

Department of Physics Annual Report: 2008 – 2009

Self Study

The department of physics experienced several changes this year in its faculty, curriculum, and research activities. Dr. Erik Helgren joined the department from UC Berkeley. Dr. Helgren is a solid state physicist and has begun setting up a research laboratory around solar cell development. This year he taught several upper division majors courses as well as lower division service courses and did an outstanding job. He is a much needed addition to the department and has had a significant impact already. Sadly, the department of physics lost a long time member of its faculty, Dr. Robert Good, this year. Dr. Good who was the senior member of the department and had been at CSUEB since the 60's passed away this past summer. This puts the department back down to four TT faculty, one associate professor and three assistant professors and once again we have a strong need for another faculty member. This past year less than half of our classes were taught by a TT faculty member, and even over a five year average we still need at least one hire to get to a 75% ratio of classes taught by TT faculty. Next year we will request a search for 2010-2011.

This past year we made several modifications to our program and course offerings to better serve our students. We created an option in physics education, designed specifically for students interested in teaching high school physics. This option will allow a student to earn a BA and simultaneously demonstrate subject matter competency by completing a CCTC approved subject matter program. We have also redesigned our introductory physics sequence, adding a fourth quarter. This will put us more in line with the vast majority of colleges and universities who spend at least a year and a half on this critical introductory sequence. Looking to next year we plan on making minor modifications to the physics BA and BS degree and will investigate creating an option in engineering physics.

In addition to the above changes orientated at physics majors, we have also added to our general education curriculum. In response to the high demand for upper division science GE courses we have created two new classes: Solar System Astronomy (PHYS 3710) and Stars and Galaxies (PHYS 3720). These will be offered for the first time in 2009-2010. This year we also moved another one of our upper division GE courses (PHYS 3750) to an online format. This allowed us to incorporate this course into the PACE program this year. The instructor for this course, Dr. Louis Villanueva, was awarded the instructor of the year by the PACE program.

The department has continued to emphasize undergraduate research over the past year, and in fact has been able to involve more students in research than ever before. Dr. Kimball has had ten undergraduates working in his laboratory this year. One of these students gave a talk at a regional conference and two others gave talks at international conferences. Dr. Kimball is entering his third year of a three year NSF equipment grant. He will be applying to renew this grant and is also taking the lead on a major instrumentation grant that is a collaboration between the departments of physics and chemistry. While still modest, the start-up package that we were able to offer Dr. Helgren was the largest in the history of the department and has allowed him to build a functional material science laboratory. This has broadened the available opportunities for our

students interested in doing research. During his first year he has been able to involve four different students in his research activities. We expect that as he is able to further build up his laboratory even more students will have the opportunity to participate in a diverse range of research activities in the physics department.

Assessment Plan

The department of physics has adopted an assessment plan that includes learning objectives and learning outcomes. Below the three learning outcomes are given along with a brief summary of the data collected for these during the past year.

1) Students will have a general understanding of the fundamental principles of physics.

In our introductory physics sequence (PHYS 1001,2,3) we measure this outcome with pre- and post-tests. Students are given a qualitative exam on the first day of class of each quarter covering several core ideas. The same exam is given to the students on the last day of the quarter. We continue to see strong improvement in the students understanding after they have taken the course.

2) Students should be able to effectively perform a physics experiment, analyze the acquired data, draw meaningful conclusions, and communicate these results to their peers.

We have adopted several rubrics for assessing different aspects of this learning outcome. These are applied in our upper division physics laboratories: PHYS 3281 Experimental Physics and PHYS 3283 Advanced Laboratory. As one example, in assessing students' communication skills we have them give a presentation on one of their experiments near the beginning and at the end of the course. Using a standard rubric the students improved by an average of 9% during the course. Similar gains are observed in their ability to effectively perform a physics experiment, analyze the acquired data, and draw meaningful conclusions.

3) Students have in-depth knowledge of the foundational subjects in physics (primarily analytical mechanics, quantum mechanics, thermodynamics and statistical mechanics, and electrodynamics).

Students enrolled in our capstone class, PHYS 4950 were given a physics GRE exam at the end of the quarter.

2006	average score	710
2007	average score	524
2008	average score	
2009	average score	605