# Chabot College Fall 2021 Program and Area Review (PAR):

# **Physics**

## **Background Information:**

- What organizational unit does your program/area belong to?
  - X Academic Services
- Name of your Program, Discipline, Area or Service:
  <u>Physics</u>
- Name(s) of the person or people who contributed to this review:

## Scott Hildreth (with input from colleagues Shannon Lee, Steve Asztalos, Len Filane, & Nick Alexander)

- What division does your Program/Area reside in?
  - X Science and Mathematics

# Status of Program Goals from Prior Comprehensive PAR Cycle

Goal from Previous Cycle	Status of Goal	Outputs or measures (e.g students served, program change made, etc.) Please explain.
1. Hire a Lab Assistant	X Not achieved but still relevant	A lab assistant will help us to improve classroom demonstration and lab experiences in Physics 11, 3A, 3B, 4ABC, and Physics 5. Better labs, with working equipment, and better demonstration apparatus, helps students learn. We have listed this as a primary goal in every program review since the system was initiated, to no avail. Chabot continues to be one of the only community colleges in the area with lab support in physics. Las Positas College has this position.
2. Acquire experimental equipment supporting Modern Physics to be used in Physics 3A/3B, Physics 5, and possibly in other new curriculum.	X Not achieved but still relevant	We have not yet made a curriculum switch to adding Physics 4D, with a lab, to replace Physics 5 (which doesn't have a lab). Still, more lab equipment, even for demonstrations, would help significantly and be used across multiple courses.
3. Hire an additional full-time faculty member in Physics	X Not achieved but still relevant	With the retirement of Tim Dave in 2019, this need is even more acute that when raised in Fall 2018. We cannot serve our students without this position. It was approved in the 2019 Faculty Prioritization Process, but because of COVID19, we weren't able to hire.

# Learning Outcomes Assessment Results

### <u>SLO:</u>

**Student Learning Outcomes** (SLOs): SLOs are the outcomes that instructors aim for students to successfully reach by the end of a course. SLOs should be established for each course, listed in CurricUNET, displayed on all course syllabi, and assessed in CurricUNET on a 5-Year cycle. The following questions are about SLO assessment.

- How many courses in your discipline have SLOs developed and listed in CurricUNET?
  <u>X</u> All courses
- How many courses in your discipline have rubrics (or some other form of assessment) developed to measure SLOs?
  <u>X</u> About half of the courses

If any courses do not have rubrics to measure SLOs, please explain why.

We need to add published rubrics for Physics 3A/3B, and for Physics 18

How many courses in your discipline had their SLOs assessed and recorded in CurricUNET in the 5-year cycle?
 <u>X</u> Almost all or most courses

If any courses were not assessed in the five-year cycle, please explain why.

We are in the process of trying to assess Physics 3A at this time.

Assessing SLOs has led to improvements in my area.
 <u>X</u> Neither agree nor disagree

Different faculty have (or may have) very different views on this question, and it would not be fair to characterize the discipline as having a consensus.

#### PLOs:

Certificate and Degree programs also establish and assess **Program Learning Outcomes** (PLOs). PLOs are the outcomes students should successfully reach when they complete all the requirements for a certificate or degree program. PLOs are also assessed in CurricUNET on a 5-year cycle.

Were all Program Learning Outcomes (PLOs) assessed in the 5-year cycle in CurricUNET?
 <u>X</u> No, many PLOs were not assessed in the 5-year cycle.

If any PLOs were not assessed in the five-year cycle, please explain why.

We have not been able to meet as a team to tackle these. Creation of Physics a separate program was accomplished in this past review cycle.

- Assessing PLOs has led to improvements in my area.
  - X Neither agree nor disagree

# **Institutional Supports and Barriers**

Reflect on your experiences, data, and/or previous program reviews and consider what work in your discipline/service area you are most proud of and what problems remain a major challenge. Then respond to the following questions:

• What institutional-level supports or practices were particularly helpful to **your program or area** in reaching its PAR Goals, SLOs, PLOs, SAOs, and/or the college mission?

