Program Overview

The B.A. Physics program provides students with a solid foundation in physics. Students will be prepared for jobs in industry. The program provides enough flexibility for students to obtain additional preparation to enter professional schools (law, medicine, etc.) or even double major in education if they wish to teach physics in high school. The degree has sufficient rigor for students to be competitive for admission to a masters program in physics or related fields.

Program Outcomes

1. Analyze problems in physics and formulate strategies for solutions.
2. Safely and accurately execute experiments and derive experimental uncertainties
3. Critically evaluate scientific articles, interpret data, draw conclusions, and develop testable hypotheses about physical phenomena
4. Be prepared for jobs in industry, education, professional schools or master STEM programs.
5. Present scientific results in a clear, organized and professional manner, both oral & written
6. Recognize and practice ethical behavior in the conduct of science
## Curriculum/Program Map

### Key

<table>
<thead>
<tr>
<th>Grade</th>
<th>PHYS 2005</th>
<th>PHYS 2005L</th>
<th>PHYS 2006</th>
<th>PHYS 2006L</th>
<th>PHYS 3001C</th>
<th>PHYS 3002C</th>
<th>PHYS 3010</th>
<th>PHYS 3020</th>
<th>PHYS 4099</th>
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</thead>
<tbody>
<tr>
<td>E: Emerging</td>
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<td>D: Developing</td>
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<td>A: Achieved</td>
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</tbody>
</table>

### Outcomes

- **Students will analyze problems in physics and formulate strategies for solutions**
  - **E**
  - **E**
  - **D**
  - **D**
  - **D,A**
  - **D,A**

- **Students will execute experiments and derive experimental uncertainties**
  - **E**
  - **E**
  - **E,D**
  - **E,D,A**

- **Students will evaluate scientific articles, interpret data, draw conclusions, and develop testable hypotheses**
  - **E**
  - **E**
  - **E**
  - **E**
  - **E**
  - **D,A**

- **Students will be prepared for graduate study**
  - **E**
  - **E**
  - **D**
  - **D**
  - **A**
  - **A**
  - **A**

- **Students will present scientific results in a clear, organized and professional manner, both oral & written**
  - **E**
  - **E**
  - **D**
  - **D**
  - **A**

- **Students will recognize and apply ethical behavior in the conduct of science**
  - **E**
  - **E**
  - **E**
  - **E**
  - **D,A**
# Methods and Measures

## Assessment Measures Aligned with Program Outcomes

<table>
<thead>
<tr>
<th>Program Outcomes</th>
<th>Assessment Tools</th>
<th>Course</th>
<th>Time Line</th>
<th>Responsible Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students will analyze problems in physics and formulate strategies for solutions</td>
<td>Final Exams, Instructor Evaluation</td>
<td>PHYS2005, PHYS2006, PHYS3001C, PHYS3002C,</td>
<td>Every Semester</td>
<td>Course Instructor and front office</td>
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<td></td>
<td></td>
<td>PHYS3010, PHYS3020, PHYS3030,</td>
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<tr>
<td>Students will safely and accurately execute experiments and derive experimental</td>
<td>Lab write-ups in PHYS2005L, PHYS2006L, PHYS3001C, PHYS3002 and by rubric (item</td>
<td>PHYS2005L, PHYS2006L, PHYS3001C, PHYS3002C</td>
<td>1st, 2nd and first semester of the 4th year</td>
<td>Course Instructor and front office</td>
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<tr>
<td>uncertainties</td>
<td>j) from PHYS5001</td>
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<tr>
<td>Students will critically evaluate scientific articles, interpret data, draw</td>
<td>By rubrics in PHYS4099 (Capstone) (see item i) and PHYS5001 (see item j)</td>
<td>Capstone (PHYS4099)</td>
<td>4th year</td>
<td>Course Instructor (Advanced Lab) and Undergraduate</td>
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<td>conclusions, and develop testable hypotheses about physical phenomena</td>
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<td></td>
<td>Program Director (Capstone)</td>
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<tr>
<td>Students will be prepared for graduate study, principally in physics</td>
<td>GPA in core (required) Math and Physics Courses + post-graduate survey</td>
<td>Core Courses</td>
<td>Yearly with post-graduate survey after six months and then after three years</td>
<td>Undergraduate Program Director and front office</td>
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<tr>
<td>Students will present scientific results in a clear, organized and professional</td>
<td>PHYS4099 and PHYS5001 using rubrics (see items g, h)</td>
<td>PHYS4099</td>
<td>4th year</td>
<td>Undergraduate Program Director (Capstone)</td>
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<td>manner, both oral &amp; written</td>
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<tr>
<td>Students will recognize and ethical behavior in the conduct of science</td>
<td>NSF ethics test in year one and two, Rubric in PHYS4099 (see item k)</td>
<td>PHYS2005L, PHYS2006L, PHYS3001C, PHYS3002C</td>
<td>1st, 2nd and 4th years</td>
<td>Course Instructors and Undergraduate Program Director</td>
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<td>PHYS4099</td>
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The following materials are used for assessment:

