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Page 1: I. Program Overview and Update

Q1

1. Department(s) Reviewed:

Physics and Astronomy

Q2

2. Lead Author:

Miriam Simpson

Q3

3. Collaborator(s) - list of any person that participated in the preparation of this report:

Alexandra Neri, Scott Stambach, Glenn Thurman

Q4

4. Dean/Manager(s):

Tammi Marshall

Q5

5. Initial Collaboration Date with Manager/Dean:

Enter the initial date you met with your dean to discuss your program review using this format: MM/DD/YYYY **09/13/2023**

Q6

6. Program Update (Required): Please summarize the changes, additions, and achievements that have occurred in your program since the last program review. You can access 2022 program reviews on the program review webpage.

We are RADICALLY student-centered. Five years ago we only had in person courses, we now offer a dynamic array of educational experiences, including hybrid, HyFlex, and fully online courses—both synchronous and asynchronous. Our dedication to our students is reflected in our active engagement with their feedback, which is the cornerstone of our iterative approach to curricular and instructional design. Our enrollment strategies are agile, undergoing thoughtful modifications each semester to align with our students' evolving needs. We are devoted to fostering excellence in our faculty, investing significantly in their development through recruitment, comprehensive training, and consistent support. We do this through intensive professional development sending the bulk of our full and part time faculty through EMTLI, Humanizing STEM, and our vibrant community of practice (SEED), which cultivate a culture of creativity, flexibility, and a deep-seated focus on student engagement.
In a pioneering effort to synchronize our academic offerings, we've developed proprietary software that cross-references our course schedules with those of other STEM departments and our own degree pathways. This technological innovation ensures a seamless and cohesive educational journey for our students, reinforcing our philosophy of student-centered progress and academic excellence.

To further this work, we are currently spearheading implementation of a pilot project as a joint effort between counseling and all of STEM that would be a first year experience course focused on providing timely support, information, and community to all new STEM-interested students.

Big Successes
+Growth in Enrollment: The Physics and Astronomy department has witnessed a decade of sustained growth, with a notable increase in the last five years. 279 students (55.83 FTES) in 2018 to 611 students (103.77 FTES)in 2023. See figures 1 and 3. This consistent rise underscores our programs' growing appeal and relevance. In the entire college, only Spanish, Arabic, Real Estate, and Exercise Science have similar growth.

+Advances in Representation: Once grappling with a significant underrepresentation of women and students of color, our concerted efforts over the past five years have borne fruit. We've achieved gender parity and nearly matched the college's racial demographics, narrowing the gap to within 1% for students of color.
+Strides in Equity: In recent years, our Physics department has successfully closed the equity gap for Hispanic students during the spring semester and has reduced it to below 10% in the fall. This progress is significant when compared to the historical average of around 10%. Moreover, we've consistently maintained negligible disparities across gender and race. Figure 3 and 4.

Big Challenges
-Resource Constraints Amidst Enrollment Surge: Despite doubling our student enrollment and making strides in equity, we've seen no proportional increase in our lab budget, chair compensation, full-time faculty, or lab support staff. Consequently, we're tasked with doing more with less, straining our capacity to deliver quality education.
-Faculty Strain: The reliance on part-time faculty across three instructional modalities has inflated the workload, particularly in curriculum development and technology training. The absence of commensurate compensation and support has only exacerbated these challenges.
-Major Operational Issues in Lab Management: Our lab infrastructure is under stress due to doubled enrollment and a diversified array of lab types, yet we've been functioning with only one lab technician whose job description fails to match the skills required. Interim periods without a lab technician, coupled with an inappropriate substitute, have resulted in the loss of expertise, equipment, and time. The inability to attract candidates with specialized degrees means that the chair and faculty are shouldering additional burdens.
-Uncompensated Labor: The chair LED ranges from 0.1 to 0.25 due to shared resources with Earth Science and Engineering departments. Actual hours worked put us at 0.4 – 0.6.
-Curricular Redesign for New Modalities: Transitioning to HyFlex, hybrid, and other modern educational modalities necessitates a continuous comprehensive course redevelopment, placing further demands on our already stretched resources.

Page 2: II. Assessment and Student Achievement

Q7

7. Did your program complete and submit SLO assessment in the last year? If you are unsure, check the most recent updates on your program's SLO Assessment Updates.

