

Physics PPR 2022 Chair Response to External Review

The three members of the department's PPR External Committee brought broad perspective and a diverse array of expertise in the process. The Committee members were:

- Andreas Bill, Professor and Chair, CSU Long Beach
- Jennifer Shaw, Professor and Chair, Syracuse University
- Jeffrey R. Knott, Professor Emeritus, former Chair of the Geology Department, CSU Fullerton

We really appreciate the time and the efforts the Review Committee invested in the process. We also appreciate the opportunities and the challenges they identified in their review. I have attached below their recommendations along with my response and comments.

Ionel Tifrea
Professor and Chair
June 2022

Student Success

The students made several useful suggestions:

- With the lessening of pandemic restrictions, students would enjoy a reintroduction of social events to gather faculty, graduate students, and undergraduates together.
- Undergraduates would benefit from reinstating the Society of Physics Students chapter (SPS). It is recommended to have a faculty advisor for the SPS.
- Both undergraduate and graduate students stated that they would benefit from more information about possible employment opportunities. This could be as simple as a career panel where alumni share their career path.
- Students have expressed interest in additional research opportunities being posted (for example Research Experience for Undergraduates -REU- from NSF).
- In the course of discussion, students said that they found MATH 250B facilitated understanding in PHYS 300; however, MATH 250B is not a pre-requisite for PHYS 300 at this time.
- Students agreed that there was a noticeably positive improvement in instruction by professors who had consulted with and utilized teaching methods promoted by the physics education professors.
- Both undergraduate and graduate students expressed the need to have a better and more visible flow chart for their respective degrees.

Tifrea response:

We agree that after two years of COVID related shut down a lot of our student-oriented activities have suffered. Our plan is to restart at full speed in Fall 2022. For example, we plan to have an introductory Colloquium, where undergraduate and graduate students will meet all Faculty members and will be able to learn about research in our Department. At the same time, we will have a comprehensive discussion on what a Physics degree offers in terms of future careers.

During Fall 2022, the Department plans to revise the Curriculum and address all students' concerns.

The Department recently created ideal road-maps for all the students in our program. These ideal paths are annually revisited and improved.

Inclusive Environment

Staff

The one area of concern related to inclusivity and teamwork expressed by Physics staff relates to attempts to the ongoing efforts to fill vacant staff positions. CSUF human resources is difficult and impersonal acting as more of a barrier to success rather than including Physics staff as teammates working toward a shared goal.

Tifrea response:

We are aware that the Department is at least two staff members short. We are currently running searches for an IST III and an ASC II position.

Students

Based on the student comments, we recommend:

- Continuing the department activities, such as mentoring and research, that produces the current environment.
- Development of a recruitment plan aimed at both community college and high school students that emphasizes engagement of underrepresented groups. This plan should have clearly defined, measurable benchmarks and goals.
- Development of a faculty-mediated communication platform with undergraduate and graduate students. The undergraduate students recommended the Slack app. Slack is good because students can make separate channels to talk among themselves in addition to having a general channel.

Tifrea response:

All physics students at the undergraduate and graduate level benefit from a one-to-one advising session each semester/year. To improve communication, starting the Fall 2022 semester the Undergraduate and Graduate advisors will launch Slack specific groups for all our students.

To attract more students in our programs (both freshmen and transfers) we plan to cooperate with the local Community Colleges and High Schools. Once we regain our staff positions, we will be able to run popularization meetings again and attract students to physics. In particular, we will focus on the URM students in the area.

Faculty

Based on our conversations with available faculty, the Team recommends:

- Formalization of the department mentoring process. This should include documented meetings between the tenure-track faculty and the chair as well as the tenured faculty mentor.
- It is recommended the revised and updated tenure and promotion criteria review the role of the SOQ data and how to interpret these data. The SOQ should be only one of several criteria to assess faculty teaching. New criteria should reflect recent research on student biases, etc., related to SOQs.

- It is recommended to have a more formal in-class review process for each faculty under review by at least two faculty members for two lectures and to use these peer evaluations as part of the tenure case.
- The publication requirements for tenure seemed to not consider the standards of various subdisciplines in determining the actual productivity of faculty.

Tifrea response:

We are aware of all the issues addressed by the Committee. Our Department Standards will need to be refreshed to incorporate all suggestions made by the Committee – a retreat to address all these changes is planned for Fall 2022.

Undergraduate/Graduate/Faculty Research

For the most part, the department should continue what is currently being done, with some minor recommendations:

- It is recommended to have meetings each year or semester where faculty or students in their groups inform new graduate and undergraduate students about research activities and opportunities. This could involve the Society of Physics Students for undergrads.
- Leadership should look for ways to re-engage faculty who are slowing down in publishing (for example mid-career faculty).

