

## PSME APRU 2016-17

### Dean's Summary

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#### **Astronomy:**

Enrollment in the astronomy program has declined about 3% over the past three years corresponding to a period of 5.4% overall campus enrollment decline. Most of the decline occurred in the past two reporting years and corresponds to a 7% decrease in the number of sections offered. This decrease in sections is a result of the reduced availability of qualified instructors through retirement and negotiated changes in course load which reduced the number of sections that can be taught by part-time faculty. Since single astronomy sections contain up to 140 + students, even small changes in the number of sections can have enormous enrollment effects.

The issue of declining enrollment in the face of continuing high student demand is a common theme that seriously affects several PSME departments. The affected departments are not limited by student demand but by the inability to recruit qualified faculty in that discipline. During the current year we attempted to find a full-time replacement for a recently retired instructor who taught in both meteorology and astronomy, however, we had no success in finding a replacement qualified in both disciplines. As a result the new full time faculty was hired for meteorology alone. Although meteorology also has a high student demand that is able to support a full time instructor on its own, the hire reduced the availability of astronomy faculty. The problem will be even further exacerbated in the near future as another senior astronomy faculty member has announced his retirement plans. In addition, negotiated course load increases in astronomy and meteorology reduced the number of annual sections we can offer to the few qualified part-timers we do employ.

The success rates of the department remain very (81%) and the equity gap has decreased, though it still remains at 12%. The department provides students with a general education laboratory science, and serves a wide variety of students, 37% of whom are in targeted groups – this is well above the campus average. Despite the high overall success rate and the slight reduction in equity gap, the department and division needs to (and will) continue to focus on strategies that further reduce that gap. Professional development activities that focus on very specific and practical strategies for reducing the equity gap are needed.

The department has requested equipment funding to purchase a small telescope and spectrometer. The total amount requested is \$3,210. The equipment will provide hands on experience for the large number of students in astronomy classes, will significantly enhance their experience and engagement, and will provide an approach that appeals to a wider spectrum of student learning modes by supplementing text and lecture materials.

#### **Chemistry:**

Chemistry enrollments have remained at almost a constant level throughout the three year reporting period. Enrollment each quarter remains very close to 100% of the section capacity, and very large waiting lists for chemistry continue to demonstrate an excess of student demand. As in several PSME departments, enrollment growth is limited by internal college resource limitations (faculty, staff, and facilities) rather than by demand. Many students, especially those in the biological and health sciences, complain of having to wait several quarters in order to gain entry in chemistry courses required to

complete their degree and transfer requirements, and our offerings continue to constitute a bottleneck to their educational goals.

Overall chemistry success rates have increased significantly over three years to 80%, and the equity gap has shown a moderate decrease over the same period, ending at 11% for the last reporting period. Once again, though these numbers are relatively positive, further professional development that addresses specific equity enhancing strategies relevant to laboratory science teaching is needed.

I see four major areas that need to be addressed that would significantly enhance our chemistry program:

