

EXECUTIVE SUMMARY

**Academic Program Review**  
**College of Arts and Sciences**

DEPARTMENT/PROGRAM

**Department of Physics and Astronomy**

EXTERNAL REVIEWERS

Professor Betty A. Young, Santa Clara University  
Professor Scott Severson, Sonoma State University

CAMPUS VISIT

April 11 – 13, 2018

The review team read the self-study written by faculty in the Physics and Astronomy Department, reviewed the curriculum, course syllabi and evaluations; interviewed faculty, students and staff; and met with the Dean, Associate Deans and other relevant members of the campus community. Prior to their visit, the reviewers were provided with USF's Vision, Mission, Values Statement, and other university materials.

**1. How did the external review committee rate the quality of the program – excellent, very good, good, adequate, or poor? How does the program compare with benchmark top-tier programs nationally? Please provide a brief rationale for the external review committee's rating.**

The committee gave the Physics and Astronomy Department an overall rating of VERY GOOD. Reviewers commended the 'highly competent and dedicated disciplinary experts' that the department's faculty is comprised of, as well its 'innovative' 3+2 program and the 'unusual and noteworthy breadth of excellent minor programs' offered. They felt that the Department 'absolutely' has the potential to become an outstanding or excellent program, and that the sole constraints stifling its growth are 'resource-related, rather than weaknesses of the Department [itself].' The review team provided recommendations for the 'few areas ... that could use some improvement.

**2. What are the most important general issues that emerged from the external review process?**

- While Physics and Astronomy offers a 'standard and rigorous curriculum,' the program 'suffers from [its] inability to offer key upper-division physics courses annually' due to 'unusually strict enrollment requirements and imposed scheduling limitations' imposed by the University. Reviewers felt that 'these curricular limitations impact student learning, as well as student recruitment and retention.'
- The Department's 3+2 program partnership with the University of Southern California is a 'major draw' for students-- many students interviewed by reviewers 'cited this program as the main reason they chose to come to USF --and should be more aggressively highlighted by the University.
- There exists 'a wealth of positive information about Physics and Astronomy ... that will reflect extremely well on the University,' and Department faculty 'know best how to package it to make it attractive to physics- and engineering-focused students.' Faculty should be offered more

opportunities to engage in messaging about their programs to prospective students, more so 'than is currently the case.' Further, sharing student success stories 'on a larger scale can even help USF gain greater visibility on the national scale.'

- Physics and Astronomy faculty 'are all committed to helping the department, and USF thrive,' as well as developing students academically, personally, and ethically.' Reviewers did caution that as a result, faculty 'seem to have an unusually large service burden' between their many initiatives (supporting the University's Core curriculum, providing 'meaningful research and internship opportunities' for the program's own majors, outreach programs, etc) and this may 'perhaps not [be appreciated] by those outside of the department.'
- The Department is 'extremely lean,' and with 'faculty sabbaticals and release for administrative duties, there is a risk of understaffing.'
- While the Department has "just enough space to run an efficient and effective program" and uses said space wisely, "losing any space from what [it] has now would harm the program overall." Additionally, while most current space is "efficient and appropriate," reviewers recommended updates to some outdated technology, and perhaps cosmetic updates to older classrooms and equipment, to boost morale and student experiences.
- Given its strength, the Physics and Astronomy program will play an important role in attracting "capable and dedicated students" to USF's forthcoming engineering program. As serious students applying to the engineering program "will look carefully at the breadth and depth of physics (and other science) courses available to them at USF, reviewers strongly encouraged engaging Physics and Astronomy faculty that are already "ready, able, and willing to help the university develop an appropriately rigorous academic engineering program." Increased demand for Physics courses from new engineering students will also necessitate discussions with faculty about potential impacts to their program, and how best to serve both programs.

### **3. What specific recommendations for improving the program's quality has the external review committee made to the Dean?**

#### Curriculum, Course Offerings and Student Engagement

- Slate at least one more upper division course for majors each year
- Allow the Department to offer "more courses each year with less than 12 students"
- Work to involve more students in undergraduate research and internships – a good start to this endeavor would be to build upon existing relationships with UCSF and formalize a pilot program for strong USF students to work with UCSF researchers (i.e. biophysicists, data scientists, medical physicists, and outside but local "industrial partners who do physics-friendly work."
- Use this pilot program, once initiated, as a recruiting tool for talented local high school or community college students seeking a solid path to job opportunities after graduation.
- Consider adding a short lab practicum to the upper division lab course, so that students can individually demonstrate "key lab proficiencies" at course end.
- Add a weekly, hands-on laboratory component to PHYS 240: Modern Physics
- Consider ways to encourage more students to write a thesis – "this is what one would expect to find at a top-tier liberal arts institution."
- Continue to re-invigorate student clubs, such as "Society of Physics Students, WIP, WIS, and

Astronomy,” to build a “supportive, encouraging environment” in the Department.

- Explore and connect to broader field efforts to recruit and retain diverse student populations, I.e. California’s MESA (Mathematics, Engineering, Science Achievement) initiatives.

#### Admissions, Marketing, and Alumni Tracking

- Provide opportunities for department faculty to be involved in the admissions process, specifically to reach out directly to promising applicants.
- Work to “more aggressively highlight” the Department’s many impressive activities, especially with “the administration, the university community at-large, and the broader SF Bay Area community.”
- Facilitate “greater control over web content and how it is delivered at USF” directly to the Department, so that they can ensure detailed and creative content to draw talented students.
- Increase marketing for the Physics and Astronomy 3+2 program and collaboration with USC. Emphasize that this is a distinct program serving a different population than the forthcoming engineering degree.
- Continue tracking alumni outcomes – “such record keeping is difficult and time consuming, but richly rewarding.”
- Share “outstanding” alumni successes (including “employment at Google, Capital One, and Lockheed Martin”) “beyond the department walls.”

