

We departed our brief two-day visit of the Cal Poly Pomona physics department with a great deal of admiration and respect for the commitment of the physics faculty, lecturers and staff to providing and supporting excellent teaching. The department prides itself on the care it takes in preparing its classes, the time it devotes to its students at all levels, and its excellent student evaluations. All concerned remarked repeatedly on the positive collegial relations and friendly work environment that exists in physics.

Centering faculty activities on pedagogy has been historically a successful model for running the department. All ranks of the current faculty are dedicated to teaching excellence; indeed, most said they came to Cal Poly because of it. The junior faculty were no different and strongly support this notion but noted they were attracted to Cal Poly also for opportunity for professional growth and creativity in their respective scientific fields—these young-to-the-department faculty are excited and motivated by the chance to build laboratories, do research, and include students in the endeavor.

Heavy teaching loads, however, have had a severe negative impact on the department and morale is currently low. It is difficult for junior faculty to find fulfillment in their professional endeavors in the current environment, and their lack of time and resources to undertake them is a source of much frustration. With a 12 unit teaching load and some 90% of faculty effort committed to the lower division service courses, the department is in danger of collapsing into a community-college mode. It is critical that the faculty explore with the dean and the administration all opportunities to move the department—especially the junior members—towards a 9-3-3 (teaching-assigned time-service) workload for active faculty.

Parallel to these efforts, it is crucial the faculty with the dean develop strategies to secure the space and the laboratory resources essential to active laboratory-based research programs. The reviewers certainly view this as a two-way street: it is essential that new and current-junior faculty secure external funding and that the dean supports their efforts with matching resources. The reviewers note the common snafu within the CSU system that departments and colleges with large lab-based service components should somehow fund the necessary lab equipment internally, and Cal Poly physics is no exception. The practice, however, of faculty overloading their lectures with FTE to recover money to fund lower-division *service-course* lab equipment is above and beyond the call of duty and unheard of in the physics programs familiar to these reviewers in our many years of collective experience.

For the physics faculty, heavy teaching loads and resource allocation are clearly the central concerns. The department has higher teaching loads than is typical for the CSU system. Its average SFRs over the last decade are about 20, placing them near the highest in the CSU system. The current consequence is that the faculty spends a large fraction of their 12-unit workload teaching lower-division service courses with a corresponding toll

on professional development and morale, especially among the junior faculty. In an effort to address the heavy teaching load, and in response to the 1990 WASC review, the department states that it has (i) reduced the scheduling frequency of upper-division labs, (ii) scheduled lectures in the largest rooms available and not capped enrollments, (iii) redesigned existing classes to appeal to a larger group of students, (iv) begun developing new large enrollment GE classes, and (v) implemented a dynamic scheduling system that allows them to run service lectures and labs with as few empty seats as possible. The department feels that these steps have led to potential improvements in teaching loads, but that the administration has not allowed them to keep the savings at the department level. We also note in this regard that currently both physics lectures and labs are running above CSU target capacities: service-course classrooms are over 80% full—the CSU guideline is 66%—while labs are over 95% full—the CSU guideline is 85%.

The dean, on the other hand, feels that additional and more efficient means can be employed by the department to allocate faculty time.

In fleshing out these issues for ourselves, we have reached a few conclusions and would like to make the following recommendations that the department, and especially its junior members working closely with the dean, might consider over the short haul.

(1) The department should draft a mission statement and a five-year plan, mindful of the pending retirements and heavily weighted towards the input of junior faculty and the new hires.

The focus should be on strategies that foster externally funded research among the junior faculty and the new hires. The junior and new faculty, including those recently hired or tenured, will be the ones who must implement and live with the vision, and their input should be given high priority and the support of their senior colleagues.

(2) The department should focus new hires over the next five years in experimental physics with junior faculty given a strong voice in the process.

The department should carefully consider the disadvantages of maintaining a more pedagogic focus versus hiring faculty who will want to spend more of their efforts building laboratories and involving students in their work.

We strongly feel that new hires for the time being should be made in experimental physics. Young experimentalists currently active in postdoctoral research will bring a great deal of energy and technology to the program to build new laboratories and seek the external grants and resources to equip them. Their involvement in the department and expertise with modern technology will nurture the entire curriculum and, with student involvement at all levels of their research, thus will foster a modern curricular perspective that ultimately distinguishes successful university programs from community colleges. An ac-

tive program of this sort provides enormous opportunities for students at all levels and in turn attracts more students to the major. Of course, experimentalists require commitment of dedicated lab space and start-up funds, and the department should be prepared to share these commitments with the dean.

We also believe a balanced physics program requires theorists, and they certainly contribute in key ways to the university experience as well as to teaching in and out of the laboratory. However, in the short term, we just don't see a pressing need in the department for theorists. More importantly, hiring theorists in lean years for purely fiscal reasons would appear to indicate a lack of mission and strategic planning.

