

## PROGRAM REVIEW Fall 2020

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**Program: Physics and Astronomy**

**Division: STEM**

**Date: 24 September 2020**

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**SLO/SAO Point-Person: Robin Rehagen**

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**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 be used to inform the campus and community about your program. It will also be used in the processes of creating Division Summaries, determining College Planning Priorities and allocating resources. A final use is to document fulfillment of accreditation requirements.

**Please note:** Program Review is NOT in itself 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 on program status during the 2020-21 academic year. It should describe plans starting now and continuing through 2021-22.

**Sections:** This Program Review has been shortened due to the COVID-19 pandemic. The Program Review Committee understands that you are completing this program review in a time of stress and disruption and that this may affect many of your responses. Sections and questions are marked with the name of the committee or office that will use the information.

- The first section focuses on general program reflection and planning.
- The second section has specific questions to be filled out by all programs this year.
- The third section is a review of curriculum, to be filled out only by programs with curriculum.

**Topics:** The Program Review Glossary defines key terms. Writers should review this glossary before writing: <https://bit.ly/2LqPxOW>

**For Help:** Contact Nadiyah Taylor: [ntaylor@laspositascollege.edu](mailto:ntaylor@laspositascollege.edu).

A list of contacts for help with specific sections is provided on the Program Review website under the “tools for writers” tab. [<https://bit.ly/3fY7Ead>]

### **Instructions:**

- 1) Please respond to each question as completely as possible.
- 2) If the requested information does not apply to your program, write “Not Applicable.”
- 3) Optional: Communicate with your dean about completing this document.
- 4) Send an electronic copy of this form to Nadiyah Taylor and your dean by Monday, November 2.

### **Links:**

Program Review Home Page: [laspositascollege.edu/instructionalprogramreview](https://laspositascollege.edu/instructionalprogramreview)

Fall 2019 Program Reviews: [laspositascollege.edu/programreview/pr2019.php](https://laspositascollege.edu/programreview/pr2019.php)

Frequently Asked Questions: [laspositascollege.edu/instructionalprogramreview/programreviewfaqs.php](https://laspositascollege.edu/instructionalprogramreview/programreviewfaqs.php)

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## Section One: Program Snapshot [Program Review Committee]

For assistance with this section, contact the Program Review Committee Chair. [\[https://bit.ly/3fY7Ead\]](https://bit.ly/3fY7Ead)

### No Significant Changes Option

Contact person: \_\_\_\_\_

By marking an X in the box above, the writers of this Program Review indicate that there have been no significant changes to their program or their program's needs in the past year. In this case, programs may opt not to complete Program Review Section One: Program Snapshot. **Programs must still complete all other sections (as applicable).**

Please note: Choosing this option means that your program's information may not be included in the yearly Division Summary.

The No Significant Changes Option may only be used for two years in a row; after two years, programs must complete a full Program Review including the Program Snapshot. Our program's most recent Program Snapshot was submitted in the following semester: Fall 2017\_\_\_\_\_.

### A. Accomplishments: What plans were achieved during AY19-20? You may describe achievements that were or were not planned in earlier Program Review. Your response may include actions regarding COVID-19. Please highlight any positive impacts to students.

#### Accomplishments since the last Program Review Cycle (Fall 2017):

- Due to the change from the Physics 8 series to the Physics 1 series (purpose: to shift physics course sequencing to match mathematics prerequisites), students in PHYS 1C have been noticeably better prepared for the rigorous calculus in PHYS 1C.
- The Engineering Technology degree has successfully shifted from the requirement of PHYS 2A to PHYS 10+10L. This appears to be having the desired effect of retaining Engineering technology students who would not otherwise complete the physics requirement, while at the same time providing the lab skills and concepts required by their employers at LLNL and elsewhere.
- The engineering laboratory classroom (1822) has been used to supplement lab space when needed by physics classes since Fall 2019. While this addition of space has helped us schedule additional classes, there are still outstanding laboratory space issues (see next section).
- New laboratory equipment has been purchased in the past three years to replace aging equipment and expand into the second laboratory space (room 1822).

