PROGRAM INFORMATION

Date submitted: _2 April 2012________________________

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<th>Degree Program(s):</th>
<th>B.S./B.A.</th>
<th>Department:</th>
<th>Geology</th>
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<tbody>
<tr>
<td>Department Chair:</td>
<td>Robert Miller</td>
<td>Phone:</td>
<td>4-5025</td>
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<tr>
<td>Report Prepared by:</td>
<td>Robert Miller</td>
<td>Phone:</td>
<td>4-5025</td>
</tr>
<tr>
<td>Next Self-Study due :</td>
<td>2012</td>
<td>E-mail:</td>
<td><a href="mailto:Robert.b.miller@sjsu.edu">Robert.b.miller@sjsu.edu</a></td>
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Note: Schedule is posted at: http://www.sjsu.edu/ugs/programplanning/

ARCHIVAL INFORMATION

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<tr>
<th>Location:</th>
<th>DH 321</th>
<th>Person to Contact:</th>
<th>Robert Miller</th>
<th>4-5025</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Bldg/Room #)</td>
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<td>(Name)</td>
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Assessment schedule is posted at http://www.sjsu.edu/ugs/assessment
Please send any changes to the schedule or to student learning outcomes to Jackie Snell jacqueline.snell@sjsu.edu

Student Learning Outcome #6: Visualize and comprehend geologic structures and processes in 4 dimensions (3D plus time)

Initial Evidence of Student Learning:

The visualization and comprehension of geological structures and processes in 3-dimensions and through time is treated in a number of upper-division classes in the major, but in the following we focus on results from two courses, GEOL 125 and GEOL 129, which most directly involve this SLO. GEOL 125 is generally taught once a year (though not in 2011-2012), whereas GEOL 129 is taught two out of every three years.

[GEOL 125—Fall 2009, Spring 2010; GEOL 129—Spring 2010, Fall 2010, Spring 2011, Fall 2011]

In GEOL 125, the instructor utilizes two types of exercises. 1) During three laboratory meetings, students are required to answer a series of questions about the 3-dimensional structure of an area from relationships depicted on geological maps, and are expected to interpret the evolution of the crustal structure through time. Students find these questions challenging, as they are required to integrate a wide range of information, and many of them find it difficult to envision and interpret 3-D and 4-D relations from 2-D geological maps. In the first lab, the majority of students had problems with at least some of the questions and roughly 25% of the class performed unsatisfactorily. Students did better in the last 2 labs, presumably reflecting growing familiarity with geological maps and changes made to the labs (see “Changes” below). 2) The second exercise required students to make a geological map in the field during a five-day class trip to the Death Valley region, construct cross sections (projections of
structures below Earth’s surface) from the map, and interpret the geological history of the mapped area. Students are excited to begin mapping on their own, and although overwhelmed at first, make solid improvement. Most students demonstrate by the end of the project a satisfactory, albeit unsophisticated ability to interpret in 4-D the geologic history and processes of the area, but <25% have comprehension at a high level.

GEOL 129 is the capstone course in geology and much of the class is devoted to this SLO. This SLO is evaluated through an intensive 10-day (9 hrs/day) field exercise involving geological mapping in the Mojave Desert over the Spring break, and an even more intensive 18 days of geological mapping in eastern Nevada in June. For each of these sessions, the students produce a geologic map (~5-6 km²) and cross sections for their area and write an extensive (>10-20 pages) report summarizing the rock units, 3-D structural relationships, and geologic history of the area based on their own field study. In the beginning of the class, perhaps a third of the students were slow to recall concepts learned in GEOL 125, a prerequisite for the course.

**Change(s) to Curriculum or Pedagogy:**

[GEOL 125—Fall 2009, Spring 2010; GEOL 129—Spring 2010, Fall 2010, Spring 2011, Fall 2011]

In GEOL 125, the instructor responded to the student difficulties in interpreting structures on geological maps by adding to the last 2 labs a few easy, “leading” questions” at the beginning of the assignment that were designed to better guide the students while maintaining the more challenging, integrative questions in the map exercise. The field trip exercise has not been modified, as all students were at a point to build on their proficiency in GEOL 129, the capstone course in the Geology major.

In GEOL 129, the only change over the last 2 years is that the instructors have utilized different map areas in the Mojave Desert, but the types of activities have not changed.

**Evidence of Student Learning after Change.**

[GEOL 125—Fall 2009, Spring 2010; GEOL 129—Spring 2010, Fall 2010, Spring 2011, Fall 2011]

For GEOL 125, student performance on the last 2 map lab exercises was significantly improved. All students performed at a satisfactory to commendable level. The improvement probably resulted in part from the modification of the exercises and also from greater familiarity with geological maps after constructing a map of their own during the field trip. In the future, the instructor plans to utilize the revised labs, and will further evaluate the level of improvement.

For GEOL 129, the instructors were pleased with the new study areas, and are very satisfied with the utility of this capstone experience for learning and meeting this and other SLOs. No significant changes in the course content are envisioned.