To maintain current momentum in the program along these lines, and to boost morale and foster planning for the future among junior members, we suggest that upcoming search committees should be composed of mostly junior faculty with, for example, a senior member of the department serving as chair.

(3) The department will need to revise its RTP document to be in line with their new mission statement and long-range plan.

The RTP document should be updated to provide encouragement and incentives to junior faculty to build their research programs with strong student involvement as well as external funding. Currently, the document is weak in this regard.

(4) New communication channels need to be established between the junior faculty and the dean, and among junior and senior members of the department. The department should have a retreat.

Despite the exceptional collegiality expressed by everyone we met in the department, as well as strong accolades across the department for the dean, we found discussion across the department and with the dean regarding mission and planning to be somewhat stifled and dysfunctional.

Everyone we met with spoke highly of the dean's past support and efforts to maintain a 9-3-3 (teaching-assigned time-service) program plan, and the dean affirmed to us his commitment to find resources for the program, despite budget constraints. Nevertheless, the department believes that the administration's promises for earned resources have not been kept, and that the very high departmental teaching loads are the result of administrative dictates. The dean sees things differently and, importantly, that he has kept his promises.

We might note here that the department has a long-standing Budget and Planning Committee which needs to be more accountable and informed regarding the allocation department resources. They are now too reliant upon the chair. Department funds and spending

were a fuzzy topic at best for most folks we talked to. Although everyone seems to believe the department is currently almost broke, the dean says it has a discretionary fund with \$90K.

The central issue thus seems to be communication not only between the faculty and the dean but also among the faculty, especially between its junior and senior members. There are of course a number of ways to improve this situation. All parties show good will and good intentions and there doesn't seem to be any intrinsic barrier here. For the most part, we also feel that the faculty and the dean are pretty much on the same page regarding mission, although the quality of life issue certainly has everyone currently on edge.

As a simple start, we recommend the department invite the dean to a department meeting of the whole soon and then have an ongoing and open discussion of such things as FTE allocations, course caps, and ways to reduce the oppressively high teaching loads in the lower division. Of course, this kind of interaction can also occur naturally on various levels, for example, when the search committee meets with the dean to discuss its progress, and the resource and curriculum committees can follow their lead.

Such meetings should be planned to promote fact-based discussion across the department, which in turn may help repair overall morale, especially among the junior faculty. The entire faculty could use these meetings as a springboard for discussion how best to reduce everyone's teaching load and thereby increase the time available for creative professional endeavors.

It would seem therefore to be a good time to have a one-day department retreat at an agreeable off-campus location with a competent facilitator to brainstorm the department's mission statement and five-year plan. Throw some money at it and manifestly avoid department chores or anything that smells of a department meeting. Include a very nice lunch for yourselves and invite the dean to join you and stay for an afternoon discussion session to compare your vision with his and to look for ways to institutionalize meetings between the dean and the department.

(5) The department should review its upper division curriculum.

We recommend the department move away from a standard graduate-school preparation curriculum and instead towards program options that reflect the professional futures of its majors. According to the department's survey, 66% of the graduates work in some industrial capacity while only ~10% work in academics. The department is aware of this and desires to create more options within the physics program. We agree that the creation of hard-wired paths through the major (e.g., applied physics, optical physics, engineering physics, computational physics, and biophysics) will better prepare graduates for their future careers and will likely attract more majors.

In developing new programs, the department should be careful to recycle or repackage its current offerings as much as possible so that large efforts are not required to develop new curriculum. A more modular curriculum that overlaps traditional boundaries and course topics with reduced emphasis on prerequisites could offer students more flexibility and available courses.

Proposed new programs should take maximal advantage of courses listed in other departments. The dean and the administrators we met with felt for example that an engineering-physics option designed for physics majors to take upper-division engineering labs would be welcomed. To boost enthusiasm among majors, the new programs should be established in such a way as to minimize the special requirements and permissions for the various combinations of courses offered in and out of the department.

Finally, while we laud the department's commitment to meeting the needs of their students, we feel there is currently insufficient faculty time available to justify teaching remedial sections of courses, or extra recitation sections in the lower division.

(6) The department should consider the possible benefits of creating a masters degree program.

While we cannot necessarily recommend that the department offer a masters degree, we do believe that discussing the possible benefits of a masters program would be instructive: Would it be useful to have masters candidates available to help teach in the lower-division? Could a masters program help the department attract external funding? Could a masters program help build a critical mass of laboratory research?

(7) The department's staffing situation needs to be addressed.