Yes

Q8

7a. Which SLOs did you assess in the last year?If you did not assess in the last year, please share why, including whether your program is experiencing barriers to assessment or data submission, and/or if your program would benefit from outcomes and assessment support.

Physics: We assessed all of Physics 130 and 131 as well as 202, we are assessing all other physics courses this semester.

Astronomy: Astronomy needs some help on assessing their SLOs which haven't been done since 2019. We will work on a plan to get these done in spring 2024.

Q9

8. Please share any outcomes assessment projects your program has worked on in the last year, including SLOs on Canvas, PLOs by ACP, Equitable Assessment Strategies (innovative collective/common assessments, project-based, work-based learning, student-centered, etc.), or other.

Physics has started using SLOs and PLOs on canvas. It's awesome and we plan to roll it out as strongly recommended to all faculty during Flex week this spring.

Q10

OPTIONAL: You may upload a copy of any assessment-related documents here. If you have an Excel sheet, please convert it to one of the supported files listed below before submission.

Respondent skipped this question

Page 3: II. Assessment and Student Achievement

Q11

9. Please discuss any equity gaps in access or success

Physics:
Women: We are hovering near gender parity with 42-50% women over the last three years, a significant increase from the previous 30-40% female representation. Although this does not match the college's 55% female demographic, it's a considerable improvement. Additionally we have no equity gaps related to gender.

Hispanic Students: We have closed the representation gap. Over the last 10 years we have moved from averaging a 10% gap in representation between our program's population as compared with the college to less than 1% in the last three years. We have done this while simultaneously addressing equity gaps, with our gaps dropping to an average of less than 5% down from an average around 10% 5-10 years ago. Spring semester has several years of no equity gaps since 2018. We plan to focus our attention on continuing our equitable teaching practices, while adding higher support for gateway courses as well as a first year experience course. .

African American and Pacific Islander Students: There are still representation and success gaps. These groups make up less than 10% of the department and college population, and efforts are being planned to provide better support.

Astronomy:
Women: Representation exceeds parity with 54% female students, which is closer to matching the college's demographic. No success gaps between genders have been noted.

Hispanic Students: Equity gaps are present but not consistently every semester. The department might need targeted interventions for consistent support.

African American and Pacific Islander Students: Unlike Physics, the Astronomy department does not have reported issues regarding representation and success gaps for these groups.

Both departments have seen improvements in gender equity, with Physics making notable progress for Hispanic students as well. However, both departments differ in their success with African American and Pacific Islander students, with Astronomy not facing the same challenges as Physics in this area.

Q12

10. What action will the department or discipline take to address these equity gaps? If equity gaps have been reduced or eliminated, please share what the program did to achieve this. If equity gaps still exist, consider the specific steps your department will take to address equity gaps.

Plans to maintain and improve:
Dedicated counseling for STEM (continue)
Write and manage grant to extend CoP for all faculty + EMTLI and/or onboarding course (EMTLite) where applicable
Early faculty mentoring for all physics majors
Embedded support online and in person
easy help for basic needs (Cuyamaca Cares integration into all classes)
Learning Assistants for intro classes
More resources embedded in Canvas

Q13

11. How has this data impacted the goals set in your previous comprehensive program review?

We have done a lot of work re-developing our labs and courses this year to make them more flexible and we continue to work on faculty growth and development within our SEED community of practice.

Q14

12. Please describe the most significant or impactful ways your program worked across the college to advance the college's vision of equity, excellence and social justice through education over the past year.

