

Comprehensive Program Review Report



Program Review - Physics

Program Summary

2021-2022

Prepared by: Quinn MacPherson and Larry Owens

What are the strengths of your area?: The Physics Department offers two physics course sequences to meet the needs of various science and mathematics-based majors. The calculus-based sequence (PHYS 55, 56, 57) is designed for engineering, physics, mathematics and other majors requiring the more advanced level of physics. The algebra/trigonometry-based sequence (PHYS 20, 21) typically meets the needs of biology, health science, and computer science majors, among others. Additionally, physics aids in promoting transfer by teaching classes that satisfy the UC and CSU group 5A and group B1 requirements respectively. Astronomy ASTR 10 and physical science PSCI 20 satisfy both satisfy these requirements. These courses are typically taken by a diverse set of student majors and are highly popular – filling to room capacity with students on the waitlist.

In spring 2016, the physics department began to offer another "scheduling track" for the calculus-based physics sequence which allows more options for student success in physics. Traditionally, the calculus-based, three-course sequence has been offered starting in the spring (Phys 55-spring, Phys 56-fall, Phys 57-spring). To support students who don't follow the traditional schedule, as well as to provide students a more immediate option to retake a course (rather than waiting a full year), an alternative course sequence schedule has been developed and is now fully implemented. The additional scheduling flexibility and ability to retake a course the following semester of the two-track model has proven its value in the ability to accommodate the student's life and academic uncertainty during the COVID pandemic. The alternative track and variety in delivery methods support student success. Additionally, the two-track schedule has encouraged and allowed the physics department to accommodate increased enrollment in the series.

The physics laboratory is fairly well equipped and new equipment has been acquired through Above-Base and grant funding. These funds have been used to purchase enough equipment for more lab groups to be able to operate at the same time within each lab section. The physics labs are taught in John Muir 208, which has 8 lab tables. The goal is to have 8 complete setups of each experiment to support full classes and engagement by all students. By having enough equipment, the lab can accommodate more students while providing a meaningful hands-on experience for each student. The funds are also used to upgrade the equipment so students can work with modern data acquisition in addition to traditional methods. A mixture of both provides a well-rounded laboratory experience for the student.

What improvements are needed?: 1. Support increased student enrollments, success, transfer, and degree completion in physics.

To support student needs in physics and related courses (Astronomy, Natural Science (designed for education majors) & Physical Science (general education lab science course)), the physics department needs at least two full-time faculty and one or two adjunct faculty. This is in addition to a full-time faculty member in the engineering department. Without adding any additional courses beyond what is already scheduled, there is sufficient teaching load to support two full-time physics faculty and still have overload and need for adjunct faculty. Having two full-time physics faculty allows us to continue offering the expanded course offerings in the two physics sequences (20/21 and 55/56/57) that has increased enrollments and facilitated improved student scheduling and degree completion. The physics sequences are needed for ASTs in biology, mathematics, chemistry, computer science, engineering, and physics. Expanded course offerings in physics have also had a positive impact on enrollment in advanced engineering courses.

With the retirement of our senior tenured faculty member at the end of the last academic year, we added a new full-time temporary member (Dr. Marc Royster) to our team for this academic year. In order to continue supporting students through our

current course offerings, we are requesting a replacement tenure track faculty position following the end of the temporary contract ending in spring 2022.

The need for the second full-time physics position is even greater than in past years as we have added a second section of astronomy to the spring schedule to accommodate increased enrollment. With the second section of astronomy in the spring, there are a total of 73 LHE per year of physics, astronomy, and physical science courses (and potentially 3 more, if another Astro section is added to the fall schedule).

Having two full-time physics faculty members:

(A) allows Physics to offer its current course offerings including two physics tracks.

(B) by offering two physics tracks, increases enrollment in physics and engineering.

(C) gives students the opportunity to learn from multiple presentation styles.

(D) gives students access to professors with differing sub-disciplines. (For example, Dr. Royster has experience in astrophysics, complementing the strengths of the other full-time faculty).

