



2008-2009 Assessment Plan Report

PROGRAM ASSESSMENT REPORT AY 2009-2010

Report Date: JUNE 1, 2010
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 2009-2010, 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 1:
 - Learning Outcome 1 (a). Demonstrate mastery of the core concepts and general principles of physics.
 - Learning Outcome 1 (b). Demonstrate competent knowledge of the specific concepts, principles, and problems of each of the basic subfields and some areas of application in physics.

b. The learning outcomes above were assessed in the courses PHYS 110 (General Physics I), PHYS 210 (General Physics II), PHYS 240 (Modern Physics), PHYS 312 (Statistical & Thermal Physics), PHYS 320 (Electromagnetism), PHYS 330 (Quantum Mechanics), and PHYS 422 (General Relativity). The whole process was organized by the "assessment coordinator," Horacio Camblong (Physics & Astronomy Department Chair), providing precise procedural guidelines for data collection via embedded questions 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: Brandon Brown (PHYS 110 and 210), Thomas Bottger (PHYS 312 and 320), Marcelo Camperi (PHYS 330), Horacio Camblong (PHYS 422), and William Golightly (adjunct for PHYS 240).

2. **Please Answer 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*:

- Embedded problems in the final exams were used for Learning Outcome 1 (a) in PHYS 110, 210, 240, 312, 320, 330, and 422. These were selected as representative, standard questions or problems with significant conceptual content, where the mathematical solution is only incidental to the underlying concepts
- With similar conceptual emphasis and via embedded problems, Learning



2008-2009 Assessment Plan Report

Outcome 1 (b) was assessed [overlapping with 1 (a) in most cases] in PHYS 312, 320, 330, and 422.

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 110: A representative sample of embedded questions was extracted from two different problems, for 69 students. Above Average: 52 students; Average: 8 students; Below Average: 9 students.
- PHYS 210: A representative sample of embedded questions was extracted from two different problems, for 39 students. Above Average: 19 students; Average: 13 students; Below Average: 7 students.
- PHYS 240: One embedded problem, for 11 students. Above Average: 3 students; Average: 5 students; Below Average: 3 students.
- PHYS 312: One embedded problem, for 14 students. Above Average: 5 students; Average: 1 student; Below Average: 2 students.
- PHYS 320: One embedded problem, for 8 students. Above Average: 9 students; Average: 4 students; Below Average: 1 student.
- PHYS 330: One embedded problem, for 8 students. Above Average: 5 students; Average: 3 students; Below Average: 0 students.
- PHYS 422: One embedded problem, for 7 students. Above Average: 3 students; Average: 3 students; Below Average: 1 student.

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

A faculty meeting in the Fall 2009 semester addressed the assessment plan and results from the previous year. This was followed in the Spring 2010 semester with a Departmental Retreat, where curricular issues were comprehensively discussed (May 15, 2010). It is expected that additional, targeted discussions will take place as outlined below. So far, the following steps have been taken:

- All in all, the results of the assessment activities show a high level of performance by most students, with an excellent command of basic conceptual skills---especially in the lower-division General Physics courses PHYS 110 and 210.
- *No significant curricular changes are planned/required for AY 2010-11. Generally speaking, even though the results of the assessment activities can be regarded as satisfactory, there is room for some improvement. Correspondingly, assessment-driven curricular changes are likely in AY 2011-12 and/or in subsequent years. Complex issues have been*



2008-2009 Assessment Plan Report

identified, but their interplay makes this decision-making process non-trivial. These issues are related to evolving student populations: their analytical and abstract skills, study habits, the number of majors, etc.

- *The Physics & Astronomy Program Review is anticipated for AY 2010-11*, including a preparatory Self-Study underway. Curricular adjustments are being entertained for inclusion in the Self-Study and review by the external team. These ideas reflect some of the lessons learned from the assessment activities, e.g., the need to address a perceived lack of students' focus.
- The *ETS Field Test in Physics* was administered this month (May 6th and 10th, 2010) as part of a pilot program at the university level. Our departmental goal is to revisit the assessment plan and reconsider the role of the ETS Field Test as a possible assessment tool (either as the principal one or in addition to the other tools currently in use). This ongoing discussion will be also included in the Self-Study and Program Review.

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.