

## **Geology BS Program—Example of Inclusive Polytechnic Educational Experience**

**May 2018**

### **Summary**

Our **GSC 461-462-463 Senior Project / Senior Thesis course sequence** is an excellent example of an educational experience that hits most elements of an “Inclusive Polytechnic Education.” Approximately 1/3 of our Geology majors complete some form of Senior capstone project, even though the Senior Project / Thesis is now optional because of the 1:1 student faculty ratio that makes the experience so successful is also expensive to teach.

Students work closely with a Geology faculty mentor on directed research leading to completion of a **Senior Project** (GSC 461-462; 4 quarter units) or **Senior Thesis** (GSC 461-462-463; 6 quarter units). In the past, most of the projects were completed individually, but group projects have become more common in recent years. This mentored learning experience intentionally addresses **Application of Knowledge; Creative Discovery and Innovation; Critical Thinking and Problem Solving; and Integration of Technology** at a significant level. When teams of students are involved, they achieve **Collaborative Learning**. The impact to student is best exemplified in the attainment of **Professional and Career Readiness** that is essential to landing industry jobs or acceptance to graduate programs.

### **Assessment**

The assessment process starts with back-and-forth interaction between the student(s) and faculty supervisor on elements of the research endeavor. This leads eventually to public presentation of the results in either an oral (Powerpoint) or poster format. Research presentations are attended by Geology faculty and student peers. Many of these presentations take place at professional Geology and Geophysics conferences (student travel is supported by Geology Department funds). Abundant constructive feedback is provided to the student at all of these venues, encouraging improvements to be made to the final thesis write-up. Perhaps the best measure of student success is the high

placement rate (>85%) in Geoscience jobs or graduate schools for those Geology majors completing a Senior capstone.

**California State Polytechnic University, Pomona  
Modified Inventory of Educational Effectiveness Indicators (IEEI)  
AY 2017-2018**

1	College	Science
	Department	Geological Sciences
	Degree Program	Geology BS
	Name of all available Options within the degree	None
2	Have formal program learning outcomes (PLOs) and student learning outcomes (SLOs) been developed and submitted to the Office of Academic Programs? Yes/No	Yes
	Website with PLOs and SLOs	Program Learning Objectives are published on the Department Website. <a href="http://www.cpp.edu/~sci/geological-sciences/about/academic-goals.shtml">http://www.cpp.edu/~sci/geological-sciences/about/academic-goals.shtml</a> Individual GSC Course learning outcomes are published at: <a href="http://www.cpp.edu/~sci/geological-sciences/docs/academics/LearningOutcomes2014Compilation.pdf">http://www.cpp.edu/~sci/geological-sciences/docs/academics/LearningOutcomes2014Compilation.pdf</a>
3	Has a Curriculum Map been developed and submitted to the Office of Academic Programs? Yes/No	Yes
	Where is this curriculum map published for quarters and semesters?	The curriculum map is published on the Department Website. <a href="http://www.cpp.edu/~sci/geological-sciences/docs/academics/GeologyMatrixCoursesVsOutcomes.doc">http://www.cpp.edu/~sci/geological-sciences/docs/academics/GeologyMatrixCoursesVsOutcomes.doc</a>
4	Other than GPA, what types of <b>direct evidence</b> are used to determine that graduates have achieved stated student learning outcome identified in #5 for the degree? (e.g., capstone course, portfolio review, licensure examination)? Note: <a href="#">Formative and summative assessment</a> exceeds our expectations.	See part 5 below
5	Provide an executive summary of results on how students are achieving at least one SLO (more than one SLO is exceeding our expectations) for the degree program. For undergraduate programs link the SLO evaluated to one of the WSCUC's core competencies (Critical Thinking, Information Literacy, Oral Communication, Written Communication or Quantitative Reasoning). Remember to identify which core competency this fits. For programs that do not have an SLO that aligns to a Core Competency still provide direct evidence on student learning.	Geology BS SLO #2: <b>"Effectively communicates results of scientific investigations in written and oral format"</b> links directly to two WASC core competencies: <b>Written Communication</b> and <b>Oral Communication</b> . SLO#2 is assessed in multiple upper division GSC courses during a typical Geology major's tenure through evaluation of: 1. Oral presentations of scientific research or journal article summaries presented to the class for a required capstone project (these also require a written abstract or summary outline); or 2. Poster presentation of personal scientific research (Senior projects, etc.) to student peers and faculty. Individual faculty members score student performance using a standardized rubric. We find that the poster sessions are especially effective for providing feedback from both faculty and students to the student presenters.
6	What types of <b>indirect evidence</b> are used to determine that graduates have achieved stated outcomes for the degree? (e.g., student survey, employer survey, focus groups)?	<ul style="list-style-type: none"> <li>Advising efforts that include one-on-one advising of each Geology major each quarter. New advising worksheets first developed during 2014-15 were refined in 2017-18 enable students to track student progress toward degree. This was especially helpful for qtr-semester transition students. Our personalized advising efforts allow faculty to make suggestions for efficient</li> </ul>