2. Continue increasing enrollment.

Enrollment in the PHYS 55/56/57 sequence has increased - albeit with some semester-to-semester fluctuation - since the sequence has been offered every semester. During the covid-induced online nature of the 20-21 academic year, we saw particularly high enrollment - in part because classroom seating limitations were not in place. Fall 2021 enrollments are lower than the general trend would suggest, potentially as an aftereffect of covid. See the attached document titled "PHYS Enrollments and Success by AY as of Sep21" for more details. We seek to expand the enrollment in the 55/56/57 sequence. With expanded enrollment, even on semesters when enrollment is lower than usual, courses will not fall into low-enrolled status.

To increase enrollment in the series, we aim to both recruit more new students as well as improve retention so that more students progress through the sequence. To this end, we have performed an analysis of students who were in 55 and 56 in spring 2021 to see what courses they are enrolled in for fall 2021. This analysis is presented in the attached document "Student Retention Analysis". Here we list the actions we plan to take as a department to increase enrollment.

(A) Outreach to local high schools: We plan to reach out to science/math instructors at local high schools with the hopes of setting up a day when we could meet with their students to tell them about COS's physics and engineering programs and do some fun lab demos..

(B) Meet with counseling staff at COS to clarify where our courses transfer to (often more than people realize) and what students could benefit from our courses. We believe improved communication with the counseling staff will both increase enrollment and improve students' outcomes.

(C) Advertise (possibly with a poster in the hall) which courses transfer to which programs at various universities. Often students are unaware that 56 and 57 now transfer to as many places as they do.

(D) Contact students identified by our analysis as potentially benefiting from the next course in the series but not currently enrolled in it.

Improve communication to try to prevent course scheduling conflicts, such as CSCI 002 which conflicted with all three 55/56/57 courses in fall 21.

3. Increase student success through individualized support.

The problem-solving-heavy nature of physics requires individualized or small group tutoring as well as collaborative settings to improve student success. The MESA program has been a critical resource for students taking physics courses by providing both a location and a program facilitating students getting help from each other and staff members. This is doubly important because through the process of explaining to others students gain the deep understanding needed to succeed after transfer. With the end of the REALM program this December, there will be a significant hole in student support offerings for STEM students. Having someone to coordinate the MESA center, act as an academic coach, and assist students in their studies is particularly important in introductory courses to maintain and hopefully improve our student success rate. We are requesting that the current MESA coordinator position be expanded into a full-time position to continue the important work of at the MESA center as well as take on some of the services formerly supported under the REALM program.

4. Increase student engagement in the physics laboratory

Over the last several years, we have been able to use a variety of funding sources to purchase equipment for the physics laboratory. Purchases typically fall within two areas to improve the student experience in the lab and to prepare them for future courses and transfer. The first type of purchase is to modernize the equipment for an experiment that we have already been using; i.e. upgrading 1950's or 1960's equipment with modern digital equipment or just properly-operating, non-worn equipment. The second type of purchase is to add to the experimental repertoire that we can use in the student labs. Within this second type of purchase, we would be looking to add equipment for measuring the speed of light - an essential lab for PHYS 57. Therefore, a new action item this year is obtaining equipment to allow multiple lab groups to perform the speed of light experiment taking turns over several lab periods. We have identified a way of doing this that is significantly cheaper by buying

parts from various vendors and assembling them rather than purchasing the entire setup from PASCO scientific.

5. Support for student success in physics laboratory activities

We are requesting an augmentation to our annual supply budget. We have added several new sections of courses without any increase in the budget to support them over the last several years. The physical science budget is used to support courses in physics, geology, geography, natural science, astronomy, and physical science. While we have been fortunate to be able to make equipment purchases with grant funding and above-base instructional money over the last several years, supplies and smaller pieces of equipment must be purchased using our annual supply budget. This year we have the new action item of obtaining accessories that make the high-speed camera we currently have more useful for lab experiments, demos, and student projects.

6. On-going support for student success through in-class and hybrid course technology.

During the pandemic, we moved our courses online. While this experience revealed the value of in-person interaction for student learning, particularly in lab courses, it also revealed a previously unmet demand for online or partially online courses and new ways of engaging students. A remote teaching option allowed students to attend classes via zoom on days when they previously would have been absent because of health issues or work or family obligations. Additionally, we were able to serve students attending various high schools as well as students in higher education institutions (e.g. CalPoly, Fresno State) for whom the course offerings in their institutions had time conflicts. Remote teaching has shown how we can improve student engagement with the usage of classroom technology. Continuing to improve student access and success through the usage of hardware and software applications has become essential.

