Core Curriculum Assessment Report
2013_14

Department: Physics
Representative: Dr. Chin-Che Tin

Course Name / number: PHYS1500/1510

1. AGSC Content Area of Alignment: Area III: Science and Math

2. SLO(s) being assessed: Student will...
   SLO 10: Students will understand and appreciate methods and issues of science and technology.

3. Assessment Method(s):
   [Explain how assessment for the measures associated with this SLO - not grading for the course as a whole - was conducted. You may cut/paste rubrics for inclusion here, identify faculty reviewing committees, or identify specific kinds of test questions important to your method. Is this the method you initially planned to use? Provide a separate paragraph for each method].

   The assessment of these courses comes under the purview of the Physics Department’s Learning Improvement Committee for Introductory Physics and Astronomy, chaired by Dr. Chin-Che Tin. The committee believes that learning assessment should not be viewed as a measure of the teaching effectiveness of the instructors. To discourage such unwarranted association and to encourage participation in the assessment efforts, the committee has decided not to identify the instructors. However, during the committee meetings to discuss assessment data, the instructors may choose to identify themselves to aid in the discussion, and many instructors did. Members of the Learning Improvement Committee for Introductory Physics and Astronomy were: Dr. Chin-Che Tin (Chair), Dr. Satoshi Hinata, Dr. Stephen Knowlton, Dr. Stuart Loch, Dr. Joseph Perez. The Chair of the committee has also invited other instructors also teaching these courses but who are not members of the committee, to the meetings. The department has identified the following assessment areas: homework problems, laboratory experiences, classroom interactive sessions, and test questions.

   Faculty may elect to use any or all of these assessment areas for learning assessment. However the department encourages all faculty teaching PHYS 1500/1510 to use MasteringPhysics, an online assignment program, as the primary assessment tool. Up to five problems are assigned throughout the semester that relate well to each of these five measures associated with SLO 10 and the performance of our students is compared to the National Average. Up to Fall 2011, the committee allowed instructors to choose their own set of problems even when more than one instructor are teaching the same course. The committee noted that it is most logical for all classes of the same course to use the same set of questions. Therefore, from Spring 2012 onward, instructors using MasteringPhysics are requested to use the same set of questions provided by the committee. For Spring 2012, we included data from laboratory experiments as well. Data were collected for both Fall 2011 and Spring 2012. The committee met on April 3, 2012, to discuss the assessment data for Fall 2011. The committee met again on September 27, 2012, to discuss the assessment data for Spring 2012. PHYS 1500 Fall 2011: Instructor C taught both MWF and TR classes. Data were collected from both classes. The instructor chose tests as the mode of assessment. This is one of the methods accepted by the department for learning assessment. Spring 2012: In this semester, two different instructors C and D taught the course. Both instructors used MasteringPhysics online assignment as the mode of assessment. Both instructors chose questions from the common set of questions provided by the committee. PHYS 1510 Fall 2011: This class was taught by Instructor D. Spring 2012: In this semester, three different instructors E, F, and G taught the course. All instructors used MasteringPhysics online assignment as the mode of assessment. All instructors chose questions from the common set of questions provided by the committee.