- 1) Health and safety: we are finally making some progress in training and supporting efforts in chemical hygiene (health and safety). We have been working with the District to develop a chemical hygiene plan; however, the District has placed additional burdens (both in staffing, training, and direct costs) on our department. Traditionally, the District Office of ... has been responsible for maintaining district wide standards of health and safety, but recently they have placed a growing reliance on the individual departments to provide the resources (for example staffing a "chemical hygiene officer") needed to maintain these standards. In the near future, a decision on whether these resources should be supported at the District level or within individual departments must be made at higher administrative levels, and if the departments are to bear those responsibilities, additional funding and staffing will be required. The department has requested an additional \$6,000 - \$10,000 to address these needs, but I believe the issue of District responsibility should be resolved and specific financial costs established before committing to this financial burden. I do strongly support an increase in professional development funding for the department to address the need to provide health and safety training for the large number of part-time instructors that we employ in the program, and would recommend an increase of \$2,000 in B Budget funding per year to provide stipends to part-time faculty who participate in such training.
- 2) Enrollment and program maintenance: in order to maintain our current levels of service, the department requires additional full-time faculty and some additional funding to support equipment repair and maintenance. In the past two years, the department has lost two full-time faculty members through retirement and resignation. IPBT has authorized one full-time replacement for these two positions, but the second position was the first after the hiring cut-off. The loss of this position is a severe hindrance to maintaining our current levels of offerings. It severely limits faculty available to participate in the activities (such as curriculum, committee membership, planning, equity planning, etc.) Given the strain due to the very large student demand and the critical importance of the program to many of our students, the reduction of full-time faculty by more than 16%.
- 3) Enrollment growth: the chemistry department has provided a well-thought out expansion plan (outlined in their Program Review) that would enable increased growth to meet the clearly established excess student demand for chemistry. If additional enrollment in chemistry is a strong priority, I strongly encourage the acceptance of their plan and the necessary additional staff and faculty position and the laboratory facilities necessary to support it.
- 4) Equity work: I believe that we need to do a better job of increasing the number of targeted students participating in chemistry related programs and reducing the current equity gap of those that do participate. The new inquiry tool provides a much clearer and precise view of our equity efforts – there is great variance from course to course in participation and equity, and these issues should be addressed at the finer level.

The department has included an equipment request of well over \$60,000, and listed several other substantial funding requests for safety equipment, maintenance, and other activities that bring the total requests to more than \$120,000. This is a very large amount relative to the total resource needs of our Division and the College as a whole. I have asked that the equipment and supplemental requests be further refined and categorized into that required for current operations, that required to meet the proposed expansion plan, and that which would further enhance the department offerings. I would recommend funding items in the first category, recommend funding the second category if the campus determines that further expansion of chemistry is a priority, and recommend a phased funding for the third category. The department does need replacements of the flammable/corrosive materials storage cabinets, and their request should be added to equipment needs. Finally, I strongly support the need for additional "B" Budget to provide for the maintenance and repair of our current equipment. Funding for maintenance and repair is not allowed in the current equipment allocations.

### **Engineering:**

As described in the department program review, engineering enrollment more than doubled during the three year review period. The engineering program continues to have a very great potential for growth, and is now limited by the lack of any full time faculty member who can take responsibility for the necessary program development, SLO and curriculum coordination, recruitment, and scheduling as the program reaches a larger scale. In addition to an astounding enrollment growth, the department has very high success rates (87%) and has a demonstrated a relatively small equity gap of 4 – 7% during the past few years. The department, like similar programs across the U.S., still struggles with a highly skewed gender balance, and is working with the STEM Director on strategies to attract more women into the program.

The department is in need of basic laboratory equipment. Small quantities were purchased when the program began its recent growth, but large, continuous growth over the past 5 years has increased class enrollments and the number of sections, and additional lab stations are required. The department has requested equipment funds of \$13,200, which I strongly support. The department also would like to have the obsolete computers in S48 replaced by laptops, which would more flexibly accommodate lecture/laboratory situations and would best meet the specific software requirements of their laboratories.

The engineering department is also pursuing the development of an engineering technology program as part of the State workforce training initiative. Department part-time instructors and I are in discussions with representatives from an engineering technology program at SJSU and with several regional companies to determine if a cooperative effort is feasible.

### **Geology:**

The department has experienced a significant enrollment growth of around 13% over the past four years and a good growth during the past report year. Part of the success has been due to the addition of online oceanography offerings, which may still have room for growth. The department might also consider extending their online geology course, which coupled with an in-class laboratory, might provide an attractive opportunity for students. Success rates have fluctuated, but are relatively high for a science class. Targeted groups make up 39% of the department's total enrollment, exceeding the overall proportion in the college population. Overall success rates are high for the sciences and the equity gap, at 11% is similar to the overall college value but still needs additional attention. The requests for equipment are well justified, and I believe would enhance the program, aid in student recruitment and, through more hands-on activity, promote student retention.

