviation	**0.74**	**0.74**	**1.07**	**0.99**	**0.99**	**4.31**

CSUEB Geology B.S. Program - CRITICAL THINKING & WRITING RUBRIC - *Precis Form*
APPLIED TO: GEOL4800 - Senior Seminar, Winter 2015: Final Precis
8 students evaluated
Class total average: 8.9 out of 12, (4 is meeting PLO), class total standard deviation: 1.89

Student	Context & Purpose	Disciplinary Conventions	Syntax and Mechanics	Explanation of Issues	Total
1	3	2	2	2	9
2	3	2	3	3	11
3	2	2	2	2	8
4	1	1	2	1	5
5	2	2	2	3	9
6	2	2	2	3	9
7	2	3	3	3	11
8	3	1	2	3	9
Class average	**2.3**	**1.9**	**2.3**	**2.5**	**8.9**
Standard deviation	**0.71**	**0.64**	**0.46**	**0.76**	**1.89**

GEOL 3701 Igneous and Metamorphic Petrology
Instructions and Guidelines for Rock Suite Project

SYNOPSIS: You will carry out a petrological research project for the rock suite of your choice from our outstanding collection. Then, similar to Mineralogy class last quarter, you will create and submit a manuscript suitable for publication in a petrological journal. However, this quarter, your manuscript will be based upon your *own* research, data collection, observations, discussion-synthesis, and conclusions. The rock suite project will be worth 20% of your overall course grade; do not take the project lightly! I recommend that you begin early in the quarter, as significant out-of-class lab time will be required.

TOPIC:

Choose a rock suite from our extensive collection. I suggest that you first look at the rock suites to learn which are available, then do some research on localities of interest before making your choice. I can help you decide if you want, just ask!

RESEARCH:

Your paper should include the general geology of your samples (geologic setting, location, previous work by others, etc.). The bulk of research, however, will be complete hand sample and thin section descriptions, following the same procedures as used in the class lab exercises. Collect data systematically - prepare tables and figures as appropriate. Labeled photographs, photomicrographs, and sketches are an excellent way to convey information. When you have completed the research, integrate what you observe about your samples with the bigger regional geologic picture. This is the quantum leap - you must synthesize your observations to come up with a petrogenesis for your rock suite that is supported by your observations. This requires a lot of thought.

MANUSCRIPT FORMAT:

Following examples from the journal Geochemica, Cosmochemica Acta (posted on Blackboard).

Organize your paper as follows:

Title

Abstract: 200 to 300 words; what did **you** do, how did **you** do it, what did **you** find out

Introduction – Geologic History **–** Setting etc. (you will have to research this…)

Writing a Precis

As Senior-level students you are ideally expected to do many critical readings, to assess arguments, hypotheses or models, and then to present an informed argument of an article and to reproduce the logical development of the argument in as cogent a form as possible *in your own words*. In order to demonstrate that you have assimilated the central argument and proof of another scholar's critical interpretation, you must be able to compose a *precis* of an argument.

A summary or a precis is NOT a personal interpretation of a work or an expression of your opinion of the idea (you will never use the first-person I in a précis); it is, rather, *an exact replica in miniature of the work, often reduced to one-quarter to one-fifth of its size, in which you express the complete argument!*

What actually happens when you write a precis? First, *you must understand the complete work so that you can abstract the central argument and express it cogently and completely*. Next, you must develop the argument exactly as the writer has presented it AND reduce the work by 75-80% of its original size.

The key word here is *assimilation*. When you read the material, it is probable that you will understand only those parts that have associations within your own experience. Don't get bogged down by mathematics if things are not initially clear: look at the terms and their arrangement – try to recognize fundamental relationships and try to verify them with your reading of the text.

How you actually go about writing a precis depends largely on your ability to restate the writer's central ideas after you have assimilated them in your own mind.

Steps to writing an effective précis:

1. Read the article many times most carefully.

2. Write a precis of the article in which you state the entire argument

and also to present the logical progression (the development) of the argument.

3. Reduce the article to around one-fifth to one-quarter of its original length

and omit nothing from the essential argument. This is, in reality,

the key to the whole enterprise!

4. Type the precis and begin with your abstraction of the central, inform-

ing idea of the article. Having understood and written the central idea,

present the essential argument(s) in as cogent manner as possible.

5. Here is a central rule: Do not copy a single sentence from the article! You may use

key words and phrases only when you are expressing ideas which are technically precise or when you feel comfortable using the writer's

own words, i.e., you understand exactly he or she means, and there

is really no better way to express the concept.

Finally, in order to complete this assignment, you will have to read the work most carefully, ask questions about the work repeatedly, and reach into your own geologic background so that you can best shape the writer's concepts!

These kinds of assignments are not easy! When you have completed it well, you will likely never forget the argument, the examples, and the development of the article. More than likely you will also be learning that, when you write research papers and other critical papers, you ability to write the precis is central to the basics of analysis, synthesis, comparison, and other key, higher order thinking skills absolutely required for your success in college and in the profession or career you have chosen when you graduate.

Shamelessly Pirated off the Web & modified by LMS-(http://lonestar.texas.net/~mseifert/precis1302.html)

Department of Earth and Environmental Sciences, CSCI

CALIFORNIA STATE UNIVERSITY EAST BAY

ASSESSMENT PLAN: B.S., B.A. in Geology

Updated: Winter 2015, by Mitchell Craig and Luther Strayer

PROGRAM MISSION

[CSUEB Missions, Commitments, and ILOs, 2012]

CSUEB Geology BS and BA Program Description

The undergraduate degree programs consist of required courses plus electives designed to meet the needs of students with objectives ranging from employment at the Bachelor's degree level, through preparation for a secondary school teaching credential, to graduate study in Geology. A B.S. major in Geology is the primary, professional program in Geology, and serves as preparation for employment in the field, usually on a technical level; those wishing to do independent geological work should plan on graduate study. The B.A. degree major is designed for persons who do not necessarily plan to become professional geologists or to go on to graduate work.

