Program: Physics & Astronomy

Division: STEM

Date: November 1, 2024

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SLO/SAO Point-Person: Robin Rehagen

Audience: Deans, Vice Presidents of Student Services and Academic Services, All Planning and Allocation Committees. This document will be available to the public.

Uses: This Program Review will inform the audience about your program. It is also used in creating division summaries, determining college planning priorities, and determining the allocation of resources. The final use is to document the fulfillment of accreditation requirements.

Please note: Program Review is NOT a vehicle for making requests. All requests should be made through appropriate processes (e.g., Instructional Equipment Request Process) or directed to your dean or supervisor.

Time Frame: This Program Review should reflect your program status during the 23-24 academic year. It should describe plans starting now and continuing through 2024-25.

Helpful Links:

- ★ Tools for Writers - with contacts for help with specific sections.
- ★ Program Review Glossary - defines key terms you can review when writing.
- ★ Fall 2023 Program Reviews
- ★ Program Review FAQs

For help with your program review, please contact Karin Spirn at kspirn@laspositascollege.edu

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Sections

There are four sections to the document:

1. Review your program, including curriculum updates, accomplishments, challenges, and planning.
2. Data Analysis
3. SLO/SAO Review
4. Feedback on the PR template and process

Instructions

1. Please answer each question with enough detail to present your information, but it doesn't have to be long.
2. If the requested information does not apply to your program, write "Not Applicable."
3. Optional/suggested: Communicate with your dean while completing this document.
4. Send an electronic copy of this form to Program Review chair, Karin Spirn, and your Dean by Monday, Nov. 4, 2024

5. Even if you don't have much to report, we want to hear from you, so your voice is part of the college planning process.

Equity is a guiding principle. Here is the LPC definition:

Las Positas College will achieve equity by changing the impacts of structural racism, ableism, homophobia, and systematic poverty on student success and access to higher education, achieved through continuous evaluation and improvement of all services. We believe in a high-quality education focused on learning and an inclusive, culturally relevant environment that meets the diverse needs of all our students.

LPC Equity Definition: Equity is parity in student educational outcomes. It places student success and belonging for students of color and disproportionately impacted students at the center of focus.

Section 1: Your Program In 2024-2025

Please place an X next to N/A where relevant

A. Accomplishments: Identify your main accomplishments from the 23-24 academic year.

- Physics club is in its second year and continues to attract students across all STEM disciplines and promote community among them. Fieldtrips to local laboratories and STEM employers have positively impacted student employment/internships as well and have inspired students to persist in STEM.
- This was our first year as part of the ASTRAL Consortium, in which LPC is connected to Lick Observatory in San Jose. Several faculty (both full and part time) have taken advantage of what the consortium offers. We have taken field trips to the telescopes, used data from the telescopes in our physics and astronomy labs, mentored honors students working on telescope data, and applied for observing nights where students and faculty can take data themselves at the observatory. Allied with the consortium is a program called PDP that designs equity-focused, inquiry-based science labs, and a PDP team will be team-teaching a lab to some of our physics students this fall, with a planned annual partnership.

B. Challenges, Pain Points, and Needs

What significant or ongoing challenges or obstacles did your Program face during the 23-24 academic year, especially related to accomplishing program goals/plans? Consider funding, staffing, materials, facilities, outside requirements such as legislative mandates, working on equity gaps, etc. Highlight/identify any challenges mentioned in previous reviews.

- Our enrollment is skyrocketing. Every time we add a new class, it fills and waitlists. With our currently allotted FTEF, it is impossible to keep up with student demand and we have been requesting more FTEF every semester. Here are some numerical details:
  - Averaged over the calculus-based physics sequence as a whole, the increase in student enrollment this year constitutes a 16% increase from last year. Last year's enrollment was a 12% increase over the previous year. **Four years ago (2020-2021), we offered 14 lab sections of calculus-based physics. This year, the student demand is for 22 sections. This is a 60% increase in demand over the past 4 years.**
  - Many articulation agreements with transfer institutions require the entire physics sequence (1A-1B-1C-1D) to be taken at one college. By not offering enough sections, our LPC students are completely blocked from transferring: they don't even have the option to take the course at another college.
  - The large increase in enrollment is driven primarily by rising numbers of computer science majors. However, student enrollment in engineering and the physical sciences has also increased.
- Finding part-time faculty to help share the teaching load with the addition of so many new classes has been difficult. This has been an ongoing problem for several years. Right now, the two full-time faculty are teaching 66-70% of the FTEF, and we are almost always overloaded. If enrollment continues to increase at the current rate, we may need to consider hiring a third full-time faculty member.
- The classroom facilities in the 1800 building (which is ~50 years old) are deteriorating. The whiteboards are poor quality and are constantly breaking or broken. The projectors are constantly breaking, unreliable, or broken.

