Cal Poly Pomona BS Physics Program Review
External Review Report

Reviewer 1: Jennifer Klay Institution: Cal Poly San Luis Obispo

Reviewer 2: Brian Monacelli Institution: Jet Propulsion Laboratory / Pasadena City College

The purpose of this external review of the BS Physics program is to provide an unbiased examination of the quality of education and service in the program, and to identify opportunities for improvement and growth. After carefully reviewing the program's Self Study, we took part in a two-day on-campus visit on April 11 and 12, 2024. We met with Alison Baski (Dean) of the College of Science; with students in the program; with tenured/tenure-track faculty, lecturers, and adjunct faculty. This report is divided into sections on strengths, challenges, and recommendations.

Strengths:

- The quality of undergraduate education is obviously high in the CalPoly Pomona (CPP) Physics and Astronomy program. CPP graduates are respected in industry and in graduate programs. Student education is clearly a top priority for Physics and Astronomy department staff. This is exemplified in the small class size that facilitates the eight elements of inclusive polytechnic education in the Academic Master Plan, in the fact that undergraduates are conducting laudable research early in their academic careers, and the noticeable job satisfaction of faculty and lecturers. This is recognized and appreciated by all levels of faculty, and it fosters the research experience for undergraduates.
- Faculty understand, and explicitly stated, that learning is a social endeavor. They foster social learning in the academic classroom, academic laboratory, and research laboratory environments. Many aspects of faculty job satisfaction were observed:
    - They respected their boss. We were pleased to see so many lecturers and faculty members patently respectful and supportive of their direct supervisor.
    - The CPP program to supplement housing costs for faculty is commendable, especially given the cost of living in Southern California and typically modest faculty wages.
    - Start-up funding for new faculty is exceptional and research laboratory space is adequate.
    - Available reassigned time for academic endeavors not related to teaching was appreciated and used well by the faculty.
    - Lecturers indicated that they feel supported and respected. They are happy with their schedules and interactions with others, though some were interested to teach more upper-level courses.
    - Faculty invest time to support networking through extracurricular activities such as clubs and career fairs.
- Students displayed a strong sense of belonging and camaraderie.
    - They are respectful to and supportive of each other, and they had only constructive things to say about their instructors.
    - CPP Choice is helping students recognize their options as they proceed through their academic experience.
    - Students appreciate that learning is synchronous and interactive. Students were happy to not have asynchronous lectures, which strengthens the perspective that the program enacts learning as a social endeavor.
    - It is commendable that the local chapter hosted an SPS Zone meeting in 2023.
- The department is doing a good job at assessing student learning. Concrete action to implement the recitation/activities to foster student math and problem-solving skills at both lower division and upper division shows that they take assessment seriously.
- Students are active in research with 70 having given conference presentations and 49 being authors or co-authors on peer-reviewed journal articles with their faculty mentors since 2017.

- Lab equipment seemed available, industrially relevant, and well maintained. Students did not complain about outdated or broken hardware. New tenure-track faculty have been hired. Lecturers are well equipped to do their jobs.
- The department navigated the transition from quarters to semesters in 2018 expertly, completing a curricular redesign that included the introduction of recitations that support problem-solving. They have followed this up with detailed assessment of their practices to evaluate and continually improve their program across all levels of the curriculum.
- Alumni relations are strong. Faculty are aware of what many recent and not-so-recent graduates are doing in industry or grad school, and they remain supportive and communicative.

Challenges (Threats and Weaknesses):

- As a consequence of low tenure density, some of the service load normally managed by T/TT faculty has been assigned (with compensation) to lecturers; similarly, reduction in support staff has shifted some administrative tasks to T/TT faculty.
- We did not have the chance to interact with many women or gender minority students during our visit so it is difficult to assess the climate in this area. From the self-study it is clear that there are active efforts to support women in physics—through the club, annual seminar/luncheon, and the hosting of the 2018 CUWiP conference. From the data, the department is admitting women in numbers that are no worse than the national average for physics but they may wish to focus some future attention on increasing support to help address the national challenge.
- Faculty hiring seems to have improved since the last review. Existing tenured and tenure-track faculty were enthusiastic about the two new faculty members soon joining the department, and their workloads did not seem burdened from this process. For the few cases when tenure-track faculty are not available to teach upper-level courses, there were lecturers who seemed skilled and eager to teach these courses. They should be considered to do so.
- Faculty and lecturers were vocal about their computer and IT issues and the collaboration (or lack thereof) with the IT department. There seem to be many opportunities for improvement in this area.
- Students do not have anywhere to sit outside of classrooms. This includes both hallways and outdoor spaces. Students and faculty both directly voiced their concern and disappointment with this situation, as it really diminishes opportunities to collaborate and strengthen community.
- It was indicated that the dean's office is still a bottleneck for things related to hiring, particularly administrative staff support and timely hiring of student support. This is the most significant observed example of a gap in communication between the faculty and the administration.
- Existing administrative staff conveyed that they are powerless and underpaid, feeling uncomfortable and unsupported by their dean and the dean's office. In particular, the $36k to $48k salaries posted for this job are insufficient. Qualified CPP graduates applying for administrative positions would thereby not be offered competitive living wages to work at the colleges from which they graduated.

