PSME Division

APRU 2012 PSME Deans Summary

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**PSME Departmental Level View:**

**Astronomy:** the astronomy department continues to attain a nearly 100% fill rate, has very large class sizes, and one of the highest productivity rates (1072) in the District. There is excess demand for the courses, but growth and access are limited by available instructors and room for the large lecture in the planetarium, which is shared with income producing community education programs. We have begun to move astronomy sessions outside the planetarium to free the planetarium for increased utilization of a limited resource. Limits in room and instructor capacity make it difficult to increase access or growth for targeted populations. The equity gap has increased slightly during the past year, and the department might review methods such as closer integration with tutoring and mentoring services to see if they might help decrease the equity gap.

**Chemistry:** The chemistry department has an extraordinarily high demand for all classes, with substantial wait lists on almost all of their courses. The department has not been able to provide the numbers of sections needed to meet this high demand, and this lack of capacity has had a serious impact on those wishing to enter academic or career disciplines in the biological and health sciences. Chemistry has become a bottleneck in the bio-health science pipeline, with some students having to wait quarter after quarter for entry into a chemistry class required for them to meet their academic goals. The lack of section capacity is due in some part to inadequate numbers of full time faculty and to losses of long-time part time faculty members. The department has completed a recent review of its yearly schedule and has altered its schedule to maximize room utilization. Lab courses are only run 4 days per week, and can be expanded to five days, therefore freeing up to 20% of additional capacity. Increasing class size is also possible - however, additional laboratory technical support is required to support these efforts.

**Engineering:** In response to previous program reviews the department faculty and dean have begun a comprehensive review of the engineering curriculum and offerings. The number of offerings have been significantly reduced to allow a more focused and effective approach to encouraging engineering enrollment and success. Curriculum and strategies that would better meet the needs of students considering entry into engineering disciplines were formulated. During the past year, with far fewer sections, most engineering classes were filled to capacity and the retention and success rates increased by about 2% overall and by 12% among targeted populations.George Krestas, the sole full time member of the engineering faculty, has continued to focus his efforts in teaching mathematics (where he is also qualified) while a newly hired part-time instructor has begun to teach Engineering 10 and 37 in accordance with the suggested changes in curriculum. We are currently working in conjunction with San Jose State University Engineering Department and regional industry representatives to find ways to further encourage engineering students and to assist them in basic skills development needed to guarantee their success. We have also made use of an active engineering club to provide mentoring and additional support and engineering related activities that encourage students (especially those in underserved populations) to pursue engineering. The club produced a large solar furnace made out of used CDs and has been actively involved in robotics and autonomous drone projects. These projects have not only generated strong interest among current engineering students, but have been helpful in recruiting other students on campus and providing them with a taste of the engineering discipline. The engineering club and their project are strongly supported by part-time engineering and full time physics instructors and by other community volunteers. We are also investigating ways to incorporate a cohort approach to engineering education and also mechanisms for extending tutoring and advising to engineering students.

**Geology:** During the previous three reporting years the geology program at De Anza has supported an enormous growth, including an overall increase of 76% in general enrollments and a 108% increase in number of targeted students participating. During the same period there was a concomitant 6.5 % increase in the success rate of the targeted population, resulting in a 19% decrease in the equity gap. During the most recent period, there has been a slight decline in overall enrollment and a small decline in the equity gap. In order to further address the equity gap, the department would like to encourage the use of tutoring, counseling, advising, and mentoring services; however, limitations on student support services make that process more difficult. The department is well along in the process of developing a transfer model curriculum in geology, and I encourage the completion of that activity. Improvements in streamlining the ordering and procurement process associated with already allocated Measure C funding would be very helpful in the necessary update of the geology lab facilities. Recent ETS update of classroom computer and display technology is beginning to improve effective delivery of key curriculum.

