

science. For instance, the seminar series will be held during the University Hour, but we will need to monitor and assess the impact on attendance and the availability of outside speakers.

8. **Continue to provide undergraduate research experiences for all interested majors, and other STEM majors where possible.**
9. **Invest in upgraded and state-of-the-art laboratory and hands on learning equipment for teaching and research.** Furthermore, the program needs to develop a plan to improve the storage and proper use of lab and demonstration equipment.
10. **Monitor and support the newly designed Astronomy minor to assess the possibility of growth.**

<i>URM total</i>	<i>URM DFW</i>	<i>Non-URM total</i>	<i>Non-URM DFW</i>	<i>Equity Gap</i>	<i>Overall</i>
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planning goal but also many other ones (and will be referred to in subsequent points). The **Department of Physics DEI Action Plan** is as follows:

Executive Summary

The Department of Physics is committed to improving and sustaining diversity, equity and inclusion in all aspects of our community. Our plan focuses on two areas in particular,

- 1) **DEI in the classroom**, i.e., a focus on decreasing equity gaps in the Physics General Education and Physics service courses that we teach, and
- 2) **DEI in the department**, i.e., a focus on courses and student in our major, as well as the general Physics community, including faculty, and staff.

Specific programs, efforts and actions that the physics Department will undertake in the coming year are listed below. Many of these actions address both DEI in the classroom and in the department.

Review equity gap data in our service courses as well as in our major courses regularly with faculty at department meetings, e.g., at department meetings, at least once a semester, update the faculty regarding past-semester results and trends in equity gaps. In Spring semester 2021 the equity gap data for our department was shared with faculty at a department meeting to initiate the discussion of a greater focus on equity gaps in our classes.

Make faculty more aware of **campus resources** and programs that are aimed at supporting students, e.g., provide faculty with a summary of campus resources to be included on syllabus.

Encourage faculty to join *Improving STEM Teaching Faculty Learning Programs*, and share **best/high-impact practices** with faculty at **department pedagogy meetings**.

Encourage faculty participation and support for CSUEB **peer-mentoring programs**, e.g., STEM Lab Learning Assistants and SCAA tutoring.

Continue our department's efforts in **Communities of Practice**, e.g., in 2019 our department faculty and staff joined the American Physical Society (APS), Inclusion

the NSF-funded UC-CSU **Cal-Bridge program**. The Cal-Bridge program
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Also, in AY 20-21, due to switching to online modality, we had numerous open forums in Physics sharing best practices regarding how to deliver high quality online synchronous and asynchronous classes. For instance faculty were instructed on using department issued iPads and Apple pencils to serve as a digital whiteboards in lectures which mimics the in-class ability to write out complex Physics equations on chalkboards/whiteboards, and provide sketches and graphs for students to visualize the concepts.

In AY 20-21, the Physics department continued its use of Slack channels, one specifically including all lecturer, tenured and tenure-track faculty to provide a resource for sharing ideas and best-practices including on the subject of online teaching, DEI efforts and overall methods to support student success.

5. Develop and implement a strategic plan to promote sustainable and measured growth in the number of majors in the program.

The department is still committed to formulating a coherent plan to promote sustainable and measured growth. This point is also consistent with our department's DEI Action Plan. Within the department, discussions have centered on reaching out to local community colleges, e.g., Contra Costa College, Diablo Valley College, Los Medanos, Chabot, Ohlone, and Las Positas, specifically to the chairs of the Physics departments to advertise the support structures, the sense of community our department offers and the research opportunities we have here at CSUEB.

One area of achievement that we use to promote the Physics department at CSUEB, is the fact that Dr. Amy Furniss continues as the co-director of the [Cal-Bridge](#), NSF funded mentorship program. This program provides "intrusive" advising for underserved populations of Physics students at all CSU campuses with the goal of increasing the number of diverse students earning Ph.Ds. in Physics and Astronomy. Benefits include the weekly mentoring/advising from CSU and UC faculty, up to \$10,000 per AY and support in applying for graduate school. In this past AY, two women Cal-Bridge scholars graduated and are now attending graduate school. DEI efforts often focus on BIPOC students, but in Physics there is also a dramatic underrepresentation of women in the field at the doctorate level. As a department we are taking pride in helping to support more women joining the graduate ranks!

