Program Review - Physics

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What are the strengths of your area?: The Physics Department offers two physics course sequences to meet the needs of various science and mathematics based majors. The calculus-based sequence (PHYS 5, 6, 7, which is transitioning to PHYS 55, 56, 57) is designed for engineering, physics, mathematics and other majors requiring the more advanced level of physics. The algebra and trigonometry-based sequence (PHYS 20, 21) typically meets the needs of biology, health science, and computer science majors, among others.

Except for PHYS 5, the success rate for physics courses is high ranging from 64% to 100% (data from 10/11 to 12/13 academic years).

What improvements are needed?: The success rate in PHYS 5, the first course in the calculus-based sequence, has had lower success rates than the other physics courses, ranging from 33% (10/11) to 53% (11/12 year). Of the calculus-based courses, this course has the highest enrollment (8.8 to 10.8 FTES). This is an important course because it is a prerequisite not only for the rest of the physics sequence, but also for the advanced engineering courses.

Describe any external opportunities or challenges.: The Physics Department is responding to the statewide effort to streamline articulation and transfer by revising courses to meet the course descriptors in the C-ID program. The department will also be modifying the AS Physics degree to meet the TMC adopted by the state.

The modified calculus-based sequence PHYS 55, 56, and 57 will replace the previous PHYS 5, 6, and 7 beginning in Spring 2015. The Physics TMC adopted by the state is more problematic as the courses required are inadequate for preparation of a physics major for transfer, which is clearly admitted in notes at the bottom of the TMC. This presents a challenge in developing a degree that meets the TMC requirements without harming our students.

Overall Outcome Achievement: The physics course-level outcomes are being assessed according to the cycle adopted by the science division. Having a regular schedule for assessments is working well. PHYS 6 was assessed in Fall 2013, PHYS 5 and 7 were assessed in Spring 2014, and PHYS 20/21 and the Physics Program will be assessed during the 2014/2015 academic year.

Outcomes thus far have been acceptable, but small changes are being made to maintain or make improvements in each outcome.

Changes based on outcome achievement:

Action: Physics and Engineering Technician

Hire a technician to maintain all equipment in the engineering and physics laboratory and to set up experiments for the engineering and physics courses.

Implementation Timeline: 2015 - 2016
Start Date: 01/01/2015
Completion Date: 08/01/2015
Status: New Action

Identify related course/program outcomes: All course-level outcomes in physics and engineering are affected by the time and effort required to maintain equipment and set up and take down experiments. A technician would allow more time for the faculty to work with students on the material being covered.

Program-level outcomes for both physics and engineering include a laboratory component and having a dedicated technician working with the faculty and the students would be beneficial in achieving these outcomes.

Person(s) Responsible (Name and Position): Robert Urtecho (Dean), Jesse Wilcoxson (Division Chair), Shirin Sadeh (Faculty), Larry Owens (Faculty)

Rationale (With supporting data): Laboratory safety is also an issue. A single faculty member with 24 to 30 students in the physics laboratory is difficult to maintain supervision of students performing experiments that involve electricity and/or rapidly-moving parts. A full-time technician could assist in the supervision of students in the laboratory to help maintain safety of the students.

Priority: Medium
Safety Issue: Yes
External Mandate: No
Action: Increase Physics Department Budget

Increase physics department budget by 100%.

Implementation Timeline: 2015 - 2016
  Start Date: 01/01/2015
  Completion Date: 07/01/2015
  Status: New Action

Identify related course/program outcomes:
All course-level outcomes depend on adequate laboratory equipment to give the students hands-on experience to relate to the material being covered in the lecture. One program-level outcome specifically addresses the need for adequate laboratory equipment:
Students will develop the ability to design and conduct experiments, as well as to analyze and interpret experimental data.

Person(s) Responsible (Name and Position):
Robert Urtecho (Dean), Jesse Wilcoxson (Division Chair), Shirin Sadeh (Faculty), Larry Owens (Faculty)

Rationale (With supporting data):
For the last few years, the purchase of equipment and supplies has not been a problem because funding from the PASEO grant has been available to purchase equipment for the physics laboratory. With the PASEO grant ending in September 2015, additional equipment money will be needed in the department budget, especially with the new PHYS 57 starting in Spring 2016. Since annual budgets cannot be rolled over, it is almost impossible to buy a laboratory set of any type of substantial physics experiments.

Priority: High
Safety Issue: No
External Mandate: No