

## 2019-20 Physics/Astronomy Annual Program Plan

### I.A. Program Profile: Purpose

Describe the program(s) to be reviewed. What is the purpose of the program and how does it contribute to the mission of Skyline College?

#### Narrative

The Physics & Astronomy department offers Skyline College Students a wide range of course work intended to support students through their respective guided pathways and meta majors.

Courses in this department include three tracks (Calculus, General and Conceptual), each supporting different pathways (i.e. Technology and Engineering, Mathematics, other Physics Sciences, Life and Pre-Health students) for their AS-T degrees as well as GE requirements for non-science majors.

The Physics departments goals include:

- Strengthening the course streams to be contextualized for students of respected majors while articulating to CSU and UC transfer level courses.
- Increase student's persistence and retention through additional resources including embedded tutoring, supplemental workshops as well as additional support in the classroom.
- Laboratory improvements:
  - Increase current lab setup inventory to accommodate additional lab set ups for growing capitol in the Calculus Physics Track as well as improve/modify current equipment.
- Additional Personnel
  - Calculus Sequence has shown an increase of student enrollment. Lab seat size should be increased to 30
  - The total FTE for Physics and Astronomy shows that an additional FT Instructor would assist the department in development, facilitation and assessment for Physics and Astronomy.
  - Additional personnel can support the current Lab Technician who is providing to the needs of two departments (i.e. Engineering and Physics).

The Physics & Astronomy department contributes to the Skyline College mission through continued efforts in providing students with equitable resources. This includes facilitation of peer embedded tutoring and workshops through the MESA Center and The Learning Commons as well as the AEW Peer Instructional Leader Program being funded by various grants in the Division.

The department is also supporting learning community sections for students in the Engineering and Technology Scholars learning community, ASTEP and in



the FY 19'20 year Biology and Chem Scholars. With the currently being developed STEM Center, the Physics and Astronomy department also aims in being a strong presence with the aim towards student success, increased retention and preparedness for transfer.

**I.B. Program Planning Team**

Annual program planning is intended to be a collaborative process which promotes dialogue and reflection. Please identify all individuals who contributed to or shaped the narrative. Include names and the title or role of each person.

**Narrative**

Maryam Khan - Assistant Professor (Physics and Engineering) (Interim Position from Fa2018-Sp2019)

Raymond Hernandez - Dean (SMT Division)

Marco Wehrfritz - Laboratory Technician (Physics Lab and Innovation Center/Engineering Lab)

Adam Windham - Previous FT Professor (Physics and Astronomy)

## II.A. Analysis: Progress on Prior Program Objectives (Goals) and Activities

Describe the progress made on previously established program objectives (goals) including identification of achievements or areas in which further effort is needed. New programs which have not yet established CPR/APP objectives should discuss progress on program implementation or activities.

### Narrative

#### 1. Diversity outreach:

##### Progress:

The connection with Physics and ASTEP is still in need of progress as the enrollment of ASTEP students in the Conceptual/GE Physics courses remain low while the enrollment of students within the Conceptual/GE Physics has appeared lower from recent history (3 years).

With the previous goal to connect with more learning communities, Physics has opened Learning Community sections for the Calculus Track physics to support students in the Engineering and Technology Scholars (ETS) Learning Community. This started with just reserving a section in the afternoon lab period for Phys 250 but has grown to the sequential courses of the Calculus Track.

With coordination from ASTEP and Puente, Physics and Engineering workshops were held in the Innovation Laboratory and led by Physics and Engineering faculty. These workshops were geared towards empowering students of underrepresented minorities to pursue STEM in college as well as to initiate the students with their sense of identity within the Physics and Engineering classrooms.

##### Moving forward:

More collaboration with the STEM Learning Communities will be done. Firstly, to promote flexibility in scheduling, as well as supporting the growth of the ETS cohorts, LC seats will be reserved in different lab sections for the ETS and Biology and Chem Scholars.

More outreach will be done to our feeder high schools. Collaboration with Meta Majors for physics as well as the efforts in collaborating with ASTEP and Puente needs to be stronger.

