### Course Name / number
PHYS1600/1617, PHYS1610/1617

### AGSC Content Area of Alignment:
Area III: Science and Math

### SLO(s) being assessed:
Student will...

SLO 10: Students will understand and appreciate methods and issues of science and technology.

### 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 with Calculus, 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. Yu Lin Dr. David Maurer Dr. Minseo Park Dr. John Williams 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 faculty teaching these courses to use Mastering Physics, which is an online assignment program, as the primary assessment tool. 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. The instructors can choose to use assign any questions they see fit. To provide guidance as to the appropriate questions to use, the committee has provided a list of questions that they may use, if they want to. However, these courses have several classes each, taught by different instructors. 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. In addition to that, grades from a laboratory experiment were included in the assessments for Spring 2012 for PHYS 1600 and 1610. Data were collected for both Fall 2011 and Spring 2012. The committee met on April 3, 2012, to discuss the assessment data for this course. The committee met on September 27, 2012, to discuss the assessment data. PHYS 1600 Fall 2011: Several instructors taught this course. They were Instructors H, I, J and R. Instructors H, J, and R used MasteringPhysics. Instructor I used tests as the mode of assessment. Spring 2012: In this semester, two different instructors K and L taught the course. Instructor K used MasteringPhysics but instructor L used quizzes/exam as the mode of assessment. Both instructors chose questions from the common set of questions provided by the committee. PHYS 1610 Fall 2011: This course was taught by Instructors P, Q, and R. All used MasteringPhysics. Spring 2012: In this semester, two instructors, N and O, taught the course. Both instructors used MasteringPhysics as the mode of assessment. All instructors chose questions from the common set of questions provided by the committee. PHYS 1607 and PHYS 1617 These are Honors Physics I and II respectively, and they were both taught by the same instructor M. Instructor M used tests as the mode of assessment.

### 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. Historically, the average test score for Introductory Physics courses is consistently about 60-65%. 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. Historically, the average score is about 90% and the average completion rate is about 70-80%. PHYS 1600Fall 2011: Instructor H: %Complete: 79.3%Average score: 88.2%National score: 95.4The average score is slightly lower than the national average. Instructor I: % Average score: 61.9This average test score is within the historical range for tests in our Introductory Physics program in our department. Instructor I should use more questions. Instructor J: %Complete: 82.6%Average score: 88.3%National score: 93.1The average score is slightly lower than the national average. Spring 2012:

Instructor K: % Complete: 72.1% Average Score: 94.9% National Score: 91.7 The average completion score is within the historical range for MasteringPhysics in our department. The average score is higher than the national average. Instructor L: % Complete: 86% Average Score: 63.5 The average completion score is higher than in MasteringPhysics because the mode of assessment is quiz/exam. This is to be expected because the quizzes/exam were given during recitation sessions or in class. The average score is within the historical range for tests in our department. The average score cannot be compared to the national score even though the same set of questions was used. This is because MasteringPhysics allows multiple attempts and longer time duration. PHYS 1610 Fall 2011: Instructor P: % Complete: 86% Average Score: 95% National Score: 94% Completion rate is higher than usual and average score is comparable with the national average. Instructor Q: % Complete: 77.4% Average Score: 93.8% National Score: 94.5 Completion rate is typical and average score is comparable with the national average. Instructor R: % Complete: 77.3% Average Score: 85.5% National Score: 92.4 Completion rate is typical but average score is lower than average national score. Spring 2012: Instructor N: % Complete: 84.0% Average Score: 94.4% National Score: 94.3 Average completion rate is slightly higher than historical value. Average score is comparable with national average. Instructor O: % Complete: 73.1% Average Score: 85.9% National Score: 94.3 Average completion rate is typical but average score is lower than national average. PHYS 1607 Fall 2011: % Average score: 63.4 This is within the historical range for tests/exam in Introductory Physics program. PHYS 1617 Spring 2012: % Average score: 82.8 This test score is significantly higher than normal, indicating the possibility that the tests were easier.

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?]

Some instructors should use more questions. Getting all the students to do the assignments is a problem.

Motivation is an issue that instructors have to confront. Those instructors who asked their teaching assistants to discuss assignment problems during recitations would get higher average scores, which only shows that regular reviews and help during recitations can be very helpful. Instructor’s Verbatim Comments: (Instructor L for PHYS1600-Spring 2012) The results for PHYS1600 (Spring, 2012) are lower than all other physics courses due to the methodology employed in obtaining grades. I used exactly the same assessment questions, but in my course, the questions were all assigned as exam or quiz questions instead of using the multi-attempt,
online, Mastering Physics system used by the other Physics sections. The average performance recorded for my class was consistent with the student performance on exams and, in my opinion, provides a more realistic evaluation of student performance. For future semesters, I'll continue to work with the students to improve their preparation for these problems. (Instructor O for PHYS1610-Spring 2012) This was my first time teaching Physics 1610. As a result I stayed with a traditional lecture format, including demonstrations to help foster understanding of key physical ideas along with conceptual discussion and example problem development and solution on the chalkboard. A main portion of the class discusses the physics of electricity and magnetism. The phenomena introduced are intuitively somewhat difficult for students new to the subject given that they do not have any practical experience with electric and magnetic fields as they do with simple mechanical systems from everyday life. This motivated me to make connection to practical examples of the use of the concepts I was discussing to generate interest and make the ideas less abstract. I think this approach was somewhat successful (but have no way to quantify it), given that the students were typically majoring in engineering, and enjoy discussion of applications. I plan on expanding these application discussions the next time I teach the class as one way to improve student learning. A new element I plan on employing when teaching Physics 1610 again in Spring 2013 will be to incorporate iClickers to foster more interaction with the students during lectures. This will both enable me to gauge students understanding of material rapidly in class as well as then respond by further discussion of any misunderstanding of specific concepts.

6. **Additional Comments:**

[What else would you like the Committee to know about your assessment of this course or plans for the future?]

Using a common set of questions for all classes of the same course is a major step forward in our assessment efforts. For Spring 2012, we included data from labs, which is more meaningful for Measure 3. Problem still exists in finding proper questions to suit Measures 1 and 4.

7. **Committee Comments**

Mean of rubric score = 2.94 (out of 4) Since assessment doesn't relate to measures, utility of findings is questionable. Since questions don't relate to Measures, then no findings can logically emerge. Most of the questions allegedly assessing various measures, with the exception of Measure 5, have little to do with the associated measure(s).