In 2017, under 4% of the bachelor's degrees awarded in the U.S. in the field of Physics were earned by African Americans, and only 10% of the bachelor's degrees awarded in the U.S. in the field of Physics were earned by Hispanic Americans.² In AY 2019-2020 the CSUEB Physics Faculty applied for and were accepted as a pilot institution for the American Physical Society's Inclusion, Diversity and Equity Alliance ([APS IDEA](#)), and we continue to be active members of this Community of Transformation.. The APS IDEA is a new initiative with a mission of empowering and supporting Physics departments,

² <https://www.aps.org/programs/minorities/resources/statistics.cfm> accessed Sept. 2020

laboratories, and other organizations to identify and enact strategies for improving equity, diversity, and inclusion (EDI). It will do so by establishing a community of transformation. We continue to be active members in the APS IDEA network and have made it a point of emphasis in our department DEI Action Plan. Through this Community of Practice, we hope to find pathways for more students from traditionally underserved populations to earn a degree in Physics.

Figure 1 - This graph shows the percentage of bachelor's, master's, and doctoral degrees awarded to underrepresented ethnic and racial minorities (URMs) in physics at U.S. institutions. In this case, URMs include African Americans, Hispanic Americans, American Indian/Alaska Natives and Native Hawaiians. (This report from APS came out in 2017 so these are the most up to date statistics). In 2017, a total of 1097 Doctoral degrees in Physics were conferred in the U.S. and 83 were conferred on URM students (19 Black/African American and 62 Hispanic/Latino). In 2017, a total of 8102 Bachelor degrees in Physics were conferred in the U.S. and 1090 were conferred on URM students (263 Black/African American and 800 Hispanic/Latino). In 2017, CSUEB graduated awarded 2 Physics B.S. degrees to Black/African American students accounting for 1% of the nation's total.

6. Request the addition of at least two new tenure-track hires.

Dr. Arran Phipps, (post-doc. From Stanford & Ph.D. in Physics from UC Berkeley) joined the tenure-track faculty in the department of Physics in the Fall of 2020. It was an unusual, virtual start for Dr. Phipps, but he has handled the situation with aplomb.

We plan on requesting another tenure-track hire for the next cycle.

7. Continue to promote and strengthen the Physics seminar series.

The Spitzer seminar series continues to be very popular with students faculty and staff. The shift to an all online format has had both its detriments and benefits. In AY 20-21, we

able to invite a broader, more diverse group of outside speakers. In Ay 2021-22, we plan on continuing hosting our seminar series in a co-synch fashion so that people can congregate in the seminar room in the Science building and also join us to listen to our speakers on Zoom. Speakers too will sometimes be on-ground and sometimes via Zoom.

As part of our department DEI Action Plan, we continue to place a focus on Diversity, Equity and Inclusion. We have made efforts to ask non-academic Physicists to speak at our seminar series this year to provide role-models for our students on non-traditional career paths for Science majors. For each speaker, we ask that they spend some time sharing what drew them into the field they are in and how their career arc changed over time. We hope that these experiential stories inspire our students to see that there is no one traditional pathway to success in STEM fields and that *“through not just through adversity but also diversity we reach the stars.”*

8. Continue to provide undergraduate research experiences for all interested majors, and other STEM majors where possible.

Dr. Grimm continues to engage undergraduates and graduate students from CSUEB working on projects associated with the large Hadron Collider (LHC). Highlights include students working at Stanford performing technical work associated with new sensors to be installed at the LHC.

Dr. Furniss continues to mentor CSUEB students in conjunction with her work at the VERITAS gamma ray observatory in Arizona and other partnerships. She works with both Physics majors and other STEM majors year-round.

Dr. Kimball continues to lead international dark matter search collaborations GNOME and CASPER. CSUEB students, both Physics and other STEM majors, work with him year-round in his CSUEB research labs.

Dr. Ryan Smith was on sabbatical during the AY 2021-22 and spent much of his time in Berlin Germany at the Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy .

Due to COVID, many of the on-campus research activities were curtailed when the shelter in place orders were issued in March of 2020. However, the faculty continued to hold group meetings and switched their efforts to activities amenable to online/remote work, e.g., data analysis, coding, writing up progress reports, etc.

