

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.**

B. Progress Toward Five-Year Review Planning Goals

Report on your progress toward achievement of the 5-Year Plan. Include discussion of problems reaching each goal, revised goals, and any new initiatives taken with respect to each goal.

1. Implement, assess and revise as necessary the semester courses offered by the Physics program.

In the 2019-2020 AY, the department went through the curricular procedures to re-certify all of the department's GE area B1 and B3 courses (along with any accompanying overlays). This included PHYS 104, 105, 106, 107, 108, 115, 125, 126, 135, 138 and 139.

Due to COVID, the department decided to adjust some of the offered upper division major courses offered during this online-only year, specifically we are opting to not offer PHYS 481 that Advanced Lab IV class which typically has students running hands-on lab-based projects (a project-based-learning model) working closely with a faculty member in the student lab research classroom. In lieu of this 3 units class needed for graduation, we individually advised our majors to take an alternate 3 unit elective course from the two being offered during AY 20-21, i.e., PHYS 460 Astrophysics or PHYS 463 Particle Physics.

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.

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.

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. We miss meeting with all of our community on Fridays at noon on campus, however, we have been able to invite a broader, more diverse group of outside speakers who have been able to join us via Zoom. With the current state of affairs in the nation, and our continuing awareness of the lack of diversity in the Physical Sciences, we decided to focus our Spitzer seminar series on “diversity” this year. 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. We invited Dr. Lance Menthe from RAND Corporation to speak about his experiences as a gay professional in the Aerospace and Defense sectors.

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

We continue to use research to update our advanced lab and lower division lab equipment as needed for improved student learning.

In the AY 2019-20, Dr. Ryan Smith coordinated our department's Physics demonstrations and compiled a shared google sheet [@Physics Demos](#) categorized by topic and learning objective, including links to germane videos and a list of the demonstration equipment physical location in the Physics department storage rooms/closets.

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

The Astronomy minor continues to draw interest and in AY 2019-20 we had three Astronomy minors graduate (our first minor graduated in AY 18-19). 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.

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 continues to provide high-quality teaching for all students in Physics courses as well as extraordinary research opportunities for CSUEB Physics and other majors.

Dr. Kathryn Grimm has an ongoing grant from NSF.

Dr. Derek Kimball was awarded the College of Science Spitzer Distinguished Faculty award and has an ongoing grant from the Simons Heising Foundation.

Curriculum:

In general we do not anticipate any changes in Physics curriculum for the Physics major.

In PHYS 230 – Physical Reasoning and Scientific Writing, we continue to invite our colleague Jeffra Bussman from the Library faculty to help co

ysics major

Staff:

The Department of Physics shares an Office Manager (ASC I), Jacqueline Adams with the School of Engineering. Mohammad Ali serves as our Equipment Technician (IST II). Both of our staff members are extremely helpful and collegial, always going the extra mile to help our faculty and most importantly students. Mr. Ali has expressed the possibility of retiring in the com

was made to continue to deliver pedagogical content that focused on helping students master the core learning objectives associated with each course.

Other: *(e.g., major program modifications)*

We do not anticipate any major program modifications this year.

- (2) **Communication:** communicate ideas, perspectives, and values clearly and persuasively while listening openly to others.
- (3) **Diversity:** apply knowledge of diversity and multicultural competencies to promote equity and social justice in our communities.
- (4) **Collaboration:** work collaboratively and respectfully as members and leaders of diverse teams and communities.
- (5) **Sustainability:** act responsibly and sustainably at local, national, and global levels.

B. Program Learning Outcome(S) Assessed

List the PLO(s) assessed. Provide a brief background on your program's history of assessing the PLO(s) (e.g., annually, first time, part of other assessments, etc.)

Assessment Plan for 2020-2021 Academic Year:

Assessment will be curtailed during the AY 21-22 due to COVID

C. Summary of Assessment Process

Summarize your assessment process briefly using the following sub-headings.

Instrument(s):

We utilize standardized tests (FCI, BEMA and ETS Physics Exam) to assess PLOs 1 and 2. These exams have multiple choice questions on introductory and advanced physics concepts, and are accepted as standard measures of content within the physics field. For example, the Force Concept Inventory (FCI) instrument is designed to assess student understanding of the most basic concepts in Newtonian physics. This forced-choice instrument has 30 questions and looks at six areas of understanding: kinematics, Newton's First, Second, and Third Laws, the superposition principle, and types of forces (such as gravitation, friction). Each question offers only one correct Newtonian solution, with common-sense distractors (incorrect possible answers) that are based upon student's misconceptions about that topic, gained from interviews. Moreover, the Brief Electricity and Magnetism Assessment (BEMA) assesses what students know about the most basic and central concepts of the calculus-based introductory E&M course. It is comprehensive, covering topics from the Coulomb force law to magnetic induction, but omitting radiation because it is very common for the introductory course not to get that far. It has been used by various instructors in various settings and has been judged an appropriate and fair assessment of introductory E&M by physicists experienced in teaching E&M at various levels. It is not aimed at any particular curriculum but contains only those elements common to all calculus-based introductory courses.

In order to assess PLOs 3 and 5 we have utilized writing and oral presentation rubrics that have been created by CSU East Bay Physics faculty and have been adopted as standard within the Physics Department. The Rubrics allow a scaling of specific measures of quality written problem solutions, written research papers and presentations. The rubrics, each of which is provided to the students as

part of the introduction to the assignment, were developed by the physics faculty independently, through a collaborative compa

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

A notable trend in the Department of Physics has been a fall-off in the number of FTES (enrollment) and FTEF from the quarter system through the first two years of semesters.³

Table 4 - Dept. of Physics FTES, FTEF and SFR from 2016 - 2019

Reflections on Trends and Program Statistics:

Provide your reflections on the trends discussed above and statistics and supplemental information presented in this report.

The department is committed to growing the number of majors and continuing our efforts to increase the number of traditionally underserved student populations in Physics.

We are concerned about decrease in the enrollment in GE Physics courses. We have been in discussion with the director of General Education regarding changes in the way advisors will block enroll Freshmen in the Fall of 2020 as compared to 2019. We hope to learn what prevented the advisors from enrolling Freshmen into Physics classes. If however incoming native freshmen students were steered away from their B1 and B3 requirements in their first year, then perhaps we will see a natural rebound in the enrollments of these classes in this cohort's second year at CSUEB.

In the PHYS 125-126 sequence we are concerned about the drop in enrollment over the previous years. One area to note is that the new semester roadmap for Kinesiology students does not include Physics any more. Under quarters, students interested in earning a Kinesiology degree with the goal of applying for Physical Therapy or Occupational Therapy school, were guided into the algebra-based Physics sequence as this is a requirement for these graduate programs. It is clear that the number of Kinesiology majors in the PHYS 125-126 sequence is down, but that drop occurred even under the first semester under the new roadmap for Kinesiology, i.e., Fall 2018, with the large drop in total enrollment not coming until Fall 2019. Thus the reduced number of Kinesiology students is certainly not the only source of attrition in enrollment. We have already reached out to the Chair of Kinesiology to discuss the possibility of including the Physics 125-126 sequence as part of the official roadmap for students interested in earning the Kinesiology degree who are looking towards a graduate degree in Allied Health. There are currently over 1200 Kinesiology majors here at CSUEB, though many are transfer students who would likely not need to take the course. However as the Chair indicated, likely 70% of Kinesiology majors express an interest in Allied Health

