2012-2013 Annual Program Assessment Report

Please submit report to your department chair or program coordinator, the Associate Dean of your College and the assessment office by Monday, September 30, 2013. You may submit a separate report for each program which conducted assessment activities.

College: **Science & Math.**

Department: Physics & Astronomy

Program: Physics & Astronomy

Assessment liaison:

1. Overview of Annual Assessment Project(s). Provide a brief overview of this year's assessment plan and process.

(i) ***Undergraduate Program:*** *A junior-level 4-week recitation session at the start of the Fall semester was offered. This course was a review of all basic core concepts that are fundamental in physics. This was a gateway course intended to refresh and prepare students for their undergraduate course work. In addition, an "entrance exam." was administered at the end of the 4 week course.*
Students in their final spring semester of their senior year were administered the ETS Majors comprehensive test. The assessment results were compiled and reported to the department.

(ii) ***Graduate Program:*** *Our graduate program offers two options for the M.S. degree. One is the Thesis option and the other is the Comprehensive exam. This past year, assessment of the graduate program under the Thesis option was implemented with the method discussed and agreed to in Faculty meetings. A rubric was developed to assess the Thesis work and the Thesis defense presentation. Members of the thesis committee complete the rubric. Results were compiled and made available to all faculty.*

Assessment is under the oversight of the Department Assessment Coordinator, the Undergraduate Advisor and the Chair.

2. **Assessment Buy-In.** Describe how your chair and faculty were involved in assessment related activities. Did department meetings include discussion of student learning assessment in a manner that included the department faculty as a whole?

Assessment instruments and methods were discussed in faculty meetings. The rubric for assessing the graduate thesis was developed with faculty input and the final form was approved by faculty at a meeting. Faculty members of thesis committees

participated in the thesis assessment. The Chair oversees the implementation of the assessment methodology and helps in communicating the requirements between the assessment committee and the rest of the faculty.
The faculty together has reviewed the results of the ETS Majors comprehensive test. Program modification to include a new capstone course with the purpose of improving test scores and the topics for the course were discussed at a faculty meeting. The final proposal has been submitted to EPC.

3. **Student Learning Outcome Assessment Project.** Answer items a-f for each SLO assessed this year. If you assessed an additional SLO, copy and paste items a-f below, BEFORE you answer them here, to provide additional reporting space.

3a. Which Student Learning Outcome was measured this year?

Undergraduate:

1. Demonstrate knowledge of physical principles used to model natural phenomena.

2. Demonstrate ability to convey physical concepts with mathematical expressions, and effectively derive quantitative predictions from a model through mathematical analysis.

Graduate:

1. Knowledge of physical principles used to understand and model natural phenomena.

2. Understanding of scientific methodology, which may include for example: a) data collection from observations, b) setting up laboratory experiments and data collection from experiments, c) analysis of data, and d) testing a model or hypothesis.

3. Ability to communicate clearly and accurately physical concepts, findings, and interpretations in oral presentations.

4. Ability to write clear organized and illustrated technical reports with proper references to previous work in the area.

3b. Does this learning outcome align with one or more of the university's Big 5 Competencies? (Delete any which do not apply)

Undergraduate

- Critical Thinking X
- Oral Communication
- Written Communication
- Quantitative Literacy X
- Information Literacy

Graduate

- Critical Thinking X
- Oral Communication X
- Written Communication X
- Quantitative Literacy X
- Information Literacy X

3c. Does this learning outcome align with University's commitment to supporting diversity through the cultivation and exchange of a wide variety of ideas and points of view? In what ways did the assessed SLO incorporate diverse perspectives related to race, ethnic/cultural identity/cultural orientations, religion, sexual orientation, gender/gender identity, disability, socio-economic status, veteran status, national origin, age, language, and employment rank?

The assessed SLOs did not address the topics mentioned.

3d. What direct and/or indirect instrument(s) were used to measure this SLO?