9. Invest in upgraded and state-of-the-art laboratory and hands on learning equipment for teaching and research.

Hands-on learning equipment and material purchasing was curtailed during AY 20-21 due to COVID restrictions to being on campus. Furthermore, our department Instructional Service Technician (IST) of over 20 years, Mr. Mohammad Ali, retired. We are excited to finally be on-boarding a new IST, Andre Li and in the upcoming year we plan on having our new IST update our inventory, and develop a plan for investing in upgraded and state-of-the-art lab equipment for teaching and research.

10. Monitor and support the newly designed Astronomy minor to assess the possibility of growth.

The Astronomy minor continues to draw interest. We will continue to advertise the minor and track the number of students in the years to come. The prefix ASTR was approved by the CSUEB Senate in the Fall 2020 and our plan is to officially list many of the Astronomy related courses with this prefix rather than PHYS in order to draw more attention to the Astronomy minor, with a long-term goal of developing an Astronomy B.S. program.

C. Program Changes and Needs

Report on changes and emerging needs not already discussed above. Include any changes related to SB1440, significant events which have occurred or are imminent, program demand projections, notable changes in resources, retirements/new hires, curricular changes, honors received, etc., and their implications for attaining program goals. Organize your discussion using the following subheadings.

Overview:

The Department of Physics strives to offer a welcoming, community-oriented environment that is welcome to all. Faculty and staff are dedicated to providing a supportive, and enriching educational experience to all students, both majors and any student enrolled in a Physics or Astronomy GE or service course. In AY 2021-22 the regular faculty created our Department DEI Action Plan in an effort to codify how we as a department plan on affecting change with respect to DEI issues in our Physics in general and for our CSUEB student population.

The faculty truly make the department exceptional and unique. Our tenure-track faculty are extremely research-active and excel at garnering external funding support, but always with a mind towards providing meaningful research and experiential learning opportunities for our majors and for students from outside our major who are interested in doing research. Even during this past year under COVID, faculty continued to engage CSUEB undergraduate students in research.

Curriculum:

In AY 2020-21 we anticipate a “return to normal” for offering most of our Physics courses on-ground.

In the Fall of 2020, the Physics department offered every one of its lab courses on ground as well as all of our upper division major courses, and in fact every faculty member had at least one on-ground class they were teaching in the Fall semester. Large lecture courses were still mainly offered online. Safety and COVID precautions and guidance were reviewed at our monthly department meetings to reduce the anxiety of teaching on ground, and many faculty were very happy to be back on ground teaching labs in-person to students.

We anticipate that almost all of our course offerings in the Spring 2022 semester will be on-ground, except for the few GE classes which were already approved and taught online pre-pandemic.

In the past year, AY 20-21, the tenured/tenure-track faculty, as PIs or co-PIs wrote the following grants to the National Science Foundation (NSF) and NASA, all of which have now been funded (these are great achievements, and fall under the category of **honors received**)

II. SUMMARY OF ASSESSMENT *(suggested length of 1-2 pages)*

A. Program Learning Outcomes (PLO)

List all your PLO in this box. Indicate for each PLO its alignment with one or more institutional learning outcomes (ILO). For example: PLO 3. Critical thinking skills (ILO 3, 4 & 8). PLO 4. Program Learning Outcome(S) Assessed. List the PLO(s)

The CSUEB Institutional Learning Outcome (ILO) numbers referred to above correspond to the following:

- (1) **Thinking and Reasoning:** think critically and creatively and apply analytical and quantitative reasoning to address complex challenges and everyday problems.
- (2) **Communication:** communicate ideas, perspectives, and values clearly and persuasively while listening openly to others.
- (3) **Diversity:**

Physics 135 (Fall 2021) – PLO 1; FCI at start and end
Physics 136 (Spring 2022) – PLO 1; BEMA at start and end
Physics 230 (Spring 2022) – PLO 2; problem solving rubric + writing rubric
Physics 351 (Spring 2022) – PLO 2; problem solving rubric + writing rubric
Physics 480 (Fall 2021) – PLO 3 and 5; apply writing rubric to lab write ups
Physics 481 (Spring 2022) – PLO 1, 2 with ETS Physics Exam and PLO 5 with rubric assessments of end of term research projects and presentations

However, due to restrictions associated with teaching certain courses online only during the Fall 2021 semester the following plan for assessment will take place in AY 2021-22:

Physics 135 (Spring 2022) – PLO 1; FCI at start and end
Physics 136 (Spring 2022) – PLO 1; BEMA at start and end
Physics 230 (Spring 2022) – PLO 2; p

III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS *(suggested length of 2 pages)*

Each program should provide a one-page discussion of the program data available through University Dashboard. This discussion should include an analysis of trends and areas of concern. Programs should also include in this discussion requests for additional resources including space and tenure-track hires. Resource requests must be supported by reference to University Dashboard data.