Recommendations (Opportunities):

- Resource-intensive recommendations:
  - Increase tenure density - hire more TT faculty to 1) lower the major-to-faculty ratio, 2) increase research opportunities for students, 3) better allocate department service load, and 4) so that more sections of 1510/1520 can be taught by T/TT faculty.
    - Aim for the ratio of T/TT faculty to lecturers ("tenure density") to be >50% at a minimum but >70% would be better.
  - Allocate more space for research, rather than using corners of teaching labs.
  - Increase availability of reassigned time for research, accessible to all faculty, to better support the Teacher-Scholar model.
  - Staff the department office with two full-time staff to handle student and faculty needs on a daily basis.
    - Restore to staff some of the work that is currently being done by faculty: hospitality for seminars, coordination of events, hiring paperwork, payroll for student assistants, etc.

        - Staff could start paperwork for hiring student assistants earlier to be effective in time for the scheduled classes. This current process is unclear and undocumented, so additional staff can increase this efficiency and establish this process.
        - Two office staff members will enable them to manage work time assignments so there is always coverage during regular business hours.
        - Increase salaries for staff positions to attract high quality applicants who will stay in the roles, reducing turnover and its associated costs.
    - Allow all faculty to choose the laptop or desktop computer and the academic software required to fit their teaching needs. IT should efficiently support this process, not add cumbersome bureaucracy. IT should establish or and maintain a regular period of refresh. Some lecturers and faculty prefer to use their own computers, while others need support from the department.
    - Handle office allocations on a case-by-case basis. Some lecturers did not make use of their assigned office, while others appreciated and used the space frequently.
    - Allocate Learning Assistants to the laboratory work for larger classes. Labs with more than 24 students should not have only one instructor.
    - Increase the budget for Learning Assistants and encourage more students to participate.
    - Allocate more funding for faculty to attend professional conferences, engage in CAFÉ workshops that support student success.
    - Allocate more funding for faculty to hire graders.
    - Add student seating outside or near classrooms to support social interaction and basic student comfort.

- Administrative-level recommendations:
    - Restore advising holds for physics majors; it was expressed that these are useful for students, faculty, and counselors and can be managed for the relatively small number of students it would impact.
    - Reduce bureaucratic barriers to software implementation and mandated website development by improving IT support for faculty. Faculty went so far as to say IT "doesn't really care about faculty needs" and that IT is unresponsive. The faculty know what software is required to teach; they should be trusted and included in the software assessment and implementation process.
    - Allow the department chair to have more information about and discretion over department budget – to set targets for grader hours, learning assistants, supplies, etc. on an annual basis. This could reduce bureaucratic bottlenecks in hiring student assistants, resource planning, etc.
    - Improve communication about policies and procedures from dean's office to department staff.
    - Coordinate communication between faculty and Academic Counselors about courses that support particular career paths—faculty who know the curriculum could prepare a resource guide for the Advising Center staff to use with majors.
    - Leverage the department's IAB and industry partner network to cultivate donors for student scholarships and alumni guest lectures to support practical education and promote student awareness of career paths.
    - Include more grant-writing workshops through the CAFÉ program to support the Teacher-Scholar model.
    - The self-study identified restrictions on square footage in existing campus facilities policies as preventing the department from efficiently utilizing its lab space for classes. Re-examine and possibly correct or clarify these policies.
    - Recognize professional service obligations such as peer review, society committee work, etc., as components of the Teacher-Scholar model and directly support faculty who engage in these activities.
    - Ensure that staff job descriptions are current and aligned with expectations for work assignments; maintain flexible work assignments that enable the department to offer night labs.

- Resource-neutral (or minimal) recommendations to the department:
    - Allow qualified lecturers to teach upper division classes to support their professional development and to give T/TT faculty more opportunities to teach PHY 1510/1520.
    - Use the first-year experience (FYE) in physics to teach new students what a physicist does, and what the career options may be for a physics major. This may help recruit students who initially selected other disciplines.
    - Re-examine office allocations for lecturers—optimize around established full-time, part-time schedules—find rooms for office hours.