**Mathematics:** The mathematics department dominates the division in terms of courses offered and enrollment. Enrollment trends which have increased in the 4 to 5% range for the past few years have accelerated to more than 5% during the current reporting year (2011-12) and appear to be further accelerating during the 2012-13 academic year. Many mathematics classes continue to have large wait lists, but enrollment is limited by our inability to find qualified instructors and classroom space to accommodate student demand. Despite full-time faculty replacement hiring, the increase in demand has caused a further decrease in the per cent of classes taught by full time faculty. It continues to be extremely difficult and taxing on full time faculty and staff to recruit, hire, train, mentor, and evaluate the large numbers of part time faculty who have been hired to help match our enrollment needs, and many duties and obligations necessary for a smoothly functioning department and division have gone unsatisfied due to the large number of faculty teaching maximum allowable loads and the high proportion of part time employees. The greatest need for the department is for additional full time hires and for training and staff development opportunities, both for the many new faculty and other faculty desiring additional training in basic skills and other instructional techniques. In addition, the new growth in enrollment has been almost completely in the targeted student population, and the success rate of that subgroup has shown a 2% increase during the report period. Through such special programs as MPS and Statway, the department has the documented capability of significantly increasing success and retention rates even further; however, participation in these programs are hampered by limitations on recruiting, registration, scheduling, advising, counseling, tutoring and other student support services- all of which have been severely affected by budget cuts. I highly recommend the creation of a position of coordinator for special programs. This coordinator would have the ability to increase the scope and effectiveness of our special program efforts by providing assistance in integrating the various components (recruitment, scheduling, advising, etc.) necessary for a more efficient use of MPS and similar special program efforts. Finally, due to its large size and special requirements for printing and copying exams and other assessment materials, the mathematics department will be especially hard hit by changes in materials fees policies. An effort to provide alternative (non-paper) delivery of online quizzes, tests, and other assessment documents as well as electronic delivery and ubiquitous printing of required classroom worksheets should be made, and the necessary support and training for faculty and students is also critical.

**Meteorology:** During the previous three years there had been an overall growth in enrollment of 17% and a growth of the targeted student population of 29%., though during the current report year the enrollment has dipped by about 13%. The department has had problems finding effective part time instructors, and much of the enrollment decline is related to this inability. The department continues to search for new part-time instructors and to provide mentoring and guidance to current part-timers. The extraordinarily high productivity (908) and high retention (95%) and success (82%) rates continue, though there has been a sudden and significant decrease in the success rate of targeted populations. During the recent past the department lost a key part time member, and there was a clear and significant impact on enrollment and success. The department coordinator, Paul Olejniczak, has been involved in national curriculum standards efforts, and has developed an excellent new lab curriculum that matches the new national standards. We hope to implement the lab in the coming year and provide a much needed laboratory experience for students. Integration of the laboratory experience is important from a pedagogical point of view and is attractive to students as a means of satisfying their transfer laboratory science requirements. It is also hoped that the new lab and increased mentoring efforts with part-time instructors can restore the previous exceptional success and retention rates among targeted as well as non-targeted students.

**Physics**: Enrollments in physics has decreased a small amount (1%) from the previous year, with retention and success rates remaining essentially the same as in the past. Reductions of very large class sizes in some sections were purposely initiated, but the overall productivity remains relatively high at 747. The changes in enrollment are mainly due to the initiation of automated prerequisite clearance, and the department and campus Curriculum Committee determination to enforce more rigorous mathematics prerequisite standards than are usual at other colleges (including Foothill). We believe the enrollment will rise slowly over the next few years as students become more aware of the need and reason for these more rigorous standards and begin to enroll the necessary mathematics prerequisites. The department has particularly suffered from the elimination of the physics technician position. This has hampered the design of laboratory experiments, the repair and maintenance of laboratory facilities and the ordering of already allocated Measure C funded equipment purchases. The lack of a physics technician has also placed a severe strain on the ability of instructors to perform in class demonstrations, since it is almost impossible for an instructor to move the demonstration apparatus in and out of the classroom and calibrate and set it up so that it can be used during a class session. This has had a serious and significant effect on the quality of physics instruction, and I highly encourage restoration of funding for this position as soon as it is financially feasible.