#### Relationship with School of Engineering

- Involve Physics and Astronomy faculty into discussions about the upcoming engineering degree “early-on in the process” – “no department at USF is more capable than P&A to help define [its curriculum.”
- Prepare for potential increased demand of electronics and computational courses offered by PHYS to meet demand of incoming STEM/general engineering degree students.
- Discuss frankly intended course offerings and potential impacts of any increases with Physics and Astronomy faculty, as early as possible.

#### Space and Resources

- Enable “straightforward access” to appropriate university spaces for the Department’s popular astronomical viewing nights program.
- Retain in perpetuity the two dedicated P&A staff positions for the health of the Department
- Teach courses that regularly use field-specific resources (i.e. lab and demonstration equipment) in classrooms and laboratories proximal to their storage spaces.

#### **4. In the opinion of the external review committee, is the program following the University’s strategic initiatives?**

- a) *Promotes close student-faculty relationships and effective mentoring/advising by faculty and staff on the personal and professional development of students*

Physics and Astronomy faculty and staff were noted to be “extremely collegial, kind and compassionate,” with strong connections to students. Reviewers commented that “the dozen or so physics majors we interviewed seem well-adjusted, happy, mutually supportive, appropriately challenged, and appreciative of their close ties with dedicated department faculty and staff. Students were effusive in their praise for the support system in place, feel rewarded for their work, and stated that in office hours faculty can ‘explain ideas in 1,000 ways.” Overall, the Department is “thoughtful and intentional in fostering a climate of student development and learning” that serves students well.

- b) *offers demanding academic programs that challenge students to maximally expand and develop their intellectual capacities and transformative educational experiences*

Reviewers felt that overall, “the department does a commendable job in preparing their students for pathways in Physics, and this is demonstrated in successful student outcomes.” Additionally, faculty do “an exemplary job in monitoring student academic progress and assisting students” throughout their time at USF, as well as at “carving out space in creative ways to enable [research and hands on] opportunities in discipline-appropriate environments” that enrich the lives of their students. Reviewers also noted that the Department’s “seamless” integration of technical writing into—and throughout—its curriculum makes it truly notable amongst other programs, and yields “truly impressive” and “near professional quality work” from students.

- c) *recruits and retains a richly diverse mix of students, faculty and staff so that the university community, as much as possible, broadly resembles the world to which our students will contribute*

Reviewers noted that USF’s Physics and Astronomy Department “appears keenly aware” of issues with diversity and inclusion in the Physics field and works hard to maintain its own “diversity-friendly atmosphere” with “awareness of and sensitivity to multicultural issues.” As a result, they encountered students “of groups underrepresented in Physics” that cited the Department’s “support system,” “culture of advising,” and genuine care of faculty as highlights of their experience at USF. Ultimately, the supportive culture, availability of student clubs and community, and increasing diversity of the faculty all “facilitate the department’s ability to recruit and retain a diverse student population.” They did feel that the Department should develop a connection to “broader pipeline efforts [in the field] to recruit diverse student populations,” and suggested better coordination “at the school level and above.”

- d) *serves as a social and educational agent by applying creative expression, knowledge, and research skills to promoting human development, advancing understanding, and improving the quality of life for all Bay Area residents and promoting academic engagement from the university.*

The Department has “a clear sense of ‘place’ in how it fits within San Francisco and the broader Bay Area community, and the faculty has been proactive in fostering ties beyond USF for the clear betterment of their students.” Reviewers not only found this “consistent with USF’s desire to boost enrollments, attract more able students, and raise the profile of USF in the national academic arena,” but also cited “magnificent” local collaborations (like one with the Robert Ferguson Observatory) as “a tremendous service to all USF students, as well as to the extended Bay Area community.”

**5. In what way is the program contributing to the goal of making the University of San Francisco a premier Jesuit, Catholic urban university with a global perspective that educates leaders who will fashion a more humane and just world?**

Reviewers felt that “the USF Physics & Astronomy Department faculty, individually and collectively, clearly embody the Jesuit ideals of education” in many ways, including, but not limited to “disciplinary and broad academic excellence, cura personalis, and service to students.” They felt that faculty demonstrate these ideals “daily in department activities and interactions,” especially in the “extraordinary attention” they give to educating the whole person in each of their students, as well as the “generous in the use of faculty time to support the USF core curriculum for non-majors”

outside of their Department. Faculty are known to “make clear their appropriately high expectations for student performance, while at the same time enthusiastically offering high level individual and group support to help students succeed.” Ultimately, reviewers felt that “in all these ways and more, the Department is fully aligned with the University Mission to [offer] students knowledge and skills needed to succeed as persons and professionals, and the values and sensitivity to be men and women for others.”

**6. What is the timetable for the response to the external review committee’s recommendations for program improvement? What can the Office of the Provost do to appropriately respond to the review?**

The next step is for the Dean and Associate Deans to meet with the Chair of Physics and Astronomy and discuss the action plan based on the self-study and reviewers’ report. Based on the reviewers’ suggestions, the Office of the Provost could assist the program by: engaging Department faculty in program marketing, retaining/refreshing Department space, affording more flexibility for the Department to offer more fewer enrolled courses

**7. What general comments or issues, if any, are crucial to understanding the reviewers report?**

No additional information is necessary to understand the report.