The <u>Faculty Prioritization Committee</u> did support the replacement hiring of a full-time faculty member in 2019, to help make up for the retirements of Tim Dave and Jose Alegre. We had begun the process of advertising the position and scheduling a hiring committee to review applications, when COVID-19 occurred in March 2019. Unfortunately COVID-19 hit, and from that point forward, we were left with the status quo – one full-time faculty member in Physics, and one full-time faculty member in Astronomy & Physics. We hope to have the support of the campus and the FPC for the next round of hiring for Fall 2022.

The <u>Facilities & Infrastructure Technology Committee</u>, and the <u>Planning and Resource Allocation Committee</u>, helped to allocate additional monies for new lab equipment in Physics, useful for Physics 11, 3A, and 4A, and electronics kits for students to use at home for Physics 4B.

• What institutional-level barrier or challenges prevented or hindered **your program or area** from reaching its PAR Goals, SLOs, PLOs, SAOs, and/or the college mission?

We were unable to justify hiring a Classified Professional to help with Physics, Astronomy, and Engineering labs (even part-time). And we weren't able to add full-time faculty. Both are largely budgetary issues. Supporting adjunct colleagues who must be hired to compensate for lack of full-time faculty is doubly challenging without a lab tech position, as that requires full-time faculty to provide significant time and help with identifying, locating, and setting up lab equipment. And adjunct colleagues leading those labs share their immense frustration and not having support, support that is provided at other colleges where they work (including Las Positas).

• What institutional-level supports or practices do employees in your program/area believe are particularly helpful **to students** in reaching their educational milestones and/or goals? (i.e., from your vantage point, what does Chabot do for students that we should **keep** doing?)

MESA/TRIO grant support, Student Club support, Tutoring at the STEM Center, and faculty office hours in the STEM center, are supporting practices absolutely crucial to student success in Physics and Engineering.

The directed outreach by Maria Rodriguez-Larrain and her MESA/TRIO team has been instrumental in helping many of our engineering students who are required to take physics. Student Clubs in Engineering and Robotics are "co-sponsored" by faculty in Engineering and Physics, and use the Physics lab facilities, and equipment, and have encouraged students to network and discuss HW and problems with one another. Collaboration with Engineering Faculty (Dr. Tess Weathers and Dan Quigley) involved with the student clubs is another key component to the success of our shared students.

Tutoring remains one of the most requested support resources for students in Physics 4ABC – and one of the most difficult to meet, given that students with that course experience typically transfer away from Chabot. Additional time in the STEM center by faculty definitely improves student access to help.

• What institutional-level barriers or challenges do employees in your program/area believe are a hindrance **to students** in reaching their educational milestones and/or goals? (i.e., from your vantage point, what does Chabot do that we should **stop** doing or **change** to better support our students?)

We have to change our hiring practices so that we can anticipate staffing needs earlier, and invest in hiring colleagues prior to the retirement of experienced faculty. Waiting a year – or now two – after our best and brightest colleagues have left to hire means we lose the knowledge of the program, the students, the material, and the entire sense of how our discipline fits into the greater fabric of the campus. Even allowing for a one-semester (or better, one-year) overlap will give us much better continuity. We can share labs that work, and help new full-time faculty at the start of the tenure process with multiple views.

# Academic Programs/Disciplines Data

## **FTES and Enrollment**

Division	Subject	Term	Primary Section C=	Capacity	Enrollment Census	Fill Rate
5300 - Science and	PHYS	Fall 2018	9	215	199	9396
Math		Spring 2019	8	192	182	9596
		Summer 2019	2	48	45	9496
		Fall 2019	9	215	218	10196
		Spring 2020	9	216	208	9696
		Summer 2020	1	24	15	6396
		Fall 2020	7	167	166	9996
		Spring 2021	10	240	209	8796
		Term Avg.	7	165	155	9196
	Term Avg.		7	165	155	9196

Division	Subject	Term	Total FTEF	WSCH	FTES	WSCH/FTEF
5300 - Science and	PHYS	Fall 2018	3.12	1,218	39.52	390.64
Math		Spring 2019	2.86	1,103	35.17	385.13
		Summer 2019	0.55	214	6.94	389.09
		Fall 2019	3.21	1,362	43.66	424.43
		Spring 2020	3.04	1,244	40.89	409.35
		Summer 2020	0.20	45	1.50	225.00
		Fall 2020	2.59	1,029	33.45	396.84
		Spring 2021	3.39	1,314	42.64	387.72
		Term Avg.	2.37	941	30.47	376.02
	Term Avg.		2.37	941	30.47	376.02

Over the past 3 years, in comparison to the overall FTES trends of the college, FTES in your discipline have:
 <u>X</u> Decreased in comparison to the overall college trends

Please provide a brief explanation that would help the college understand these trends (e.g., tangible reasons for the increase or decrease).

