

PROGRAM REVIEW 2008-2011

Division: PSME

Department or Program: Geology

Name and Title of Preparer(s): Marek Cichanski, Full-Time instructor

In providing responses in the following areas, **please utilize the quantitative data available in the Program Review Enrollment Data Document and the Budget Document.** For the purposes of the Program Review, both departments and programs will be referred to as "program."

I. Description and Mission of the Program

Which area(s) does this program considerably address (check all that apply):

Basic Skills Transfer Career/Technical Other (describe)

A. Provide a brief description of the program including any services provided and the program's mission.

The mission of the De Anza College Geology department is to give students an opportunity to successfully complete science coursework for transfer, Associate degree, or lifelong learning, with transfer being the primary goal of most Geology students.

The Geology Department currently teaches two to three sections of Geology 10 per quarter. Geology 10 is a general education science course (CAN GEOL 2) with both lecture and lab components. Students who successfully complete Geology 10 simultaneously fulfill two major IGETC and CSUGE requirements:

1. A course in physical science
2. A laboratory science course

Geology 10 is one of only three "10-level" G.E. lab science courses in the PSME Division at De Anza College, the others being Chemistry 10 and the Meteorology 10 lab.

The department offers a 90-person section of Geology 10 during the daytime each quarter (Fall, Winter, and Spring), with the laboratory portion of the class split into three 30-person lab sections. In addition to the day class, the department offers a night section of Geology 10 each quarter (Fall, Winter, and Spring), which is taught as an integrated lecture/laboratory class of 30 people. Additionally, a second night section is taught one quarter each year, typically during Fall Quarter.

Department personnel to date have consisted of one full-time faculty member, one part-time instructor, and no technicians, aides, or graders. Total FTEF for a typical quarter is 1.47.

B. Provide a summary of the program's main strengths.

The Geology program prides itself on continuing to provide the physical science and lab science components of all three of the General Education packages that affect our students: IGETC, CSUGE, and De Anza's requirements for the Associate degree.

The Geology program continues to exceed College averages for Productivity, Retention, and Success. For the three-year interval from the 2005-2006 school year through the 2007-2008 school year, the comparisons are:

- Productivity: Geology average = 642, DAC average = 581.
- Retention: Geology average = 94%, DAC average = 89%.
- Success: Geology average = 84%, DAC average = 79%.

The Geology department has established an excellent safety record on the required Geology 10 field trips. Since the Fall of 1998, approximately 3,900 students have participated safely in approximately 40 field trips, involving approximately 4,000 miles of travel.

C. Provide a summary of the program's main areas for improvement.

There is always room for improvement in the institutionally identified areas such as enrollment, retention, and success of targeted (i.e. traditionally underrepresented) groups of students. The Geology program shares these goals with the College in general and the PSME division more specifically. Additionally, the institutional goal of closing the equity gap, such as is discussed in section III, below, remains an important shared goal between the Geology program and the rest of the College.

Within the specific area of facilitating successful student learning about the Earth, the program will greatly benefit from modernizing the laboratory facility. This will allow students to engage in more dynamic and collaborative forms of learning, particularly with the increased use of technology. Improving this portion of the program will, it is hoped, have a positive effect on student enrollment, retention, and success in general, and on these outcomes for targeted populations in particular.

Here is an example of modernization of the lab facility: A 3-D projection system for the lab room, which will facilitate 'seeing' earth science information. One of the great challenges in earth science education is 3-dimensional visualization – the skill of 'flying around' a geological structure in one's 'mental helicopter', or of 'slicing and dicing' one's way through the earth's crust in order to see it from different perspectives. A consortium of earth science educators, called the 'Geowall Consortium', has designed a 'build-it-yourself' system of hardware and software to project 3-dimensional images. The Geology program looks forward to being able to use this exciting technology to assist, engage, and excite students.

D. What are your expected outcomes (such as learning outcomes, transfer, career goals, certificate and degrees) for students in your program?

Pedagogically, the Geology department seeks to foster an awareness, understanding, and appreciation of the complexity of the planet that the students, faculty, staff, and all of humanity live on. Some of this drive stems from the desire to enable the students to be better-informed citizens of our increasingly crowded world, while some of it comes from the faculty's desire to draw the students into the sheer fascination of the Earth's dynamism and complexity.

In terms of concrete educational goals, the department expects to provide students with an opportunity to earn transferable general education credits. This outcome applies to the majority of the Geology 10 students, with smaller fractions of them taking the class for the A.A. Degree, personal interest, or lifelong learning.

As the College continues its development of Institutional Core Competencies and assessable Student Learning Outcomes, the Geology department will work collaboratively in this process to develop assessments for S.L.O.s, to insure that students who take Geology courses make long-term strides in their knowledge about science in general and the Earth in particular.

II. **Retention and Growth**

A. How has the program responded to the institutional goal of increased access, growth and retention? (Include the number of students enrolled in the program and the retention rate over the last three years.)

