

Program Review: Geology

Program Description and Scope:

- *Program Review Title:* Geology
- *Academic year:* 2016/2017
- *Review Type:* Instructional Disciplines
- *Program/Departments:* Geology (22002)
- *Authority Code:* 44-Dean, Science, Engineering, and Mathematics
- *External Regulations:* No
- *Provide a brief narrative that describes the instructional program/discipline:*
Geology program at the Ohlone College focuses on the interdisciplinary study of the Earth, its materials (minerals, rocks, fossils), and the processes on its surface and in its interior by which they change. Geology is a major academic discipline that combines aspects of physical and biological sciences and provides insight into 4.6 billion years of Earth history, movement of its crust (plate tectonics), climate change, evolutionary history of life through geologic time, and human impact on the Earth system. Geology has many practical applications, such as exploration of natural resources (mining, fossil fuels), water resources, remediation of environmental problems, evaluation and prediction of natural hazards (volcanic eruptions, earthquakes, seismic sea waves, landslides, erosion, etc.), and geotechnical and civil engineering. It involves the efforts of one full-time faculty member (Paul Belasky, Ph.D., Professor of Geology) and two part-time faculty members.

College Mission:

- *Mission Statement:*
Ohlone College responds to the educational needs of our diverse community and economy by offering high quality instruction supporting basic skills, career development, university transfer, and personal enrichment and by awarding associate degrees and certificates to eligible students in an innovative, multicultural environment where successful learning and achievement are highly valued, supported, and continually assessed.
- *Program Relation to College Mission:*
 - Basic Skill
 - University Transfer
 - Personal Enrichment
- *State Your Program Mission/Purpose:*
The Geology program is designed to provide the lower division transfer requirements for geology, earth science, and environmental science majors, general science education to other potential transfer students (both science and non-science majors), and improved scientific literacy to all other Ohlone students and the community at large. The general scope of the Geology

program at the Ohlone College is to provide an understanding of the processes that shape the Earth and to develop a view of the Earth from the physical, historical, and cultural perspective. Special attention is given to the global geological phenomena (moving plates, volcanoes, earthquakes, mountain-building, landslides, glaciers, etc.), geological (“deep”) time, and the interaction between humans and their environment. This program also examines the history of life from its beginnings to the dawn of civilization and provides a basic understanding of the prehistoric life in terms of the changing Earth, evolution, mass extinctions, the fossil record, and climate change.

- *Briefly Describe Program Accomplishments:*
The program offers ADT in Geology (approved in 2014) and certificates of completion in Geology, Earth & Environmental Sciences, and Paleobiology. It is a diverse program in terms of the number of courses (4 lecture courses and 2 labs in physical geology, historical geology, oceanography, and paleontology), all transferrable to UC's and CSU's, as well as the unique Ohlone Museum of Paleontology, now publically displayed in the main lobby of the Newark Campus. The program has large teaching collections of minerals, rocks, and fossils from all over the world. It is more comprehensive than those at most CC's in the Bay area and notable in its emphasis on paleontology and field work. A number of our majors have transferred into the top universities in and out of state. The faculty at the department possess advanced degrees and have taught at various universities as well as community colleges. They remain active as scientists, maintain membership or are board members in professional societies, and publish scientific papers. A new lab course (GEOL 104L Historical Geology Laboratory) has been added to the curriculum in 2013 and has received (along with GEOL 104) a C-ID approval.

Achievement and Resource Data Analysis:

Research Questions: None

- **Resource Assessment Summary:**
 1. *Academic Year:* 2013-14
 2. *Activity Center Fund 10 Budget Allocation:* \$0
 3. *FTEs:* Fall: 19 Spring: 20 Summer: 0
 4. *WSCH/FTEF:* Fall: 492 Spring: 584 Summer: 0
 5. *Course Sections Offered:* Fall: 6 Spring: 5 Summer: 0
 6. *Sections Taught FT Faculty:* Fall: 5 Spring: 4 Summer: 0
 7. *Sections Taught PT Faculty:* Fall: 1 Spring: 1 Summer: 0
- **Human Resources:**
 1. *# of FT Faculty:* 1
 2. *# of PT Faculty:* 2
 3. *# of Classified Staff:*
 4. *# of Administrators:*

5. % Faculty release/reassigned time: 0%

6. Technology:

- Specialized Software
- Technology Enhanced Instructional Equipment
- Laptops
- Tablet

Physical Resources:

- General Classrooms
- Specialized Labs

- Program Analysis PSLOs - Student Learning:

(Key: I-Introduced, P-Practiced with Feedback, M-Demonstrated at the Mastery Level)

PSLO Matrix:

Course	PSLO-1	PSLO-2	PSLO-3
GEOL 101	M	I	I
GEOL 102	P	I	I
GEOL 102L	P	P	I
GEOL 103	I	I	M
GEOL 103L	I	P	P
GEOL 104	I	I	M
GEOL 104L	I	P	P
GEOL 190			
GEOL 213			

Please Indicate the PSLO(s) which you are reporting on:

- List and explain the geological hazards (earthquakes, volcanoes, seismic sea waves) and natural resources (earth materials, precious metals, fossil fuels) in North America and local area and their relationship to the theory of plate tectonics.
- Demonstrate the scientific and geographic literacy by identifying major geographic and tectonic features on the map and applying unit conversions to the metric system of measurement.

Analyze and summarize your assessment findings. What in the data jumped out?

On the positive side, the PSLO1 and PSLO2 assessments demonstrate that the students' success in reaching them improved from an average of 68% (14 out of 21 broad standards/categories met) at the beginning of a given course to an average of 91% (19 out of 21 met) at the end of the course. Best performance was in the area of natural resources/environment, and best improvement was in the area of plate tectonics.

When performance on individual topics was assessed, the student success in answering specific questions related to PSLO's did improve from the average

40% at the beginning to 67% at the end of the course, and nearly all students have improved. Two areas of concern that have resulted in lower scores are geographic literacy (in world physical geography) and basic math skills, especially word problems and applications of basic math in conversions and rate problems. Additional assessments of basic math skills in the lab setting of GEOL 101 and GEOL 103L indicate the need of additional basic math tutoring. The program currently has an imbedded tutor, and the outcomes are expected to improve in the future. As for improving geographic literacy, an additional, comprehensive early quiz on geographic literacy will be given to all students in the lecture and lab courses.

In general, according to the MSE statistical data in this review, the Geology program has demonstrated success rates among almost all ethnic groups well above the target Ohlone College success rates. In addition, despite a college-wide decrease in enrollment in 2016, there has been a marked improvement in the success rate of under-represented groups, such as African-Americans and Hispanics, and other large ethnic and age groups in the last couple of years. This may be due to the increased emphasis on tutoring, unification of the GEOL 101 lecture and GEOL 101L lab classes into a single course, and introduction of hybrid classes that provide flexibility for working students.

Give examples of assessments used for your PSLO analysis:

A before-and-after questionnaire passed around to all students within the first several weeks of the semester. It is attached to (but not be counted as part of the first quiz they have to take). The students were asked questions that test their familiarity with concepts of plate tectonics and types of geological phenomena (e.g., earthquakes, volcanoes, mountain ranges) associated with different plate boundaries. The students were also asked to choose from the list of geological hazards that can affect the Fremont area and to match common natural resources with their general origin, geographic distribution, and use. The questionnaire also assessed the students' knowledge of the topics pertaining to global geographic literacy and applying unit conversions to the metric system of measurement. It contained objective, specific questions (matching lists, multiple choice) on those topics. The same questionnaire will be given to students at the end of class. The results will then be compared. The questionnaire given at the end of the semester will also ask students if their interest in the subject has increased through the course and by how much (expressed on a scale from 1 to 10).

Describe input from Program Advisory Committee (if applicable):

Comments:

PSLO3 will be assessed in the next program review using a before-and-after questionnaire that tests student proficiency in using the Geologic Time Scale and matching it with the major events in the history of the Earth, including tectonic changes, evolutionary breakthroughs, mass extinctions, and major climatic shifts.

Program Improvement Objectives

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

To move the Ohlone Earth Science Museum (formerly known as the Ohlone Museum of Paleontology) to a larger location, to purchase two display cabinets to replace the damaged ones, and to display part of the museum collections in the main lobby of the future Science Building on the Fremont Campus, so it could be opened to the public.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

The Ohlone Earth Science Museum is currently located in the Geology/Geography Lab (Room NP-8B) and display cabinets in the main lobby of the Newark campus. Because of space limitations, only part of it is open to public. The donors of the fossils have expressed the desire to have them displayed, so the public could see them, and were concerned that the museum continues to be of limited access to the public. According to the current plans by the college administration, the museum will be moved to the new Science Building upon its completion in 2018. The collection will be prominently displayed throughout the building and open to the public, including organized visits by school children and the community. During the 2014 Geology Dept. move from Fremont to the Newark campus, two of the Heritage floor display cases were damaged and might have to be replaced. The cost of replacement is about \$2900.