While high flex setups are scheduled to be installed in some classrooms, these may need to be added to additional classrooms or augmented by other hardware, software, or web applications. Continued financing in these areas will be important to student access, success, and retention.

7. Improve student equity by supplying quality texts.

Both faculty members currently teaching the 55/56/57 series are using the Knight's Physics for Scientists and Engineers, 4th ed for the course textbook. This is a single textbook that costs around \$333.18 for the hardcover at the COS bookstore and can be used for all three courses in the series. There exists a free online textbook from OpenStax, however, this text is generally of lower quality. One solution currently being used in PHYS 55 is to list both readings from Knight and OpenStax in the syllabus to allow students who can't afford Knight to at least have access to the corresponding, albeit lower quality, reading from OpenStax. In fall 2021 students were given book store vouchers, however, it is expected that these vouchers are unlikely to continue into the future, which will put students who can't afford Knight at a disadvantage. We hope this can be remedied in the future with some sort of textbook loan program.

Describe any external opportunities or challenges.: Due to flexibility that the statewide physics FDRG built into the physics C-ID descriptors, our COS students sometimes have trouble on transfer due to course articulation issues. The C-ID descriptors for physics include "floating topics" which causes colleges and universities to have different placement of certain topics in their course sequences. We have aligned our course topics with CSU Fresno's courses, but it does cause issues for students transferring to other universities. Work at the state level would be required to align courses so they contain the same topics. This was the goal of the C-ID descriptors, but was not carried out successfully by the physics group.

Physics Department faculty are interested in participating in externally-funded grants to provide research opportunities for our students.

Overall SLO Achievement: We are currently working to get the SLO's evaluation up to date for the courses for which we have data. The SLO for PHYS 21 cannot currently be complete because it hasn't been taught by any current faculty members yet. Student assessments indicate that students are generally performing as expected, but there is always room for improvement.

Changes Based on SLO Achievement: No additional changes based on SLOs are planned at this time.

Overall PLO Achievement: We are currently working to evaluate the program-level assessments.

Changes Based on PLO Achievement: No changes based on program outcomes at this time.

Outcome cycle evaluation: The physics program is behind on its outcome cycle evaluation. The faculty member who filled this out retired and a new one is collecting the data, which has not been completed yet. We will have some of these updated over the coming weeks but some will require that we wait until a current professor has taught the relevant course.

Related Documents:

[PHYS Enrollments and Success by AY as of Sep21.xlsx](#)

[StudentRetentionAnalysis.pptx](#)

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Action: (2021-2022) Support increased student enrollments, success, transfer, and degree completion in physics. (Replacement Faculty Member)

(Replacement Faculty Member)

Leave Blank:

Implementation Timeline: 2021 - 2022

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Identify related course/program outcomes: District Objective 1.1 - The District will increase FTES by 1.75% over the three years
District Objective 2.1 - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years

Person(s) Responsible (Name and Position): Quinn MacPherson

Rationale (With supporting data): To support student needs in physics and other courses taught by physics faculty (astronomy, natural science, and physical science), the physics department needs at least two full-time faculty (in addition to the full-time engineering faculty member). Current course offerings provide load (plus overload) for two full-time physics faculty, plus courses for one or more adjunct faculty. Having two full-time physics faculty allows us to continue offering the expanded course offerings in the two majors physics sequences (20/21 and 55/56/57) that has increased enrollments and facilitated improved student scheduling and degree completion. The physics sequences are needed for ASTs in biology, mathematics, chemistry, computer science, engineering, and physics.

The CCC Chancellor's Office is working with the University of California system in developing a UC Guaranteed Transfer Pathway for Physics. The draft template closely matches our current offerings, so this may become an attractive incentive for increasing numbers of transfer students. This will likely increase demand for our courses and the physics major.