Enrollment, retention, and success have remained strong for the last three years, as partially outlined in section Ia, above. In particular, the figures for retention and success have remained above College averages. During the brief, presumably housing-induced economic bubble that saw the College's overall enrollments decline circa 2006 and 2007, enrollment in Geology 10 actually went up. Figures for the 2007-2008 year were not as high as those for the 2006-2007 year, but are still at normal levels.

Growth is always a tricky subject when dealing with a "one full-timer" department. In a small department with one full-timer and one part-timer, incremental growth of a few percent each year is very difficult to achieve. Growth would have to take place in larger jumps as whole sections were added, but this would raise the issues of full-time / part-time ratio and staffing numbers.

B. How has the program responded to the institutional goal of increased access, growth and retention specifically for the identified targeted populations of African Ancestry, Latino/a, and Filipino/a students? (Include the number and percentage of the program's enrollment that was made up of the targeted populations and the retention rate of the targeted populations over the last three years.)

Averaged over the three-year interval from 05/06 through 07/08, the representation of the targeted population has been several percent lower than for the College in general. The percentage of students from the targeted population has undergone a slight drop, from 22% to 18%, over the three-year period. However, during this same period, retention of students in targeted populations increased from 90% to 95%.

Representation of the targeted populations has followed the same trend as overall enrollment: An increase from 05/06 to 06/07, followed by a decrease from 06/07 to 07/08. These changes, however, are all fairly small, and it is difficult to interpret their significance. For example, although it is certainly desirable to increase participation by students of African ancestry, the numbers are small enough to make it hard to assess the significance of a 1% change from one year to another.

C. The Statewide Basic Skills Initiative defines “basic skills” as English, mathematics, reading, writing and ESL skills. In what ways does your program address the basic skills needs of students? For programs that do not directly address basic skills, how does the lack of basic skills impact student success rates for your program?

The Geology program does not directly address basic skills, but issues involving basic skills have an impact on both the efficiency and the effectiveness of its mission. Mathematical skills provide one example: Like most introductory Geology courses, the Geology 10 course is taught using a conceptual and generally non-quantitative approach. Despite this, however, a small amount of mathematics is used, such as in discussing how minerals are made from the chemical elements. When students have difficulty with basic procedures such as adding and subtracting positive and negative numbers, this becomes much more difficult to teach. This raises the prospect of these students succeeding at lower rates.

Attempting to predict the improvement in success rates from a hypothesized improvement in basic skills would be exceedingly difficult, but like any science class, Geology 10 would benefit greatly from any improvements in basic skills. It would allow the class to cover the material in more depth, it would allow for improved active and collaborative learning, and it would probably improve long-term gains in student learning outcomes.

III. Student Equity

A. What progress or achievement has the program made towards decreasing the student equity gap? (Include student success rates for targeted populations compared with other students over the last three years.)

The targeted population has succeeded at a rate above that for the College during the three-year review period. Overall success for the targeted student population has been 75-80%, compared to 74-76% for the College in general.

B. In what ways will the program continue working toward achieving these goals?

One important step that the department can take is to reduce the uncertainty that exists regarding the avenues of outreach and support that may be available. For example, I am currently uncertain as to whether or not I can/could/should interact with the Student Success and Retention Services Center in some way. Should Geology interface in some way with one or more programs administered by the SS&RSC? Finding out more about these sorts of potential initiatives will be useful in working towards decreasing the student equity gap.

During the Spring and Fall of 2002, and again during the 06/07 school year, the campus tutorial center helped to arrange Adjunct Study Skills courses in which students could enroll concurrently. The courses not only covered study skills, but involved significant tutoring help from former Geology 10 students. The ‘Student Instructors’ who led these courses were very capable, and I recall that at least one of them had a class composed mostly of Latino(a) students. In addition to tutorial work, the Department welcomes feedback and outreach from any groups on campus that can help to coordinate peer-group and/or small-group support.

C. What challenges exist in the program in reaching such goals?

Efforts like the Adjunct Skills classes are highly dependent on finding suitable instructors from the ranks of former students. Any tutorial efforts, for that matter, including drop-in tutoring, are completely dependent on having high-achieving former students who are interested in teaching their peers. Such students have come forward in the past, but this is always very unpredictable from quarter to quarter. It is particularly difficult in a small program like Geology, where the total pool of students from which we might draw will always be much smaller than that for, say, Mathematics or English.

IV. **Budget Limitations** (Please be specific in your responses.)

A. Identify any limitations placed on the program based on limited funding. What increases in resources are critical to the program and what are the consequences of continued limited funding on the program?