**Division Wide View:**

**Enrollment**:

Overall **Enrollment** in the Division has **increased** from the last report year (2010-11) to the current report year (2011-12) by **2%,** despite the overall College decline in enrollment during the same period by 2%. This follows a pattern of continuous Division enrollment gain of more than 20% over the past 5 report years. Preliminary data for the next (2012-13) year show yet another significant rise in enrollment on the order of 5%. In addition to the high per cent gains, the large absolute size of the Division means that these percent gains correspond to very large gains in numbers of enrolled students and WSCH. The Division is now the largest by WSCH in the District. Division **productivity** overall is high, especially considering the large number of developmental level courses offered. Physics (**747**), meteorology (**908**), and astronomy (**1072)** are particularly highly productive.

Despite a high demand in almost all courses (with continuing significant wait lists in astronomy, chemistry, mathematics, and physics), the **limiting factors of faculty and room availability** continue to be responsible for capping our enrollment.

In the mathematics department, which accounts for roughly ½ of total Division enrollment, for the second year in a row every faculty member (both full and part time) was maxed out in the number of classes they could (by contract or desire) teach. Similar situations occurred in chemistry, meteorology, and physics. Similar factors affect astronomy, chemistry and physics. The resignation, retirement, and other loss of faculty (especially in mathematics and chemistry) added to the difficulty of meeting student demand. Recruiting, hiring, training, mentoring, and evaluating new instructors to meet the enrollment demands continues to place an onerous burden on existing faculty and the Division Office staff and limits the number of sections that can be offered. During the last report year, in order to maximize fall and winter sections, part time faculty were offered opportunities to complete their total yearly load during fall and winter quarters. In order to compensate, the Division hired twenty three brand new part time faculty members to teach in spring quarter alone. Despite the hiring of replacement faculty in mathematics and chemistry at the end of that year, further increases in enrollment have again led to a similar situation this year (2012-13), and over 40 new part-time faculty have been hired to meet the increased student demand. Overall, our Division has a **38%/62%** **full time to part time ratio** (i.e. only 38% of all Division courses are taught as full-time load. Developmental level courses are disproportionally taught by part-time faculty, and for those courses this ratio is much lower. The large numbers of part time faculty and full time faculty teaching multiple overloads has a serious impact on our ability to carry out the many non-teaching duties required for a smoothly functioning Division (including such tasks as committee membership and SLO and program review obligations. Reductions in office staff as well as in registration, assessment, and scheduling will have a further severe impact on our ability to find and support additional faculty and courses.

In addition to enrollment limitations due to the lack of additional qualified instructors, classroom availability, especially for the very large (70 to 140) student classes in astronomy, meteorology, and physics prevented offering additional sections of those highly productive courses. During the past program review we suggested a college wide comprehensive review of **room utilization** to address limitations on enrollment caused by lack of room availability. The Astronomy department is currently experimenting with a model that utilizes other large classrooms as a meeting place for astronomy classes on some meeting days. This policy frees the Planetarium for additional sections of very large (140+) Astronomy classes. I have also met with other deans to try to more efficiently match classroom size to course capacity. We have had a limited success with this approach; however, further work on campus wide room scheduling and allocation would be very helpful in increasing our enrollments. This need is even more critical in times during which campus remodeling has further reduced classroom space. We have also reviewed our chemistry laboratory usage patterns and class capacities and have recently revised our longtime chemistry scheduling patterns to make greater use of the relatively scarce laboratory resources. Unfortunately, at the same time we have made a significant effort to increase the size and number of our classes, concurrent budget reductions have reduced our classified staff and our ability to support those enrollment and section number increases. Finally, the recent exponential increase in the number of mathematics sections that utilize online and other computer based teaching tools has created the need for additional laboratory facilities. This requires the addition of laboratory equipped rooms, computer and network facilities, and support staff required to set up and maintain those facilities.

