# Assessment Overview

Discipline/Program Name ___Physics____________ Assessment Year ___2008-2009__________

<table>
<thead>
<tr>
<th>Student Learning Outcome</th>
<th>Outcome Type</th>
<th>Methodology</th>
<th>n</th>
<th>History</th>
<th>Benchmark</th>
<th>Results</th>
<th>Strength of Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. State Physical Laws</td>
<td>Discipline</td>
<td>Pre Test / Post Test</td>
<td>34</td>
<td>4 years</td>
<td>Gain of .35</td>
<td>Gain of .29</td>
<td>Neutral: Misses Benchmark</td>
</tr>
<tr>
<td>2. Problem Solving</td>
<td>GE</td>
<td>Graded Exercises</td>
<td>0</td>
<td>0 years</td>
<td>25% improvement over the semester</td>
<td>None</td>
<td>N/A</td>
</tr>
<tr>
<td>3. Report Writing</td>
<td>GE</td>
<td>Rubric Graded Lab Reports</td>
<td>37</td>
<td>4 years</td>
<td>80% Average Rubric Score or Better</td>
<td>86% Average</td>
<td>Strong: Exceeds Benchmark</td>
</tr>
<tr>
<td>4. Instructor Consistency</td>
<td>Other</td>
<td>GPA Comparisons and Pre/Post Test Comparisons</td>
<td>N/A</td>
<td>1 year</td>
<td>None</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Recommendation: Complete this Assessment Overview Page after you have completed your Assessment Summary in the following template.
Program/Discipline Assessment Report

Program Disciplines: PHYSICS DEPARTMENT
Responsibility: Henry Weigel

Program/Discipline's Mission Statement:
The mission of the physics department, which is housed within the physical sciences department, is to provide learning-centered education of principles of physics to students. This program strives to meet the needs of both science and non-science students by providing a basic understanding of physical principles at an appropriate level of detail. The physics department is committed to providing a modern learning environment with integrated technologies, a variety of demonstrations and activities, as well as a valid student assessment program to measure student achievement.

Program/Discipline's Assessment History:
By using the assessment process as an evaluative technique, how has it previously affected your program's curricula and/or teaching strategies?
   - We have adopted a more interactive problem solving approach in our classes as well as using different technologies to improve student interaction in class.

By using the assessment process as an evaluative technique, what changes to student learning have been noted?
   - Our diagnostic test indicates that students are improving, yet we still see variation from year to year. Our annual sample size is still small, so it is hard to draw hard conclusions on an annual basis.

What unintended consequences, if any, have occurred because of the assessment process?
   - None

Who receives information about your department's assessment and why? (Please note if you plan on altering either of these items for the coming year.)
   - All information is shared among instructors for the purpose of improving the curriculum as well as the Dean of Health, Science and Engineering.

Part 1: Previous Academic Year Assessment Summary

Previous Academic Year: 2008-2009
<table>
<thead>
<tr>
<th>Outcome Type (choose by bolding): Discipline/Program; General Ed; Other</th>
<th>Outcome Title: State Physical Laws</th>
</tr>
</thead>
<tbody>
<tr>
<td>If General Education outcome (choose by bolding): Communication; Critical Thinking; Quantitative Reasoning; Use of Technology; Diversity and Global Awareness; Leadership and Teamwork</td>
<td>Outcome Description: All students in PHY 111 and PHY 211 will take a pre test – post test. This test measures gains in conceptual understanding of physics and physical processes.</td>
</tr>
</tbody>
</table>

**Outcome #:** 1  

**Outcome Title:** State Physical Laws

**Outcome Description:**  
All students in PHY 111 and PHY 211 will take a pre test – post test. This test measures gains in conceptual understanding of physics and physical processes.

**Benchmark for success**  
1) Please specify what percentage of the sample size is expected to meet or exceed your benchmark.  
2) What is the rationale for choosing this measure?  

**Pre/Post Test:**  
The average gain for all students taking the diagnostic test should exceed 0.35. The rationale was to show some improvement over the previous year.

**Description of assessment process:**  
1) What assessment methods were used to measure this outcome (i.e. pre/post test, portfolio review, etc.)?  
2) How do these methods show students are learning?  
3) What frequency is this outcome being measured (i.e.: each semester, yearly, every other year, etc.) and why?  
4) How many students made up the sample size?  

Pre and Post testing: The physics education community has been using a common test for assessing student gains in learning for several years. We intend to use this common exam as a pre and post test to measure student gain in understanding during the course. We will assess all PHY 211 and PHY 111 sections. There is a standardized gain calculation to determine the students’ increase in understanding. We will also be able to use these results to compare our students with average results across the nation. Outcomes 1, 2, and 3 will be assessed in this manner. The sample size for the pre-test was 46 and for the post test 34.

**Results**  
What were the results of the assessment process? (List results for each method, if more than one were used.)  

