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

ASSESSMENT REPORT 2015-16

GEOLOGY B.S., B.A.

28 June 2016

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

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Contents

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 = Master

B.A. / B.S. Geology Program

Assessment Summaries, 2015-2016

Overview

We evaluated student work from selected courses in the Geology BA/BS Program 2015-2016 to assess how well Program Learning Outcomes (PLOs) were met. PLOs evaluated during this period are: 3) Data & Analysis and 5) Geologic Time.

GEOL 3810 Structural Geology – Winter 2016: Data, Analysis & Interpretation.

Laboratory activity in which students determine the friction envelope of a series of frictional surfaces in dry, moist and water-saturated conditions and to compare their results to Byerlee's Law, which governs sliding frictions in rock at relatively shallow depths.

Successful completion of the activity requires apparatus set-up, digital data collection from a series of runs, recording the normal and critical shear force required for 'fault' slip. Results are tallied, analyzed and regressed in Excel, and compared with Byerlee's Law. Students communicate their results and conclusions in written form and tabulated results.

A modified laboratory & dataset skills rubric was used to evaluate student work. With a student population of n=10, and a maximum score of 12 possible, the overall ranged from 4.5 to 10, with an average of 6.9. All students exceeded the standard of "competency" (4), and two exceeded the "accomplished" (8) threshold. None displayed an "exemplary" level (12). The fundamental mathematical skills of advanced algebra, calculus, and graphing is an expected pre-requisite for the course, but some students lack the basic preparation and others have the necessary preparation but their quantitative skills are quite rusty. With the intent of 'closing the loop', possible ways to improve learning outcomes for this assignment are: 1) a pre-assignment that gives students practice with advanced algebra skills, 2) recommendations for math tutoring at SCAA for students who do not perform well on a math skills pre-test given on the first day of class, 3) an additional, optional, session where students work on problems with the instructor present.

GEOL3910 Geologic Field Methods - Spring 2016: Geologic Time

A capstone laboratory experience where students complete a complex geologic analysis of the San Leandro block, which is bounded by the Hayward and Chabot faults, and was likely the locus of the last large earthquake in the East Bay, and will likely host the next.

Successful completion will require students to construct a detailed geologic maps, collect, organize, analyze and interpret structural and lithologic data, construct structure sections through the area, and interpret/develop its geologic history. Material is submitted in report form, both hard-copy and electronic.

A compound mapping / field analysis project rubric was used to evaluate student work. With a student population of n=10 (actually 12, but 2 students had to leave early for field camp and will turn in their final projects August of 2016), and a maximum score of 24 possible, the overall ranged from 10.5 to 15.5, with an average of 13.5. All students exceeded the standard of "competency" (6); 7 students exceeded the "accomplished" (12) threshold. None displayed an "exemplary" level (24). This is effectively our capstone course for the BA/BS until the new field courses are implemented during the semester conversion. Student performance in the field is a strong indicator of preparation, however not all geologists must be field focused, and not all individuals are comfortable in a field environment. The results here indicate that our students are at least competent and capable in the field and that their work products are solid and usable. The variation evident in the rubric results is consistent with in-class performance for many students, although in some cases it is the field classes where a student truly connects with geology.

Possible ways to improve learning outcomes for this assignment are: 1) more field experiences earlier in the sequence. This is being addressed by a transformative programmatic change (semesters) where a 1 week field course that is effectively equivalent to this (GEOL3910) course will be required in the lower-division sequence.

GEOL3910 – Field Methods Spring 2016

Fairmont Ridge Project Assignment

Turn In:

1) Inked and colored bedrock map with major landslides and legend with title, name, etc.
2) Inked and colored structure section in an orientation and of a length of your choosing, with the goal of choosing a illuminating section that characterizes the structure of the area.
3) Brief (1 page) structural analysis – with stereonets (does not count toward the 1 page).
4) Brief (1 page) lithologic descriptions of the major units found in the area.
5) Bried (1 page) description of the geology and geologic history of the map area.

Turn all in by Thursday at 4pm in a simple envelope with no plastic and your name on it. Your name must be on all materials to be graded.

<u>Late submissions will not be graded.</u>

Grading Rubric

	Exemplary **3**	**Accomplished** **2**	**Competent** **1**	**No 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** and **minimally** conveys intent and **error prone**
3) Execution	Work is complete to levels **above expectation** and/or turned in **early**	Work is **strong**, **complete** and turned in **on time**	Work is **weak**, **complete** and turned in **on time**	Work is **incomplete** but turned in **on time**
4) Connecting, Synthesizing, Transforming	**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.