- The lab storage space has become increasingly disorganized to the point where it is getting hard for faculty to locate necessary equipment or find counter space to work on in room 1824.

C. Planning: What are your program's most important plans, either new or continuing?

- The Common Course Numbering (CCN) initiative is going to force huge changes in the physics curriculum. The physics faculty unilaterally agree that the changes, which result in significant loss of course hours for our degree program (20% reduction in hours), will be hugely detrimental to student learning. We are not looking forward to upending our successful physics program because of changes forced upon us by politicians. Our department also strongly opposes the compressed calendar because it will make the extremely high-unit load classes even more difficult for students and faculty. We think it is irresponsible for the district to solicit faculty and student feedback about the compressed calendar and then ignore our recommendations.

D. Identify any college, district, or legislative barriers to your program's equity work. What suggestions do you have for minimizing or eliminating these barriers?

N/A___X_____

E. Curriculum Updates

Reasons for updating include that it is required every two (CTE) or five (non-CTE) years, there is a program or college need, starting a new program, or new legislation.

1. Are you planning to update any curriculum in 24-25?
   Yes____ No__x__

2. Comments (Optional):

3. Please review your program maps. Do you need to make any modifications?
   Yes____ No__x__

4. If yes, compare each Program Map to your current course offerings and sequencing. Pay close attention to prerequisite information, and classes offered only during certain semesters.
   a) If your map requires a **non-curricular change** (i.e., course sequencing), consult your **Pathway counseling faculty liaison** to initiate changes.
   b) **If your map requires a curricular change** (Program modifications) - these are initiated through the Curriculum Committee.

   Any questions? Contact the Curriculum Chair or the Curriculum and SLO Specialist.

Section 2: Data Analysis – Quantitative and Qualitative

IR Data Review: Discuss any significant trends in the data provided by the Office of Institutional Research and Planning (or any other data you use for decision-making and planning).

- **We are at our pre-pandemic enrollment levels.**

- **We have reached pre-pandemic fill-rates for classes (97-99%) and nearly all our non-GE classes have waitlists.**
- **All our Physics courses are in-person. However, pre-COVID, only 20% of physics students supplemented their college education with DE classes. Post-COVID, 60% do.**
- **The prevalence of younger students (<19 years old) has gone up 15% compared to pre-COVID levels. There is a significant decrease in older students (25+) since COVID.**
- **The only racial demographic change is fewer white students replaced by more Asian students, though the change is small (~5%).**

B. Program-Set Standard (Instructional Programs Only):

The program-set standard is a baseline that alerts programs if their student success rates have dipped suddenly. 95% of the rolling 5-year average. There are valid reasons a program does not meet the Program Set Standard; when a program does not meet this standard, they are asked to examine possible reasons and note any actions that should be taken, if appropriate. | Program-set standard data can be found on this page.

1. Did your program meet its program-set standard for successful course completion?

   Yes__X__ No____

2. If your program did not meet your program-set standard, discuss possible reasons and how this may affect program planning or resource requests.

Section 3: SLOs/SAOs: Assessment of Student Learning and Support

Program Review is the college's major data source on student learning and support and is, therefore, regularly reviewed. *Each year, programs must discuss their PSLOs, CSLOs, or Service Area Outcomes (SAOs.) This helps us to see how our students are progressing in their learning.* For assistance with these questions and instructions on running reports using eLumen, click here.

Please complete at least one of the following three sections based on what is appropriate for your program.

Check at least one below:

- X C1: Instructional Programs with PSLOs (disaggregated PSLOs)
- ☐ C2: Instructional Programs with CSLOs *(Departments without degrees, non-major courses, and/or other courses up for assessment)*
- ☐ C3: Non-Instructional Programs (SAOs)

C1: Instructional Programs with PSLOs (disaggregated PSLOs)

To assess PSLOs within eLumen, CSLOs must be correctly mapped to only one PSLO, and every mapped CSLO must have assessment data. Please review the items below and proceed accordingly.

- If the CSLOs are mapped correctly and there is data for each CSLO, then continue to question 2.
- If the CSLOs have assessment data and the mapping needs to be completed, then complete the mapping within eLumen (See SLO Handbook, p. 7) and continue to question 2.

- If not all mapped CSLOs have assessment data, then you cannot assess the PSLO. In this case, continue to section C2.

1. Please review your 3-year plan and verify that all courses will be assessed by June 2026. (between Fall 2023 – Spring 2026)

   Will at least one SLO be assessed in each course by June 2026?
   Yes__x__ No____

   If not, please update your 3-year plan to include any courses you missed. If you plan to revise your 3-year plan, then send your updated plan to the Curriculum and SLO Specialist and the SLO Chair.

2. Based on your 3-year plan, list the PSLO(s) for the academic year 2023-2024 that your program selected to review and explain why these were chosen.

