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## External Reviewer Report for Sonoma State Physics & Astronomy Program Review

### Introduction

During my one day visit (March 6-7, 2024), and through the self-study report (2022-23), I found the Department of Physics & Astronomy at Sonoma State University to embody a collaborative atmosphere, student-focused approach, and commitment to academic excellence. As part of my visit, I met with all tenure-line faculty, the department chair, dean, instructional and administrative staff, and a selection of students. Everyone was friendly, helpful, and presumably candid about their experiences within and with the department and its associated programs. The department has taken multiple measures to provide individualized and structured support to all its students. Recent enhancements, such as the new degree programs and concentrations and innovative general education courses, underscore the department's adaptability and dedication to meeting evolving educational needs. However, despite its successes, the department faces challenges such as declining enrollments, budget constraints, reduced instructional capacity, and potential curriculum changes. This report offers an overview of the department's achievements and obstacles, along with potential recommendations to navigate these challenges and continue its tradition of excellence in education.

### Strengths

The faculty members within the department exhibit congeniality, collaboration, and a strong commitment to student success. Faculty ensure tailored advising to help students develop optimal graduation plans based on their unique circumstances for all majors. And as part of their weekly department meetings, they engage in discussions on individualized student support strategies for those students who may be struggling. Additionally, the Society of Physics Students chapter offers students further opportunities to engage in the department's supportive community.

The department boasts a diverse range of degree options, catering to students with varied interests and levels of preparedness. These options include a Physics BS degree, featuring an astro concentration tailored for those aspiring to pursue graduate studies in physics or astronomy; a Physics BA degree offering increased flexibility for students interested in industry roles; and a Physical Science degree with multiple concentrations designed to provide graduates with a comprehensive scientific foundation for careers in healthcare, education, or industry.

Central to all degree programs is the Capstone course, which I had the opportunity to observe during my visit. I was highly impressed by the supportive atmosphere cultivated within this course, where discussions among faculty and students, as well as among peers, fostered a growth mindset, ensuring that learning was collaborative and supportive. Furthermore, the course projects were thoughtfully designed to resonate with

students' real-life experiences and future career aspirations, facilitating one-on-one interactions with faculty across various fields. Leveraging a robust array of experimental equipment and strong collaborations in observational astronomy and science education, faculty members provide students with invaluable hands-on learning experiences. The culmination of the semester is marked by the Capstone course's final showcase and celebration, which not only engages the department but also involves students' families, effectively bridging the gap between educational endeavors and home life.

Additionally, the department has expanded its service courses, developing General Education offerings beyond the traditional Area B science courses. These initiatives, including courses in Oral Communication, the Sustainability and Environmental Resilience Overlay, Writing Intensive Overlay, and Area E, contribute to the department's Full-Time Equivalent Student (FTES) count. Since the previous program review, the department has observed a significant uptick in enrollment among women, first-generation students, and underrepresented minorities, underscoring its commitment to diversity and inclusivity.

## Challenges

From speaking with faculty and reading the self-study, there are some current challenges facing the department. Declining enrollments across the CSU and especially at Sonoma State have led to budget issues that have precipitated a planned structural reorganization of colleges and departments, which has increased uncertainty for faculty and staff. Recent retirements of a few long-time lecturers has resulted in fewer instructors available to teach the needed courses. And the implementation of the new Cal-GETC General Education package may result in the loss of the department's popular Area E course (SCI 220), depending on how the university decides to implement the mandated changes and if the department attempts to reconfigure it for another GE Area.

## Recommendations

In response to the above changes and capitalizing on the strengths of the department, the following are some recommendations for the department to consider adopting.

1. Submitting the Upper-Division GE asynchronous course to CSU Coursematch. For courses that hold at least 10 seats for CSU students from other campuses to enroll, the Chancellor's Office pays a few thousand dollars. This can provide much needed funds for department and college activities during tight budget times.
2. Potentially requiring the Oral Communication course of all physics or physical science incoming first-year students. This would allow these students to meet one of the Golden Four General Education requirements, while also getting to meet these new students in their first semester or year, regardless of their incoming math preparation. Efforts can be made in this course to help students get to know the physics faculty and each other, thereby integrating them into department life sooner than if they waited until their first physics course.
3. Presumably the college reorganization will increase interactions between various STEM programs. This could be a great opportunity to capitalize on those interactions and increase the interdisciplinary work. Interdisciplinary research might require more synergy between individual faculty, but there could be room for more interdisciplinary courses that could appeal to students in a broader range of programs, such as a Planetary Astronomy courses between astronomy and geology faculty, a Materials Science

course between physics and chemistry faculty, or some applied courses between physics and engineering faculty.