FTES has decreased from an average of  $\sim 40$  to just over 30 in the past two years, corresponding in part to the retirement of our full-time colleagues Tim Dave and Jose Alegre. We've seen a decrease in enrollment largely stemming from COVID, and the sheer challenge of learning a difficult subject online, at home, without the necessary support resources we know help Chabot's students – especially tutoring. Another factor in decreasing FTES is that we are cutting back offerings, in part because we don't have the faculty to lead the classes we could offer, nor support the students in those classes.

• As noted above, enrollments impact our funding. Please review the courses in your discipline in the <u>Chabot College</u> <u>Enrollment Management Data Dashboard</u>: are there specific courses/sections that, on average, across the past three years did not fill to capacity? Why might this be?

<b>Physics 3A</b> offered only in Fall at two times:	(daytime) ~ 90% fill	(evening) ~ 115% fill
<b>Physics 3B</b> offered only in Spring at two times:	(daytime) ~ 96% fill	(evening) ~ 104% fill

The second term always decreases but these fill rates are very strong. 85% fill

**Physics 4A** offered both Fall and Spring, at two different times offered during the day: ~ 106% fill **Physics 4B** offered both Fall and Spring, at two different times: ~ 111% fill **Physics 4C** offered only in Spring: ~

The third term of physics is not required for all majors, and because of attrition, doesn't typically fill to capacity. We intentionally cut out the historically lower-enrolled Fall section of Physics 4C in 2019, and have offered only a single 4C section in Spring for the past 3 years.

#### Physics 5 (only offered in Spring): ~ 50% fill

This is the last class in the sequence, and it is required for Physics majors, but not for others. While it is accepted for transfer to San Jose State University, and to UC Berkeley, not all STEM students need to take this class, and many engineering students do not have time in their final semester for an additional physics elective. We have converted this class to fully online (synchronous in 2020 through ZOOM) and hope that the flexibility offered by this delivery mode might help to maintain enrollment.

#### Physics 11 (offered both semesters and summer): ~110% fill

Physics 18 (offered both semesters and now in summers): 80% overall; 90% fill in Fall/Spring, and 63% in summer

We had to add Physics 18 as a prerequisite for Physics 4A to allow engineering students the opportunity to transfer to UC Berkeley. We hope to establish that Physics 18 is the best option for most students to take in preparation for the 4ABC sequence.

• Is there anything faculty in your area would consider doing to improve overall discipline productivity\* while maintaining our commitment to student learning? (e.g., taking additional students in sections with higher fill rates or changing the days/times or format—in-person, hybrid, online—of low fill-rate classes, etc.)

Physics classes with labs necessarily are limited in size because of safety, equipment, and room sizes, and consequently WSCH/FTEF values typically are <400. This should not be seen as a mark of "low productivity". Labs take time to set up and clean up; ordering, storing, and maintaining lab equipment takes time. And that time is not captured in the WSCH/FTEF metric. In addition, students routinely may spend more time in physics labs after class hours, under the direction of willing faculty – and those hours are also not caught.

Instead, "productivity" for science lab classes should be evaluated using a different metric, one more related to overall student retention and success. If we truly are productive in lab classes, it is because we have helped students to understand how science works, to develop organization and collaborative skills working with classmates, to hone presentation skills, and ultimately, to find success with the course materials overall. If we try to make labs larger, and have more students per lab section, we would need much larger lab spaces, more equipment and a full-time lab tech.

• Are there any classes in your discipline which routinely fill to capacity and for which there is often a waitlist? If yes, please list here.

Our largest enrollment challenges with classes that reach capacity come from the scheduling of single sections of Physics 4C in Spring only, and limiting sections of Physics 3A or 4A at the start of those course sequences. We have had enrollment demands for 4C of 30-35 students – more than a single section, but not quite justifying a separate second section.

