

Physics Program Assessment

Objectives	Measurement	Use
Students will be able to:		
Knowledge		
1) show breadth and depth of fundamental content knowledge by		As weaknesses show, dept. will take action to provide practice and feedback earlier than Seminar as appropriate
a) solving problems using physics principles	161,162 final cumulative exams (D)	
b) maintaining lab journals	101, 102, 264, 301, 302 Compare pages of 101, 264, 302 Rubric to evaluate organization, data analysis, error analysis (D)	
c) using standards of evidence	362 (statistics) exam (D) Error analysis from lab journals Rubric to evaluate progression of sophistication	
Attitude		
2) show curiosity about the natural world	Attend extra-curricular talks/events/SPS Take attendance (D) Small group discussions Students attend regular seminar, pose questions	
3) practice ethical behavior	Lab reports will show original work and real data (D) Citation of references and sources	
4) feel prepared for the next step (job, grad school)	Survey/exit interviews (I) Surveys of alums at 2 years out (I)	
Skills		
5) demonstrate	Independent research project/Seminar Rubric to evaluate each skill (D)	
a) framing an inquiry question		
b) experimental design		
c) problem-solving		
d) data collection		
e) data analysis		
f) data interpretation		
g) critical thinking/drawing conclusions		
h) communication		
i) oral		
ii) written		
iii) graphic		
i) programming		

D = direct measure, I = indirect measure

The previous matrix is the overall assessment plan for the Physics Department when it will be completely implemented. We will begin with implementation of Objective #5 in Fall 2006. The additional objectives will be addressed in subsequent years depending on the results of the assessment of the #5 capstone experience.

I. Student Learning Objectives/Outcomes

When students complete the major, they should be able to *integrate* a demonstration of these skills:

- Framing an inquiry question
- Experimental design
- Problem solving as the experiment proceeds
- Data Collection
- Data Analysis
- Data Interpretation
- Critical thinking/Drawing conclusions
- Communication
 - Oral
 - Written
 - Graphic

The difference between the Option I (50 credits), Option II (36 credits), and Applied Option majors will be in the nature of the inquiry questions they are likely to address in the future: Option I (50 credits) will have a greater breadth of choices of theory and practical inquiry; Option II will be more limited in breadth of content choices; Applied Option will be best suited for a primarily applied/action research. The different options provide the majors with different experience only in terms of the *type* of question they are most likely to problem-solve, but there will be no difference in the skills listed above nor in the level of competency required.

II. Identification of Where Objective/Outcomes Are Being Achieved

Physics 161, 162, and 204 and the accompanying lab courses 101, 102, and 264 are the fundamental physics courses where these skills are introduced. All physics majors take these courses. All additional physics courses and labs reinforce these skills and allow additional refinement, practice, and additional content examples.

III. Assessment Tools to Measure Objectives/Outcomes

Students develop and present a Senior Seminar project which invokes all these skills and they are expected to integrate them toward a single inquiry question. A rubric will be used by each faculty member who attends the presentation and/or reads the accompanying required paper to evaluate the level of competence in each skill area and how well they were integrated in service to the specific inquiry.

IV. Timetable Indicating the Cycle of Assessment and Continuous Improvement

At the end of each semester's round of Senior Seminar projects, the physics department assessment coordinator will aggregate the data and the physics department faculty will determine which area(s) need improvement. Immediate adjustments can be made in upper division courses before the next round of senior seminar projects which will be assessable by that round. Improvements in lower division courses will require longer time frames, assessable in smaller projects associated with each course and finally assessable when those students reach the capstone experience.

We have only just implemented this assessment plan beginning in the Fall of 2006. We will begin by using a rubric for the Seminar Project. Each year, we will add additional components of the overall assessment plan as we determine, based on the Seminar evaluations where the most effective next stage should be.

V. Data Presentation and Discussion Process

The Senior Seminar Coordinator will provide each faculty evaluator with the appropriate rubric. Each faculty member will return the completed rubric to this coordinator who will record the grades. This data will be given to the Assessment Coordinator who will aggregate the data, eliminating attachment to individuals and provide a summative presentation to the whole department for discussion. Each semester, this data will be updated to look for trends of continuing problems and trends of improvements.

VI. Implementation of Revisions Based on Assessment Results

If skill areas are found consistently to be below expectations, all coursework will increase the level of practice of those skills.

VII. Results Availability

Aggregated data will be available on the physics department website and through the Physics Department Assessment coordinator.