PROGRAM STUDENT LEARNING OUTCOMES (PLOs)

Students graduating with a B.S. or B.A. in Geology from Cal State East Bay will be able to:

PLO 1 *ILO 1,6*	Identify and classify geologic materials, including minerals, rocks, and fossils, and know their material and/or biological properties or characteristics. *(Geologic Materials)*
PLO 2 *ILO 1,4,6*	Collect, organize, and analyze qualitative and quantitative data from both field and laboratory investigations such as lithostratigraphic and biostratigraphic correlations, geologic maps, geophysical surveys, cross-sections, soil tests, and geochemical and groundwater quality analyses. *(Data Collection and Analysis)*
PLO 3 *ILO 1,2,6*	Synthesize, interpret and critically analyze geologic datasets (2D and 3D) and reports using discipline-specific methods, techniques, and equipment. *(Interpretation)*
PLO 4 *ILO 1,2,3,4,5,6*	Critically analyze geological and environmental issues through the evaluation of scientific literature, and present their positions clearly and persuasively in written and oral form. *(Communication)*
PLO 5 *ILO 1,3,5,6*	Understand geologic time, evolution, Earth's place in the Universe, and global-scale processes such as plate tectonics, earth systems interactions, and climate change. *(Geologic Time)*

Year 1: 2013-2014

1. Which PLO(s) to assess	PLO2 *(Data Collection and Analysis),* PLO4 *(Communication)*
2. Assessment indicators	Course assignments and projects, precis & oral presentations of topical journal articles in the field. Department rubrics will be used.
3. Sample (courses/# of students)	GEOL 3701, GEOL 3801, GEOL 3810, GEOL 3910.
4. Time (which quarter(s))	Winter 2014, Spring 2014
5. Responsible person(s)	Luther Strayer, affiliated faculty.
6. Ways of reporting (how, to who)	Indicators from individual courses are submitted by faculty to the Chair. The results are compiled and analyzed. A summary report is distributed to the faculty and included within the department's annual program report.
7. Ways of closing the loop	Areas of improvement are discussed at faculty meetings and used to make improvements and revisions to courses.

Year 2: 2014-2015

1. Which PLO(s) to assess	PLO1 *(Geologic Materials)*, PLO 4 *(Communication)*
2. Assessment indicators	Course assignments and projects, precis & oral presentations of topical journal articles in the field. Department rubrics will be used.
3. Sample (courses/# of students)	GEOL 2101, GEOL 3601, GEOL 3701, GEOL 4800.
4. Time (which quarter(s))	Fall 2014, Winter 2015, Spring 2015
5. Responsible person(s)	Luther Strayer, affiliated faculty.
6. Ways of reporting (how, to who)	Reports are submitted first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and “closing the loop.”
7. Ways of closing the loop	Areas of improvement are discussed at faculty meetings and used to make improvements and revisions to courses.

Year 3: 2015-2016

1. Which PLO(s) to assess	PLO 3 *(Interpretation),* PLO 5 *(Geologic Time)*
2. Assessment indicators	Course assignments and projects, precis & oral presentations of topical journal articles in the field. Department rubrics will be used.
3. Sample (courses/# of students)	GEOL 3801, GEOL 3910, GEOL 2102, GEOL 3810
4. Time (which quarter(s))	Winter 2016, Spring 2016
5. Responsible person(s)	Luther Strayer, affiliated faculty.
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and “closing the loop.”
7. Ways of closing the loop	Disciplinary knowledge assessment will aid with program revision concurrent with quarter-to-semester conversion.

Year 4: 2016-2017

1. Which PLO(s) to assess	PLO 1 *(Geologic Materials)*, PLO 5 *(Geologic Time)*
2. Assessment indicators	Course assignments and projects, precis & oral presentations of topical journal articles in the field. Department rubrics will be used.
3. Sample (courses/# of students)	GEOL 2101, GEOL 2102, GEOL 3701, GEOL 3801, GEOL 3810, GEOL 4800.
4. Time (which quarter(s))	Winter 2017, Spring 2017
5. Responsible person(s)	Luther Strayer, Mitchell Craig, affiliated faculty.
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and "closing the loop."
7. Ways of closing the loop	Assess progress made since 2014-2015, adjust strategies. Revise program requirements concurrently with quarter-to-semester conversion.

Year 5: 2017-2018

1. Which PLO(s) to assess	PLO 3 *(Interpretation),* PLO 2 *(Data & Analysis)*
2. Assessment indicators	Course assignments and projects, with department rubrics.
3. Sample (courses/# of students)	GEOL 3801, GEOL 3810, GEOL 3910, GEOL 4010.
4. Time (which quarter(s))	Fall 2017, Winter 2018, Spring 2018.
5. Responsible person(s)	Luther Strayer, Mitchell Craig, affiliated faculty.
6. Ways of reporting (how, to who)	Reports first to the Chair and then to the entire faculty for comment & discussion. An end-of-year meeting will be devoted to evaluating assessment results and "closing the loop."
7. Ways of closing the loop	Assess progress made since 2016-17, adjust strategies.