#### 2. Hybrid Expansion

##### Progress:

Currently one Part Time Faculty member is taking the OER Canvas training to teach Phys 210 as a Hybrid/distance ed course. The training is required by

Skyline College; for faculty to teach a fully online or hybrid online course they are to build the course prior to instruction in commitment with OER guidelines.

Due to the change in FT faculty staffing (i.e. sudden departure of both FT faculty) in physics, when the previous faculty who had the online training left, the hybrid course had to be taken offline was converted to a face to face course. This did not meet the students needing the distance ed portion of the class thus dropping enrollment levels.

#### Moving forward:

Additional faculty (On-boarding/new FT Faculty for Fall 2019) will be encouraged to partake in the Online Canvas training. More courses may need to be offered as a hybrid course.

### **3. Laboratory Development**

#### Progress:

- Lab equipment purchased (replacement of old bulbs for e/m lab.
- Needing to purchase additional setups in support of increased cap size for students (24-30)
- Coordination with facilities to move lab benches to accommodate another lab bench with supplied power in the main physics lab (7-305) with at least one lab bench set to meet ADA compliance. This is being scheduled for summer 2019.

#### Moving forward:

- A thorough inventory count needs to be done prior to purchasing additional setup equipment. As of right now, concurrent scheduled labs are being arranged and topics scheduled based on limitations of lab equipment (i.e. Pasco Interface).
- Collaboration with Physics and Engineering department to discuss utilization of equipment in the Innovation Center (using Engineering Power Supplies for Phys 260 which is held in the Innovation Center/Engineering Lab).
- Updating the Physics Lab Setup Manual to consider recent changes to certain lab setups.
- Increase lab seating capacity.
- Census reports from previous semesters indicate a growth of students taking the calculus sequence. Currently the two labrooms can hold 32 seats. Change seat count from 24 – 30.



**Associated Objectives**

447-Diversity Outreach

476-Hybrid Expansion

475-Laboratory Development

## II.B. Analysis: Program Environment

Describe any recent external or internal changes impacting the program or which are expected to impact the program in the next year. Please include when the specified changes occurred or are expected to occur.

### **Narrative**

#### **Physics Sections for Learning Communities and Guided Pathways**

With the development of Learning Communities for Engineering and Computer Science, more students are taking the Calculus based physics sequence for transfer. Many if not most of the students in the Calculus sequence are students are Engineering and Computer Science Majors. There has been growth of student capitol for the calculus track physics and now there are three sections of Phys 260/270 being offered, Phys 250 has increased to 4 sections. In Fall 2018, an additional section of Phys 260 was opened in the Fall to support students who couldn't add the course in Spring 2018. This course was also met with high demand of students wishing to add. Currently the lab equipment as well as the rooms are not meeting the demands of the higher capitol of students. With the learning communities, restricted sections have been made allowing cohort students priority in enrollment.

Along with the wraparound support students in the specific cohorts are getting, grant initiatives within the division to fund and facilitate these communities have also been a provider in hiring staff for facilitation and funds for embedded tutoring support. This tutoring support and staff services has been accessible to all students in Physics courses.

#### **Change of Faculty Leads:**

There has been a change in faculty leadership with the resignation of the two fulltime physics faculty. This had made a ripple effect within the department with most regard to student capitol for the general/algebra track physics courses. It was seen through student evaluations that the transition of leadership has impacted the physics program as well as the enrollment of Phys 210 after the hybrid/distance Ed course was made face to face. During the transitional period an interim full-time physics faculty was appointed as well as the hiring of many new adjunct instructors to maintain the department's pulse.

However, this has also provided the department with opportunities for part time faculty to innovate and improve their course pedagogy to enhance the experience for students with contextualized learning for guided pathways as well as more wrap around support from the MESA and developing STEM Program.

## II.C. Analysis: Student Learning Outcomes (SLOs and PSLOs)

- (1) Instructional Programs Only: Describe what was learned from the assessment of course SLOs for the current and past year.
- (2) Student Service Programs Only: If PSLOs are being assessed this year (3-year cycle), describe what was learned. If no assessment was done because this is an off-cycle year, please state that this item is not applicable.