Over the past year, the Physics and Astronomy Departments have made significant strides in advancing the college's vision of equity, excellence, and social justice through education. Our approach has been multifaceted, involving expansion of our community of practice model, fostering collaborations, and advocating for equitable practices across the college. Here are the key initiatives that highlight our work:
Expansion of Community of Practice Model: We have branched out our community of practice, SEED (Science and Engineering Educational Design Project), to include more faculty members from diverse disciplines with SEED participants in Biology founding their CRAB community. This has fostered an inclusive environment where educators share, refine, and implement teaching strategies that address the varied learning needs of our students, ensuring that educational excellence is coupled with equity.
Interdepartmental Collaboration for Course Development: We have joined forces with the counseling and career center, among other departments, to design and pilot innovative courses such as STEM 101 and Counseling 101 which will be piloted in spring 2024. These courses are crafted with the aim of providing students with foundational knowledge and skills that bridge the gap between academic theory and practical application. STEM 101 focuses on introducing students to key concepts and career paths in the STEM fields, while Counseling 101 offers insights into effective strategies for personal development and academic planning. This collaborative effort ensures that students are well-equipped to navigate their educational and career trajectories, which is essential for fostering equity and empowering students to capitalize on opportunities within and beyond the college environment.
Committee and Senate Work for Equitable Hiring: We have been active in committees and the college senate, promoting equity in hiring practices. Our aim is to ensure that our faculty and staff reflect the diversity of our student body, which is crucial for fostering an educational environment where all students can see themselves represented and supported.
Collaboration with Grossmont and STEM Departments: In an innovative step, we've collaborated with Grossmont and other STEM departments to create a student-centered schedule using Airtable. This tool allows for a more dynamic and responsive scheduling system that considers the needs and constraints of our diverse student population, thereby supporting their academic journey more effectively.
Student-Centered Initiatives: We've placed students at the heart of our academic planning. This includes designing course schedules that are sensitive to their work and family commitments, ensuring that education is accessible and equitable.

These collective efforts represent our unwavering commitment to not only academic excellence but also to creating an equitable and just educational environment that empowers all students to succeed.

Q15

13. What challenges is your program still experiencing due to the disruption of operations caused by the pandemic and the need to offer services in various modalities?

Our programs continue to navigate through several significant challenges that arose from the pandemic-induced operational disruptions. These are chiefly centered around lab technical support and the increased workload on the chair due to new modalities of course delivery.

Lab Technician Issues: The departure of a long-serving lab technician due to the vaccine mandate severely impacted our operations. The position, which was already under-supported, took a hit when this individual, carrying extensive institutional knowledge, left. Attempts to fill the vacancy faced obstacles due to the technical nature of the role and compensation that is not competitive with market wages. For nearly two years, the position remained either vacant or was temporarily filled by individuals who did not meet our standards, including one who was dismissed for harassing a faculty member. Consequently, the chair and a few faculty have had to shoulder many technical responsibilities without additional compensation while also dealing with the harassment issue. Although we now have a new hire who is competent, the lack of specialization in physics means faculty members continue to perform technical tasks. This situation has led to an incomplete inventory, with many items missing or broken, creating a struggle to maintain normal operations. Our telescopes, for instance, have not been serviced since before 2020, creating huge difficulties in offering in person astronomy. Currently many of our labs are online. This is both a good bid for enrollment, but also an unfortunate necessity. If we bring the labs back in person, faculty will have more work and not enough supplies.
Chair Workload: The chair's workload has increased significantly, as hiring, scheduling, and designing courses across new modalities demand more time and effort than before. Managing this for the disciplines of physics, earth science, and engineering, with a Load Equivalent (LED) of only 0.36—and specifically 0.1-0.25 for physics—is an arduous task. The development and implementation of new scheduling methods, coupled with hiring and training staff for HyFlex modalities amidst high turnover rates, is particularly draining. Faculty are no longer interchangeable as not all of them specialize in all modalities. As more enrollment has not resulted in better lab budgets or more LED, we have become victims of our own success.

These challenges emphasize the need for additional support and resources to ensure that the advancements we have made in educational delivery during the pandemic can be sustained and that our faculty and staff are not overburdened.

Q16

OPTIONAL: Please upload any documentation you would like to include as part of your responses to this section of the program review.

fa23-au-PHYSASTR-FIGURES.pdf (765.7KB)

Page 4: II. Assessment and Student Achievement continued

Q17 **Yes**

11. Does your department offer classes that are approved distance education courses?

Page 5: DE Course Success Rates

Q18

12. If there were differences in success rates for distance education (online) versus in-person sections of program courses in your last comprehensive program review, what has the department done to address these disparities? If online and in-person sections had comparable success rates, please describe what the program did to achieve that.

Our department has diligently worked to ensure that there are no significant differences in success rates between our online and in-person courses. This achievement is the result of concerted efforts to provide our faculty with both professional development opportunities and financial support for the creation of online courses.