E&ES BA/BS Compound Mapping / Field Analysis Project Rubric for *GEOL3910 Geologic Field Methods S16*

Fairmont Ridge Mapping and Geologic History Report

NetID: ______________________ *Student Name: ______________________*

*This assessment rubric merges E&ES PLO's 3 & 5 in order to assess a multi-component capstone laboratory project that requires **data collection**, **organization** and **manipulation**, map and directional **data analysis** and **interpretation**, **application** of computer spreadsheets and discipline-specific graphical/visualization methods, and finally a brief and concise geologic history that **integrates** the map area with the larger region through geologic time. Surficial geological data are **interpreted** and **projected** to depth in vertical structure cross-section across the map area, using **learned geologic knowledge** and experience, and **applied** to the East Bay hills. A concise report of the methods, data, **analysis**, **interpretation** of the structural and geologic history **unifies** all aspects of the project.*

CRITERIA	Exemplary **3 each**, (24 total)	Accomplished **2 each**, (16 total)	Emerging **1 each**, (8 total)	Insufficient **0**
Clarity *Structure, style (scientific voice), readability organization*	Uses **accurate language/ terminology that skillfully conveys meaning** to the audience with clarity and fluency.	Uses **language that generally conveys meaning** to readers with clarity, although some errors in terminology are apparent.	Uses **language/terminology that is basic/simplistic and/or somewhat inaccurate** so that meaning is decipherable but unclear/not straightforward.	Uses **language/terminology that is so unclear and/or fraught with errors** that meaning is not apparent.
Data Organization/Presentation *Spreadsheets, structural analyses, data presentation, map and structure sections*	Organization is **clear, consistent, observable** and **skillful** and content is **cohesive**. Work is **attractive**, **clean**, **clear**, **accurate**, visually **strong**	Organization is **clear, consistent** & **observable**. Work is **well produced**, **clear**, **mostly-accurate**, visually **effective**	Organization is **intermittently observable**. Work is adequate with **minor errors**, visually **inert**	Organization is **poor** or **not observable**. Work is **unclear**, **informal** and **minimally** conveys intent and **error prone.**
Scientific Conventions *Units, labels, map keys, formatting, references; formal scientific voice; Occam's razor*	Conveys **detailed attention to and successful execution of a wide range of conventions** in scientific communication, including organization, terminology, presentation, formatting, and stylistic choices.	Conveys **suitable attention to most conventions** in scientific communication.	Conveys **basic attention to some conventions** in scientific communication.	**Conveys a lack of attention** to scientifically acceptable communication.

E&ES BA/BS Compound Mapping / Field Analysis Project Rubric for *GEOL3910 Geologic Field Methods S16*

Fairmont Ridge Mapping and Geologic History Report

Supporting Evidence *Integrating multiple areas of inquiry (i.e mapped fold orientations and π-analysis); connect separate but related processes*	Presents **valid lines of evidence** (e.g., experimental data, peer reviewed literature) to **fully and clearly support/explain any claims** that are not common knowledge.	Presents **valid lines of evidence** that **mostly support/explain any claims** that are not common knowledge.	Presents **lines of evidence that are not yet synthesized and simplistically support/explain claims** that are not common knowledge.	**Does not include valid lines of evidence** or presents evidence that is fragmented and/or used inappropriately (taken out of context, misinterpreted, incorrectly paraphrased, etc.), so the **claims are not supported nor explained.**
Connecting, Integrating, Interpreting *Connect learned knowledge/theory to field and applied situations; make predictions based on analysis; recognize and integrate complex field relations to develop a stronger understanding. Interpret results accurately.*	**Synthesizes** ideas or solutions into a coherent whole. **Recognizes** connections to advanced discipline-specific concepts and practices.	**Connects** ideas or solutions in novel ways. **Recognizes** connections to higher-level concepts.	**Acknowledges** existing connections among ideas or solutions.	**No** or **flawed recognition** of significance of exercise to discipline or larger context.
Execution/Production *Drafting quality, neatness & attractiveness; appropriate labeling, scales and use of symbology, titles, coloring, etc.*	Work is complete to levels **that clearly meet or exceed expectation** and/or turned in **on time**	Work is **strong**, **complete** and turned in **on time**	Work is **acceptable**, **complete** and turned in **on time**	Work is **incomplete** but turned in **on time**

CSUEB Geology B.S./B.A. Program – Compound Mapping / Field Analysis Project Rubric
APPLIED TO: GEOL3910, Spring 2016 n = 10 *Class Ave. = 13.5
GEOL3810 Friction Laboratory Assignment: BS_PLO's 1, 2, 3, 4, & 5

Student	Clarity	Org./Present	Conventions	Support	Integrate	Execution	Total
1	2.5	2.0	2.0	2.5	2.0	3.0	14.0
2	#	#	#	#	#	#	RD (field camp)
3	3.0	2.5	2.0	2.5	2.5	2.5	15.0
4	2.5	1.5	1.5	1.5	1.5	2.0	10.5
5	2.5	2.5	2.5	2.5	2.5	3.0	15.5
6	#	#	#	#	#	#	RD (field camp)
7	2.5	3.0	2.5	2.0	2.0	3.0	15.0
8	2.0	2.0	2.5	2.5	1.5	2.5	13.0
9	2.0	2.0	1.5	2.0	1.5	2.5	11.5
10	2.5	2.0	2.5	2.5	2.0	3.0	14.5
11	2.5	3.0	2.0	2.5	2.5	2.5	15.0
12	2.0	2.0	1.0	2.0	2.0	1.5	10.5

*Exemplary = 18; Accomplished = 12; Competent = 6

2 students will turn in this assignment when they return from their Summer field school.