4. Findings: What assessment data did each assessment method produce?
   For tests/exam, the data reported were the average % score of the class for each question. For online assignment using MasteringPhysics, the data collected were percentage of students completing the assigned problems (% Complete), average percentage score of those students completing the assigned problems (%
Average Score), and average percentage national score of students given the same problems in those institutions in the U.S. using MasteringPhysics (% National Score). The % National Score data are derived from a sample of several thousand students. PHYS 1500 Fall 2011: Average score for MWF class: 79% Average score for TR class: 71.7% The average score for these two classes was 75% with the MWF class doing better than the TR class. This score of 79% is higher than typical test scores (~60%) in Introductory Physics in the Physics Department. Spring 2012: Instructor C: % Complete: 72.1% Average Score: 98.1% National Score: 91.5 Instructor D: % Complete: 83.8% Average Score: 95.8% National Score: 91.5 Both classes have comparable average scores which are higher than the national average score. Instructor D has a higher assignment completion rate (%Complete) than C. PHYS 1510 Fall 2011: Instructor D: % Complete: 85.5% Average Score: 91.7% National Score: 91.5 Completion rate is higher than usual and average score is comparable with the national average. Spring 2012: Instructor E: % Complete: 82.2% Average Score: 93.4% National Score: 93.8 Instructor F: % Complete: 81.7% Average Score: 97.5% National Score: 93.8 Instructor G: % Complete: 85.6% Average Score: 90.2% National Score: 93.8 From the three classes, the average results are: % Complete: 83.2% Average Score: 93.7% National Score: 93.8 The average completion rate is higher than in the past (~70-80%). The average score (93.7%) is comparable to the national average score (93.8%).

5. How did you (or will you) use the findings for improvement?

[What questions / issues / concerns did your data raise for the faculty teaching the course? What discussion did the faculty have about the findings? What future actions to improve student attainment of this outcome will the department / program take as a result of this analysis?]

Fall 2011: Instructor C should have used the same order of questions in his Fall 2011 assessment to allow more meaningful comparison between the MWF and TR classes for the same question. Spring 2012: Getting all the students to do the assignments is a problem. As in all other courses, motivation is an issue that instructors have to confront. Regular review is important and instructors should make use of recitation classes to provide review sessions. Instructor’s Verbatim Comments: (Instructor C for PHYS1500-Fall 2011) Students had the most difficulty with taking a concept or principle and applying it to other situations. They scored best on questions that were either the same or similar to ones they had seen in class. They scored poorly when a question required that they interpret the idea or concept in order to answer the concept correctly. Unfortunately in the time allotted for the course it would be difficult to correct this problem. Roughly 50% of class time is spent on concepts and making sure the students understood them. When doing problems students were required to think about the conceptual implications of the problems. Unfortunately many students either ignored, refused to do, or spent little effort on this part of the class. Several teaching techniques were employed including active learning and peer instruction, these produced mixed results and were often met with resistance by the students. The students rarely understand the difference between learning and memorization and will resist any attempt to engage them in the former and will try to force the instructor to adapt to their preferred method of memorization. Another large problem is preconceived notions of how the world works these are often hard to break and for some they refuse to believe it no matter what they are shown. For example Question 1 of Measure 5 was given as a question in class after student were to have read the section but before it was detailed in class. Students were then lectured on the topic, were given homework from multiple chapters that required knowledge of the fact, given a lab that showed graphically that it had to be true, quizzed on the subject, tested on the subject, and finally given the question on a test. Despite the importance given to this question they were still more than 10% of the class who failed to correctly answer the question and many other who answered correctly but failed accept and use the fact in their work. (Instructor G for PHYS1510-Spring 2012) Average score of all 5 measures was ~90%, which was an
improvement from the previous year. The student turn out rate was ~80-90%. There were at least ~10% of students who didn't do the problems. To improve learning, I will make efforts to understand why some students didn't have time to do the homework.

6. Additional Comments:
   [What else would you like the Committee to know about your assessment of this course or plans for the future?]
   
   Instructors have academic freedom and therefore have the rights to use whatever questions or any assessment form they choose. They have the rights not to use the common set of questions suggested by the committee. It is therefore commendable that the Physics faculty agree to use a common set of questions for all classes of the same course. This is a major step forward in our assessment efforts. For Spring 2012, we included data from laboratory experiments. Using lab scores is more suitable for Measure 3. Problem still exists in finding proper questions to suit Measures 1 and 4.

7. Committee Comments
   Mean of rubric score = 3.11 (out of 4) Questions allegedly assessing various measures, particularly Measure 2, have little to do with the associated measure(s)., hard to see correlations between questions and measures Since questions don't relate to Measures, then no findings can logically emerge