

Annual Program Review 2011
Physical Sciences, Mathematics, and Engineering
Dean's Summary
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Despite significant cutbacks in B budget funding and the loss of classified assistance, both **PSME Division WSCH and enrollment have increased by 18% from the 07-08 to the 09-10 school years**. The PSME enrollments and WSCH have **continued their rise during the current year**, even in the face of significant overall college wide enrollment declines. We are now providing more than 29,000 enrollments per year. In addition to the large growth during this period, division **productivity has increased by 10%** to over 600.

This “**enrollment success**” has been the source of a **significant strain on our resources**. Human resources have been strained due to the necessity of recruiting, hiring, training, and evaluating new part-time instructors to teach the many new sections we have added during the past three years. During the past quarter, every full-time and part-time faculty member has maxed out in the number of assignments they are willing or (contractually) able to accept, and even finding substitutes has become a serious problem. Administrative tasks (especially heavy for new sections and new hires) have burdened our Division office staff, already stretched due to the absence of a permanent replacement for a Division assistant. Faculty and support staff are under increased strain with a significantly increased number of students per section (as our productivity has increased) and students and faculty further strained by the long waiting lists and unsatisfied demand in mathematics, chemistry, physics, and astronomy. Our funding has been strained as we adjusted to lower B budgets and ever tightening funding – causing difficulties in obtaining and maintaining necessary supplies and equipment, especially in chemistry and physics. Room availability has also become a limiting factor, especially obtaining computer equipped classrooms for the ever growing number of courses that use software to enhance student learning. Finally, it is difficult to consider the strain on our division for the past two years without mentioning the difficulties surrounding the Banner conversion. I would hope that as a district, we take a closer look at the Banner implementation and devote significant resources and thought to how the **Banner implementation can be improved**.

Nearly all PSME departments have undergone **large enrollment increases**; but three departments had exceptional growth over the three year period - **physics (33%), astronomy (21%), and mathematics (18%** of an already very large base).

This growth, during a period of reduced resources, has been approximately equal across targeted (underrepresented) and non-targeted populations alike, so that the approximate percent of targeted populations have remained constant.

Likewise, on a general basis, **student success and retention rates (%) have not varied significantly** over the recent three plus years of analysis, and **remain lower than one would wish for** – especially in the areas of math, engineering, and chemistry. In most cases a significant **equity gap** makes the problem even worse for targeted populations. There are exceptions; astronomy, meteorology, and geology have a significantly higher success rate than other PSME departments, and astronomy has shown a significant improvement in both general and targeted population success rates. Although mentioned briefly in the individual department reports, generally low success rate and equity gap solutions have (in the humble opinion) of the dean not been addressed to a degree that reflects their importance, and I would recommend that all larger departments, and a collection of the smaller departments assign specific faculty members to take the lead in a deeper analysis and discussion of processes that can effectively improve success, retention, and equity. Increased retention and success also decrease the number of repeat enrollments, and hence allow us to effectively educate an equal number of students in times of reduced sections and resources anticipated over the next few years. I also plan a future division meeting to further consider division issues of success and retention. During the past two years, the reorganization of the student success center, and especially **the development of a far more effective math, science, and technology tutoring and support program**, has begun to improve services to under-prepared students. The Title III math team has taken the lead in integrating those support services with classroom instruction, and I look forward to subsequent improvements in retention and success, especially in targeted populations, as a positive consequence. I also recommend that the excellent approach of the Title III math team be extended to other PSME departments, and that faculty in those departments work more closely with student success to improve our success. **Special programs such as enableMath, Math Performance Success (MPS), and software based modular review courses have been tried and shown to be very effective in increasing student success.** Unfortunately, lack of funding, resistance to integrated services, and other factors have reduced the potential efficacy of these proven solutions. The division continues to work to develop these programs and apply them on a larger scale. I would encourage funding and support for these very effective models.

Overall, PSME progress in identifying student learning outcomes and their metrics has been outstanding. Under the particular leadership of Barbara Illowsky and Ram Subramaniam, the division has completed a large percentage of its outcome assessments, and has begun an analysis and reflection on the results of their assessments. The division has worked as a whole to both complete the process and to obtain meaningful results that can truly be used to improve our efforts. There remain a few departments that lag in this process, and I hope to encourage individual faculty members in some of those departments to begin complete their assessments and to meet for serious discussions on the meaning and use of their results.