#### **Enrollment Disaggregations:**



Our enrollment historically has followed the trends shown above for the last 4 years – Physics students are more often of Asian-American ethnicity, compared with the college population, and significantly less often African-American/Black. Students identifying as Latinx are under-represented in Physics compared with the college population, which students identified as White are about at the college average.

The best tool we have in Physics to help identify whether Chabot's program enrollment is similar to national averages is provided by the American Institute of Physics (AIP)'s interactive graphing tool (<u>https://www.aip.org/statistics/stats-degrees</u>, 2020). While the institute's data includes 4-year programs, and not just community colleges, it still provides the ability to sort students majoring in physical sciences and engineering by ethnicity. For example, we can look at degrees awarded) in Physical Science/Engineering (as a % of all degrees awarded vs. time across ethnicity:



AIP American Institute of Physics

aip.org/statistics

This data shows that the under-representation of African-American/Black and Latinx students is a national issue, and one that Physics professionals are actively trying to address.

Looking at gender in physics, we see that participation from female students is still significantly under the college population norms:



This statistic is also not out of line from national results. The AIP's "Women in Physics and Astronomy" 2019 Report, by Anne Marie Porter and Rachel Ivie (<u>https://www.aip.org/statistics/reports/women-physics-and-astronomy-2019</u>) shared:

- In 2017, women earned 21% of physics bachelors' degrees and 20% of physics doctorates. In that same year, women earned 33% of astronomy bachelors' degrees and 40% of astronomy doctorates.
- In 2016, 26% of newly hired physics faculty members and 40% of newly hired astronomy faculty members were women. The percentage of faculty members who are women is increasing over time.
- The representation of traditionally underrepresented race/ethnicity/gender student groups in our **discipline/major** compared to our industry/field:

 $\underline{\mathbf{X}}$  could be improved.

Compared to national averages, Chabot is not at all out of alignment with enrollment in physics by gender, but this should not be taken as indicating we can't improve the results further. The National Academy of Sciences 2015 report, *"Why is it important to encourage more women to pursue science and engineering careers?"* cites among many other factors the lack of mentoring for women interested in physical science and engineering as one reason for the lower rate of women in the professions (<u>https://thesciencebehindit.org/why-is-it-important-to-encourage-more-women-to-pursue-science-and-engineering/</u>). Clearly hiring more women, and inviting talks and contributions from women in science from traditionally underrepresented groups, can help our students see that they could have a positive future in the fields. Our colleague in Engineering, Dr. Tess Weathers, is starting a club for women in STEM; Stanford offers a "Women in STEM" group, which also could be a model for Chabot (c.f. Kubota, T. (2020) "Recognizing and empowering women in STEM at Stanford."(<u>https://news.stanford.edu/2020/03/02/recognizing-empowering-women-stem/</u>)

## Non-Credit

- Does your program/area offer non-credit classes?
  <u>X</u> No
- Over the next 3 years, non-credit course offerings in our program/area are planned to:
  <u>X</u> Stay the same as they are now

#### Course success rates

Refer to the Chabot College Course Enrollments and Success Rates Dashboard.



Over the past three years, how have course success rates in your discipline changed? Course success rates have:
 <u>X</u> Stayed roughly the same

Given the challenges posed by COVID-induced online instruction, to maintain 75-80% success in Physics is a remarkable achievement.



(Comment/Explain) Please provide a brief explanation that would help the college understand the trends in overall course success rates or disproportionate impacts in course success rates for any student group:

Looking at success by ethnicity data, the data is not sufficient to create any significant comparisons – there are no trends to pick out. Trends in success by gender equally is too difficult to judge with such small numbers – perhaps 3-4 women in Physics 4A/B/C per class. We need to pay close attention to the success of all of our students, and constantly ask what services and tools might be used to help – whether that is from MESA/TRIO, student clubs, tutoring, increased access to office hours, remediation, instructional assistants, or some other means.

We should capitalize on Chabot's recent efforts to support student success, especially within the African-American/Black community, with the Black Excellence 10x10 Villages projects, and reach out to the Umoja team as well, to improve our understanding of the types and levels of support services we might encourage, and amplify, for our Black students.