a) Final Exams from PHYS2005, PHYS2006, PHYS3001C, PHYS3002C, PHYS3010, PHYS3020, PHYS3030
b) GPA in core (required) Math and Physics Courses
c) Post-graduate survey
d) Instructor Evaluations: Each instructor will use (a) to rank each student as “needs improvement”, “meets expectations”, or “exceeds expectations” with respect to PLOs #1
e) Lab write-ups
f) NSF ethics test
g) Oral Presentation Rubric
h) Writing Rubric
i) Capstone Rubric
j) Advanced Lab Experiment Rubric
k) Ethics Rubric

Program assessment goal: X% of students on average meet or exceed expectations of progress to the stated PLOs.

Note: Until we have several years of data we cannot determine what X should be.

The undergraduate director will use (c) as a second check on progress towards PLOs #1 and 4. Average grades lower than B indicate unsatisfactory progress.

Program assessment goal X% of students meet or exceed the B-average threshold.

PLO#2 will be assessed by lab write-ups and by the advanced lab experiment rubric.

Program assessment goal: X% of students on average meet or exceed expectations of progress to the stated PLO.

Rubrics will be used to access PLO’s #3, 5&6.
Program assessment goal: X% of students on average meet or exceed expectations of progress to the stated PLO.

The American Physical Society does not provide standardized tests or program reviews. Instead we will track the placement of our students in graduate schools, industry and summer NSF REU programs. In additional we will use the results of our post-graduation surveys as an assessment tool for our program.
Assessment Infrastructure

- The undergraduate director will appoint each year an “undergraduate assessment coordinator” (UGAC) whose role will be to collect all the material described above. The front office will help the UGAC to organize and store these records.

- The UGAC will be responsible for distributing and collecting suitable evaluation rubrics to the instructors of PHYS4099 and PHYS5001.

- A subcommittee of the undergraduate committee, headed by the UGAC, will analyze the collected material at the end of each academic year and prepare a report describing progress at each level (E, D, A) towards each PLO. This will be done by computing the absolute numbers and percentage of each relevant student cohort that has progressed “more slowly than expected”, “at the expected rate”, or “more quickly than expected” towards the given level of each PLO.

- The above report and recommendation will be distributed to the full physics faculty for discussion and possible action. Appropriate parts of the report and recommendations will be shared with relevant departments.
Findings

Here you will describe and explain in this section any multi-year patterns and trends that your assessment efforts have identified, including a description of any relevant relationships to national standards.

Use of Findings

In this final section, you will describe how your program intends to make use of the program-level assessment data it has gathered.

- How will this information be presented to and discussed among the faculty?
- How might this data or these discussions result in review and possible revision of course or program learning outcomes and pedagogical strategies?

We believe in the PLO’s that have been developed and will if need be, revise our pedagogical strategies to ensure that we meet the PLO’s.