GEOL3810 Structural Geology Name ______________________________

Sliding Friction Lab

Introduction/Goals

1) Determine the coefficient of friction, □, and angle of sliding friction, □, for a series of 3 frictional surfaces, in dry, moist and wet states (9).
2) Collect frictional data from each of the 9 frictional states.
3) For each frictional state, make at least 3-5 $\square_c$ measurements. These will be averaged later.
4) Each run consists of recording the critical shear stress, $\square_c$, and normal stress, $\square_n$, resulting from successive addition of steel weights (you will measure and record each mass) onto the frictional slider (~0, 1, 2, 3, 4, 5 weights). Record the critical shear stress from the digital fish scale at the moment of failure. The area of the slider will need to be measured for stress conversion from force.
5) Collect and organize all your data using an Excel spreadsheet.
6) Perform linear regressions of your collected and average $\square_n$, $\square_c$, data to determine the slope and y-intercept (in any) for each run, to yield the angle of sliding friction, □, for each material surface, dry, moist and wet.

Write-Up will include:

1) Brief write-up including description of experiment, apparatus, methods, data, analysis, and results.
2) A statement of interpretation and your conclusions. Please consider how your experimental results differ/agree with Byerlee's Law of frictional sliding? What if any is the effect to water on the sliding surface? Is this as expected by any theory?
3) Carefully hand- or computer-drafted (no photo) diagram of the experimental apparatus on a single, separate sheet.

Grading Rubric (5 pts. Each; 25 total):

1) Neatness and Appearance
2) Clarity and organization of data spreadsheet & calculations.
3) Write-Up
4) Interpretation & Conclusions and analysis (part 2 above)
5) Experimental apparatus diagram

CSUEB Geology B.S. Program – LABORATORY & DATASET SKILLS RUBRIC
GEOL3810 Structural Geology S16
Sliding Friction and Byerlee's Law
NetID: ______________________ *Student Name:* ______________________

*This rubric is used here to assess our PLO 3 (*Synthesize, interpret and critically analyze geologic datasets (2D and 3D) and reports using discipline-specific methods, techniques, and equipment) *in order to assess a multi-component laboratory project that requires* ***apparatus set-up****,* ***data collection*** *and* ***organization*** *and* ***manipulation****,subsequent* ***data analysis*** *and* ***interpretation****,* ***application*** *of computer spreadsheets and discipline-specific graphical/visualization methods, and finally a brief and concise write-up that* ***integrates*** *the idea explored in the lab exercise with larger course concepts. Data are collected for various frictional materials, requiring precise and repeatable technique. Data are* ***interpreted*** *and* ***compared to theory****. A concise report of the methods, data,* ***analysis****,* ***interpretation*** *of the findings unifies all aspects of the project.*

	Exemplary 3	**Accomplished** 2	**Competent** 1	**No 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** and **minimally** conveys intent and **error prone**
3) Execution	Work is complete to levels **above expectation** and/or turned in **early**	Work is **strong**, **complete** and turned in **on time**	Work is **weak**, **complete** and turned in **on time**	Work is **incomplete** but turned in **on time**
4) Connecting, Synthesizing, Transforming	**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.

This rubric may be applied to student **laboratory and course assignments** and **projects** that involve all or parts of the B.S. in Geology Program Learning Outcomes (PLOs) 1, 2, 3, 4, and 5.

CSUEB Geology B.S./B.A. Program – LAB SKILLS / COURSE PROJECT RUBRIC

APPLIED TO: GEOL3810, Winter 2016 **n = 10** ***Class Ave. = 6.9**

GEOL3810 Friction Laboratory Assignment: BS_PLO's 1, 2, 3

NetID	Organization	Presentation	Execution	Connect, Synthesize, Transform	Total
1	2.0	1.0	1.0	1.0	5.0
2	2.0	2.5	3.0	2.5	10.0
3	2.0	1.5	2.0	1.5	7.0
4	2.0	1.5	1.5	1.0	6.0
5	1.5	1.0	1.5	0.5	4.5
6	2.0	2.0	1.0	1.5	6.5
7	2.0	2.0	2.0	1.5	7.5
8	2.0	2.5	3.0	2.5	10.0
9	1.5	2.0	1.5	0.5	5.5
10	2.0	1.5	1.5	2.0	7.0
11	2.0	2.0	2.0	1.5	7.5
12	2.0	2.0	2.0	0.5	6.5

*Exemplary = 12; Accomplished = 8; Competent = 4

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.