The Office of Institutional Research strives to continually improve representation in our data. Currently, we have a <u>dashboard on course enrollments and success rates</u>, which can be disaggregated by race/ethnicity, gender, and parttime/full-time status. What other student group(s) would you like to be able to disaggregate by in the dashboard? How will this disaggregation promote Chabot's mission? (Please keep in mind we will need to build further disaggregation into the dashboard over time and we will work in the order that is possible to do based on data availability and for which there is the most interest in Chabot campus community.)

What will help us significantly in Physics would be longitudinal studies of students who start the sequence with High School physics vs. taking Physics 11 vs. Physics 18, and looking at success rates. We've asked for this type of report before, and hope to get the OIR's help in creating something that might identify whether greater success follows from students taking Physics 18 vs. HS. Our hypothesis is that mathematics continues to be a major barrier to students' success, and any reports that could be run to correlate student grades in preparatory math with resulting grades in physics would also be useful.

#### **Program completion (AD-Ts, AA/AS, Chancellor-approved Certificates)**

Over the past 3 years, what is the trend in Degrees awarded (AD-Ts and AA/AS) in your program(s)?
 <u>X</u> Increased

This is a result of finally offering an AS degree in Physics in 2021. Three (3) were awarded.

Physics does not offer a certificate at this time, although we have discussed this as a possibility and have been investigating how to create one.

• What barriers make it difficult for students to complete your program? Are there any barriers that could be disproportionately experienced by students from a particular demographic group (e.g., racial/ethnic, age, disability)?

Barriers to successful completion of the entire physics sequence that our students have shared include the need to work outside of class to support themselves and their families and consequently the lack of adequate study time, and the lack of tutors. Students who could help as tutors or IA's in physics typically have left Chabot to transfer in Engineering or Math & Science. Upper division students at CSUEB in Physics, who might be possible tutors, are working on their own classes at the university, and don't have time. We've reached out to the CSUEB faculty – and continue to do so – and we have a very strong relationship between our discipline's two departments, and they acutely know of the need. These barriers are not unique to any one particular demographic group.

The single best resource for student success in Physics continues to be the MESA/TRIO program, and all that it provides in terms of support, activities, access to mentoring, a place to study, computers to use, other students to help, access to counseling – everything. Staffing Analysis In this section you will analyze trends in staffing, technology, and facilities.

Staffing	Current # (Fall 2021)	How has staffing for this group changed in the last 3 years (decrease, flat, increase)
Full-time Faculty	1.5 (one full-time physics only, and 1 shared between physics and astronomy)	<u>X</u> Decreased 1.25 FTEF Tim Dave and Jose Alegre both retired and their positions have not as yet been backfilled.
Part-time Faculty	4	<u>X</u> Increased
Full-time Classified Professionals	0	<u>X</u> Stayed roughly the same
Part-Time Permanent or Hourly Classified Professionals	0	<u>X</u> Stayed roughly the same
Student Employees	0	<u>X</u> Stayed roughly the same
Independent Contractors/Professional Experts	0	<u>X</u> Stayed roughly the same

Academic Disciplines Only: Compare changes over the past three years in the FTES/enrollment in your area with changes in staffing in this same time period. What do you notice?

As shared earlier in this report, the loss of Tim Dave and Jose Alegre has significantly affected the program; we can't offer the same number of classes, and even more, can't support our students as well, with just adjunct colleagues who must teach at multiple institutions, and who can't always be present for student questions outside of class. The adjunct colleagues we have been able to keep are terrific, but we ask a huge amount of them when we don't have Classified Professional support in terms of a lab tech – something that other colleges do have to support their faculty and programs.

Compare the representation of DI populations in your program's/area's staffing (faculty, classified professionals, and administrators) to the representation of DI populations in the students you serve. What do you notice? If there is a gap in representation between students and the Chabot professionals who serve them, how has your program/area addressed that gap?

It is absolutely clear that losing Jose Alegre, representative of a Latinx population, and Tim Dave, of an African-American/Black population, impacts our ability to demonstrate that everyone in the world can do physics. We continue to advocate for increased representation from all groups, including women, and hope that for 2022-2023 and beyond that we can address the program needs for improved representation.

• The **technology** in our program/area is sufficient to support student learning and/or carry out our program/area outcomes and goals.

X Somewhat agree

## Facilities

• The **facilities** in our program/area are sufficient to support student learning and/or carry out our program/area outcomes and goals.

