

2021-22 Program Review

Program Name: Physics
Program Contact: David Locke
Academic Year: 2021-2022
Status:
Updated on:

INTRODUCTION: WHAT IS PROGRAM REVIEW FOR?

The goal of program review is to assess how well our programs are doing. Program review asks us

- to reflect on the state of student learning or support in our disciplines and programs, by discussing
 - efforts to achieve equity across student populations and modes of delivery;
 - results of assessment activities aimed at improving or researching student learning;
 - new challenges or changes to the program.
- to identify resources that we need to change and improve.

Though program review is tied to accreditation, ultimately, we want program review to be meaningful for us. This means we want to use program review to highlight and celebrate what is working, identify what isn't and to figure out what we can do about it. Program review also provides an opportunity to assess how those things work in practice, and work to improve our practices to be able to serve our students even better. It also serves to create cross-campus understanding and dialogue and make more informed decisions in our teaching and programs. Program review is also an opportunity to advocate for change and for resources by showing need and equity issues that we need additional support to be able to address.

1. Description of Program (200-400 words)

- Provide a brief description of the program and how it supports the following:
 - [CSM Mission and Values Statements](#)
 - [CSM Statement of Solidarity](#)
 - [CSM's Strategic Priorities](#)
 - [SMCCCD's Strategic Goals](#)
- Identify any factors, including federal, state, or local initiatives, that have impacted the program and the students served:

The Physics Program at College of San Mateo supports students in STEM fields by providing a 2-semester and a 3-semester lower division physics sequence applicable to AS, AS-T and BS degrees at UCs, CSUs and many private universities. The program also supports students obtaining non-STEM field degrees by offering options for completing natural science general education requirements.

Prior to March 12, 2020, the program had provided fully on-campus courses, hybrid courses with on-campus labs and asynchronous online lectures, and fully asynchronous online lecture only classes. The program also offered the 3-semester physics sequence with both day options and evening options.

For Summer 2020 through Summer 2021, the program offered only fully online classes in three modes: (1) fully synchronous, (2) partly synchronous, and (3) fully asynchronous. The laboratory portions of these classes were completed in a variety of ways using (1) simulations such as PhET, (2) lab kits, (3) instructor provided data, and (4) video analysis (student data taken from videos). The expense of lab kits, like other educational expenses, is an equity issue, so the department sought to avoid using kits when possible, and to minimize costs when they were used. In the end, kits were only used for Physics 260 and Physics 270. For these courses, the department was very cautious and deliberate in the selection of lab kits. We wanted kits that would not be overly expensive for students and would also be quality enough to allow for a good lab experience. Nonetheless, the cost to students for purchasing/renting these kits is substantial, and the department found the cheaper lab kits to be inadequate for PHYS 270, so as we plan for future semesters, we would like to purchase lab kits that can be checked out to students, possibly through the library, in alignment with CSM's Strategic Priority 2.

As the program moves forward into Spring 2022 and the 2022-23 academic year, we are developing a more intentional plan for course delivery options in order to best serve the broadest possible range of students, in alignment with SMCCCD's Strategic Goal 3. This will involve returning to in-person classes for our daytime course offerings, but shifting our evening option for the 3-semester sequence to be remote/online. We will further explore the possibility of online options for the 2-semester sequence.

Faculty in the program have assisted students outside of the classroom through Physics Jam which helps students review math concepts and prepare for physics courses. Faculty have also assisted students in the program by holding office hours in the Integrated Science Center.

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Faculty in the department have adopted many new technologies to best serve our students in the online environment. This has led to innovative teaching practices, many of which are also beneficial in in-person classes and align with CSM's Strategic Priority 3. These technologies include new software technology used in both synchronous and asynchronous classes.

Department partnerships with MESA and METaS have been an integral part of striving for equity for our students, both inside and outside the classroom.

2. Results of Previous Program Review (200-500 words)

- a) Describe the results of your previous Program Review's action plan and for identified equity gaps.
 - a. Previous Goals
 - b. Results Achieved
 - c. Changes Implemented
 - d. Plans still in progress
 - e. Any notable or surprising results and outcomes

In our 2018 Program review, the department stated its intention to develop "Just-In-Time" companion courses for Physics 210 and Physics 250, with the goal of improving success rates in these courses, particularly for underrepresented groups. Accordingly, the department developed two new courses, Physics 880MC, Just-In-Time Support for PHYS 210, and Physics 880MD, Just-In-Time Support for PHYS 250, and attempted to offer these courses in Spring 2020. However, due to low enrollment, we were unable to offer the courses. After the transition to online learning, the department chose to focus on our core classes, and did not attempt to offer these courses again.