		<p>scheduling, and rectify academic performance problems before they become untenable.</p> <ul style="list-style-type: none"> <li>• Seminars focused on how to apply for internships and graduate school</li> <li>• Tracking of BS graduate placement. The majority of our graduates are placed in industry jobs related to the geosciences. Approximately 10-20% continue on to graduate school, including some very prestigious institutions</li> <li>• Regular lunchtime seminars that facilitate interaction between Geology faculty and majors</li> <li>• Constructive discussions among Geology faculty about our curricular goals in light of the semester conversion</li> </ul>
7	<p>Provide at least one example (more than one example is exceeding our expectations) which summaries the results on how the indirect evidence was used to improve student learning?</p>	<ul style="list-style-type: none"> <li>• Each faculty member analyzes data yielded by various assessment tools to gauge student achievement and knowledge gaps that can be addressed in future course offerings.</li> <li>• Interactions with alumni at our annual reunion are very informative, and commonly lead to job opportunities for our students.</li> <li>• Feedback from employers that hire our BS graduates indicates that students perform at a high level in the workplace.</li> </ul>
8	<p>Provide one example (more than one example is exceeding our expectations) how the program is addressing student learning by using the <b>direct evidence</b> data to <b>close the loop</b> which provides the program a continuous improvement plan. Make sure this is linked to direct evidence. Examples include but are not limited:</p> <ul style="list-style-type: none"> <li>• Changes to curriculum by adding XYZ</li> <li>• Pedagogy changes within the program (adding supplemental instruction for DUF courses)</li> <li>• Faculty development on teaching</li> <li>• Changes to assessment tools</li> </ul>	<p>Our semester conversion process is an excellent example of program assessment. Geology faculty were involved in lengthy discussions about how to improve the Geology BS curriculum. We studied abundant evidence including: past student performance in specific quarter GSC classes; constraints on faculty time for teaching vs research; comparisons with other CSU and US Geology programs; trends in the academic discipline; consultations with alumni and industry stakeholders. Considering the specific expertise of our faculty cohort, we devised a new Geology BS curriculum that will efficiently and effectively lead to student success (e.g., awarding of BS degree) in the semester system while maintaining high academic standards and preparing students for productive Geoscience careers.</p>
9	<p>Who interprets the evidence? What is the process? (Note if this is same as what your program submitted in your 2018 assessment plans, than just state SAME AS WHAT WAS SUBMITTED)</p>	<p>Program assessment is addressed in fall and spring meetings of all full time GSC faculty members. Topics include: anecdotes of student successes and potential roadblocks; progress to degree; maintenance of Geology teaching standards; accommodation of burgeoning Geology major population; course scheduling issues; program revision for semester conversion. Geology faculty collectively develop new mechanisms to improve the BS program.</p>

*Note: If the degree program has a supplemental report, please include with IEEI as supporting material.*