Buses for Field Trips: The Geology 10 course has a field trip that is required for articulation. Until Winter 2009, the College's budget allowed for the use of chartered passenger buses to take students on these trips. Due to budget issues in Winter 2009, the students had to drive their own cars. The lack of buses has two main negative impacts on the program, and a potential third impact:

- Students without cars are required to rely on carpools, which they may have difficulty arranging. (Note: Faculty are forbidden to facilitate the details of carpooling for liability reasons.)
- The class is unable to visit some of the important geological sites that it would otherwise visit, because there is insufficient parking for the large number of student vehicles.
- A third potential issue is whether or not the students' safety is affected by their driving their own vehicles. This is currently unknown, but we DO know that the safety record during the 'bus era' was very good.

Technology and Materials for Geology labs: The laboratory portion of the Geology 10 class would/will benefit greatly from the use of technology and from new materials. At present, a combination of Measure C funding and a consolidation with the Foothill College geology department is expected to result in new equipment and materials for the lab. Here is a summary, largely repeated from the 2006 program review, of the main objectives for updating the laboratory program:

- a) Printing and laminating of computer-generated images and 3-D 'anaglyph' maps, to be used in laboratory exercises. (Some equipment and materials for this objective will come from the consolidation with Foothill, but some printing supplies, as well as laminating equipment and supplies, will be necessary from Measure C or other funding sources.)
- b) Acquisition of wireless laptop computers, wireless network, and high-quality digital projector for Geology lab S15. (This acquisition of computers from Measure C funding for the lab room is in process at the time of this writing.) This would allow students to access a greater variety of data sets and maps than can currently be used in the 'paper lab manual' format. Additionally, further instruction in three-dimensional visualization will be possible using computers. It is also conceivable that the lab manual could be made

available electronically, reducing or eliminating the need for a paper manual. This could reduce costs and reduce the use of paper. Free software can be used to turn the laptop computers into seismometers.

- c) Increased use of polarizing (a.k.a. 'petrographic') microscopy, so that students can learn about the fundamentals of rock texture and rock identification by examining more rock thin sections than they currently do. This objective would require the acquisition of new microscopes and new thin sections, and possibly equipment for making thin sections.
- d) Acquisition, if possible, of geological structural compasses to facilitate the learning of the basic 3-D concepts of 'strike' and 'dip' in a hands-on fashion, rather than through instructor demonstrations.

B. Describe the consequence to students and the college in general if the program were eliminated or significantly reduced. Please be specific.

Elimination or reduction of the Geology program would take away one of the main avenues that students have for fulfilling state- and College-mandated General Education science requirements for both Transfer and A.A. Degrees. It would restrict both their access to science classes in general, and to the lab science requirement in particular.

I would point out that the greater San Francisco Bay region is one in which geology has a particularly strong influence on the lives of our students, along with everyone who lives here. In light of this, some comments from the 2006 Geology program review are worth repeating here, with the changes for this 2009 report given in [square brackets]:

"...a small department like Geology finds it prudent to provide as many perspectives as possible on its utility to the College. Here are three:

Issues of oil supply have [at times during the early portion of the current economic crisis] assumed center stage in the world economy, the U.S. economy, and in the arena of global politics. Heated debate is currently ongoing about the near-term and long-term future of oil supply.

How many programs at De Anza College have faculty members with work experience in the oil industry? How many programs have faculty members that garner WSCH by explaining to students how oil is formed, found, and extracted?

A recent report by the U.S. Geological Survey estimates the probability of at least one magnitude 6.7 or greater earthquake in the Bay Area between 2003 and 2032 at 62%. The De Anza College library contains a book by the noted environmentalist Marc Reisner that describes, in 'plausible fiction', an account of a major earthquake on the Hayward Fault. It paints a picture of the Bay Bridge collapsed, the Bay Area's infrastructure crippled, the Sacramento / San Joaquin delta flooded, and the water supply to southern California compromised.

When an event like this happens, how many programs at De Anza College will be able to garner WSCH by explaining to students what just happened?

The world recently commemorated the [fourth] anniversary of the 2004 Sumatra tsunami that killed [over 200,000] people.

How many programs at De Anza College garner WSCH by explaining to students what happened?"

V. **Additional Comments (optional):**

Consolidation with Foothill College Geology program:

The following is a short summary of recent developments involving the Geology programs at De Anza and Foothill Colleges:

Starting in Fall 2009, the Geology program at De Anza will be joined by Dr. Chris DiLeonardo. The earth sciences program from Foothill College, which he directed, will be merged with the program at De Anza College. This will expand the Geology program from one full-time instructor to two. It is anticipated that the Geology program will expand its offerings, both in terms of sections of Geology 10, and by adding Oceanography courses, which Dr. DiLeonardo has taught at Foothill. Discussions will also be held with the Biology and Health Sciences Division concerning synergies that may be achieved between Geology and the Environmental disciplines.

Dr. DiLeonardo and I anticipate moving a significant quantity of materials and equipment from the Foothill laboratory space to De Anza's. This will include rock and mineral samples, maps, and a large printer and printing supplies. These materials and equipment will be extremely helpful in making the Geology labs as effective and engaging as possible. It is worth pointing out, however, that some additional materials and equipment will still require Measure C or other funding.