We measured gains for the spring and summer semesters. For the spring, the overall gain was 0.40 and for the summer it was 0.14. Overall, the gain was 0.29

**What did the department learn?**  
1) How did group performance compare to the benchmark?  
2) How does the data compare to the previous year, if applicable?  
3) If multiple measures were used, how do they compare to each other?  

Spring gains are comparable to previous years, but summer is low and bringing the overall gain down. This is very helpful information and we need to study the cause. The shortened semester is certainly a possible issue, but also we may be seeing inconsistencies across instructors.

**Student performance summary**  
1) Based on the findings, how does the department rate student performance in regards to this outcome (strong, weak, or neutral)?  
2) How does this assessment affect plans for this coming year in terms of curricula, teaching strategies, and assessment methods?  

We feel student performance is neutral. For the spring we are consistent with previous years and overall a gain of 0.40 is above the scores for traditionally taught physics classes. The summer session may be an anomaly, but we will try to identify ways to improve summer gains for the upcoming summer term. It is difficult to get information for the summer because the courses are often not taught because of enrollment issues.
<table>
<thead>
<tr>
<th>Outcome #: 2</th>
<th>Outcome Title: Problem Solving</th>
</tr>
</thead>
</table>
| **Outcome Type** (choose by bolding): **Discipline/Program; General Ed; Other**  
If **General Education** outcome (choose by bolding): Communication; Critical Thinking; Quantitative Reasoning; Use of Technology; Diversity and Global Awareness; Leadership and Teamwork | **Outcome Description:**  
Students taking introductory physics will show an acceptable level of physics-related problem solving ability. (Quantitative Reasoning) |
| **Benchmark for success**  
1) Please specify what percentage of the sample size is expected to meet or exceed your benchmark.  
2) What is the rationale for choosing this measure? | Students will improve by 25% over the term according to the grading rubric. |
| **Description of assessment process:**  
1) What assessment methods were used to measure this outcome (i.e. pre/post test, portfolio review, etc.)?  
2) How do these methods show students a re learning?  
3) What frequency is this outcome being measured (i.e.: each semester, yearly, every other year, etc.) and why?  
4) How many students made up the sample size? | Students in PHY 111 will be given a set of problems to solve before each scheduled exam. These problems will not be graded, but the students will be encouraged to do them in preparation for the upcoming exam. They may receive some small bonus points for attempting the problems. The solutions will be turned in and analyzed for the following pieces: 1. A clear organized approach. 2. Correct selection of underlying physical laws or equations. 3. Correct application of these laws or equations. These problems will be scored with a grading rubric. |
| **Results**  
What were the results of the assessment process? (List results for each method, if more than one were used.) | Unfortunately this assessment was not done. It was decided to instead implement a set of Blackboard administered reading quizzes for first PHY 111 and then PHY 211. Because of time considerations, the aforementioned assessment was not carried out. |
| **What did the department learn?**  
1) How did group performance compare to the benchmark?  
2) How does the data compare to the previous year, if applicable?  
3) If multiple measures were used, how do they compare to each other? | N/A |
| **Student performance summary**  
1) Based on the findings, how does the department rate student performance in regards to this outcome (strong, weak, or neutral)?  
2) How does this assessment affect plans for this coming year in terms of curricula, teaching strategies, and assessment methods? | N/A |
| Outcome Type (choose by bolding): **Discipline/Program: General Ed; Other**  
If General Education outcome (choose by bolding): **Communication; Critical Thinking; Quantitative Reasoning; Use of Technology; Diversity and Global Awareness; Leadership and Teamwork** | Outcome Description: Writing acceptable scientific reports. |
|---|---|
| **Benchmark for success**  
1) Please specify what percentage of the sample size is expected to meet or exceed your benchmark.  
2) What is the rationale for choosing this measure? | Students will score have an overall average of 80 percent or better on the 3 graded formal lab reports. |
| **Description of assessment process:**  
1) What assessment methods were used to measure this outcome (i.e. pre/post test, portfolio review, etc.)?  
2) How do these methods show students are learning?  
3) What frequency is this outcome being measured (i.e.: each semester, yearly, every other year, etc.) and why?  
4) How many students made up the sample size? | We continued to grade three formal lab reports for all students taking PHY 111 and PHY 211 using a grading rubric. |
| **Results**  
What were the results of the assessment process?  
(List results for each method, if more than one were used.) | The overall average for students was 86 percent which is the same as last year. |
| **What did the department learn?**  
1) How did group performance compare to the benchmark?  
2) How does the data compare to the previous year, if applicable?  
3) If multiple measures were used, how do they compare to each other? | The results indicate that report writing is good and it has been for the last 2 years. Students exceeded the benchmark. |
| **Student performance summary**  
1) Based on the findings, how does the department rate student performance in regards to this outcome (strong, weak, or neutral)?  
2) How does this assessment affect plans for this coming year in terms of curricula, teaching strategies, and assessment methods? | Student performance is strong. We seem to be doing well in this category and we have learned that time spent focusing on well-written reports will significantly improve the rubric scores. Many students come into the classes with no prior knowledge of how to write a scientific report, but over the course of the semester they must write 3 formal reports and 5 informal reports, so they gain a great deal in this area. Because of consistent strong results, we are going to remove this outcome from this year’s assessment plan. |
<table>
<thead>
<tr>
<th><strong>Outcome #: 4</strong></th>
<th><strong>Outcome Title:</strong> Instructor Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome Type</strong> (choose by bolding): <strong>Discipline/Program:</strong> General Ed; <strong>Other</strong> If General Education outcome (choose by bolding): Communication; Critical Thinking; Quantitative Reasoning; Use of Technology; Diversity and Global Awareness; Leadership and Teamwork</td>
<td></td>
</tr>
<tr>
<td><strong>Outcome Description:</strong> We will measure student success across sections to determine the level of consistency among instructors.</td>
<td></td>
</tr>
</tbody>
</table>
| **Benchmark for success**  
1) Please specify what percentage of the sample size is expected to meet or exceed your benchmark.  
2) What is the rationale for choosing this measure? |
| We have no real benchmark, but we want to document the results. There may be many reasons why we have inconsistent results among instructors, most having to do with the number of students in any given section. In physics at most we will have 2 sections of any one course running simultaneously, so averages can be highly skewed by any particular grouping of students. Also, it is harder to achieve gains in courses where the pre-test scores are already high, so this may have a big effect over a single course. |
| **Description of assessment process:**  
1) What assessment methods were used to measure this outcome (i.e. pre/post test, portfolio review, etc.)?  
2) How do these methods show students are learning?  
3) What frequency is this outcome being measured (i.e.: each semester, yearly, every other year, etc.) and why?  
4) How many students made up the sample size? |
| As stated in our plan, we just want to document discrepancies between sections of a particular course. Specifically we are going to focus on Pre-Post test gains among the different sections as well as Grade Point Averages across different sections. Grade Point Averages are found by assigning 4.0 to an A, 3.0 to a B, etc. and averaging for all grades in the section and ignoring withdrawals. |
| **Results**  
What were the results of the assessment process? (List results for each method, if more than one were used.) |
| The results show an inconsistency in pre-post gains. For spring and summer the results are .14, .22 and .51. The Grade Point Averages across sections were a little more consistent. If we include the fall classes, the range is from 2.21 to 3.89, however the 3.89 seems to be an outlier. If we ignore this, the range is 2.21 to 2.73. It is not possible to compare overall trends for instructors as most instructors are only represented once in the dataset. We will need to continue to collect data in order to identify any important trends. |
| **What did the department learn?**  
1) How did group performance compare to the benchmark?  
2) How does the data compare to the previous year, if applicable?  
3) If multiple measures were used, how do they compare to each other? |
| N/A |
| **Student performance summary**  
1) Based on the findings, how does the department rate student performance in regards to this outcome (strong, weak, or neutral)? |
| N/A |
2) How does this assessment affect plans for this coming year in terms of curricula, teaching strategies, and assessment methods?
Part 2: Current Academic Year Assessment Plan