Requests for tenure-track hires should indicate the are

Fall 2017	PHYS 1001	Furniss	76
Fall 2018	PHYS 135	Kimball	97
Fall 2019	PHYS 135	Furniss	93
Fall 2020	PHYS 135	Furniss	168
Spring 2021	PHYS 135	Furniss	82
Fall 2021	PHYS 135	Kimball & Phipps	171

Table 5- Enrollment in Introductory Calculus-based Physics service course PHYS 135

Below we show the data for our Algebra-based Introductory Physics sequence's initial class, PHYS 125 (which under quarters was PHYS 27

will see a natural rebound in the enrollments of these classes in this cohort's second year at CSUEB.

In the PHYS 125-126, noting that many students seem to be starting the sequence in the Spring term, we are encouraged to see an increase in the number of student served in AY 20-21 as compared to AY 19-20. One area to note is that the new semester roadmap for Kinesiology students does not include Physics any more. Having reached out to the Kinesiology advisors, students who express interest in PT or OT graduate work are verbally steered into taking the pre-requisites for those graduate programs, which includes Physics and Chemistry. We will continue to monitor the trends in the coming years.

In the PHYS 125-136-137 sequence, we are experiencing a huge increase in the number of students starting this series, and we actually anticipate this growth to continue into the future. The growth is due to a combination of growing enrollments in Chemistry & Engineering and also due to the fact that during quarter to semester conversion, the Computer Science department elected to require PHYS 135 as part of their required B.S. roadmap.

B. Request for Resources (*suggested length of 1 page*)

1. Request for Tenure-Track Hires: provide evidence from trends provided

We are requesting a tenure-track hire for the upcoming academic cycle. As per our five-year plan, we had anticipated needing two new hires during the subsequent five years, i.e., 2018 – 2023. We made one hire who started in the Fall of 2020 and if we were allocated a new hire, this second faculty member would be able to join the department in the Fall of 2023.

As indicated above in the Program Changes and Needs section, according to Pioneer Insights the percentage of Regular Faculty Teaching courses over the past five academic years are as follows

Fall 2016	34%
Fall 2017	38%
Fall 2018	32%
Fall 2019	34%
Fall 2020	31%

Table - Percentage of courses taught by Physics TT Faculty

Even though, in the Fall of 2020 Dr. Arran Phipps joined the department as a new Assistant Professor, the percentage of courses taught by Regular Faculty went down and stays extremely low. Further, given the growing numbers of Chemistry, Computer Science and Engineering majors as well as the newly proposed Civil Engineering Program, we anticipate that the demand for Physics service courses and labs will continue to increase in the future. Given these trends and this anticipated growth we are respectfully requesting a new Tenure-Track hire during the next cycle. We are hopeful that a newly approved search will offer our department the opportunity to further increase the diversity and gender equity in our ranks in order to provide a

Appendix B: Checklist for CAPR liaison who reviews the APR and guiding checklist for author of the annual program report.

NOTE TO CAPR REVIEWER:

Read the Annual Program Review submitted by the program by visiting the Five-year Reviews and Annual Reports by Department page on the Academic Senate website. Find the CAPR document that pertains to the last five year review (e.g. 08-09 CAPR 42). Read this document and identify the main issues raised by CAPR with respect to the five-year plan and the goals set for this program in the intervening five years to the next program review. Report back on the program and the degree to which the Annual Report a) addresses the five year planning horizon as appropriate, and b) addresses the specific elements as parsed out below (questions 1-4).

CAPR liaisons: please check the Annual Program Review, and identify whether the following information is included in the submitted report:

1. Does the Annual Program Review have a self-study?
Yes___(*support with evidence starting with recommendations from last 5 year review, program learning outcomes, assessment strategies and results*)
No___(*provide rationale for not including a self-study*)

2. Does the Annual Program Review record progress with departmental planning and review?
Does it describe progress toward the program's defined goals, any problems reaching its