Program PIO will address the following:

- Student Learning & Achievement
- Course Retention
- Course Completion
- Success Rates
- Increase Program Enrollments
- Increase Degrees/Certifications
- Access to high quality courses - community needs

How will you assess the effectiveness of your PIO:

The open-access Ohlone Earth Science Museum should result in the increased awareness of and interest in the Earth Science programs on campus among the Ohlone students and the community at large. This should result in measurable increases in geology course enrollments, retention, completion, and success rates. It should also result, depending on the economy, in measurable increases in the number of earth science majors and degrees/certificates awarded.

PIO Action Plan:

How will you accomplish this?

The curatorial work on the specimen collection, research, and database development, as well as the preparation of the museum website and other educational/online materials are currently being conducted. This will be followed by moving the collection to the site on the Fremont Campus where it will set up, labeled, and displayed. The large mammoth skull is already stored on the main campus, in the basement of Bldg 7, under the care of Alex Lebedev, ready to be moved to the new museum area.

What is your timeline?

The preparatory work will be completed by the end of the Spring semester of 2018 (at the end of the sabbatical leave of Dr. Paul Belasky, the full-time geology faculty member). The collection will be moved to the Science Building on the Fremont campus during the Fall semester of 2018 or thereafter, contingent upon the timely completion of that building.

Who is going to do this?

Dr. Paul Belasky, Professor of Geology, with the help of the adjunct faculty members, the moving company hired to move the Geology Department, special projects students, and/or student volunteers.

PIO Status:

- Revised

Closing the loop - Describe the results of your PIO implementation or completion:

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- \$2900 for replaced Heritage display cabinets

PIO Resources:

- Resource: People Time
Description: Need people to set the museum up and to provide labelling and information about the artifacts
- Resource: Instructional Equipment
Est. Cost: \$3,500.00

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

Provide new visual aids, digital media, and other visual resources, such as closed-captioned DVD's suitable for deaf and hard-of-hearing students that demonstrate important geological concepts and hazards to Ohlone students and improve their geographic literacy by providing better maps and atlases.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

The Geology program received \$2000 in mini-grant in order to purchase these materials and resources. A list of close-captioned DVD's and other visual aids from the National Geographic Society, Discovery Channel, and BBC has been completed. However, it needs to be revised, so that more online resources are included along with the older technology DVD's.

Program PIO will address the following:

- Awareness of, and sensitivity to, diverse cultures and perspectives.
- Student Learning & Achievement
- Course Retention
- Course Completion
- Persistence
- Success Rates
- Equity/Disproportionate Representation
- Access to high quality courses - community needs
- Use human, fiscal, technological, and physical resources responsibly,

How will you assess the effectiveness of your PIO:

Close-captioned, high-quality visual aids, media, and online resources should result in measurable increase in the course retention, completion, and success rates of all students, but especially deaf, hard-of-hearing, and DS/PS students

PIO Action Plan:

How will you accomplish this?

The Geology program received \$2000 in mini-grant funds that are still available. The list of materials to be ordered is currently being revised in accordance with improvements in technology, and reassessments of the current department needs.

What is your timeline?

To revise and complete the purchase orders by the end of the Spring Semester of 2017. Some materials (maps, atlases) have already been purchased with the department funds.

Who is going to do this?

The full-time faculty in geology (Dr. Paul Belasky) in consultation with the MSE Dean and adjunct faculty members.

PIO Status:

- Revised

Closing the loop - Describe the results of your PIO implementation or completion:

Thirty new National Geographic Student atlases and thirty topographic and geological maps of the local Niles quadrangle have been purchased. Outdated and non-captioned AV materials have been removed from the Ohlone library collections in order to be replaced by the new materials in 2015.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- Funded Instructional equipment / instructional software 2014-15 FY.

PIO Resources:

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

To improve the online component of the geology courses by offering additional hybrid courses, such as GEOL 102, Introduction to Oceanography, and incorporating digital resources and virtual field trips into the curriculum, both online and in-class.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

Program PIO will address the following:

- Student Learning & Achievement
- Course Retention
- Course Completion
- Success Rates
- Increase Program Enrollments
- Access to high quality courses - community needs
- Use human, fiscal, technological, and physical resources responsibly,

How will you assess the effectiveness of your PIO:

Monitoring course retention and successful course completion rates, as well as enrollment trends in the hybrid courses.

