Course or Program Assessment Summary

http://academic.cuesta.edu/sloa/docs/Course_and_Program_Assessment_Summary_F_2011.docx

This form can be used to record SLO assessment plans and results for courses or programs. It is recommended that this document be stored on a group drive, or in MyCuesta.

Division: **Physical Sciences** Program: **Astronomy** Date: **5/21/2012**

v. 3 2012

Courses in program, or course: Astronomy 210

Faculty involved with the assessment and analysis:

Course-to-program outcome mapping document** is completed Yes_x__ No_____

1	Student Learning Outcome Statements x Program ☐ Course	1. Describe and understand motions of stars, the sun, the moon, and planets. 2. Understand and explain underlying natural laws governing planets, stars, galaxies, the universe. 3. Develop fundamental science skills and attitudes, and connect these to current developments in astronomy. 4. Use and analyze data from telescopes to write and submit scientific papers to peer-reviewed research journals.
2	Assessment Methods Plan (identify assessment instruments, scoring rubrics, SLO mapping diagrams)	1-2. Assign detailed SLO survey (Student Assessment of Skills Survey, Patrick M. Len, in development, http://waiferx.blogspot.com/2012/02/education-research-sass-and-student.html) and standardized concept test (Star Properties Concept Inventory, Janelle M. Bailey, "Development of a Concept Inventory to Assess Students' Understanding and Reasoning Difficulties about the Properties and Formation of Stars," Astronomy Education Review, Vol. 6, No. 2, pp. 133–139, August 2007) on the last week of class, due during the following finals week. 3. Assign online SLO survey (Research Skills Mastery Survey, Patrick M. Len, in development, http://waiferx.blogspot.com/2012/04/education-research-rsms-and-student.html on the last week of laboratory, due the following week. Students take attitude survey (Astronomy Laboratory Learning Survey, Patrick M. Len, in development, http://waiferx.blogspot.com/2010/01/education-research-astronomy-laboratory.html), in the first and last laboratory sessions. Students take weekly current events quizzes each week. 4. Track acceptance/publication rate of student papers submitted to research journals such as *Journal of Double Star Observations.* Analyze papers submitted for publication to determine if the learning outcome objectives were achieved.

3	Assessment Administration Plan (date(s), sample size or selection of course sections, scoring procedures, etc.)	(1)-(2) Administer SASS, SPCI at the end of fall and spring semesters to two sections of approximately 30-50 students each. (3) Administer RSMS, ALLS, and current events quizzes, fall and spring semesters, to three sections of approximately 24 students each. (4) At the end of fall, evaluate each submitted paper accepted/rejected for publication.

4	Assessment Results Summary (summarize Data)	SASS/SPCI results: http://waiferx.blogspot.com/search?q=sass+spci For fall 2011, of the 24 detailed student learning outcomes listed above, 21 were self-reported on the SASS as being achieved by at least 85% of students, while three student learning outcomes were self-reported as being achieved by less than 85% of students (4, 7, and 8). For spring 2012, 22 were achieved, while 2 were not (6, 18). For fall 2011 and spring 2012, SPCI scores are comparable to results from 1,100 large research university students that have completed introductory astronomy and earth sciences courses (Bailey, 2007), where the average was 51% (no further statistics provided); and also comparable to SPCI results from earlier semesters at Cuesta College. RSMS results: http://waiferx.blogspot.com/2012/04/education-research-rsms-and-student.html For fall 2011, of the six detailed student learning outcomes listed above, three were self-reported as being mastered by at least 85% of students, while three student learning outcomes were self-reported as being not mastered by less than 85% of students (1, 2 and 5). ALLS results: http://waiferx.blogspot.com/2011/07/education-research-alls-pre-to-post.html http://waiferx.blogspot.com/2011/07/education-research-alls-post.html For spring 2011, students self-report statistically significant normalized Hake gains for response to the following question: "I know where and how to look up astronomy information" ($p < 0.00001$, $\langle g \rangle = +0.66$). In order to validate this self-reported result, assessment of pre-instruction and post-instruction student scores for current events quizzes will take place following the end of spring 2012, and will be posted online before the start of fall 2012. These shifts in student attitudes and self-report learning gains are comparable to results from previous semesters (fall 2010, spring 2010, fall 2009). Assessment of pre- and post-instruction current events quizzes is in progress, however, the effect of current events quizzes on student promptness and preparedness has been studied: http://waiferx.blogspot.com/2010/07/education-research-current-events.html For ASTR 299, all four papers submitted by students were accepted for publication by peer-reviewed scientific journals.

5	Discussion of Assessment Procedure and Results, and Effectiveness of Previous Improvement Plans	(Refer to #4 above.) SASS achieved student learning outcomes has shown slight improvement, from 18 out of 24 in fall 2010, to 17 out of 24 in spring 2011, to 21 out of 24 in fall 2011, to 22 out of 24 in spring 2012. There have no significant changes in student attitudes as tracked by the ALLS from semester-to-semester using traditional laboratory instruction through fall 2010, and when a new backwards faded scaffolding curriculum was adopted in spring 2010 and still used to date.
6	Recommended Changes & Plans for Implementation of Improvements	Determine common, prevalent non-achieved student learning outcomes from previous semesters, and target these specific student learning outcomes for improvement in subsequent semesters.
7	Description or evidence of dialog among course or program-level faculty about assessment plan and results	Posted SASS and SPCI results on the Center for Astronomy Education (http://astronomy101.jpl.nasa.gov/) "astrolrner" academic discussion group for improving college-level astronomy teaching and learning, for discussion and feedback: http://tech.groups.yahoo.com/group/astrolrner/ The effect of current events quizzes on student promptness and preparedness has been presented as a poster session at the Astronomy Society of the Pacific Cosmos in the Classroom National Symposium on Teaching Astronomy for Non-Science Majors, August 2-4, 2010, University Memorial Center (UMC) Ballroom, University of Colorado, Boulder, CO. To date, every current events quiz question has been posted online for use by other astronomy instructors: http://waiferx.blogspot.com/search/label/astronomy%20current%20events%20question Findings from the ALLS and current events quizzes have already been posted on the Center for Astronomy Education (http://astronomy101.jpl.nasa.gov/) "astrolrner" academic discussion group for improving college-level astronomy teaching and learning, for discussion and feedback: http://tech.groups.yahoo.com/group/astrolrner/ Also findings from the RSMS will be posted on the Center for Astronomy Physics Education Research CAPER Team (http://www.uwyo.edu/caper/) "BFS-Labs" discussion group for develop and disseminate instructional materials based on a backwards faded scaffolding approach: http://tech.groups.yahoo.com/group/BFS-Labs/ Discussion among Cuesta College astronomy instructors on bi-monthly basis occurs for ASTR 299 related activities.

**Course and program level outcomes are required by ACCJC to be aligned. Each program needs to complete a program map to show the alignment. See examples of completed CPAS and program mapping documents are available at http://academic.cuesta.edu/sloa