Mark an X before each area that is addressed in your response.

Definitions of terms: <https://bit.ly/2LqPxOW>

	Community Partnerships/Outreach	<b>x</b>	Facilities, Supplies and Equipment, Software		LPC Planning Priorities		Services to Students
	Course Offerings		Financial/Budgetary		LPC Collaborations		SLO/SAO Process

<b>x</b>	Curriculum Committee Items		Human Resources		Pedagogy		Student Equity
	External Factors		Learning Support		Professional Development		Technology Use

**B. Challenges, Obstacles and Needs: Describe any significant challenges, obstacles or needs for your program. Your response may include issues regarding COVID-19. Please highlight any negative impacts for students.**

**The current obstacles our department faces can be divided into three categories: facilities needs, coordination with our lab tech to prioritize the needs of the three programs he supports, and COVID-related issues.**

**Facilities needs:**

The number of students enrolled in physics laboratory courses has nearly doubled, and yet our laboratory classroom space and storage space has not increased. We need:

- A second, dedicated physics laboratory classroom.
  - Engineering and physics lab equipment requirements are different. Both disciplines use large, bulky equipment that needs to be stored in the classroom for daily use. Room 1822 is currently stuffed to the brim, with no free counter space and walkways impeded by racks of equipment storage.
  - Sharing room 1822 with engineering is a band-aid on the bigger problem: that physics requires two laboratory classrooms. The engineering program is also increasing in size, and scheduling laboratory space so that there is no overlap between departments is difficult and not sustainable.
- Increased storage rooms for laboratory equipment
  - The increase in enrollment of both the physics and engineering programs has significantly increased the amount of laboratory equipment necessary to run the programs. There is no longer adequate space to store all equipment.
  - Not only is the engineering lab space overflowing with equipment that cannot be properly stored, the physics classroom is also going the same route. 50% of the physics lab counter space is now unusable and equipment is piled up so high that it blocks part of the windows. In addition, the room 1824, which used to be a student workspace, is now completely filled with boxes of equipment, laser cutters, and other supplies that cannot be easily stored.
  - Right now physics, astronomy, and engineering technically have “access” to three small closets for storage. However, two of these closets are located on separate floors from the laboratory classrooms (VERY inconvenient), and the closets contain so much bulky and heavy equipment (for example, machine shop tool benches) that obtaining access to the desired equipment is often physically impossible.
- Dark Sky Site and Storage Shed for telescopes
  - For over a decade, the astronomy program has needed a vehicle-accessible dark sky site near campus. The current telescope dome is unusable with the lights from the nearby athletic fields. While building a new telescope dome may be impossible, an easier task would be to simply pave a road to a dark location in the hills surrounding campus, and build a small storage shed at the site to store the telescopes.

- For telescope safety, the storage shed should be locked and temperature controlled (ex: a solar-powered fan and mesh windows) so that summer heat does not destroy the telescopes.
- Currently, nighttime astronomical observations are a logistical nightmare because of the necessity of transporting heavy, bulky telescopes down multiple stories of the 1800 building (often by a single faculty member), and driving them (not all faculty members have large SUVs to fit the telescopes) to a dark location (the current location behind M&O is not easily accessible and unpaved). Damage to the telescopes is a constant danger during transportation.