The department also stated its intention to convert the experimental PHYS680MB (Rockets and Drones: Science and Engineering) to a permanent course that would satisfy the physical science GE requirement. Accordingly, the department converted this course to the permanent course PHYS 130, Introduction to Drone-based Science and Engineering, and the course was approved by the College for both the Natural Science and Communication and Analytical Thinking GE requirements. However, since this course necessitates in-person instruction, the department has not yet been able to offer PHYS 130.

In the 2018 Program review, the department also stated its intent to offer Academic Excellence Workshops (AEW) for students in Physics 210 and Physics 250. However, the department did not receive the requested release time to develop these workshops.

- b) Explain any curriculum or programmatic changes since last program review
 - a. To specific courses, or to any discipline as a whole
 - b. Includes degree, certificate, or course sequences, program delivery or structure, etc.

As described above, the department developed the support courses Physics 880MC and Physics 880MD, and also converted the experimental course PHYS680MB into the permanent course PHYS 130. The department also developed online versions (and the corresponding changes in Master Syllabi) for all of its core courses (PHYS 100, 210, 220, 250, 260, and 270) due to the transition to the online modality. No other changes to course curricula or programs occurred.

3. Current Program Review (200-400 words)

Please use the statistics below, which are college-wide, as a reference. Please refer to the Program Review website for individual program data.

College Stats 2020-21	Ethnicity	First Gen	Age	Gender	Total
Headcount (unduplicated)	Latinx 32% White 26% Asian 19% Filipino 7% Multi Races 7% African American 3% Pacific Islander 2% Unknown 4% Native American 0%	48% of our students are the first in their family to go to college.	66% Under 24 yrs. 20% Ages 25-34 15% over 35 yrs.	50% Female 47% Male 2% Unknown	10,910 students
Enrollments (duplicated)	Latinx 32% White 25% Asian 19% Filipino 7% Multi Races 8% African American 3% Pacific Islander 3% Unknown 3% Native American 0%	47% of enrollments were by students who are the first in their family to go to college.	73% Under 24 yrs. 16% Ages 25-34 11% over 35 yrs.	48% Female 50% Male 2% Unknown	32,761 enrollments

Physics 2020-21	Ethnicity	First Gen	Age	Gender	Total
Enrollments (duplicated)	Latinx 20% White 21.1% Asian 38% Filipino 7% Multi Races* African American 1% Pacific Islander 1% Unknown** 3% Native American 0% <i>*Not Provided by PRIE</i> <i>**Listed as "Unrecorded" in PRIE data</i>	42% of our students are the first in their family to go to college.	86% Under 24 yrs. 10% Ages 25-34 4% over 35 yrs.	42% Female 57% Male 2% Unknown	370 enrollments

(a) Student population equity: Discuss any gaps in student success, persistence, satisfaction, utilization or enrollment across student populations (statistics provided for ethnicity, first-gen, age, gender and total enrollment), or student population served.

- Findings: What has changed from the previous program review?
- Analysis: What factors do you feel contribute to these gaps?
- Resources: If you were granted a resource request, please note what that was and the impact it had.

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- Plans to address opportunity gaps: What has your program done to address these gaps? Include information on:
 - interventions implemented
 - any successes in closing gaps
 - ongoing challenges

Note: If these interventions constituted your discipline-level assessment, please see “(c)” below.

Findings	Analysis	Resources	Plans to Address Opportunity Gaps
<p>1. Analyzing current gaps in enrollment is tricky. Our enrollment percentage of Latinx students has increased, however the enrollment count has not.</p>	<p>Without disaggregated data for day 1 enrollments and for Census day enrollments rather than just enrollments after COVID-19 EWs, we can say little about equity gaps during the Covid-affected terms, since different populations likely exhibited different patterns with regard to enrollment and withdrawal during these terms. (For example, international students were likely not withdrawing at the same rate as other students in order to maintain their student visas, and many international students did not enroll at all). It is likely that enrollment gaps (lower than college-wide enrollment of Latinx, Filipino, and African-American students) that existed prior to spring 2020 will continue to exist in future semesters as we return to in-person teaching.</p>		<p>Department members David Locke and Alex Wong have been involved in the development of PSCI 141, Introduction to Research in STEM. This course aims to attract students who might be considering science but have not yet committed to a STEM major. Our goal is to work closely with the learning communities to market this class to populations for which there are STEM enrollment gaps. Through this class we hope to attract such students to STEM majors in general, which would include our physics major.</p>
<p>2. For ethnic groups with 10 or more enrollments annually, we see equity gaps for Latinx and Filipino students in AY18-19. Interestingly, the equity gaps for AY20-21 are for International Asian students and for Filipino students.</p>	<p>Analyzing “Percent Success” is difficult for AY19-20 and AY20-21. COVID-19 EWs make the denominators in the calculations too small. However, we can analyze gaps in AY18-19 and from gaps in AY20-21, we can possibly see communication gaps with the same groups that have had success gaps in AY17-18 and AY18-19</p>		<p>The department’s primary strategy for addressing equity gaps and improving success rates has been to provide more supplemental instruction to students through the tutoring available at the ISC and learning center and SI leaders. In addition, the department, funded by the Metas grant, has offered the “Physics Jam” preparatory workshop to students free of charge prior to each semester for interested students over the past two years. The department plans to continue these as funding allows and plans to begin offering our companion</p>