**Retention and Success:**

Despite the demands of continued Division growth rates at a time of reductions in support, **retention and success rates** remain the same over the whole division, with a small (1%) increase in success of non-targeted populations. There has been a significant increase (from 50% to 57%) in the success rate of Pacific Island students, a group that has recently begun to be served by the Math Performance Success (MPS) program through the support of an Asian American Native American Pacific Islander Serving Institution (**AANAPISI**) grant. There have been clear and statistically significant gains in success rates in mathematics by Filipino, and Pacific Island students (as well as for Latino students who may have benefited from the additional MPS sections supported through the grant). The mathematics department has shown overall gains in success in targeted, non-targeted, and all ethnic subgroups. Although the department’s success rate far exceeds state and national averages (63 % vs 55% statewide), we need to continue our efforts to improve student success in this discipline which is a critical to overall student transfer and completion. Particular attention has been focused on providing tutorial, advising, and counseling support in mathematics. Programs such as Math Performance Success (MPS) have been documented by published institutional research to be especially effective in improving student success, with course success rates over the past 15 years of the program’s existence to be from 12% to 25% higher than the corresponding non-MPS courses. During the past two years the program has been slowly expanded, but limitations of qualified instructors, room facilities, counseling and advising, tutoring, and recruiting and coordination support have kept the program from reaching its full potential. It is frustrating that the College has initiated and maintained a nationally recognized program that is able to provide the elements of success for improvement in developmental mathematics, yet lacks the resources needed to expand its scope to reach a wider number of students. Efforts continue in the area of engineering education to revamp the curriculum and provide additional support for students interested in pursuing studies in engineering (see discussion below). The recent reorganization of the Student Success Division continues to enhance our ability to provide tutorial and mentoring services to struggling students, and we believe that the results are beginning to pay off. Our Division has made a concerted effort to closely integrate our activities and curriculum with the Math and Science Tutorial Center. Many of our faculty have volunteered to hold office hours in the tutorial center and provide additional support to all students while there. We have also worked closely with both the Assessment Office and Tutorial Center to provide improved advising and preparation for placement testing and to provide review modules to supplement classroom instruction and worked with the Disability Support Services office to improve success rates for students with disabilities. The science faculty have also been active in recruiting tutors and have enhanced non-math tutorial services significantly. We have a grave concern that as funding resources become more and more stressed, that reductions in secondary student support services such as tutoring, advising, counseling, and assessment will reverse the difficult progress we have made in the area of student success. We would like to expand our successful efforts at increasing success (especially for targeted populations) by increasing access to tutoring, mentoring, advising, and other student support services shown to be effective in improving student success outcomes. We encourage any college wide effort to provide expanded student services to other STEM areas beyond mathematics, and believe that such an effort would be effective in improving student success in those disciplines as well.

Although there has been a Division-wide decline of about 2.5% in *non-targeted* students, the numbers of students in *targeted populations* taking courses in our Division has increased nearly 13% over the report period. Thus, the growth of our Division as a whole has been due to this surprisingly large increase in targeted students. During this same time period, the overall Division success rate has remained the same, although in the area of mathematics there has been an increase in success rates in all subgroups. Despite significant increases numbers of targeted students and despite increases in their mathematics success, the wide equity gap between targeted and non-targeted students remains essentially the same. For example, both targeted and non-targeted math students raised their success by 2% with the result that the gap also remained constant at 15%. Once again, we hope that increased efforts in the areas of tutorial, advising, counseling, and assessment support services aimed at specific targeted populations will assist in reducing the success gap. I believe that we also need to provide increased staff development activities that directly address STEM specific curriculum and encourage classroom techniques that have been demonstrated as effective in improving the success rates of targeted groups. As mentioned earlier, special grant funded efforts aimed at targeted Asian and Pacific Island populations have shown that they are effective at reducing the equity gap for those groups. We need to widen those efforts to reach other under-served populations.

**SLO Efforts**

Progress on SLOACs and PLOACs are advancing, though as mentioned before, the high proportion of part time faculty and full time faculty teaching multiple overloads has had a significant impact on the time available to complete these critical tasks. Our Division expects to complete all required SLOAC activities before the end of spring quarter.