<u>X</u> Strongly agree

The "somewhat agree" selection for technology comes from the continued need to upgrade laptops and printers in the lab rooms. Our laptops run Windows 7, and are now out-of-date in terms of operating system upgrades. They do the job, but we need to plan for upgrades and an improved method for (limited) printing within the labs. The remaining projection technologies in the labs, and in the lecture rooms, are some of the best in the campus, and heavily utilized.

The lecture and lab spaces in 1800 used by Physics continue to be terrific – a direct result of active participation by Physics faculty in their design and construction.

### **Professional Development**

• In general, **Faculty members** in my program/area regularly participate in professional development activities offered <u>by/at Chabot.</u>

X Somewhat agree

• In general, **Faculty members** in my program/area regularly participate in professional development activities offered <u>outside of Chabot.</u>

X Somewhat agree

• How did these professional development experiences contribute to improving your program/area, equity, and/or student learning and achievement?

The American Physical Society (APS) and its focus on teaching physics through the American Association of Physics Teachers (AAPT) continue to provide some wonderful professional development activities online and in person. Some faculty regularly attend the regional AAPT meetings to present and share ideas about teaching physics, as well as participate in national webinars. Over the last two years of COVID, the APS has sponsored a great series of meetings about equity, supporting under-represented groups in science and physics, physics and gender, and much more. Physics Today (the primary news portal for the physics community in the US) and Physics World (the same for the UK and Europe) have offered webinars on cutting edge physics that are equally useful. And locally, CSUEB has graciously shared access to their weekly colloquia series in physics, allowing Chabot's students access to talks by leading scientists from around the country, as well as by upper-division students.

All of these opportunities to learn and network with colleagues outside of Chabot are enormously important. We need to continue to take advantage of similar programs and outreach efforts, because they not only help us as teaching faculty to stay current and aware of new tools, they also help us help our students, increasing awareness of grants and internships and research experiences for undergraduates.

The data in this section is intended to support the further development of Guided Pathways at Chabot. Respondents' answers will be given to the Guided Pathways Steering Committee for analysis.

Have you completed all program maps for your discipline?
 <u>X</u> Yes (or we will do so by the deadline).

Given the lack of full-time faculty who could work on this effort, we were very lucky to have Shannon Lee, our adjunct colleague, help in this effort.

• Can a student who is working toward the degree(s)/certificate(s) in your area take all their required courses for this program: 1) during the day or 2) in the late afternoon/evening/weekend or 3) online? What changes would be needed to ensure access for students in all three scenarios?

To make it through Physics 4ABC and 5 (the core courses for a Physics major, and those taken by many Engineering students), students must attend during the day only. We do not have the demand, nor the faculty, to offer our calculus-based physics sequence at night or on weekends. And with the labs required, we cannot offer the program online or in a hybrid format.

To complete the Physics 3AB program, students may attend either mornings or evenings. We have in the past had to cancel the evening section of Physics 3B because of very low enrollment, as few students continued after 3A. We are hoping that increases in the Biology/Allied Health enrollments will continue to bring enough students to Physics to fulfill requirements, and justify keeping both daytime and evening sections.

• How are you collaborating with other disciplines with whom you share students to ensure that your schedules are not conflicting, so that students with specific educational goals can take the courses they need to finish in a timely fashion? Please discuss the discipline(s) with whom you already collaborate, as well as any discipline(s) with whom you would like to start collaborating.

The entire faculty/classified/administrative team in Science & Mathematics works tremendously hard every semester to share schedules, identify conflicts, and collaboratively remove barriers for our students. We recognize that our students are not "owned" by any one discipline, but rather they are shared, simultaneously taking Math, Chemistry, Biology, Computer Science, Engineering, and Physics. When changes are required to remove a conflict, our team works collaboratively to find alternatives. This collegiality is one of the very best things about working at Chabot.

• Are there any classes in your discipline that you do not offer every semester or every year that are required for any of your degrees or programs? In an *ideal* world, with perfect coordination and infrastructure, how would you want to communicate which **required courses** are **not** offered in all semesters to: 1) counselors, 2) other faculty, and 3) students? (If you offer all classes required for degrees/certificates in all semesters, then you can write NA.)