A prime example of this success is our Physics 130/131 series (see figure 2). These courses have been completely restructured for both online and in-person delivery. Since the onset of the pandemic, the majority of these classes have been conducted online. Remarkably, not only have we maintained consistent success rates across modalities, but we have also narrowed equity gaps and even eliminated some. This feat is particularly noteworthy as it was accomplished during the transition to an online format—a change typically associated with increased challenges.

Key Initiatives Contributing to Our Success:
-Financial incentives were provided to encourage faculty participation in the EMTLI program.
-We established and sustained a community of practice known as SEED (Science and Engineering Educational Design Project), which offers coaching, collaborative exchange, support, and feedback. This enables faculty to experiment with and share innovative teaching strategies.
-The Physics 130 and 131 courses were redeveloped into fully online, student-centric curricula. This involved investing in conferences, training sessions, curriculum redesign, and high-quality audio and video equipment to enhance the learning experience.
-Funding was allocated for several smaller projects that facilitated the transition to online education in 2020.

Our efforts underscore the department's commitment to educational excellence and equity, regardless of the challenges posed by changing teaching modalities.

Page 6: III. Previous Goals: Update

Q19

Previous Goal 1:

Previous Goal 1: Outreach
Web updates, social media posts, K-12 visits, cool science demos at events in the region

Q20 **In Progress - will carry this goal forward into next year**

Previous Goal 1:

Page 7: III. Previous Goals: Update continued

Q21

Please describe the results or explain the reason for deletion/completion of the goal:

Respondent skipped this question

Q22

Do you have another goal to update?

Respondent skipped this question

Page 8: III. Previous Goals: Update continued

Q23

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Increase equitable access (enrollment)

Q24

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

We have started presenting at various K-12 venues and plan to continue. This is a lot of work and we need support from more faculty as well as a more specialized technician.
We would like to fold social media and updates into a new lab tech roll.

Q25

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

New faculty position,

New classified position

Q26

Do you have another goal to update?

Yes

Page 9: III. Previous Goals: Update continued

Q27

1. Previous Goal 2:

Previous Goal 2: In-Reach
Counseling, Mentoring, Job Talks, Field Trips, Internships, Work Experience

Q28

3. Goal Status

Deleted

Page 10: III. Previous Goals: Update continued

Q29

Please describe the results or explain the reason for deletion/completion of the goal:

We can’t do all this with current resources, so we will focus on STEM 101

Q30 **Yes**

Do you have another goal to update?

Page 11: III. Previous Goals: Update (If Applicable) continued

Q31 **Respondent skipped this question**

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Q32 **Respondent skipped this question**

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Q33 **Respondent skipped this question**

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Q34 **Respondent skipped this question**

Do you have another goal to update?

Page 12: III. Previous Goals: Update continued

Q35

1. Previous Goal 3:

Previous Goal 3: Flexible Lecture Overhaul
Make high quality content available in multiple formats (online both -- synchronous and asynchronous, in-person, HyFlex)

Q36

3. Goal Status

In Progress-will carry this goal forward into next year

Page 13: III. Previous Goals: Update continued

Q37

Please describe the results or explain the reason for deletion/completion of the goal:

Respondent skipped this question

Q38

Do you have another goal to update?

Respondent skipped this question

Page 14: III. Previous Goals: Update continued

Q39

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Increase persistence eliminate equity gaps (re-enrolling the subsequent semester or year)

Q40

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Professional Development – Continue to enroll faculty in SEED, EMTLI, humanizing STEM
HyFlex support like TAs
Equitable practices (flexible grading, deadlines, projects, inquiry based, high touch approach) supported by PD for all modalities
Coordination between instructors
Content Library - storage and distribution to students and faculty, finish lecture recordings for all courses, put in Canvas Studio

Q41

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

New faculty position,

New classified position,

Supplies, equipment, and/or furniture

Q42

Do you have another goal to update?

Yes

Page 15: III. Previous Goals: Update continued

Q43

1. Previous Goal 4:

Previous Goal 4: Hybrid Lab Restructure
Now that we have some experience with online labs we need to rewrite and organize ours and match them with the in person ones to provide maximum student flexibility as well as more inquiry and project-based models.

