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

ASSESSMENT REPORT 2016-17

GEOLOGY B.S., B.A.

20 September 2017

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

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Geology B.S., B.A.

Contents

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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

Assessment Summaries, Geology BS and BA, 2016-2017

Overview

We present an assessment from the Geology BS & BA program that evaluates our Program Learning Outcome 1) Geologic Materials.

GEOL 3701 Igneous & Metamorphic Petrology - Winter 2017

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. Students analyze rock hand samples and thin sections, identifying the minerals, modal mineralogy, textures, etc. so that they can understand and describe each rock's petrogenesis. Once students have this information for their entire rock suite, they then synthesize those results and explain how those samples fit into geologic history of the sample area. An assignment-specific scoring sheet is used in the quantitative assessment.

Only 6 students were assessed (the class enrollment, 3rd year Geology majors). The mean score was 8.3 out of 12, (4 is meeting PLO), with a standard deviation of 3.4. The highest average scores are in the areas of 'Methods', 'Hand Sample Descriptions and Observations' and 'Thin Section Descriptions and Observations', with lower scores in Synthesis/Discussion sections consistent with early- and mid-level students having some difficulty in analysis and integration. Not all students take advantage of the opportunity to receive feedback on a draft version, when comments on synthesis of information allow improvement in this area. The instructor may incorporate peer review in the future, as motivation for submitting an improved final product, and to allow students to develop evaluation skills. Because this project provides an excellent introduction to the methods used by and skills required of a professional geologist and incorporates all of the Geology BS/BA PLOs, it will continue to be a component of program assessment.

CSUEB Geology BA/BS. Program - GEOLOGIC MATERIALS

APPLIED TO: GEOL3701 - Igneous & Metamoprphic Petrology, Winter 2017: Rock Suite Project

6 students evaluated

Class total average: 8.3 out of 12, (8 is meeting PLO), class total standard deviation: 3.4

CSUEB Geology Program Assessment

Rubric: **Lab Project**
Course: GEOL 3701
Quarter: Winter, 2017
Assignment: Rock Suite Project

Student ID	Organization	Presentation	Quantitative Skills	Execution	Connection, Synthesis, Transformation	Total (12 possible)
1	2	2	N/A	1	2	7
2	2	2	N/A	2	2	8
3	3	3	N/A	3	3	12
4	2	2	N/A	3	2	9
5	3	3	N/A	3	3	12
6	1	1	N/A	0	0	2

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 et 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…)

Methods – how did you carry out your study of your rock suite samples

Results – your hand sample and thin section descriptions, etc. (can be an Appendix…)

Discussion – how do your samples fit into the context of the geologic setting and characteristics of your field area? Synthesize your results into a story…

Conclusions – what did you find?

Reference List

GUIDELINES:

In your paper you are expected to reference your sources -- class readings, any published source (books or articles) or the Internet (however, as the quality of materials on the Internet can vary drastically, you should use some discretion here). For a paper of this size, 10 cited references is a good average. YOUR PAPER MUST BE YOUR OWN WORK. Do not lift sentences directly from a text; this is plagiarism and is subject to academic punishment. You must express the ideas and concepts in your own words. But you MUST cite/reference the source of your information -- give credit where credit is due. If you do not cite the source of your information, this is also plagiarism. Feel free to use illustrations – plots – diagrams, etc. (remember a picture says a thousand words…), just be sure to include Figure Numbers, Figure Captions, and Figure References.

Do not use quotes unless it is necessary to illustrate your point or you are critiquing someone else. For this paper, you should be able to express your ideas in your own words. Do not use terms or jargon that you are not familiar with. If I do not understand what you are writing about, I will come to you and ask and you must be able to explain what you mean.

Remember that petrology is a science concerned with phenomena at a wide variety of scales - from mappable units, to hand samples, to microscopic examination. Your paper should reflect this breadth of scale. Your paper should include a map of the geology and sample locations if available.

I will help you every step of the way - research, petrography, paper organization, etc. Just ask! **The best way to get my help is to turn in a draft!!**

REQUIREMENTS:

Length: 7-8 pages of double-spaced text (excluding title page, abstract, references, tables and figures).

1 inch margins all around with 12 pt font.

Follow the format for the journal Geochimica et Cosmochimica Acta for style (references, figure captions, organization, etc.). The instructions for contributors are found in each January issue of that journal (copy on our bookshelf; also scanned and posted on Blackboard).

DUE DATES:

Rock Suite Selection deadline: see syllabus.

Draft deadline: see syllabus. You must turn in your draft paper on this date. I will grade it and return it to you with comments. If you are satisfied with your grade, you have completed the assignment.

Revised deadline: see syllabus. If you are dissatisfied with your grade, you may edit/rewrite your paper and turn it in (along with the graded draft) on the revised deadline for a revised final grade.

Grading Sheet

NAME_____ROCK SUITE_____YEAR_____
(100 Points Possible)

(5) **Title**

(15) **Abstract**

(10) **Introduction and Geologic Setting**

(5) **Methods**

(15) **Hand sample descriptions and observations**

(15) **Thin section descriptions and observations**

(15) **Discussion (Synthesis)**

(15) **Conclusions**

(5) **References: usage and list**

Overall

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.