### Narrative

The SLO results for Astronomy have been positive and show that most students are reliably meeting the success criterion for both ASTR 100, and 101. Assessment methods cover the various outcomes through questions on the final exam. Overall, the results show strong performance of students across all aspects of lecture and lab in astronomy.

The courses that were assessed for Physics in Spring 2018 were:

- Phys 220 lecture and lab
- Phys 250 lecture and lab
- Phys 260 lecture and lab
- Phys 105 lecture
- Phys 106 lab

PHYS 105 was assessed for Spring 2018. The results have continued to show poor performance across all aspects of the course. The benchmark criterion, where at least 75% of students pass with 70% or more, was not met for all four learning outcomes of the course. With the oncoming transition of Physics department FT leadership, alternative assessment methods and pedagogy may need further discussion and implementation.

PHYS 106 results met the 75% benchmark, however the assessment methods used for the Groupwork/Lab skills has thus proven to be inconclusive. Current methods the faculty are using for assessing the lab skills in the physics department has proven to be unsustainable. Onboard/New FT Physics Program Lead will need to plan strategic methods on revising assessment methods or modify the learning outcome for it to be more realistic.

Phys 220 was assessed for Spring 2018. Of the four outcomes that were considered, both 'Conceptual Understanding' and 'Quantitative Analysis', were not met with the current benchmark of 75% or more students succeeding above 70%. For Conceptual Understanding, the students that achieved above the benchmark was considerably low (34.6% of the students), where as for Quantitative Analysis, 73.1% of students achieved above the benchmark. Since both outcomes were not met and were assess prior to a grading curve, and since the fourth outcome which considered the students collaboration within a group has historically proven to be inconclusive, new or modified criterion may need to

be considered. These discussions will have to wait until the department receives a new FT Physics Faculty.

Phys 250 - For the learning outcomes reviewed for Physics 250, students overall did not achieve benchmark. When considering the breakdown, 50% of the students scored at least 70% through the method of assessment. Quantitative analysis indicates that more efforts are needed to strengthen the students' performance where 35% were able to achieve the benchmark criteria. The assessment method for groupwork has thus been inconclusive. With the onboarding of new FT Physics Faculty, there needs to be discussion, planning and considerations for revising the assessment methods for more meaningful results.

Physics 260 was met with very low success (28% of 78 students scored at least 70% of the conceptual understanding questions that were given on the final exam for that course, and 15% of the students earned at least 70% of the points available on quantitative questions on the final exam. 75% of the students answered at least 70% of the standardized data analysis questions correctly, while the group work outcome's results remain inconclusive) With the very low success rate, it seems to be an indication for a greater support for students in this course.

### III.A. Reflection: Considering Key Findings

Consider the previous analysis of progress achieved, program environment, and course-level SLOs or PSLOs (if applicable). What are the key findings and/or conclusions drawn? Discuss how what was learned can be used to improve the program's effectiveness.

#### **Narrative**

The Physics and Astronomy department has overall maintained its goals with prior the departmental objectives and with the college vision and initiatives. However, in the recent year the program has gone through a transient period due to change in faculty leadership. Both FT physics instructors went on subsequent leave of absence and have migrated to other colleges. This has impacted the department primary in terms of staffing as well as the pedagogy that students reputedly receive. It was seen in student evaluations as well as the dropped enrollment when distance ed courses were made face to face that the loss of the previous FT instructors became a setback for the department.

To keep up with the demands of course offerings, the Science Math and Technology Division had to hire additional adjunct faculty for Physics as well as an interim FT faculty member to facilitate with instruction, coordination and purview of the department until the college hired on new FT faculty members.

While the enrollment for the algebra track has dropped, there has been a positive demand for the calculus track. This has been contributed mainly to the efforts the Engineering and Computer Science department in designing learning communities and streamlining guided pathway / transfer tracks for engineering and computer science majors. With the growth of the calculus sequence additional sections have opened to meet those needs. Ongoing and proposed improvements to the program are discussed in according narratives in the plan, as well as continued improvements to laboratory facilitation (i.e. equipment, updating lab manual and cap size for enrollment), outreach to students in under-represented areas as well as the expansion of our course offerings for distance education.