### **Coordination with Laboratory Technician:**

- The physics, astronomy, and engineering programs have many different (and often conflicting) needs. Finding the correct balance of lab tech time devoted to physics, astronomy, and engineering has become an issue for our department, and the issue grows bigger as the programs themselves grow. We need improved communication between the PHYS/ASTR/ENGR faculty and the laboratory technician, so that the needs of all programs are being met and prioritized fairly.
  - **Maker Space:** Currently, a great deal of the lab technician's time is used in coordinating and using a "maker space" in the second floor area involving 3-D printing, and laser cutting and etching specific to engineering. This endeavor is primarily related to the Engineering program, but it occupies significant space and lab tech time. The Physics and astronomy faculty would like to better understand the need for these activities, and their demands on the lab tech so that we could make the best use of available student learning space and the lab tech's time.
  - **Support for Astronomy:** The increasing needs of the (larger) physics and engineering programs have resulted in minimal lab tech support for astronomy. This has left several telescopes in disrepair. Likewise, astronomy equipment that can be used in lab and lecture is poorly organized, and scattered over three separate storage spaces in separate buildings, often behind heavy equipment that is scheduled to be surplussed or moved.
- **Beginning this academic year (2020-21), we would like a greater share of the lab technician's time to be devoted to the needs of the physics and astronomy programs. We would also like to develop a more formalized method of prioritizing the needs of different department and classes, when they compete for the lab tech's attention.**

### **COVID-related issues:**

- Financial support for faculty to purchase at-home educational equipment
  - While the college has been supplementing students with equipment (laptops, calculators, etc.) to help with online classes, very few resources have been given to faculty to improve their ability to teach from home. Faculty seem to be expected to purchase expensive items such as document cameras, large whiteboards, and tablet computers with styluses (to capture handwritten work), or software packages such as Camtasia. Many of us do NOT have the resources to purchase these items. The quality of online lectures and demonstrations would be improved with better financial support from the college.
- Fool-proof method to proctor paper-based exams.

- Exams are integral to STEM courses in that they are one of the few instances where students are expected to demonstrate their understanding of course material without the help of fellow students or online resources. There has been an unfortunate (but predictable) rise in student cheating now that many STEM exams can no longer be proctored and online solutions are readily available at no charge.
- **An option to proctor on-campus exams would be hugely beneficial.** Faculty have devised alternative ways to attempt to proctor exams or prevent cheating, but each new way comes with its own new drawbacks. Additionally, not all methods are fool-proof against cheating.
- The STEM laboratory experience has (predictably) suffered due to COVID and wildfires.
  - ⊖ In-class labs planned for September were cancelled/postponed due to a combination of COVID concerns and wildfire smoke. However, physics labs conducted in October in small groups went well, although they required a considerable increase in workload for the faculty member (Harpell) involved. More labs are planned for November.
  - At-home labs (when equipment is available for students to use) are working fairly successfully, although they require nearly double the amount of class time to complete than in-class labs.
  - While many labs can be done at home, there is a sizeable portion of labs that simply *cannot* be done at home because the materials are too expensive or dangerous to purchase for individual students. There is a loss of hands-on experience in these particular subject matters that cannot be replicated.
  - Online-based labs have met with a mixture of success and failure. Students do seem to be learning much of the educational content from the assignments, however many students are having difficulties communicating and building relationships with their group members.
  - In all types of DE labs, simple errors (such as using the wrong units, misunderstanding the meaning of variables, etc.) that would likely be recognized and avoided in on-campus labs are harder to avoid in a DE class when students are not constantly monitored by a faculty member during the experiment.

Mark an X before each area that is addressed in your response.			Definitions of terms: <a href="https://bit.ly/2LqPxOW">https://bit.ly/2LqPxOW</a>				
<input type="checkbox"/>	Community Partnerships/Outreach	<input checked="" type="checkbox"/>	Facilities, Supplies and Equipment, Software	<input type="checkbox"/>	LPC Planning Priorities	<input type="checkbox"/>	Services to Students
<input type="checkbox"/>	Course Offerings	<input checked="" type="checkbox"/>	Financial/Budgetary	<input type="checkbox"/>	LPC Collaborations	<input type="checkbox"/>	SLO/SAO Process
<input type="checkbox"/>	Curriculum Committee Items	<input type="checkbox"/>	Human Resources	<input checked="" type="checkbox"/>	Pedagogy	<input type="checkbox"/>	Student Equity
<input type="checkbox"/>	External Factors	<input type="checkbox"/>	Learning Support	<input type="checkbox"/>	Professional Development	<input type="checkbox"/>	Technology Use

**C. IR Data Review: Describe any significant trends in your program’s data from the office of Institutional Research and Planning. (Note: Not all Programs have IR data available; if your program does not have a data packet or dashboard data, you may note that in the response box.) You may also discuss any other data generated for your program by the Office of Institutional Research and Planning.**

IR Data packets are available here: <https://bit.ly/2lYaFu7>

Course Success Rates Dashboard can be found at the bottom of this page: <https://bit.ly/2Y9vGpl>

For assistance with this question, contact the Director of Institutional Research and Planning.

