

California State University, Fullerton
Department of Geological Sciences
Program Performance Review
Self-Study Document: Learning Assessment Plan
February 2006

2) Assessment Plan for Student Learning Goals

a) Assessment in 100-level courses (GE and new majors)

- i) In 2003-04 Geological Sciences first conducted assessments of student learning in the Physical Geology lectures using the Geosciences Concepts Inventory test (GCI). Pre- and post-instruction testing was conducted during F03, S04 and S05. We will continue to conduct pre-/post-assessment of student learning in GEOL101 (a large-lecture, survey class; >2000 students/year). This on-going project is aimed at determining how successful we are currently, with the aim of positioning the faculty to assess the effects of future pedagogical changes (e.g., using just-in-time teaching techniques or Personal Response Units).

Previous Results/Usage: Preliminary results show that student learning increased when Conceptests (peer instruction) were used. The results also showed no substantial increases in learning for students co-enrolled in 101L versus student enrolled in 101 lecture only.

- ii) In 2005-06 we implemented a parallel assessment program using CGI tests in a new course, GEOL110-T (mid-size, special topics lecture, coupled with lab and field trips), which will target a similar, dominantly freshman, audience. GEOL110-2 Earthquakes and Volcanoes: Shake and Bake was offered in Fall 2005 and GEOL110-1 Dinosaur World will be offered in Spring 2006. This assessment project is aimed at comparing student learning in the two different classroom environments and may position us to consider future curricular changes.

- iii) We will continue to conduct pre-/post-assessment of student learning in GEOL101L. Starting in Fall 2005, students will use a new lab manual that emphasizes critical thinking skills, which was written by the Department's General Education coordinator and five members of the lecturer faculty. New CGI data will enable an analysis of whether changing the lab exercises makes a significant impact on student learning in GEOL101L and 101 (for co-enrolled students).

b) Assessment of the undergraduate degree program (B.S. Geology)

In redesigning our undergraduate curriculum (new requirements put in place in Fall 2005) we made sure that each of our learning goals was addressed within the new curriculum, and we entrust the successful mastery of these student learning goals to the in-class assessment of our faculty. Given the vertical nature of our curriculum (e.g. the core sequence 101-201-380-303A-303B-321-360-481A is taken in order by the vast majority of majors), students are unlikely to succeed in any course in the sequence without mastering the learning goals of the previous courses. And while we have complete confidence in the abilities of our lecturers, we note that the entire upper-division core is

taught by tenure-track faculty who designed the curriculum, providing substantial confidence that the 6 learning goals (section V.B.1a) are consistently addressed.

Moreover, the CSUF Geology major is fairly unusual (both on campus and among U.S. geology departments nationwide) in that we require not one, but two, capstone experiences for graduation: one of which has standardized requirements for all, and the other is tailored to each students' interests.

1. Summer Field Camp (GEOL481A): in this month-long residential course, students are required to integrate and apply concepts and skills learned in the entire core sequence listed above. A course focused on advanced mapping, students are required to identify and classify minerals, rocks, structures and landforms, and interpret them in light of the tectonic evolution of the field area. Results are synthesized in original maps/diagrams and written reports. We view that successful completion of this mentally and physically demanding course more than amply assesses a student's successful mastery of the learning goals 1-3 and at least partial mastery of goals 4 and 6.
2. Undergraduate Thesis (GEOL481A): demonstrating our commitment to using the research process as an educational tool, every single undergraduate must complete a written field and/or lab-based thesis based on original student-faculty research. Completion of this requirement obviously demonstrates mastery of learning goal #6, as well as learning goals related to the individual research project. A list of undergraduate theses completed since 1997 is included in the Appendix.

By this analysis, the only Undergraduate Learning Goal that is not explicitly assessed in one of our two, required capstone courses is #5, *understand the role of geology in everyday life, appreciate the extent of human impact on Earth systems and environments, and understand the processes that create natural hazards and the strategies that minimize their impact on society*. A significant outcome of our revision of the Geology B.S. was the addition of Hydrology and Surface Processes (GEOL335) to the undergraduate core, ensuring that much of this content was required learning. Many of our undergraduate elective courses (e.g. Engineering Geology, Environmental Geology, Hydrogeology, Oceanography, Earth's Oceans and Atmospheres, and soon, Volcanology) also address various aspects of Learning Goal #5. Moreover, this learning goal most closely approaches the theme that has guided faculty hiring during this review period, meaning that both those hired—as well as those more senior faculty doing the hiring--agree that Learning Goal #5 is central to our existence as an educational and research community. We have high confidence that this message permeates our classrooms, labs and student-faculty research interactions, and that all CSUF graduates—most of whom initially seek employment in areas related to human impact on Earth's resources and environment—sufficiently master this learning goal.

We are confident that the successful completion of the CSUF B.S in Geological Sciences—with its vertical core curriculum and two required capstone experiences—provides adequate assessment of the successful mastery of the undergraduate Student Learning Goals.

c) Assessment of the graduate degree program (M.S. Geology)

We view satisfactory completion of the graduate thesis, including University review and public defense, as sufficient assessment of the learning accomplishments of our graduates. We strongly encourage the presentation and publication of student research, and will look to that record for our gauge of success. As qualitative evidence supporting that assertion, we note that one of our four M.S. graduates was awarded one of three 2004 Kerry Kelts Research Awards for Limnogeology by our field's leading professional society, the Geological Society of America (GSA). In 2005, a current graduate student won the (single) Arthur D. Howard Award from the Quaternary Geology and Geomorphology Division of GSA in recognition of the quality of his MS-level research proposal. A list of the four completed master's degrees is included in the Appendix.