**Laboratory Facilities**

Continuous budget reductions during the past five years have had a significant impact on our Division. By their very nature, the physical sciences require the use **of laboratory equipment and supplies** as a fundamental part of their pedagogical approach. The existence of a dedicated equipment budget was eliminated before my tenure as a dean, and our operating (B) budget has declined in the recent past through the elimination of so-called supplements. Our Division was unable to spend a large part of the first tier of Measure C funding due to the prioritization of large capital project spending, issues with the introduction of the Banner financial system, and subsequent Measure C purchasing freezes. We continue to have difficulties making Measure C purchases even though funds have been allocated. The reduction in our technical and division office support at a time of increasing enrollment has made it difficult to specify, complete, and track purchases. Similar reductions in purchasing support at the District level and changes in the purchasing procedures and software has substantially slowed the process. We need a more streamlined and effective means of expediting these critical operations. A large amount of the chemistry equipment is in need of repair or renewal. The physics and geology laboratories have not had any significant update or repair in over 15 years, and much of the physics equipment is more than thirty years old. Although funding for these facilities have been allocated, the difficulties with the Measure C purchasing process and the reduction in technical support personnel continue to severely hamper our efforts to improve this situation.

**Materials Fees:**

Changes in materials fees policies will have a significant effect on several departments in the PSME Division. Those departments most affected include astronomy, geology, physics, and especially mathematics. The nature of laboratory instructional material, math practice worksheets, and the large number and size of quiz, exam, and other assessment documents necessary for quality instruction in our Division will require that alternatives to traditional copying and printing are developed, and a well-planned effort and college level resource allocations will be required in order to meet these needs. Our Division highly recommends the development and support of a standardized course management system that provides the necessary tools to electronically distribute course documents and that provides an opportunity for non-printed assessment methods. In addition, a ubiquitous and efficient student printing capability is needed to allow students to print necessary materials in a convenient manner. Faculty and student training will also be required to implement these facilities, and they need to be available and tested as soon as possible so as to not interrupt our educational efforts.

**Personnel:**

In the area of **personnel**, the Division we continue our need for additional full time faculty positions; especially in the math, chemistry, and physics. We are clearly aware of the dire financial circumstances facing the College and are realistic in our expectations; however, to just maintain our current enrollment and retain a modicum of excellence, at a minimum we require replacement positions for faculty who have left or will be leaving in the coming year. In addition, if we wish to continue the successful pursuit of enrollment growth in math, chemistry, astronomy, and physics and meet the high student demand in these areas, we really need additional growth positions. Despite the College’s continued support for replacement faculty in our Division, the continuing high enrollment growth, especially in mathematics and chemistry, has outpaced the replacements and continues to lower the Division’s percent of classes taught as full-time load, which is at 38% for the current reporting year and has fallen even further during the 2012-13 time frame. This low FT percentage has a significant impact on the number of faculty available for the many necessary non-classroom duties such as serving on committees, developing curriculum, mentoring, etc. and on the overall quality of our educational effort.

Recent and future losses in technical support personnel are also **negatively affecting our operations.** The loss of a physics technician position has made it difficult to specify, procure, and maintain critical physics laboratory equipment and made it very difficult to do classroom demonstrations – a very traditional and necessary part of physics teaching.

Finally, if we are to truly support efforts to increase student success and retention and decrease time to successful completion of student academic goals we need to support the programs that have clearly demonstrated success in these areas. The MPS and Statway Programs are two programs that have done exactly this. During the past year, reductions in counseling and advising support have caused us to shift the burden of recruitment, scheduling and coordinating these programs from the counseling and advising offices to our Division Assistants. Given the reduction in our Division Assistants during the next year, we need a coordinator who can take on these duties. I would strongly urge that we establish a position that will be responsible for recruiting students, and coordinating the scheduling, faculty, advising, and tutoring that make MPS and similar programs so successful. Without such a position, I fear that the programs will no longer be viable**.**

**Division Summary of Needs**

* More Full Time Faculty
* Increased Support Personnel
	+ MPS/Special Programs Coordinator
	+ Physics technician
	+ Additional chemistry technical support to allow growth in classes
	+ Restoration of Division Assistant support
* Streamlined Measure C purchasing
* Additional mathematics laboratory facilities
	+ Dual purpose classrooms
* Adequate printing and copying support
	+ Unified course management & other technical facilities that reduce paper usage
	+ Training and professional development for electronic course material distribution