The most challenging classes to schedule continue to be Physics 3A (only offered in Fall), Physics 3B (only offered in Spring), and Physics 4C (only offered in Spring). We have shared these limitations with our colleagues in Counseling, and continue to share the fact that we cannot offer our Physics 4 classes (7 hours a week of contact) in evenings nor over the summer, even though student enquiries occasionally are made about starting Physics 3A in Spring, or taking Physics 4 outside of daytime hours.

# Planning

Goal	Briefly describe the expected <i>outputs</i> (e.g., direct short-term results like # of students served, workshops held, etc) or <i>outcomes</i>	EMP Alignment	Equity DI Group Alignment	SCFF Metric Alignment
1. Hire Full- time Instructor for Physics & Astronomy	We will find, hire, and start the next PAR cycle with a tenure- track colleague to help support our STEM students, improve our curriculum, and advance our program.	X Equity Access X Pedagogy and Praxis X Academic and Career Success Community and Partnerships	Anyone we hire will be expected and encouraged to work on improving student success across the entire spectrum of Chabot's students	X    Enrollment/FTES      X    Degree or certificate      completion    X      X    Transfer
2. Hire Classified Professional (at least <sup>1</sup> / <sub>2</sub> time) to serve as laboratory technician supporting Physics, Engineering, and Astronomy labs.	We will have labs that are even more successful, with equipment that works, improved access to demonstration equipment for lectures, and more time from faculty to improve curriculum and support students.	X Equity X Access X Pedagogy and Praxis X Academic and Career Success	Anyone we hire will be expected and encouraged to work on improving student success across the entire spectrum of Chabot's students	X Enrollment/FTES X Degree or certificate completion X Transfer
3. Updating Physics Lab Equipment for wireless Bluetooth data collection and analysis	We will provide our students with current level technologies in use at colleges around the country for the last 5 years, using smart sensors to gather and analyze data for a variety of labs in Physics 11, 3A, 4A	X Pedagogy and Praxis X Academic and Career Success	XAfricanAmerican/BlackXLatinxXNativeAmerican/AlaskaNativeXPacificIslander/HawaiianXDisabledXLGBTXDI Gender	X Enrollment/FTES X Degree or certificate completion X Transfer

# **Resource Requests : Equipment**

	Rank (1, 2, 3, etc. after all requests have been entered)	<b>Project Name</b> Use the same project name for all requests related to a large project or put 'individual request'	New, Updated, or Repeat Request	Vendor Name	Brief Item Description	Justification BRIEFLY justify how this spending relates to the EMP, College's Annual Planning Priorities and/or President's Planning Initiatives	Quantity (1, 2, 10, 12, etc.)	Year(s) Needed	Estimated Cost Per Year (Total \$)
Item 1	1	Updating Physics Lab Equipment	<u>X</u> New	Vernier	Smart Sensor Carts for Physics Experiments	New wireless technology enables gathering data without cables for dynamics experiments used in Physics 3A, 4A, and 11	14	<u>X</u> 2022-23	\$3000
Item 2	2	Updating Physics Lab Equipment	<u>X</u> New	Vernier	Smart Force and Acceleration Sensors for Physics Experiments & Bluetooth adapaters	New wireless technology enables gathering data without cables for dynamics experiments used in Physics 3A, 4A, and 11	14	<u>X</u> _2022-23	\$2000
Item 3	3	Updating Physics Lab Equipment	<u>X</u> New	Vernier	Diffraction Apparatus (with laser)	We have used old lasers and "vintage" equipment from 1960s for diffraction experiments, and need to update.	7	<u>X</u> 2022-23	\$5000

Human Resource Requests (e.g., Faculty, Classified, Administrative, Student Workers, etc.)