Current Academic Year: 2009-2010

Intended Learning Outcomes (only include if they differ from those noted in Part 1)

1. Students taking introductory physics classes will show overall increases in conceptual understanding of physical processes.
2. Students taking introductory physics will show an acceptable level of physics-related problem solving ability. (Quantitative Reasoning)
3. Students taking introductory physics classes will be able to read and analyze their textbook material on a conceptual level. (Communications)
4. We will continue to monitor measure student success across sections to determine the level of consistency among instructors.

Assessment Method(s) (only include if they differ from those noted in Part 1)

1. All students in PHY 111 and PHY 211 will take the same pre test – post test as last year. This test measures gains in conceptual understanding of physics and physical processes.
2. Students in PHY 111 will be given a set of problems to solve before each scheduled exam. These problems will not be graded, but the students will be encouraged to do them in preparation for the upcoming exam. They may receive some small bonus points for attempting the problems. The solutions will be turned in and analyzed for the following pieces: 1. A clear organized approach. 2. Correct selection of underlying physical laws or equations. 3. Correct application of these laws or equations. These problems will be scored with a grading rubric.
3. Students will be given optional reading quizzes for each day’s reading assignment. These are generally 5 questions each day. This assessment tool will be given in all PHY 111 and PHY 211 classes.
4. We will look at student success data for all students in PHY 111 and PHY 211.

Benchmarks (only include if they differ from those noted in Part 1)

1. We increase our benchmark for the pre/post test to a gain of 0.35.
2. Student problem solving skills will improve by at least 25% according to the grading rubric.
3. The average score overall will be greater than or equal to 75% of the total possible.
4. Assessment method 4 is difficult to benchmark. We want to see consistency across sections, but because of the size of our sections, it is believed that this must be done over several assessment cycles. Therefore, we will just track the data and report on the results without a particular benchmark.

Have you submitted a separate budget worksheet? (Choose by bolding; for information about this worksheet, please refer to the specific budgeting e-mail sent by the committee chairperson.)

No