- Ensure curricula are more uniform among similar courses by developing and maintaining policies and documentation that make the lower-division courses more coherent among instructors. Ensure that a paradigm is set and agreed upon by tenured and tenure-track faculty to have all students use similar teaching materials. It was apparent that this done well in labs, but not necessarily for lectures.
- Facilitate communication about policies and procedures within the department. For example, faculty could develop a written guide for continuity and communication among new faculty and staff.
- Create a Faculty Mentoring Program within the department that pairs senior faculty with junior faculty and new lecturers to provide guidance and advice on the faculty performance evaluation process, answer questions about expectations, give professional development advice, direct them to resources. (Note: Mentors would not serve on review committees for their mentees but could be present during review discussions to provide advocacy, clarification)
- Support faculty advisors to be critical partners with the professional advising team, having the content knowledge and professional perspective to advise students on CPP classes, graduate school options, career preparation, etc.
  - The department should continue to assign faculty advisors and create opportunities for interaction – advising events with food, etc.
  - Develop a written advising plan for communicating expectations and training new advisors. This can be developed in consultation with the advising center to include information about courses and tracks to suggest to students for meeting career prep objectives.
- Include lab tech(s) in the Lab Committee to ensure that their technical expertise helps inform decisions and new practices. Demonstrations are excellent, but a feedback loop should be established based on both student and lab technician input, particularly when new equipment recommendations may enhance the educational experience.
- Consider tracking physics majors into particular sections of PHY 1510/1520 to help them develop as a cohort. Staff the major cohort section(s) with T/TT faculty, regardless as to whether the department implements a specialized freshman-level sequence for majors. Similarly, cohort the optional recitations and/or make the recitation for PHY 1510/1520 mandatory for physics majors. (This could count as elective credit so that students who switch into the physics major after the first year are not disadvantaged even if they did not take the optional recitation.)
- Advise students on graduate school options and career pathways that go through graduate school. Students were generally positive about the industry career guidance they are receiving but expressly state they wanted to know more about graduate work.
  - T/TT faculty already provide this advice and guidance. Augment it by encouraging lecturers to share their experience and guidance to students interested in their area of expertise, within the bounds of their work assignment. For example, office hours can be used to discuss classwork or career-focused interaction regarding grad school, industrial careers, management and other career paths, work-life balance, etc.
- Students expressed that they would like more options in the classes they take. Consider reducing the number of required courses and allowing the flexibility of unique, industrially relevant electives.

Sincerely,

Reviewer 1 Signature and Date: Jennifer Klay (May 3, 2024 16:37 PDT) 05/03/2024

Reviewer 2 Signature and Date: Brian Monacelli (May 3, 2024 16:22 PDT) 05/03/2024

CP Pomona Site Visit Report

Final Audit Report 2024-05-03

Created:	2024-05-03
By:	Jennifer Klay (jklay@calpoly.edu)
Status:	Signed
Transaction ID:	CBJCHBCAABAAEG5UKmUhvSkTFoRu5Gg4WREezZPk9PZn

"CP Pomona Site Visit Report" History

Document created by Jennifer Klay (jklay@calpoly.edu)
2024-05-03 - 10:50:08 PM GMT- IP address: 107.77.230.204

Document emailed to brian.monacelli@protonmail.com for signature
2024-05-03 - 10:52:07 PM GMT

Email viewed by brian.monacelli@protonmail.com
2024-05-03 - 10:52:11 PM GMT- IP address: 185.159.157.24

Signer brian.monacelli@protonmail.com entered name at signing as Brian Monacelli
2024-05-03 - 11:22:39 PM GMT- IP address: 107.77.227.51

Document e-signed by Brian Monacelli (brian.monacelli@protonmail.com)
Signature Date: 2024-05-03 - 11:22:41 PM GMT - Time Source: server- IP address: 107.77.227.51

Document emailed to Jennifer Klay (jklay@calpoly.edu) for signature
2024-05-03 - 11:22:42 PM GMT

Email viewed by Jennifer Klay (jklay@calpoly.edu)
2024-05-03 - 11:37:30 PM GMT- IP address: 104.28.85.133

Document e-signed by Jennifer Klay (jklay@calpoly.edu)
Signature Date: 2024-05-03 - 11:37:43 PM GMT - Time Source: server- IP address: 107.77.230.72

Agreement completed.
2024-05-03 - 11:37:43 PM GMT