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2014-2015 Assessment Plan Report

PROGRAM ASSESSMENT REPORT AY 2014-2015

Report Date: SEPTEMBER 25, 2015
School/College: ARTS & SCIENCES
Department/Program: PHYSICS & ASTRONOMY
Person completing the Report: HORACIO E CAMBLONG

1. **Overview Statement:** Assessment activities in the Physics major program were undertaken as planned during the AY 2014-2015, following the guidelines outlined in the “Program Assessment Plan.” Accordingly:
 - a. Two Physics program learning outcomes were assessed this academic year, within the scope of Learning Goal 2:
 - Learning Outcome 2 (a). Formulate, solve, and interpret problems by the use of physical principles, via mathematical and computational techniques.
 - b. The learning outcomes above were assessed in the courses PHYS 210 (General Physics II), PHYS 320 (Electromagnetism), PHYS 330 (Quantum Mechanics), Methods of Mathematical Physics (PHYS 371), and PHYS 422 (General Relativity). The whole process was organized at the departmental level with cooperation of all the instructors involved, and according to the Physics Assessment Plan for the three-year cycle 2014-2017. This plan provides precise procedural guidelines for data collection via embedded questions and/or multiple-choice exams, and for the evaluation of the gathered data against the assessment metrics. The data were stored electronically. The faculty members teaching these courses were responsible for the required data collection: Seth Foreman (PHYS 210), Horacio Camblong (PHYS 320, 330, and 422), and Xiaosheng Huang (PHYS 371).
2. **Please Answers the Following Questions for Each of the Student Outcomes Assessed:**
 - a. **What did you do?**

Following the guidelines of our Physics Assessment Plan, the learning outcomes were assessed by means of *embedded questions or equivalent direct measures*:

 - Exam-embedded questions/problems (on the final exams) were used for Learning Outcome 2 (a) in PHYS 210 and PHYS 371. These were selected as representative, standard problems with significant mathematical content, requiring solution by mathematical and



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computational methods. In addition, the whole set of multiple-choice questions on the final exams for PHYS 320, PHYS 330, and PHYS 422 were assessed (the questions typically involve significant mathematical content and problem-solving skills, similar to the ETS Physics Major Field Test and/or GRE Physics Test).

b. What did the faculty in the department or program learn?

The learning outcomes were gauged with a *ternary metric system*: above average, average (benchmark standard), and below average---roughly equivalent to A range through B, B- through C-, and D-F range, respectively. It should be noticed that these are meant to be categories defined by comparison with the benchmark standard, regardless of the statistical course average for any given class section. In all cases, student performance was evaluated on the basis of a representative sample of embedded questions (as described above). The results for the courses selected for assessment are summarized below:

- PHYS 210: A representative sample of embedded questions was extracted from two different problems, for 18 students. Above Average: 11 students; Average: 0 student; Below Average: 7 students.
- PHYS 320: Multiple-choice final exam, administered for 11 students. Above Average: 3 students; Average: 7 students; Below Average: 1 students.
- PHYS 330: Multiple-choice final exam, administered for 11 students. Above Average: 7 students; Average: 3 students; Below Average: 1 students.
- PHYS 371: One embedded problem, for 12 students. Above Average: 9 students; Average: 2 students; Below Average: 1 student.
- PHYS 422: Multiple-choice final exam, administered for 12 students. Above Average: 9 students; Average: 3 students; Below Average: 0 students.

c. What will be done differently as a result of what was learned?

A faculty meeting on September 7, 2015 addressed the assessment plan and results of this assessment cycle, and follow-up discussions are planned for other 2015-16 Department meetings. So far, the following conclusions have been drawn, with steps to be taken:

- All in all, the results of the assessment activities show a relatively high level of performance by most students, with an excellent command of basic analytical skills---both for lower- and upper-division level physics



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courses.

- *No significant curricular changes are planned/required for AY 2015-16.* Possible assessment-driven curricular changes will be discussed in subsequent meetings.
- The Department has not yet made a decision on the issue of the possible direct use of the *ETS Physics Major Field Test* as an assessment tool.
- However, steps in this direction have been taken by exploring the role of ETS/GRE-style questions in several targeted courses; this approach will continue during AY 2015-16.

3. **Attach a copy of the components of the department/program assessment plan that have been modified since its initial submission:**

- a. Program Mission
- b. Program Learning Goals
- c. Program Learning Outcomes
- d. Program Learning Rubrics aligned with outcomes
- e. Curriculum map that shows the courses that pertain to the outcome

NO CHANGES have been made this year.