The department's lecture-tech-support staff has built a world-class stockroom collection of hundreds of lecture demonstrations, which is well known and envied by every physics department in the CSU. Their efforts are exceptional and much appreciated by the faculty. The lecture-tech staff also functions as the department's IT support, part-time machine shop staff, and part-time electronics staff. Since these all appear to be necessary and natural functions of this talented group, all aspects of the work they do and the various roles they fill should be formally recognized. For example, the department and the dean might consider redesignating staff if appropriate, and awarding them with corresponding rank and step increases. Further, the administration should commit to staffing the lecture-tech-support group with four full-time, permanent members as the majority of their efforts goes into lecture-demo and lab support for the introductory service courses.

Based on the information we have been provided, the department needs to hire additional department-office staff. The workload of the current department administrative assistant looks to be a factor of two heavier, in terms of FTEs/staff, than is typical for CSU phys-

ics departments (392 compared to an average of 163). The department needs a backup permanent person to keep the office door open and answer the phone during the day, regardless of how busy the office is with registration issues and the like.

(9) The administration should add a line item in the department budget for equipment purchases and upkeep.

We strongly recommend this addition to the budget. The department must be able to plan for updating, renewing and repairing equipment that is used throughout its teaching curriculum, especially in the lower-division course labs which serve some 1,400 hundred students per quarter from departments all over the university (amazing!). The amount of this line item could be shared between the administration and the department, but should be on the order of \$10,000 annually.

We have also been asked to respond to the department's *Suggestions for Action*. The following points also serve as a brief summary of our overall recommendations.

(1) securing faculty workload improvements; (2) development of sustainable resources for funding faculty assigned time for professional development and service; (4) implementation of procedures ensuring transparency in decision making in the department

As we discuss in the introduction of this report, the physics department feels that it is shouldering unfair teaching burdens. They believe that they have revised their practices in good faith so that they could have more faculty assigned time, but that all savings reverted to the administration. They also believe that they no longer have local control of their departmental resource budgets and that this is a major source of heavy teaching loads. The dean makes a different assessment of situation.

In the short term, we believe that if workload improvements are to be achieved they will come only through a department-of-the-whole meeting with the dean to openly discuss and inform both sides how FTE assignments are made, how course caps are established, how SFRs can be minimized, and how institutional needs can be met. Opening a direct channel of communication between the faculty and dean on these points would foster a sustained and collegial discussion regarding workload and resource issues. As this discussion moves forward, and the parameters that affect resource allocation become better understood across the department, we encourage the dean to fund a department retreat to design a new mission statement and five-year plan that focuses on the professional health of the junior faculty and new hires.

In the longer term, lighter teaching loads and improved resources may result from faculty finding the necessary laboratory space and start-up funds to attract external funding.

(3) development of mechanisms and resources for more consistent offerings of upper-division courses & (5) development of new Degree Options/Concentrations within the Degree Program

Please see recommendation (5), above.

(6) creation of problem-solving enrichment courses and other means to help under-represented students

We feel this important endeavor should be postponed for the near future. The faculty is already keenly aware of the wide-ranging needs of their students and makes ongoing, if currently informal, effort to accommodate them. Indeed, meeting this kind of curriculum challenge over the years is clearly one of the department's stronger qualities, which they can be quite proud of. Nevertheless, we feel whatever extra faculty time can be generated in the near future should be spent in professional and creative work that involves their own majors.

(7) development of new GE courses

Currently, the department runs a very successful upper-division GE course, *The Universe in Ten Weeks*. This course would appear to be an excellent model to follow in designing other like courses that might also generate significant FTE and thereby be used to reduce teaching loads.

(8) rational planning for faculty growth & (9) rational planning for space utilization

As stated in above in recommendation (2), the junior faculty with active research programs should have a strong voice in hiring new faculty during in the near term. We advise that the next few hires be made in experimental physics. Experimentalists will be able to build labs for creative professional activity that can include students, develop and enhance the laboratory curriculum, and attract external funding that can both bring in new equipment and technology to the department and also provide release time for faculty. If a critical mass of experimentalists can be hired, retained, and made successful, the entire department would benefit from the vigor of a modern laboratory program and the technology that comes with it, as well as the resulting potential to attract more majors.

For experimentalists to be successful they will need dedicated laboratory space and reasonable start-up funds. The dean and the department should work together to decide how these resources can be generated and what contributions both sides will need to make.

Finally, we appreciate the candor everyone at all levels expressed during our visit to make our task remarkably easy. We thoroughly enjoyed seeing old friends and getting to know

the relatively new and impressive junior faculty. We congratulate the dedication of these physicists and the administration on their efforts to maintain the strong traditions of excellence of this highly-regarded program. We feel good about the future of the department.

We will happily respond to any further question or concerns anyone may have regarding our report and recommendations.

Sincerely,

Professor Tom Donnelly Harvey Mudd

Professor Jim Feagin CSUF