<https://bit.ly/3fY7Ead>

**Physics:**

- Fall enrollment has nearly doubled since 2015 (increased by 75%). Spring enrollment has also increased since 2015, although more modestly (increased by 20%).
- The ratio of female to male students has steadily increased: Fall 2015: 20% women; Fall 2019: 33% women
- The age range of students has remained mostly constant, except the notable exception that there is a 10% increase in the youngest students (19 years or younger) and a 10% decrease in the next category (20-21 years)
- In terms of ethnicity, the demographics are mostly consistent, excepting a noticeable decrease in the percentage of white students (down 10% from 2015).
- Course success rates have remained mostly constant since 2015 with the notable exception of Spring 2020 (due to COVID). In Spring 2020, the passing rate was low, but not outside the normal range. The main effect was in the high number of withdrawals (22%) which was up 10% from previous spring semesters. The failing (D/F) rate correspondingly went down by 10%, since students were allowed to take Extraordinary Withdrawals all the way to the end of the semester, even after final grades were given. The percentage of As awarded increased by nearly 10% in Spring 2020, and percentages of Bs and Cs dropped correspondingly. Although Fall semester is still in Progress, completion rates for Physics 1A, as evidenced by the number of students who have already dropped with a W, are likely to be somewhat lower than in past semesters—even when adjusted for individual instructors.

**Astronomy (GE courses only):**

- Annual enrollments have increased by 15%.
- There are no significant changes in demographics over the last 5 years.
- Spring 2020 saw no increase in course withdrawals due to COVID and no change in course success rates, possibly because many of the astronomy classes were already in a DE or hybrid format, or had been offered in that format in the past. There were, however, a significant (10%) increase in higher passing grades (As and Bs) than was typical in previous semesters.

Mark an X before each area that is addressed in your response.			Definitions of terms: <a href="https://bit.ly/2LqPxOW">https://bit.ly/2LqPxOW</a>				
<input type="checkbox"/>	Community Partnerships/Outreach	<input type="checkbox"/>	Facilities, Supplies and Equipment, Software	<input type="checkbox"/>	LPC Planning Priorities	<input type="checkbox"/>	Services to Students
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<input type="checkbox"/>	External Factors	<input type="checkbox"/>	Learning Support	<input type="checkbox"/>	Professional Development	<input type="checkbox"/>	Technology Use

**D. Short Term Planning: What are your most important plans, either new or continuing, for next year? Describe plans starting now and continuing through AY 21-22. (Optional: You may also describe long-term plans if desired.)**

- Improving online teaching and assessment

- Promoting equity in course design (especially in the online environment)
- Addressing equipment storage concerns
- Increasing the number of tutors available to physics students (Recently, we have met with a group of physicists from the lab who are interested in volunteering free tutoring for low-income LPC physics students, and are trying to work out an arrangement with them.)