**Mathematics:**

Enrollment has increased over the past four years by 3.2%. The enrollment increase has been continuous for the past 10 years, with the single exception of the past reporting year. Despite excess demand indicated by the long wait lists during the one year of decline, enrollment was limited by the sudden negotiated reduction in class size of all basic skills sections and the inability to find sufficient qualified instructors required to enroll those students displaced by the smaller class sizes. We offer approximately 240 basic skills sections annually, each of which could enroll 5 less students starting in the 2015-16 year. That resulted in 1200 student displacements, and although faculty often took extra students, without a significant number of new faculty and classrooms, we could not offer those displaced students a class. We have made a continuing effort to advertise for additional part-time faculty, and have sent solicitation emails to all math faculty members from seven regional community colleges and faculty and graduate students from five regional universities, but have failed to attract sufficient instructors to meet our student demand. The problem has been exacerbated by retirements and resignations of full time faculty and the very large number of full-time faculty who are not teaching due to leaves or alternative assignments. As is the case in astronomy, chemistry, and meteorology, the lack of sufficient full-time instructors prevents us from meeting existing student demand, prevents us from taking advantage of available growth opportunities, and inhibits the supporting activities needed to ensure smooth and effective department operations. If the college wishes to increase enrollment, an investment in additional full-time faculty in these disciplines would be a wise strategy. Students enrolled in these high demand math and science courses also enroll in other classes, and the lack of sufficient mathematics and science sections is a serious bottleneck for enrollment in other college discipline areas. Students enrolled in high demand classes could be polled and solicited to enroll in other courses.

I have recently met with representatives from Human Resources and the Foothill PSME Dean (who is experiencing similar issues) to formulate strategies for improved recruitment and training of new part-time faculty. Some ideas include regional "re-employment preference" agreements, cooperative agreements with University education departments, retraining of retired engineers and scientists, etc., but these are long term solutions. Furthermore, employing large number of part-timers with its concomitant recruiting, hiring, training, mentoring, and evaluating duties, has put an enormous strain on our Division. Many of the best part-timers are soon offered full-time positions at other institutions, and the process has to be continuously repeated. Once again, if enrollment is an important District goal, the hiring of additional full-time faculty in high demand disciplines would be the most effective way to reach that goal.

Overall success rates in mathematics have increased marginally, and although much higher than state averages, still remain around 65%. The equity gap has also remained constant at around 18%. During the past year we have received a very large three year grant to expand the MPS and Statway programs, both of which have very significantly higher success rates and near zero equity gaps. We hope to apply some of the strategies that make these programs successful to the general math department offerings. In order to do so, we need additional counselors who work with all of our developmental math students, not just the relatively few who can take advantage of those special programs.

In order to better address equity and other professional development needs we would like to request \$5,000 in professional development funds to offer special activities for part-time faculty to better prepare them in basic skills and equity training specifically geared to the mathematics classroom.

Finally, the department has requested funding for a three year replacement plan that would supplant current large computers with laptops capable of running the specialized mathematics, science, and engineering software used in those labs. These labs are already or will soon be eligible for replacement under existing campus criteria. Rather than request direct funding in the Program Review, I would recommend that IPBT assist with ensuring that a priority is assigned to these refreshes under current District policy.

**Meteorology:**

Enrollment in meteorology has grown by over 33% in the past four years. A significant portion of this growth has been due to the introduction and expansion of on-line offerings in the department, and the numbers of targeted student enrollments has increased by over 100%, far overshadowing the growth in non-targeted groups. Success rates, already high, have climbed even higher and reached 89% overall in the most recent reporting year. Unfortunately, the growth of the online program also appears to coincide with a significant increase in equity gap, which in the past was nearly zero. I will be reviewing the new inquiry tool to further examine equity patterns and work with the department to address this change.