Tifrea response:

We will continue our efforts to attract undergraduate and graduate students in our research activities. Several research groups have weekly meetings and new students are always welcome to sit in these meetings and learn more about the available opportunities.

Teaching and Research Balance

The Team did not have sufficient information to examine the faculty teaching loads. Some of the curriculum vitae listed courses taught, but not all provided this information. We this limitation, we recommend improving communication:

- Transparency regarding teaching assignments and allow the department and faculty to anticipate potential release time conflicts.
- Teaching loads and release time should be shared among the faculty to demonstrate the equity or inequity of workload.
- Special care should be given to make sure that minoritized faculty are allowed to take the release time that they have been awarded through federally funded buy-outs. These buy-outs should give the dean/department the funds needed to recruit a teaching staff member.

Tifrea response:

The teaching assignment process is very transparent. 99% of the time all Faculty members teach their preferred classes. Priority is always given to junior Faculty to help with establishing their teaching and research career at CSUF.

We agree that pressures to offer the curriculum fully, coupled with our current staffing levels, have made accommodating release time requests more difficult than we would like. That noted, the number of instances that a release time request has been declined remains small, and only occurs

where the alternative would be to cancel a core class that would delay student's time to graduation. What has occurred is that accommodating buy-out requests has periodically relied on the goodwill of department faculty volunteering to take on workloads over and above their normal allocation, in order to accommodate release requests (without forcing classes to be cancelled). Improving this situation, such that release requests can be readily granted without negatively impacting the workload of other faculty, ultimately rests on increased support from the College and University, through additional faculty or part-time blanket, to be able to more readily cover ad-hoc absences.

Curriculum

The self-study provided the curriculum for the B.S. in Physics degree. The number of units required is at the maximum of 120; however, below are some items that came out during discussion a few suggestions are made below.

- PHYS 300 (Survey of Mathematical Physics) appears to be a bottleneck of the program because all upper division courses require it. Due to the decline in upper division class enrollment the course cannot be offered each semester anymore; it is now offered in the spring. In addition, PHYS 300 cannot cover the mathematics needed in all the classes.
- Consider requiring MATH 250B for differential equations and linear algebra. The undergraduate students commented that this course improved comprehension in PHYS 300. Requirements for the latter should hence be reconsidered. Undergraduate advisors should recommend the MATH 250B class for physics students wanting to go to graduate school.
- While core classes are offered regularly an elective in soft condensed matter is missing. This seems particularly important given that faculty have expertise in this field and enroll many students in research experience.
- We understand that new course proposals are often the result of enthusiasm for a particular subject by a faculty member. With that said, we recommend that Physics reconsider the name of the proposed GE class "Quantum Computing for Everyone." This consideration should be made in the light of the fact that Academic Affairs asked Geological Sciences to change "Physical Geology" to "introduction to Geology" because the word "Physical" was too intimidating for non-science majors. If the intent of this course is to develop a large-format class (i.e., >80 students), then it is hard to imagine that non-science majors will warm to a class with "Quantum Computing" in the title.
- Statistical Mechanics (PHYS 416/516) is only offered sporadically and is not a core class of the graduate program. We suggest that this class be offered more frequently or be required in the core curriculum because it is commonly a requirement for graduate schools.
- The department should consider the possibility of removing at least one semester of chemistry courses from the requirements for majors and replace it with additional courses in mathematics, statistical mechanics, or other course more relevant to the physics major.

Tifrea response:

All recommended changes are welcomed but at the same time such a drastic shift in our Curriculum needs to be addressed very carefully. We plan to have a Fall 2022 retreat to consider changes in our Curriculum.

Bachelor of Science – Business Emphasis

This B.S. degree program was not discussed on April 29th. The self-study states that this degree program has 1 student every 2-4 years. The following questions should be addressed by the department to assess this Business emphasis:

- Who among the faculty in Physics and Business champion this degree program?
- Why continue a degree program with such low enrollment?
- Is there a plan to increase enrollment in this degree program (i.e., new faculty hire)?

Tifrea response:

The program was introduced many years ago with the strong support of our alumni Dan Black. We currently have a very low enrollment in the program, however, we do not consider this program as a liability, so we would like to continue to support the program.

Part-Time Faculty Needs and Graduate Teaching Associates

This leads to the following observations:

- There may be an opportunity for Physics. Many of the TAs may continue to reside locally after completing their M.S. degrees. Providing these TAs with training that improves their teaching skills and, possibly, their enjoyment and satisfaction with teaching may develop more part-time instructors for the department.
- In any event, a training program on effective teaching strategies, even a series of informal readings, should be implemented to improve the learning experience of CSUF students in general. Additionally, the TAs would very likely benefit from regular meeting during the semester with a faculty member to discuss common issues (e.g., making exams, grading, etc.). Such programs exist in CSUF Biological Sciences and Geological Sciences.