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			courses 880MC and 880MD as supplemental courses.
3. Female students are underrepresented in our classes compared to the college as a whole.	Though female students have higher success rates in physics courses than males, they account for fewer enrollments.		<p>Outreach is the most important way to address the representation gap. It can also address representation gaps in other groups.</p> <p>Through partnerships with STEM at CSM and specifically the Science Speaker series, students are able to hear stories from scientists working in the field, graduate students in science, and even transfer students. The speaker series has a goal of allowing our students to hear stories from scientists of different ethnicities and genders and see that science is for everyone.</p> <p>The PSCI 141 class mentioned above can also help recruit female students to physics.</p>

(b) Modes of Delivery equity: Discuss any gaps in student success, persistence, satisfaction, utilization or enrollment, and student population served across different delivery modes. Please comment on in person services/instruction vs hybrid services options/instruction vs completely online services/instruction.

- Changes since last Program Review: What has changed, in terms of gaps, since last program review?
- Analysis of gaps: What factors do you feel contribute to these gaps?
- Plans to address opportunity gaps: What has your program done to address these equity gaps? Include information on:
 - interventions implemented
 - any successes in closing gaps
 - ongoing challenges

Note: If these interventions constituted your discipline-level assessment, please see “(c)” below.

Changes since last Program Review	Analysis of Gaps	Plans to Address Opportunity Gaps
1. In previous program reviews, we did not have much comparison data as most courses were only offered in one mode. So, one change is that		

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<p>we have comparison data from Spring 2021 between asynchronous online courses, partially synchronous courses and fully synchronous courses. However, due to the small sample size, we are not yet able to say anything about how equity gaps relate to mode of delivery.</p>		
<p>2.</p>		
<p>3.</p>		

(c) Discipline-level and SLO (Student Learning Outcomes) assessment/Student Services and SAO (Service Area Outcomes) assessment: Describe learning or area assessment plans implemented since last Program Review, **including any activities undertaken to address equity or delivery mode gaps.** Your summary should explain:

- SLO/SAO
 - What did the assessment focus on?
 - Was it was a discipline-specific or interdisciplinary (for instruction only)?
 - Why was it prioritized (e.g., equity issue, key disciplinary issue, etc.)?
- Assessment results
 - What was the activity or intervention?
 - What were the outcomes?
- Program improvements implemented
 - What did you learned from it?
 - What changed?

SLOs/SAOs	Assessment Results	Program Improvements Implemented
<p>1. Unfortunately due to the COVID-19 Pandemic, the faculty have not put our planned common assessment in place for SLO assessment.</p>	<p>None</p>	<p>As we return to campus in Spring 2022, department faculty will work together to determine common assessment problems with rubrics to assess SLOs.</p>

2.		
3.		

(d) Challenges and Opportunities: Describe any **other** particular challenges, opportunities, or other factors that impact the success of your program (e.g., natural or health disasters, assessing whether a degree program is meeting its learning outcomes, developing new degree programs or courses, adapting to a changing student population, keeping a flagging program alive, starting a learning community, etc.).

The physics program has seen a large reduction in enrollment from AY18-19 to AY19-20 to AY20-21. The sources of that reduction are the large decrease in international students from AY18-19 to AY19-20 and (of course) the COVID-19 pandemic. Between AY18-19 and AY20-21, our enrollment count has dropped by more than 33%. Unfortunately, an unknown portion of the decrease in headcount is a result of COVID-19 EWs, so the 33% reduction is not a fully reliable statistic (we were not provided start-of-term enrollment numbers). However, the decrease in start-of-term enrollment is definitely observed by faculty. It is difficult to know what Spring 2022 and AY22-23 may have in store. But, by offering students more options of fully online and fully on-campus classes, we hope to see our enrollment build back up to pre-pandemic numbers or higher.

Opportunities the department now has include that with all of our faculty trained to provide distance learning, we will be able to better serve students by offering a mixture of fully online classes and fully on-campus classes without the limitation of only one faculty teaching all online classes.

4. Planning

a) Program goals

Based on your current review of your program’s equity gaps, learning assessments and challenges and opportunities, identify specific goals and plans.

Please note that closing equity gaps is a College-wide priority. If there are significant equity gaps in student success, persistence, satisfaction, utilization or enrollment, and student population served in your program, these should be addressed in at least one of your goals.