With an increase in the number of course offerings as well as taking up the cap size for classroom facilitation means the department will need to purchase additional equipment. Increasing the lab size means equipment for an additional setup of each lab will have to purchased. With the cost of laboratory equipment, an increase of budget will impart in meeting those demands.

An additional full-time faculty member is also needed. The overall FTE for physics and astronomy from the Spring 2019 census report indicates that an additional FT faculty would help with course load as well as coordination to develop coursework, improve pedagogy and expand resources (face to face and online) to improve the students experience and diversify the offerings for guided pathways reaching students in the different course sequences.

In response to the SLO results, it appears that our students are not receiving ample support outside of the class and laboratory setting. Methods to improve on the retention for students taking either series, Calculus or Algebra would include additional embedded tutoring, supplemental instruction and support from the wrap around services (i.e. Retention Specialist, STEM Counselor, Instructional Aides) being developed with the up and coming STEM Center. Additional programs to increase persistence would be the development and implementation of a 'Physics Jam' here at Skyline to further diversify the departments pedagogy for specific courses. Currently, the Math Department and Chemistry Department have run short programs reviewing fundamental concepts.

Other target areas of specific emphasis needs to be:

- Increased diversity engagement with learning communities within the SMT Division and across the campus. (i.e. Engineering and Tech Scholars, Biology and Chem Scholars, ASTEP). to recruit students coming from historically underrepresented backgrounds.
- Inclusive access (textbooks and materials) for students.
- Updates to laboratory component for the courses
  - Update and revise laboratory manuals
  - Increase lab capacity to 30 students
  - Inventory update
- All Faculty to improve course pedagogy and offer diversity in course offerings.
  - Offer more Hybrid/Distance Ed courses, promote different teaching techniques in the classroom and engage with students through different modes of delivery.

Meeting students who enter the classroom under-prepared and increase persistence to pursue the course streams (Phys 210/220, Phys 250/260/270) and support students in the GE Course offerings (Phys 105/106, Astr 100/101) who traditionally don't identify themselves as science students.

### **III.B. Reflection: ISLOs**

If your program participated in assessment of ISLOs this year:

- (1) What are the findings and/or conclusions drawn?
- (2) Does the program intend to make any changes or investigate further based on the findings? If so, briefly describe what the program intends to do.

#### **Narrative**

The program did not participate in formalized ISLO assessment this year.

**IV.A. Strategy for Program Enhancement: Continuation/Modification**

Indicate whether the program is continuing implementation of the last CPR strategy or revising the strategy. Please describe the modifications if revisions are intended.

Note: Any new strategies should be linked to Institutional Goals through creation of objectives in the next section. If the program has not yet participated in comprehensive program review, an annual or multi-year strategy can be defined in this item.

**Narrative**

The department is continuing to implement it's strategy for improvement as outlined in the 2015 CPR.

#### **IV.B. Strategy for Program Enhancement: Action Plan and Resource Requests**

Based on the most recent CPR and any desired modifications, develop an annual action plan with related resource requests. No narrative response will be entered in this section, but the objectives you create will be printed automatically in the APP report under this item.

- (1) To begin, click on PLANNING at the top of the page, then CREATE A NEW OBJECTIVE. To view previously created objectives, click PLANNING at the top of the page, then VIEW MY OBJECTIVE.
- (2) IMPORTANT! Make sure to associate each objective to this standard in the APP. Need help? Contact the PRIE Office for further instructions. Institutional Goals. Need help? Contact the PRIE Office for further instructions.

#### **Narrative**

##### **Associated Objectives**

[987-Academic Support, Student Persistence and Inclusive Access](#)

[988-Additional FT Faculty](#)

[984-Diversity in Course Offerings and Pedagogy](#)

[986-Laboratory Environment and Facilitation](#)

##### **Enhanced Budget with Objectives and Tasks**

[Enhanced Budget with Objectives of Physics/Astronomy unit](#)