PIO Action Plan:

How will you accomplish this?

A new, online-enhanced, textbook has been adopted for the Fall of 2015 for GEOL 102, Introduction to Oceanography, and (pending approval of the Dean), plans are being considered for offering a section of this course as a

hybrid in the future. There has been an increase in the enrollment in the hybrid GEOL 101 classes, and a hybrid GEOL 102 section is aimed to address that need. An additional effort will be made of advertising the classes. Specifically, a department display case, now in the main lobby of the Newark main building will be set up to reflect the current offering, faculty, and exciting events in the department.

What is your timeline?

The Geology department display case will be set up in the Spring of 2017. To get the hybrid GEOL 102 section approved by the dean in the Spring or Fall of 2017 and the Curriculum Committee in the Fall of 2018. The plan is to offer it in the Spring of 2019. The reason it could not be offered earlier is that the instructor and the Geology Program coordinator (Dr. Paul Belasky) will be on a sabbatical leave in the Spring of 2018.

Who is going to do this?

Full-time geology faculty (Dr. Paul Belasky) with the help of the adjunct faculty (Kathy Velasco).

PIO Status:

- Revised

Closing the loop - Describe the results of your PIO implementation or completion:

A hybrid course (GEOL 104 The Changing Earth: Historical Geology) and a lab component (GEOL 104L Historical Geology Laboratory) have been added to the curriculum and have been approved for transfer by the CSU and UC systems. These courses have also been approved for the ADT degree in Geology in 2015. In addition, a number of innovative links and several virtual field trips has been added to the curriculum.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- No fiscal resources requested.

PIO Resources:

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

To improve student experience with earth materials by reinstating the field trip fund that were zeroed out during the last series of budget cuts (\$500 per semester in previous years) to the Geology Department.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

Program PIO will address the following:

- Student Learning & Achievement
- Course Retention
- Success Rates

How will you assess the effectiveness of your PIO:

Monitoring the enrollment and completion trends.

PIO Action Plan:

How will you accomplish this?

Getting the approval of the administration and the MSE Division Dean for restoring funding for geology/oceanography/paleontology field trips to at least \$500 annually in order to maintain/improve the quality of earth science education at the Ohlone College.

What is your timeline?

To have the funds at least partially reinstated for 2016-2017 academic year.

Who is going to do this?

the Administration and the Dean

PIO Status:

- In-Progress
- Discontinued

Closing the loop - Describe the results of your PIO implementation or completion:

This PIO was discontinued by the Geology program manager (Paul Belasky) due to its low priority compared to the other PIO's and little hope in having the field trip funds reinstated in the current budget climate and temporary college-wide low enrollment.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- Was this requested in 2015-16 budget meeting ???

PIO Resources:

- Resource: Other Budget Related Resources Needed
Description: Field trip money
Est. Cost: \$500.00

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

To improve student experience with earth materials by incorporating new lab equipment: (1) Rock Fluorescent Tube and specimens; and (2) rotating-stage Polarized Light Petrographic Microscope with binocular view and camera (at a cost of approximately \$4800). In addition, to incorporate this equipment and the Ohlone SEM into the activities for the GEOL 101, GEOL 103L and GEOL 104L lab courses.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

Currently, the Geology department has only one, inferior-quality rotating-stage polarized-light petrographic microscope. It has a monocular (single-eye) view with substandard optics and no camera. Such microscopes are essential for the study of rocks and serve to increase students' interest in the subject. They are also an important tool for majors in geology. The binocular view would greatly enhance the optics and students' experience with rock specimens, and the camera will allow the instructor to incorporate images into lectures and labs. Together with the use of already available Rock Fluorescence equipment and SEM, the purchase of this microscope should greatly enhance the quality of the geology program, increase students' interest in earth materials, and potentially draw majors to the field. The geology normally has a very frugal budget, with no major purchases in the last 10 years. This would be a much needed addition to our equipment.

Program PIO will address the following:

- Career Technical Education (CTE) Related
- Student Learning & Achievement
- Course Completion
- Success Rates
- Increase Program Enrollments
- Increase Degrees/Certifications
- Use human, fiscal, technological, and physical resources responsibly,

How will you assess the effectiveness of your PIO:

By measuring students' course completion and success rates, as well as monitoring the changes in the number of the new geology majors and degrees/certificates awarded.

PIO Action Plan:

How will you accomplish this?