Department Requests:

Full-time/part time ratios for our division hover around 50%. The implication for the math department, which is relatively huge, is that many, many sections are taught by **part-timers**, with a **disproportionate number of basic skills classes taught by that group**. Lesser office hours, freeway flying, and the high turnover characteristic of part-time faculty generally result in less contact and service available to students. During the past three years, we have **increased the number of basic skills math classes from 7% to 22% of all sections**. Despite recent full-time hiring, the current 50% full-time ration, the **anticipated loss of at least two full-time math faculty members in the coming year, the number of full-time math faculty on reassigned time and professional development leave, and the 18% growth of math sections easily justify the need for additional full-time math faculty as replacements**. Without those replacements, we will still require repetitive recruiting, hiring, training, and evaluation of the very large number of part-time faculty required to maintain our math program.

As described earlier, **physics enrollment has increased by 33%** over the past three years. There are long waiting lists for almost all physics classes, and student difficulty finding enrollment spots in physics classes has become a roadblock that prevents students from attaining their transfer and vocational goals in a timely manner. This is especially true for high demand areas such as physics, engineering, and the bio/health sciences. **Physics productivity has increased by 21% to 728 in the past three years**, with instructors taking on larger and larger class sizes to try to accommodate the increasing demand. **I highly recommend that if growth positions are available, that physics be considered as a candidate for such a full-time position, and that Measure C resources be allocated to physics to replace current equipment and provide new equipment** that will enhance and modernize physics teaching on our campus. The requested equipment is also applicable to the earth and space sciences, and will enhance the cooperation and interdisciplinary interaction characteristic of these disciplines.

The unfulfilled demand for chemistry courses continues; almost all chemistry classes have very large waiting lists, and the backlog of students continues to pose a serious problem for transfer and vocational-tech students who require chemistry as part of their educational goal requirements. The chemistry department is right in pointing out that the bottleneck lies in lack of financial resources to support chemical supplies, lab assistance and management, and laboratory equipment and maintenance funds. I highly recommend that:

- 1) the \$38,000 **Measure C request for chemistry equipment (gas chromatograph, rotovap, PH probes, and NMR spectrophotometer be granted** to help meet the stated department objective of engaging students in

state of the art instrumentation and techniques”, and 2) the **lottery allocation be increased to provide the necessary chemicals and supplies** depleted through ordinary classroom usage and wear and tear, and 3) if possible, the department find suitable **work-study students and funding to help support the overburdened lab managers duties**. Although the need for such support is real, given the college’s present financial situation, it does not seem possible to hire a needed second full-time laboratory support person at this time.

During the past two years we have narrowed the engineering offerings to focus on the core curriculum. As a result of this focus on core, high demand courses, department productivity has increased from 393 to 533, a 36% increase. To better serve our students in this discipline, I would recommend that we enhance the involvement of part-time faculty and community volunteers and possibly make a cooperative effort with CIS/CMPSC to shift curriculum to better serve the high demand and interest in computer engineering and computer applications, including modern energy systems. We should also create closer cooperation with the thriving engineering club, develop partnerships with the local engineering industry, develop grant opportunities, and work more closely with the Foothill engineering department to avoid duplication of effort. I would also recommend the purchase of Measure C funded laboratory equipment that will enhance the hands-on and more engaging aspects of engineering curriculum.

The earth and space sciences (astronomy, geology, and meteorology) have maintained a pattern of growth (21% for astronomy, 27% for meteorology – the data for geology on the Institutional Research web site is for the incorrect time frame?) for the past three years, and have maintained exceptionally high and increasing productivities (1100 for astronomy and 1215 for meteorology) during that period. These departments also have high success rates. I would highly recommend the support of Measure C funding requests for these three departments that will enhance the new laboratory curriculum that has been introduced into these departments in the recent years. This equipment will help departments meet their stated student learning outcomes of providing a more hands-on experience that closely matches the needs and characteristics of their disciplines.