ASSESSMENT PLAN
PHYSICS PROGRAM BS
COLLEGE OF SCIENCE AND MATHEMATICS
May 2011

The Physics Program is one of two housed in the Department of Mathematics and Physics. The program offers a Bachelor of Science in Physics with five emphasis areas: Physics, Engineering, Chemical/Biophysics, Physics Secondary Certification and Physical Science Secondary Certification. These emphasis areas are designed to prepare graduates for a variety of professional career paths.

Physics Program Goals

The program aspires to produce majors that:

1. Are prepared to enter technical positions in government and industry;
2. Have the knowledge and skills necessary to obtain Colorado Department of Education Certification as science teachers of physics or physical science; and
3. Have the necessary background to pursue graduate study towards a professional career in physics, astronomy or a related field.

The program goals are aligned with the College of Science and Mathematics goals:

> CSM offers quality, competitive Bachelor's and Master's degree programs that prepare graduates for success in professional and graduate programs, and for careers in the biological and physical sciences and mathematics. The College also supports a strong general education program by providing core curricula in science and mathematics for students pursuing careers in the health and environmental sciences, engineering, technology and teacher education. The CSM provides advanced learning opportunities for students via faculty mentored research projects and internships that promote the discovery of new information and the application of new knowledge. The CSM supports the community, region and related professions through outreach including initiatives that enhance economic development, scientific literacy, and K-12 education.

The program goals are also aligned with the following three University General Education Student Learning Outcomes. Students will:

1. Identify, analyze and evaluate arguments and sources of information to make informed and logical judgments, to arrive at reasoned and meaningful arguments and positions, and to formulate and apply ideas to new contexts.

2. Apply numeric, symbolic and geometric skills to formulate and solve quantitative problems.

3. Apply the scientific method, laboratory techniques, mathematical principles and/or experimental design.

Student Learning Outcomes

At the conclusion of the program, physics majors will:

1. Think critically and logically and use the scientific method in future investigations.

2. Understand and apply knowledge of the various subfields of physics at the undergraduate level.

3. Effectively communicate their results orally and in writing.

4. Learn independently, locate and use appropriate sources of technical material and make use of modern scientific and computational tools.

Assessment Procedures

1. During their senior year all physics majors will take the Major Fields Test in Physics. This exam is effective at assessing student learning outcomes 1 and 2. Students' scores are broken down into subgroups: Introductory Physics (Classical Mechanics, Electromagnetism, Optics, and Thermodynamics) and Advanced Physics (Quantum Mechanics, Atomic Physics and Special Topics). CSU – Pueblo data will be compared with National data and presented as part of the yearly assessment of the program. When possible (at least 5 student take the MFT at one time), results will be broken down in the topics listed parenthetically above. The overall results will inform the department of any possible changes to the programs' curricula and methods of delivery. Criterion: Overall and in the two breakdown areas of the MFT, ninety percent of CSU – Pueblo mathematics majors will score at or above the 50^{th} percentile on the MFAT standardized exam.

2. During their senior year all physics majors must take Physics 492 – Research. In this course students work individually under the supervision of a physics faculty member and perform research in an area selected by mutual agreement. At the conclusion of the course, students present their research in a lecture attended by the departmental faculty. They also submit a written research report. Although Physics 492 has been a featured course in the physics major for some time, results have not been used for program assessment. Evaluation of student products for programmatic purposes is in the developmental phase. During the Fall 2011 semester, physics faculty will create a rubric for evaluating the students' presentations and final written reports for the purpose of program assessment. A panel of faculty members will attend the students' final lecture and review the students' final written reports. A summary of the panel's review will be used to assess student learning outcomes 3 and 4. Criterion: Ninety percent of CSU – Pueblo mathematics majors will score at least satisfactorily according to the rubrics for evaluating student independent research, oral presentations and written reports.

Assessment Results

Major Field Tests are taken in December and in April. Results are typically returned several months later. The previous two test results are reported to the department faculty at the first department meeting held during convocation week in the fall. The minutes of this meeting along with the supporting documentation (summary score results and comparisons) will be archived and supplied to the assessment committee when requested.

The following Spring 2012 semester, students' presentations from Physics 492 will be evaluated by a panel of department faculty members and a report will be prepared. Starting Fall 2012 these results will be reported to the department faculty at the first department meeting held during convocation week in the fall. The minutes of this meeting along with the supporting documentation will be archived and supplied to the assessment committee when requested.

As the number of majors in the program is very small, running totals over the past five years will be kept and reported.

Continuous Process

Initiation and support for program improvements and the development of actions plans are primarily the responsibility of the department chair working together with faculty members of the physics program. Input from the assessment committees, the college dean and the university provosts' offices will also be sought.

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