Looking forward, the meteorology department faces some very significant challenges in regards to enrollment. The retirement of Paul Olejniczak has had a huge impact on enrollments during the current 2016-17 year, so there will be a significant drop in enrollments reported next year since we were able to offer far less meteorology sections. Individual Meteorology sections had 70 or more students so that even the loss of a few sections had a large impact. Furthermore, we department enrollment has been significantly affected by the recently negotiated change in course load for meteorology courses. As a consequence, our one instructor qualified to teach online was not able to teach as many sections during the current 2016-17 year, and the subsequent drop in enrollment will appear next year. On the positive side, we have hired a new full-time replacement for Paul (Terrence Mullens), and he has started teaching in spring of this year. This should help mitigate the otherwise drastic enrollment drop, and provide the support and leadership needed to continue past growth and activities as he begins his tenured duties in in fall 2017.

The new meteorology instructor has requested \$5,150 of equipment funds to purchase hand-held measuring devices for use in the meteorology laboratories. I strongly support this request as we continue to develop a more hands-on approach to science teaching, an approach that is more engaging to students and develops a wider appreciation of the impact of meteorology on students' lives.

### **Physics:**

There has been a continuous physics enrollment growth during the four report years, with an overall increase in enrollment of 17% during that time frame. During the same time period, full time instruction has decreased by 17%, placing a greater and greater burden on the full-time faculty for departmental duties and operations and significantly increasing the amount of effort required for faculty recruiting, hiring, training, mentoring, and evaluation. In addition, the physics department is handicapped by the past loss of a full-time technician who helped prepare and maintain physics equipment and supported the program in many other ways. Success rates have varied during the past few years, but remain nearly the same at the current value of 64%. The equity gap has also remained approximately the same, with a slight improvement to its current (2015-16) value of 13%. Targeted student enrollment has grown by 13% over the four report years, but those students are still significantly underrepresented in the program at only 15% of total enrollment.

Like other PSME departments, physics has demonstrated a strong positive enrollment increase during the review period, and is limited in future growth by the lack of additional full-time instructors. An additional full-time faculty position would not only enhance enrollment, but would enhance the services and quality of instruction available to students. In addition, the reinstatement of a physics technician would further extend our ability to increase enrollment and enhance the educational experience of students. The physics department has requested equipment funding of \$8,600. I strongly support the allocation of the requested funding, which will both replace worn and broken equipment and provide appropriate experimental equipment needed to support the growth and curriculum development of the past 10 years.

### **Recap:**

- Almost all PSME departments have had significant enrollment increases during the four report years
- Almost all departments have excess student demand beyond what can be sustained by their current resources, and are limited in additional enrollment by access to qualified full and part-time faculty. This is particularly acute in astronomy, chemistry, and mathematics, but is to a lesser extent true of engineering, meteorology, and physics. The allocation of new full-time instructors in these areas would be a good investment if the College wishes to pursue enrollment growth.
- Our growing reliance on part-timers places a tremendous burden on our existing faculty and staff – as we struggle to continually recruit, hire, train, mentor, and evaluate new part-timers in all departments, but especially in math, astronomy, chemistry, meteorology, and physics
- Our success rates, generally very high by comparable state standards still have room for improvement, and our equity measures are stubbornly persistent. We would highly benefit from an allocation of professional development funds on the order of \$5,000 for the whole division to be devoted to training designed for improving teaching basic skills and addressing equity and specifically oriented to strategies appropriate to STEM classrooms. We would also benefit from having one or more STEM counselors in addition to those already committed to the MPS program (which serves only a tiny per cent of our total enrollment).
- Equipment and computers are an integral part of our teaching environment. Most departments have requested base level equipment needs, and to the degree to which it is possible, I would strongly recommend allocation of funds for this purpose. In the case of the chemistry requests, I believe that a portion of the requests that address immediate replacement needs for worn and broken equipment should be allocated and that additional requests be phased in over a three year period. I would

appreciate assistance in ensuring that the update of obsolete computer laboratories be prioritized and implemented under what I believe is current District refresh policy. These computer labs are especially critical to several of our programs.

- We continue to expend a relatively large amount on printing and copying. Despite a very strict regimen of cost controls and electronic distribution, we still need to copy and print quizzes and exams. Additional printing funds to support our continuing enrollment growth would be appreciated.