Q44 **In Progress-will carry this goal forward into next year**

3. Goal Status

Page 16: III. Previous Goals: Update continued

Q45 **Respondent skipped this question**

Please describe the results or explain the reason for deletion/completion of the goal:

Page 17: III. Previous Goals: Update continued

Q46 **Increase equitable access (enrollment)**

Link to College Strategic Goal - Which College Strategic Goal does this department goal most directly support? (Check only one)

Q47

Action Steps for the Next Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new laptop computers).

Parallel online and in person labs
PD – SEED, EMTLI, humanizing STEM
Hands on, project based (need kits and technology access for online)
Need to develop A LOT of new labs which need money and time
Need: FT Faculty, Lab Tech, CoP money, Lab kits, Astronomy maintenance and upgrades

Q48 **New classified position**

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Page 18: IV. New Goals

Q49

Would you like to propose any new goal(s)?

Yes

Page 19: IV. New Goals continued

Q50

1. New Goal 1:

New Goal 1: STEM 101

Q51

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Increase completion and eliminate equity gaps (graduating with a degree/certificate, or transferring)

Q52

3. Please describe how this goal advances the college strategic goal identified above.

First Year Experience Course Development: We are piloting a First Year Experience exploratory course (STEM/COUN 101), designed to orient and prepare new STEM students for the rigors of their chosen disciplines. We have already put this course through curriculum but will need resources to properly develop, test, and scale it to all first-year students interested in STEM. We would like to create a model that can be adopted to other ACP pathways in the future.

Q53

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Through student surveys and informal discussion, we have found many students waste significant time navigation the college and transfer process. As our program does not encounter our majors until at least year 2 or 3 of their time at the college, we hope to reach STEM interested students within their first year to provide resources that would prevent this problem before they take their first Physics course.

Q54

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Develop and offer a pilot course in spring.
Apply for NSF grant to fund development and scaling

Q55

6. How will this goal be evaluated?

Quantitative and qualitative assessment of students in the program and students not in the program, including surveys, and monitoring of momentum points, success, retention, and eventually transfer.

Q56

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Other, please specify::

Support for NSF Grantvv

Q57

Do you have another New Goal?

No

Page 20: IV. New Goals continued

Q58

1. New Goal 2:

Respondent skipped this question

Q59

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Respondent skipped this question

Q60

3. Please describe how this goal advances the college strategic goal(s) identified above.

Respondent skipped this question

Q61

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Respondent skipped this question

Q62

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Respondent skipped this question

Q63 Respondent skipped this question

6. How will this goal be evaluated?

Q64 Respondent skipped this question

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Q65 Respondent skipped this question

Do you have another New Goal?

Page 21: IV. New Goals continued

Q66 Respondent skipped this question

1. New Goal 3:

Q67 Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q68 Respondent skipped this question

3. Please describe how this goal advances the college strategic goal(s) identified above.

Q69 Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q70 Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q71 Respondent skipped this question

6. How will this goal be evaluated?

Q72

Respondent skipped this question

WWhat resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Q73

Respondent skipped this question

Do you have another New Goal?

Page 22: IV. New Goals continued

Q74

Respondent skipped this question

1. New Goal 4:

Q75

Respondent skipped this question

2. Which College Strategic Goal does this department goal most directly support? (Check only one)

Q76

Respondent skipped this question

3. Please describe how this goal advances the college strategic goal(s) identified above.

Q77

Respondent skipped this question

4. Please indicate how this goal was informed by SLO (student learning outcomes) assessment results, PLO (program learning outcomes) assessment results, student achievement data, or other qualitative or quantitative data (from any source):

Q78

Respondent skipped this question

5. Action Steps for this Year: If you are requesting resources in order to achieve this goal, please list them below as action steps and specify the type of request (e.g., submit technology request for new computer hardware).

Q79

Respondent skipped this question

6. How will this goal be evaluated?

Q80

What resources, if any, are needed to achieve this goal? Please select all that apply. Links to request forms are included below. All resource requests are due on the program review deadline.

Respondent skipped this question

Page 24: Final Check

Q81

Are you ready to submit your program review?If you would like to go back and review a section, select a section a click "Next."

I am ready to submit my program review