	Rank (1, 2, 3, etc. after all requests have been entered)	<b>Project Name</b> Use the same project name for all requests related to a large project or put 'individual request'	New, Updated, or Repeat Request	Classification	Position Title	<b>Avg.</b> hours per week (5, 20, 40, etc.)	Justification BRIEFLY justify how this spending relates to the EMP, College's Annual Planning Priorities and/or President's Planning Initiatives (2-3 sentences).	Year(s) Needed	Estimated Cost Per Year (Total \$)
Position 1	1	Full-time replacement for Tim Dave	<u>X</u> Repeat	X Faculty FT	Instruct or, Physics & Astron omy	Full-time	Replacement of Tim Dave & Jose Alegre will help to maintain the discipline, which is a crucial component for STEM programs.	<u>X</u> Annual	Cost depends upon the step that a new faculty colleague might start. \$68 -97K
Position 2	2	Part-time support for Astronomy, Physics, & Engineering We are willing to share a full- time position with Engineering to support both programs	<u>X</u> Repeat	<u>X</u> Classified PT	Laborat ory Techni cian	~ 20 minimum	We continue to be one of the only colleges not supporting our physics lab science classes with Classified Professional help. Las Positas supports their programs in Astro & Physics & Engineering. Yet our faculty are required to do lab setup, take- down, equipment purchasing, inventory, maintenance, etc. and spend hours on these tasks that other colleagues in the District do not have to do. This has to change.	<u>X</u> Annual	Cost depends upon the step that a new faculty colleague might start. \$26 – 32K (at step 33 on current Salary Schedule for 50% time.

	Rank (1, 2, 3, etc. after all requests have been entered)	<b>Project Name</b> Use the same project name for all requests related to a large project or put 'individual request'	New, Updated, or Repeat Request	Brief Item Description (1-2 sentences)	Justification BRIEFLY justify how this spending relates to the EMP, College's Annual Planning Priorities and/or President's Planning Initiatives (2-3 sentences).	<b>Quantity</b> (1, 2, 10, 12, etc.)	Year(s) Needed	Estimated Cost Per Year (Total \$)
Item 1	1	General Consumable Supplies (Batteries, Tape, String, etc.)	Repeat	These are used in a variety of experiments every year in every class	These are required supplies to hold our Physics labs. Labs are required for the curriculum to transfer.	Misc	Annual	\$300
Item 2	2	Sensor & Cable Replacement	Repeat	These are used in a variety of experiments every year in every class; some units fail every year	These are required supplies to hold our Physics labs. Labs are required for the curriculum to transfer.	Misc	Annual	\$500
Item 3	3	Spectroscopy Emission Tubes	Repeat	These are used for Physics 11, 3B, and 4C, as well as for Astro 30	Emission tubes eventually lose gas and must be replaced; they are a critical piece in multiple experiments and demonstraitons	Misc	Annual	\$300
Item 4	4	Magnets	Repeat	Additional Neodymium magnets	Supporting student projects and experiments in Physics 11, 3B, and 4B	Misc	2022-23	\$250
Item 5	5	Rulers	New	Used for a variety of labs in every class	We replaced our long 2m rulers in the last cycle, and now need to replace 1m rulers with clear markings.	24	2022-23	\$275

## **Technology Requests**

Criterion for distributing funding vary by committee (check out the <u>Resource Allocation Rubrics</u> available on PAR's website), but are consistently based on the <u>Educational Master Plan</u>, the <u>College's Planning Priorities</u>, and the <u>President's College Planning Initiatives</u>.

\*Note: In the project name column, if your request is part of a larger project, please name the project and use the same project name for all requests related to the project. We don't currently have a good system for different shared governance committees to come together and see the total cost of projects across resource requests that go to different committees. Adding this column to Program and Area Review is the *start* to figuring out a good process for this.

	Rank (1, 2, 3, etc. after all requests have been entered)	<b>Project Name</b> Use the same project name for all requests related to a large project or put 'individual request'	New, Updated, or Repeat Request	Was the feasibility of the request discussed with IT?	Brief Item Description (1-2 sentences)	Justification BRIEFLY justify how this spending relates to the EMP, College's Annual Planning Priorities and/or President's Planning Initiatives (2-3 sentences).	Quantity (1, 2, 10, 12, etc)	Year(s) Needed	Estimate d Cost Per Year (Total \$)
Item 1	1	Upgrade Physics Laptops	New	Yes	New Windows laptops able to run current software	The (24) current laptops are heavily utilized in every physics & astronomy lab, but at 6+ years old, are ready for replacement. They run Windows 7 (out of support) and don't support HDMI video out. The units we have are terrific, and we can survive for another year or two with them, but some are breaking and losing hard- drive storage. We have a plan for gradual replacement for campus computers and hopefully these units will qualify if budget allows	24	2023-24	\$15-20K