Undergraduate: *The 4-week recitation sessions in the first semester of the Junior year covered the core basic material in the main topics in physics. mechanics, electromagnetism, thermodynamics, optics, fluids. Performance in the test administered at the end of the 4 weeks was a measure of initial student level. It also tests the ability of the students to retain the material learned in the introductory courses and demonstrate knowledge. The ETS test in the last semester of the Senior year was the exit exam: Performance in the ETS test was a measure of the SLOs.*

Graduate: *The instrument used was a rubric pertinent to the SLOs.*

3e. Describe the assessment design methodology: For example, was this SLO assessed longitudinally (same students at different points) or was a cross-sectional comparison used (Comparing freshmen with seniors)? If so, describe the assessment points used.
Undergraduate: *Same students at the junior and senior level were assessed.*
Graduate: *The thesis committee evaluated student performance at the thesis defense according to the rubric for assessing the SLOs.*

3f. Assessment Results & Analysis of this SLO: Provide a summary of how the results were analyzed and highlight findings from the collected evidence.

Undergraduate: *The test scores of both of the juniors entrance test and the exit ETS majors comprehensive test scores were not satisfactory. The reason for this could be that they were not part of student grade. The juniors test scores showed that one of the basic problems is deficiency in mathematical skills absolutely required for success in physics. The* ability *to convey physical concepts with mathematical expressions, and effectively derive quantitative predictions from a model through mathematical analysis, requires mastery of mathematical tools.*

The ETS comprehensive test requires focused preparation. Students do not have enough time to review the material required for a comprehensive test. Even if students have taken all the required courses before, they will need a review before taking the test. The review will help the students to get a wider perspective that will show the connectedness in the different courses and how the same basic laws manifest apparently in different ways in the different fields. The assessment committee and Chair believe that a required capstone course and making the ETS test scores part of the grade in the course would improve preparation and seriousness toward the test.

Graduate: *The assessment of the graduate thesis defense was started only this year. We have at this time only three evaluations. These results are satisfactory so far; we will need more sample data to get a clearer picture.*

3g. Use of Assessment Results of this SLO: Describe how assessment results were used to improve student learning. Were assessment results from previous years or from this year used to make program changes in this reporting year? (Possible changes include: changes to course content/topics covered, changes to course sequence, additions/deletions of courses in program, changes in pedagogy, changes to student advisement, changes to student support services, revisions to program SLOs, new or revised assessment instruments, other academic programmatic changes, and changes to the assessment plan.)

Undergraduate: *After reviewing the performance on the juniors test, the faculty agreed that efforts must be made to improve student skills in mathematical physics. A former course that covered some basic mathematical physics has been reinstated. This course, PHYS 389, is being offered in the present semester (F 2013). The junior exam. to inform on the initial student level, will still be administered. A new capstone course for Seniors has been proposed, to offer comprehensive review of the different courses in the Major. The ETS test in the final semester of the senior year will continue to be the exit exam.*

Graduate. *Continue evaluation of the M.S. thesis*

4. Assessment of Previous Changes: Present documentation that demonstrates how the previous changes in the program resulted in improved student learning.

In the present ongoing 5-year assessment plan, changes are being made. The effects of these changes are not yet available.

5. Changes to SLOs? Please attach an updated course alignment matrix if any changes were made. (Refer to the Curriculum Alignment Matrix Template, http://www.csun.edu/assessment/forms_guides.html.)

Attached

6. Assessment Plan: Evaluate the effectiveness of your 5 year assessment plan. How well did it inform and guide your assessment work this academic year? What process is used to develop/update the 5 year assessment plan? Please attach an updated 5 year assessment plan for 2013-2018. (Refer to Five Year Planning Template, plan B or C, http://www.csun.edu/assessment/forms_guides.html.)

We are currently on track with the 2011-2016 plan. An updated plan is attached. Performance in the junior and standard ETS test showed the existence of deficiency in mathematical skills needed for success in Physics. In response, we have reinstated a mathematical physics course. We would like to continue with the same assessment methods to see the effectiveness of this course in overall student learning as shown by performance in the ETS tests.

7. Has someone in your program completed, submitted or published a manuscript which uses or describes assessment activities in your program? Please provide citation or discuss.

8. **Other information, assessment or reflective activities or processes not captured above.**

The department invited Prof. Dr. Homeyra Sadaghianifrom, CalPoly Pomona to make a presentation of their changes to curriculum and methodology of instruction to improve learning, and retention and assessment instruments. This is an important step toward learning about assessment from experiences of other Physics departments. Several faculty members attended the lunch and the presentation. The department has already introduced some of the methods presented in one of the classes. We will continue interaction with colleagues in other physics departments to become aware of the advances being made in assessing and improving student learming.

In some of the classes new ideas of the flipped classroom and formative assessment are being tried. Experiences are shared between faculty. These may crystallize into a plan to be included in the next 5-yr assessment plan.