The full-time geology instructor (Dr. Paul Belasky) will research and select the appropriate model with binocular view and camera, contingent on the availability of funds (about \$4800). The next step is purchasing this

equipment, pending the approval of the administration and the MSE Division Dean. Rock fluorescence has already been purchased and incorporated into the GEOL 101 labs. As for SEM, the full-time faculty (Dr. Paul Belasky) has received training in the use of SEM by auditing a seminar at the Ohlone College (Newark Campus) on the use of that equipment.

What is your timeline?

Contingent on the availability of funds, the microscope will be ordered by the end of the Spring Semester of 2017. SEM activities will be incorporated into the geology lab curriculum in the Fall Semester of 2018 (following the completion of full-time faculty member's sabbatical leave).

Who is going to do this?

full-time faculty in geology (Paul Belasky)

PIO Status:

- In-Progress
- Revised

Closing the loop - Describe the results of your PIO implementation or completion:

The Rock Fluorescence purchase has been completed in 2015. The SEM course has been audited by the Geology program coordinator (Dr. Paul Belasky) in 2014.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- Funded Instructional Equipment \$ 2014-15 FY. (for Rock Fluorescence Equipment). Expect a decision on funding the Petrographic Microscope (cost - about \$4800).

PIO Resources:

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

Hiring a technician for the Geology/Anthropology/Geography departments.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

Program PIO will address the following:

- Success Rates
- Service Impacts
- Student Learning & Achievement

How will you assess the effectiveness of your PIO:

successful hiring of the technician and monitoring the student success rates, as an outcome of the more efficient operations at the Geology/Anthropology departments.

PIO Action Plan:

How will you accomplish this?

continuing to present a case to the administration for the need to hire the technician, to approve the hire, and proceed with candidate screening.

What is your timeline?

2016-2017 academic year

Who is going to do this?

the Administration, the Division Dean, HR, and geology, geography, and anthropology faculty

PIO Status:

- In-Progress
- Discontinued

Closing the loop - Describe the results of your PIO implementation or completion:

This PIO is no longer supported by the Geology Program coordinator (Paul Belasky) and was discontinued due to little hope in having such significant funds appropriated in the current budget climate and temporary college-wide low enrollment.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- Staff position requested: .5 Lab Tech not funded as of 6/22/15

PIO Resources:

- Resource: Staff/Administrative Position
Position Title: Lab Technician - Anthropology, Geography, and Geology
FTE: .5
Est. Cost: \$30,000.00

Based on the program data analysis and PSLO analysis, identify your Program Improvement Objective(s): What are you going to do? Why are you going to do it?

To establish the Earth Science Tutoring Center, similar to Chemistry and Biology Learning Center (but on a smaller scale and contingent on the

availability of funds) in order to help students with issues such as applying basic math skills to earth science problems and acquiring geographic and scientific literacy.

Notes (optional): Please include any notes related to your PIO. (2500 Character limit)

Program PIO will address the following:

- Course Retention
- Student Learning & Achievement
- Course Completion
- Persistence
- Success Rates
- Increase Degrees/Certifications
- Equity/Disproportionate Representation

How will you assess the effectiveness of your PIO:

By monitoring student participation at the tutorial center, student evaluations of the tutor, and enrollment and student success trends in the department's lab and lecture courses.

PIO Action Plan:

How will you accomplish this?

By screening, hiring, and training the tutor(s), setting aside space, working out the schedule, and advertising the tutorial services among the students of the geology, geography, and anthropology courses.

What is your timeline?

2016-17 academic year

Who is going to do this?

Division Dean and the administration with the help of the department full-time faculty members

PIO Status:

- Discontinued

Closing the loop - Describe the results of your PIO implementation or completion:

This PIO was discontinued by the Geology program manager (Paul Belasky) due to little hope of having a permanent funded tutoring center in the current budget climate and temporary college-wide low enrollment. In addition, the imbedded tutor program has been established, and the Geology Department is currently actively participating in it. We had an imbedded tutor in GEOL 101 in the Fall of 2016 and will have one in the Spring of 2017.

Conclusion: Complete if PIO has been completed

Fiscal Resources Status:

- Staff position requested: .5 Lab Tech (same request as previous PIO) not funded as of 6/22/15

PIO Resources:

- Resource: Staff/Administrative Position
Position Title: Instructional Assistant Anthropology, Geography, and Geology
FTE: .5
Est. Cost: \$27,000.00

Attached Files:

- [GEOL 103 course assessment.doc](#)
- [Program Review GEOLOGY 2013.docx](#)