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For each goal, you should include

- A brief description of the issue being addressed (equity gap, etc.)
- What actions you plan to take
- What measurable outcomes you hope to achieve
- A timeline
- Who is responsible
- What support do you anticipate needing in order to achieve your goals and plans, including:
 - Professional development activities
 - Institutional support
 - Collaborations
 - Training
 - Resources

Goal	Actions	Measurable Outcomes	Timeline	Responsible Party	Support Needed
1. Reduce racial equity gap in success rates. Improve overall success rates.	Successfully implement Physics 880MC and Physics 880MD. To improve enrollment, we will coordinate with the counselling department and learning communities like Puente, Mana, Umoja, and Year-One Promise to market the classes.	Improved physics course success rates for underrepresented races in in-person classes as compared to in-person classes prior to Spring 2020. Improved overall success rates in in-person classes as compared to in-person classes prior to Spring 2020.	Spring 2022: Market the classes with the help of counselling and learning communities. Fall 2022: Offer Physics 880MC and Physics 880MD. To Repeat the above for subsequent semesters.	David Locke	Help with marketing from STEM at CSM, counselling, and learning community staff. Willingness on the part of the college to offer the classes with limited enrollment.
2. Reduce racial equity gap in success rates. Improve overall success rates.	Implement “Honors” Physics Jams throughout the course of the semester. These Physics Jams will occur every Friday, and will focus on providing additional challenge and context for the core physics courses. The model for these advanced Physics Jams	Improved physics course success rates for underrepresented races in in-person classes as compared to in-person classes prior to Spring 2020. Improved overall success rates in in-person classes as compared to in-	Spring 2022: Identify times and paired courses for Advanced Physics Jams for Fall 2022. Fall 2022: Implement Advanced Physics Jam.	Mohsen Janatpour	Funding (grant or otherwise) for faculty pay to run Physics Jams. Funding for marketing Physics Jams.

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	is the Treisman model for supplemental honors sections, which improved success rates in calculus classes among African-American students.	person classes prior to Spring 2020.	Repeat the above for subsequent semesters.		
3. Reduce racial equity gap in success rates.	<p>Alex Wong will, if accepted, participate in the Open for Antiracism in California Community Colleges (OFAR) program in 2021-2022. As part of this program, he will “create an individual action plan for the spring term, to integrate OER and open pedagogy as a way to make teaching and learning explicitly antiracist”. This action plan will be applied to PHYS 260.</p> <p>Prof. Wong will also disseminate the techniques used in the OFAR program to colleagues in the physics department, primarily through their participation in the Science Faculty Institute for Teaching and Learning (SFIT), which will begin in Fall 2022.</p>	Improved physics course success rates for underrepresented races in in-person classes as compared to in-person classes prior to Spring 2020.	<p>Fall 2021: A. Wong begins OFAR program, if accepted.</p> <p>Spring 2022: Prof. Wong implements individual action plan for PHYS 260.</p> <p>Fall 2022/2023/2024: Other department faculty participate in the SFIT program. As part of that program, they receive information from Prof. Wong regarding his experiences with the OFAR program and associated pedagogical practices.</p>	A. Wong	<p>(Already dedicated) grant funding for release time for the SFIT program.</p> <p>Scheduling flexibility to ensure that physics faculty can participate in the SFIT program.</p>
4. Improve available resources for remote students to reduce equity gaps	<p>Acquire equipment for students to borrow, free of charge, in remote classes. These include:</p> <ul style="list-style-type: none"> • Lab kits • Tablets (for participating in 	Achieve success rates in online classes similar to those in in-person classes for all demographic groups.	Fall 2021: Submit equipment requests in program review. If approved, purchase equipment.	J. Atkins	Funds from the college (or grants) to purchase equipment. Help from the library to

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	whiteboarding activities and otherwise communicating electronically).		Spring 2022: Work with the library to develop a system for lending the equipment.		distribute equipment to students and collect it at the end of the semester.
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5. CE Only

- a) Review the program's available labor market data, as applicable, and explain how the program meets a documented labor market demand. Here are two relevant links:
 - a. [State of California Employment Development Department, Labor Market Information Division](#) (the official source for California Labor Market Information):
 - b. [Employment data](#) (by Program Top Code) from the State Chancellor's Office
- b) Summarize [student outcomes](#) in terms of degrees and certificates. Identify areas of accomplishments and areas of concern.
- c) Review and update the program's Advisory Committee information. Provide the date of most recent advisory committee meeting and outcomes of the meeting (updates, changes, new members, etc).
- d) What strategies have you discussed in your recent Advisory Committee's meetings to meet the needs and challenges of getting people retrained and back to work?

- e) Only for 2021-22 Program Review, please review the TOP codes, SOC codes, SAM codes, and CIP codes for your courses to ensure that they are aligned, and provide any updates below.