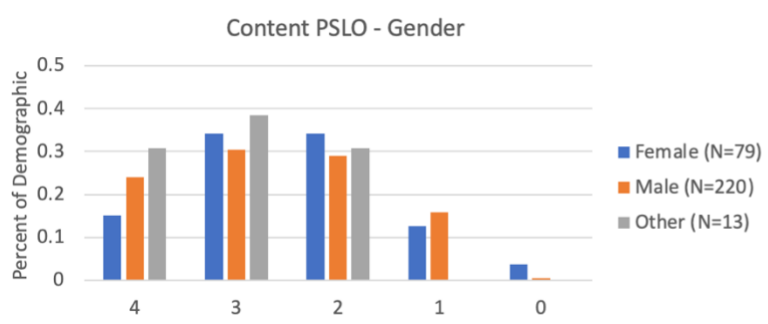
Upon successful completion of an AS in Physics, students are able analyze physical situations quantitatively using fundamental physics principles, ranging from Newtonian mechanics to modern physics.

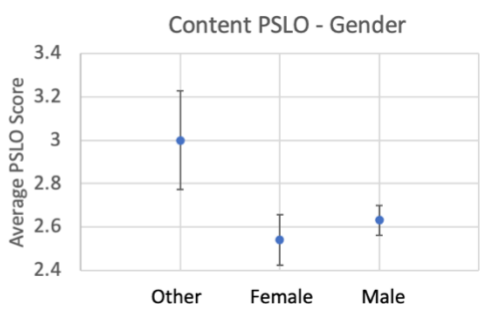
This is the SLO related to understanding physics content, typically assessed using exam grades. Our other two SLOs relate to laboratory skills. During the 3-year cycle, we assess one of our PSLOs each year.

3. What percentage of faculty completed the planned CSLO assessments? (In eLumen, run a Faculty Participation report for 23-24).
   - _____100_____%

4. Analysis of PSLO(s): What conclusions can be drawn about student learning and equity in your program based on eLumen and/or other data? You may want to consider disaggregated data. When using eLumen See the Guide for instructions on how to disaggregate PSLO data.

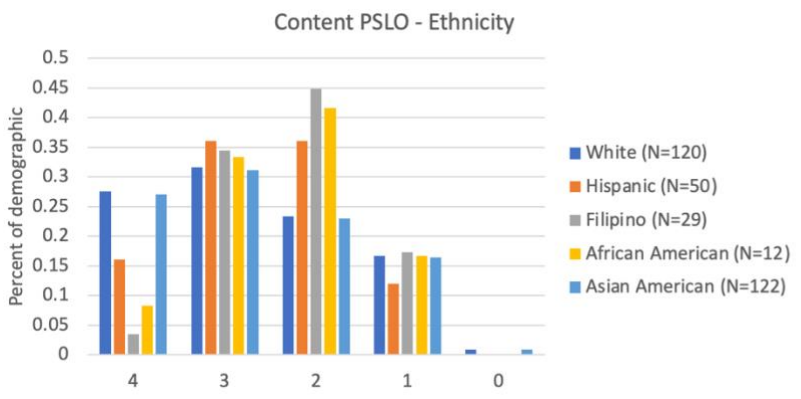
We used eLumen to disaggregate the data for our Content PSLO to see if different demographics of students perform differently on their physics exams. Note that these data apply only to student enrolled in the calculus-based physics sequence (PHYS 1A-1D). The following plots display the results of the disaggregation.

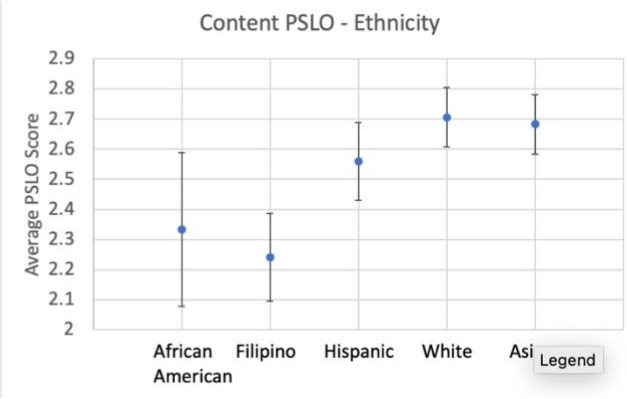




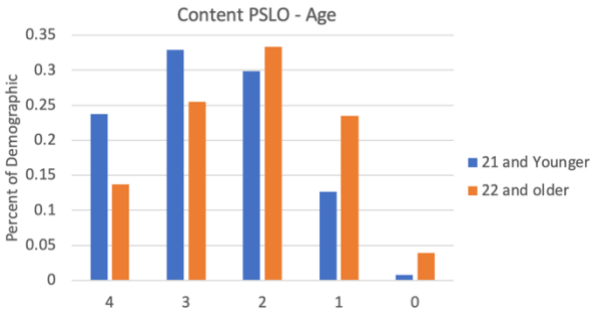
Analysis: There is no significant correlation between gender and performance on exams. While the distributions are slightly differently shaped (left plot), the means for both men and women are consistent within uncertainties

(right plot). Only 30% of physics students identify in the minority gender categories ("female" or "other"), so the uncertainty in the minority categories is larger. In the last SLO cycle (Fall 2021), women scored slightly higher than men on exams, on average. The ratio of students who identify as men, women, and other have not changed significantly in the past 3 years.