Mark an X before each area that is addressed in your response.				Definitions of terms: <a href="https://bit.ly/2LqPxOW">https://bit.ly/2LqPxOW</a>			
<b>X</b>	Community Partnerships/Outreach	<b>X</b>	Facilities, Supplies and Equipment, Software		LPC Planning Priorities		Services to Students
	Course Offerings		Financial/Budgetary		LPC Collaborations		SLO/SAO Process
	Curriculum Committee Items		Human Resources	<b>X</b>	Pedagogy	<b>X</b>	Student Equity
	External Factors	<b>X</b>	Learning Support		Professional Development		Technology Use

## Section Two: Institutional Planning Topics (Required for All Programs)

**A. Equity [Student Equity and Achievement Committee]: Please describe any recent actions your program has taken to increase equity and/or any challenges your program faces in promoting equity and equity-based decision-making? Areas to consider include students impacted by race/ethnicity, gender, sexuality, age, or disability status, as well as students who are disproportionately impacted due to the shift to remote instruction.**

For assistance with this question, contact the Director of Student Equity and Achievement. [<https://bit.ly/3fY7Ead>]

The most notable source of recent equity concerns has been the switch of the entire campus to online courses. The faculty in our department (both full-time and part-time) have been in constant discussion throughout the last few months about how to make instruction choices to promote equity, particularly across socio-economic background. We have though deeply about the cost of items students must buy in order to participate in at-home labs and lecture activities (such as measurement tools, laptops, phones, and printers). While each course requires some level of financial commitment from the students, we are trying to make sure that the requirements are truly necessary and the cost is minimal. We expect to learn a lot from this semester and make equity-minded changes, if necessary, for future semesters of online teaching.

**B.**

### **SLOs/SAOs [SLO Committee]:**

You should complete ONE of the following three sections. Please choose the option that is most appropriate for your program:

B1: Instructional Programs with PSLOs

B2: Instructional Programs without PSLOs or with Special Circumstances

B3: Non-Instructional Programs

Skip to the section you chose. If you are not sure which option to pick, contact the SLO Committee Chair or Program Review Committee Chair for assistance.

### **B1: Instructional Programs with PSLOs**

In this year's Program Review, and in support of Accreditation, we would like a snap-shot on how your program plans to collect, discuss and report assessment findings to develop best practices for teaching and student learning ("closing the loop").

As a program, please select one PSLO for a degree or certificate to focus on. This PSLO should reflect one area of your program that you would like to investigate in depth. For example, your selection may focus on an area to improve student success, to update pedagogy, equity issues, or to examine a new degree/certificate, etc.

In this section, describe your plan for assessment data to be collected, analyzed and discussed, and reported out in next year's Program Review. Your plan should identify the CSLOs that feed into your selected PSLO so that a complete data set is collected. You may choose to do this over one or two semesters. In next year's Program Review, you will be asked to summarize your SLO assessments,



analysis of those findings, and proposed changes that may be implemented to improve teaching and student learning.

For assistance with these questions, contact the SLO Committee Chair. [<https://bit.ly/3fY7Ead>]

**B1a. In the space below, insert the complete wording of the PSLO and potential reason(s) for selecting it for analysis.**

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.

**B1b. In the table below, list the CSLOs that feed up to the identified PSLO and check the semester or semester(s) that the CSLO will be assessed and data entered into eLumen.** (If this different than the submitted SLO template plan, please update and resubmit the template plan. Send the updated template to [mwiest@laspositacollege.edu](mailto:mwiest@laspositacollege.edu) and [ahight@laspositacollege.edu](mailto:ahight@laspositacollege.edu) )

Complete Name of CSLO	Fall 2020	Spring 2021	Summer 2021
Upon completion of PHYS 1A, students should be able to analyze physical situations quantitatively using Newtonian mechanics and conservation laws.	X	X	
Upon completion of PHYS 1B, students should be able to analyze physical situations quantitatively using principles of hydrodynamics, thermodynamics, harmonic motion, wave motion, and optics.	X	X	
Upon completion of PHYS 1C, students should be able to analyze physical situations quantitatively using principles of electricity and magnetism.	X	X	
Upon completion of PHYS 1D, students should be able to analyze physical situations quantitatively using principles of relativity, quantum mechanics, nuclear physics, and particle physics.		X	

**B1c. When will analysis and discussion of the assessment data be completed (during next year’s Program Review is an option)? The reporting out of the “closing the loop” analysis will be part of next year’s Program Review.**

We will convene as a department in early Fall 2021 to discuss the SLO results from the 2020-2021 school year. These results will be reported out in the 2021 program review.