Tifrea response:

All our TA's have mentors each semester. At the beginning of each semester, the Graduate Advisor and the Department Chair have a meeting with all TA's where teaching assignments are discussed. Additionally, we provide all students with the required resources to be successful TA's.

Time to Graduation and Recruitment

We recommend:

- With the establishment of the Begovich Center for Gravitational Wave Physics and Astronomy, Physics could pursue graduate students recruited from other local institutions (e.g, UC Irvine). Local students may not be as impacted by the high cost of housing in Fullerton.
- Considering that the majority of physics majors entered CSUF as freshman with a physics major declared, Physics should develop a recruitment plan that targets local high school students, especially from underrepresented groups.
- Since incoming students know they want to do physics, work on creating cohorts of students and other peer and near-peer support networks will be beneficial to keeping students in the program.
- Another avenue for recruitment is community colleges. Providing information to surrounding community colleges regarding CSUF opportunities and pre-requisite information may increase undergraduate transfers and reduce the time to graduation.

Tifrea response:

With the current drop in our enrollment numbers, we are working on strategies to attract more students to our major. We plan to contact all freshmen applicants immediately after the application deadline via text messages and emails. To improve the number of applications to the program, we plan to restart our community outreach to local high schools and community colleges.

Graduate Advising

The following suggestions should be considered:

- It is encouraged to have an orientation that facilitates the induction of all graduate students into the program.
- Cohort building can also include a hike or other off campus event as part of getting to know each other.
- In addition, meetings between the graduate advisor and graduate students should be offered at least once a semester to provide equitable advising for all students.
- It is recommended to formalize the Discord/Slack communication to make sure all students have access so that important information is conveyed to all students.
- Students also expressed insufficient guidance for after graduation. The graduate advisor provides such information, but more can be done especially regarding non-academic positions.
- TA training is also important and can focus on pedagogy and best practices for equity and inclusion in the classroom.

Tifrea response:

Our graduate program advising is run by one person that knows very well all the needs of graduate students. Each student meets with the advisor on a semester basis. At the beginning of the second semester, graduate students develop a Study Plan that guides their progress through the program. We will continue to improve our mentorship and advising for graduate students. Further, as previously mentioned, we are aware that our student orientated activities were adversely affected by COVID, and we are looking forward to reinvigorating those activities again in the near future.

Resources

We recommend:

- Physics OEE should be increased to reflect the FTES of the department and to the needs of a modern curriculum.
- The Provost should barter an agreement between Physics and Information Technology that provides the required computer hardware for laboratory instruction. These computers benefit multiple departments in CNSM and the College of Computer Science and Engineering and, therefore, are a CSUF resource that should be funded by CSUF.
- Start-up funding for experimental physics hires is woefully inadequate. This hamper Physics when recruiting productive, diverse faculty.

Tifrea response:

We welcome these recommendations and we hope that decision factors at the College and University level will implement these recommendations and continue to support our program.

Facilities

Laboratories are distributed over several buildings. In addition, some of these research laboratories are too small for the equipment and number of students who work in these labs. It is recommended to relocate, increase the size and improve the infrastructure of some of the laboratories, depending on faculty activity levels and field of research; special attention should be given to younger experimental faculty members. This is especially important given the two new experimental hires to replace retiring faculty. It is important the university provides adequate laboratory space for the department to continue thrive.

It is also important for research laboratories to have sufficient technical support. Next to the focus on instructional laboratories the technical staff should have the skills and time to support the research of its faculty. This should be accompanied with a continued, existing access to the campus machine shop.

Classrooms are a concern for the department. There is an imperative necessity of large classrooms to teach lower division classes with increased FTES. It is recommended to review the policies to assign large classrooms to provide the department with adequate space for the service classes.

Tifrea response:

We welcome these recommendations and we hope that decision factors at the College and University level will implement these recommendations and continue to support our program.

Faculty Retreat

The self-study mentions that a faculty retreat was held a “couple of years ago”. We suggest that the faculty consider another retreat soon. Two faculty are retiring; two faculty are arriving. One faculty member arrived during the pandemic. A retreat is a good opportunity to reinforce existing relationships and establish new ones.

At a retreat, the Physics faculty may discuss and outline revisions for the revised Department Personnel Document that must be completed during the next academic year. The self-study states that a five-year hiring plan is in development. A retreat is a good venue to discuss the hiring plan prior to the discussions with the Provost in the fall. The suggestions/recommendations in this report may provide some topics for additional discussion as well.

We suggest that Physics employ a 3rd party moderator. Someone unattached to CSUF who can facilitate all voices being heard equitably.

Tifrea response:

We plan to have two retreats in Fall 2022. One to address Curriculum changes as suggested by the review team. Second, to address all the changes that need to be implemented in our Department Standards.