Analysis: White and Asian students score similarly on tests, and their performance is higher than that of minority students. The plot on the right shows that Hispanic students scores are slightly lower on average, but the mean is still consistent with white and Asian students, within errors. This is an increase in performance compared to Fall 2021. African American and Filipino students have a distribution of exam scores that is significantly lower than those of white and Asian students. The uncertainties in the results for the minority students are higher because of smaller sample size.



Analysis: Students over 22 years old score lower on physics exams than younger students. As calculus is the only prerequisite for physics, this is may be due to math preparation, with older students more likely to have taken the prerequisite math classes several years earlier. This same discrepancy in ages was also seen 3 years ago (2021 PSLO disaggregation) but now the gap in performance is larger, possibly due to legislation like AB 705 and AB 1705 that removed the option for older students to review lower-level math before jumping into calculus.

5. Based on discussions with others in your program, explain potential changes designed to improve student learning and close any equity gaps identified through the analysis of PSLO data. Please also note if you decide to update any CSLOs or PSLOs based on this analysis (If updating, then you may do this through eLumen, see the SLO Handbook if you need instructions on how to do this).

The main equity gaps we found occurred for older students and students of certain ethnic minorities. We have seen a steady decline in students math skills since the pandemic, and it's possible that this decline is more pronounced in certain demographics and the source of the equity gaps in our exam performance. There are other

possible factors, like whether or not students have jobs or family responsibilities, that may also correlate with age or ethnicity.

As faculty, we already do our best to create discussion-based, active learning environments in lecture and lab that help students build camaraderie and find a support group of peers to rely on during their educational journey. Groups like physics club can also promote friendships between STEM students. Faculty reach out to struggling students of all demographics and provide support in office hours for students who make the effort to seek help.

Unfortunately, any changes in curriculum that result in fewer class hours (like CCN or the compressed calendar) will absolutely make these equity gaps worse for struggling students.

6. If you experienced any challenges in completing your PSLO assessment process, please list those below along with any items that would help you improve this process in the future.

   N/A

C2: Instructional Programs with only CSLOs - Departments without degrees, non-major courses, and/or other courses up for assessment

1. Please review your 3-year plan and verify that all courses will be assessed by June 2026. (between Fall 2023 – Spring 2026)

   Will all courses be assessed by June 2026?
   Yes____ No____
   If not, please update your 3-year plan to include any courses you missed or if you plan to revise your 3-year plan, then send your updated plan to the Curriculum and SLO Specialist, and the SLO Chair.

2. Based on your 3-year plan, list the CSLO(s) for the academic year 2023-2024 that your program selected to review.

3. What percentage of faculty completed the planned assessments for the selected CSLO? (In eLumen, run a Faculty Participation report for 23-24).

4. What conclusions can you draw from the CSLO data and reflections in eLumen. If you used any additional evidence or methods to answer this question, please explain.

5. Explain potential program changes designed to improve student learning. Please also note if you have decided to update any CSLOs or PSLOs based on analysis (If updating, then you may do this through eLumen, see the SLO Handbook if you need instructions on how to do this).

6. If you experienced any challenges in completing your CSLO assessment process, please list those in the box below, along with any items that would help you improve this process in the future.

C3: Non-Instructional Programs (SAOs)

1. Please review your 3-year plan and verify that all courses will be assessed by June 2026. (between Fall 2023 – Spring 2026)
   Will all courses be assessed by June 2026?

   Yes____ No____

   If not, please update your 3-year plan to include any courses you missed or if you plan to revise your 3-year plan, then send your updated plan to the Curriculum and SLO Specialist, and the SLO Chair.

2. Based on your 3-year plan, list the SAO(s) for the academic year 2023-2024 that your program selected to review.

3. Based on discussion with others in your area, what conclusions can be drawn from the SAO data and reflection questions from eLumen or other sources of data?

4. Explain any planned changes to improve outcomes in your service area. Please note if you have decided to update any SAOs based on this analysis.

5. If you experienced any challenges in completing your SAO assessment process, please list those below, along with any items that would help you improve this process in the future.

Section 4: Suggestions for the Program Review Committee (optional)

What questions or suggestions about this year's Program Review forms or process do you have?