**B2: Instructional Programs without PSLOs or with Special Circumstances**

If your department does not have PSLOs, you may choose one CSLO to focus on. This option may also be used if there is a strong departmental rationale for focusing on a single CSLO.

As a department, please select a course to focus on. The selected course and one of its CSLOs should reflect an area that you would like to investigate in depth. For example, your selection may focus on a course to improve student success, to update pedagogy, to analyze equity issues, etc.

For assistance with these questions, contact the SLO Committee Chair. [<https://bit.ly/3fY7Ead>]

**B2a. In the space below, describe the rationale (such as this is not a degree-granting program, we focus mainly on non-degree courses, etc.)**

**B2b. In the space below, insert the complete wording of the CSLO and reason(s) for selecting it for analysis.**

**B2c. In the table below, list the CSLO and check the semester or semester(s) that the CSLO will be assessed and data entered into eLumen.**  
(If this is different than the submitted SLO template plan, please update and resubmit the template plan. Send the updated template to [mwiest@laspositascollege.edu](mailto:mwiest@laspositascollege.edu) and [ahight@laspositascollege.edu](mailto:ahight@laspositascollege.edu) )

Complete Name of CSLO	Fall 2020	Spring 2021	Summer 2021

**B2d. When will analysis and discussion of the assessment data be completed? (During next year's Program Review is an option.) The reporting out of the "closing the loop" analysis will be part of next year's Program Review.**

**B3: Non-Instructional Programs**

***In this year's Program Review, and in support of Accreditation, we would like a snap-shot of how your student service area plans to collect, discuss, and report assessment findings to develop best practices for teaching and student learning ("closing the loop").***

Please select one SAO to focus on. This SAO should reflect an area of your program that you would like to investigate in depth. For example, your selection may focus on an area to improve student success, increase best practices, to address equity issues, or to examine a new service/program, etc. The intent is for this section to be useful for reflection to develop best practices for serving students.

For assistance with these questions, contact the SLO Committee Chair. [<https://bit.ly/3fY7Ead>]

**B3a. In the space below, insert the complete wording of the SAO and potential reason(s) for selecting it for analysis.**

**B3b. When and how will this SAO be assessed and data entered into eLumen? (If this different than the submitted template plan, please update and resubmit the template plan. Send the updated template to [mwiest@laspositascollege.edu](mailto:mwiest@laspositascollege.edu) and [ahight@laspositascollege.edu](mailto:ahight@laspositascollege.edu) )**

**B3c. When will analysis of the assessment data will be completed (during next year's Program Review is an option)? The reporting out of the "closing the loop" analysis will be part of next year's Program Review.**



### Section Three: Curriculum Review (Programs with Courses Only)

For assistance with this section, contact the Curriculum Committee Chair. [<https://bit.ly/3fY7Ead>]

The following questions ask you to review your program's curriculum. To see the last outline revision date and revision due date:

1. Log in to CurricUNET
2. Select "Course Outline Report" under "Reports/Interfaces"
3. Select the report as an Excel file or as HTML

**A. Title V Updates [Curriculum Committee]:** Are any of your courses requiring an update to stay within the 5 year cycle? List courses needing updates below. Reminder: updates to course title or units, and course deactivations, will require updating any program they are associated with. List programs requiring updating in question (B).

no

**B. Degree/Certificate Updates [Curriculum Committee]:** Are there any programs requiring modification? List needed changes below.

no

**C. DE Courses/Degrees/Certificates [Distance Education Committee]:** Detail your department's plans, if any, for adding DE courses, degrees, and/or certificates. For new DE degrees and/or certificates (those offered completely online), please include a brief rationale as to why the degree/certificate will be offered online.

In Fall 2020 we submitted DE addendums for all our Physics and Astronomy courses. Most courses are lab classes, which we only plan to offer DE in emergencies. Nearly all of our other classes were already approved for DE.