4. If the budget and enrollment situation worsens, the department may need to consider temporarily switching the frequency of some course offerings from once a semester to once a year, or from once a year to once every other year. While not ideal, a creative alternating two year schedule can be designed to both support student learning and temporarily meet budget constraints.
5. When the budget and enrollment allows, hire more faculty to replace the retirements and reduce the existing workload.
6. Continue the recruitment efforts to local community colleges and future first-year students and consider joining forces with other programs. Given increased workloads, examine the return on investment of current recruitment efforts (phone banking, marketing packets, etc.) and focus on those with more success.

To address the aforementioned challenges and capitalize on the department's strengths, several recommendations are proposed for consideration:

**1. Creation of GE Asynchronous Courses for CSU Coursematch:** By creating an asynchronous version of any General Education course previously taught online (i.e. ASTR 100, ASTR 350), the department submit them as CSU Coursematch courses and therefore can tap into additional funding opportunities. Courses with a minimum of 10 seats reserved for CSU students from other campuses can yield financial support from the Chancellor's Office. This infusion of funds can help to alleviate budgetary strains and support departmental and college activities during periods of financial constraint.

**2. Potential Requirement of Oral Communication Course for Incoming Physics or Physical Science First-Year Students:** Introducing a requirement for incoming physics or physical science first-year students to complete the AST 121 Oral Communication course can serve multiple purposes. Not only would this fulfill one of the Golden Four General Education requirements, but it would also facilitate early engagement with new students. By acquainting students with the physics & astronomy faculty and fostering peer interaction, this initiative can integrate students into departmental life from the outset, irrespective of their incoming math preparation.

**3. Capitalization on Interactions Arising from College Reorganization:** Anticipated increases in interactions between various STEM programs due to the college reorganization presents an opportunity for interdisciplinary collaboration. Leveraging this opportunity could enhance interdisciplinary work within the department. Exploration of interdisciplinary courses, such as a Planetary Astronomy course facilitated by collaboration between astronomy and geology faculty, a Materials Science courses led by physics and chemistry faculty, or applied courses involving physics and engineering faculty, can cater to students across a broader spectrum of programs while also increasing the majors electives available to students in a given year.

**4. Adaptation of Course Frequency to Budget and Enrollment Constraints:** In response to worsening budget and enrollment situations, the department may need to temporarily adjust the frequency of course offerings. Consideration could be given to transitioning some courses from once a semester to once a year, or from once a year to once every other year. Although not ideal, implementing a creative alternating two-year schedule can support student learning while addressing short-term budget constraints.

**5. Faculty Hiring to Address Retirements and Workload Reduction:** As budgets and enrollments permit, prioritizing the hiring of additional faculty to replace retirees and alleviate existing workload pressures is essential. Increasing faculty numbers can ensure continuity in course offerings and maintain teaching quality, thereby supporting student success.

**6. Continuation and Evaluation of Recruitment Efforts:** Sustaining recruitment efforts targeting local community colleges and prospective first-year students remains crucial. Within the new college and departmental structures, it might be useful to explore opportunities for collaboration with other programs to enhance recruitment efforts and amplify outreach efforts. It would also be useful to develop an assessment plan around the various recruitment strategies, such as phone banking and marketing packets. Focusing resources on initiatives that demonstrate higher success rates can optimize recruitment outcomes.

Finally, the department self-study also contained a list of items as part of their action plan moving forward. As resources allow, these tasks and strategies all seem well thought-out and beneficial to the department and its programs moving forward. I endorse them all as part of this external review report.

Thanks to everyone for a lovely visit to your beautiful campus. I look forward to hearing more great things from Sonoma State's Physics and Astronomy program.

Sincerely,

A handwritten signature in blue ink that reads "Carol Hood". The signature is written in a cursive, flowing style.

Carol Hood