The position being requested is for a replacement for a faculty member who retired in the spring of 2021 and was replaced with a one-year full-time temporary faculty member. We are requesting the replacement position to support students by continuing to cover physics and astronomy program offerings.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Personnel - Faculty - Higher replacement faculty. (Active)

Why is this resource required for this action?: To support student needs in physics and other courses taught by physics faculty (astronomy, natural science, and physical science), the physics department needs at least two full-time faculty (in addition to the full-time engineering faculty member). Current course offerings provide load (plus overload) for two full-time physics faculty, plus courses for one or more adjunct faculty. Having two full-time physics faculty allows us to continue offering the expanded course offerings in the two majors physics sequences (20/21 and 55/56/57) that has increased enrollments and facilitated improved student scheduling and degree completion. The physics sequences are needed for ASTs in biology, mathematics, chemistry, computer science, engineering, and physics.

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Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.):

Link Actions to District Objectives

District Objectives: 2018-2021

District Objective 1.1 - The District will increase FTES by 1.75% over the three years

District Objective 2.1 - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years

Action: (2021-2022) Increase student engagement in the physics laboratory. (Equipment for speed of light experiment)

Buy equipment for making speed of light lab.

Leave Blank:

Implementation Timeline: 2021 - 2022

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Identify related course/program outcomes:

Person(s) Responsible (Name and Position): Quinn MacPherson

Rationale (With supporting data): Two of the central topics for PHYS 57 are relativity and optics. A lab measuring the speed of light by shining a laser beam across a room and back and detecting it with a high-speed photodetector is an essential lab for (and the only practical lab) for the relativity topic. It is also a good optics lab. We currently own a single setup for measuring the speed of light that was purchased from PASCO scientific. The way the course is currently being taught is to have the student groups take turns performing the experiment over multiple weeks of the lab. This is sub-optimal for pedagogical purposes and organizational purposes. We are requesting funds to purchase up to 3 additional setups.

If we were to order 3 more of our current setup from PASCO they would cost \$6500 each. However, by order parts from THOR LABS and Amazon and utilizing equipment already owned by the college we are able to make new setups at a cost of approximately \$550 each. We are requesting \$1500 to purchase this equipment. Each setup would include a high-speed photodetector (Thor labs DET025A \$230), a power supply (Thor labs DET2B \$125), a mirror (Thor labs ME1-G01 \$15), a gimbal mount (Thor labs KM100CP \$77), a few minor parts from the hardware store/amazon (<\$50), as well as some extra funds to account for shipping and price changes between now and approval time. If budget limitations prevent us from getting all \$1650, at least having enough for one or two additional setups would be quite helpful.

In addition to their use for the speed of light experiment, this equipment would be useful for other labs involving photogates. Furthermore, the mounts can be refitted with other low-cost optics, reducing our future reliance on high-priced PASCO equipment.

Priority: Medium

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Equipment - Instructional - Purchase equipment for speed of light lab (Active)

Why is this resource required for this action?: Two of the central topics for PHYS 57 are relativity and optics. A lab measuring the speed of light by shining a laser beam across a room and back and detecting it with a high-speed photodetector is an essential lab for (and the only practical lab) for the relativity topic. It is also a good optics lab. We currently own a single setup for measuring the speed of light that was purchased from PASCO scientific. The way the course is currently being taught is to have the student groups take turns performing the experiment over multiple weeks of the lab. This is sub-optimal for pedagogical purposes and organizational purposes. We are requesting funds to purchase up to 3 additional setups.

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In addition to their use for the speed of light experiment, this equipment would be useful for other labs involving photogates. Furthermore, the mounts can be refitted with other low-cost optics, reducing our future reliance on high-priced PASCO equipment.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 1650

Related Documents:

[SpeedOfLightOrders.pdf](#)

Link Actions to District Objectives

District Objectives: 2018-2021

District Objective 1.1 - The District will increase FTES by 1.75% over the three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years

Action: (2021-2022) Support for student success in physics laboratory activities. (Accessories for the high-speed camera)

Purchase accessories for our high-speed camera.

Leave Blank:

Implementation Timeline: 2021 - 2022

Leave Blank:

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Identify related course/program outcomes:

Person(s) Responsible (Name and Position): Quinn MacPherson

Rationale (With supporting data): This year we would like to request accessories for the high-speed camera the department already owns. The high-speed camera is an excellent pedagogical tool for lab demos for waves on strings (PHYS 55, PHYS 57, PHYS 20, and potentially PSCI 20) as well as quickly rotating objects (PHYS 55 and PHYS 20). However, due to the high frame rate, a bright light source is needed. The high-speed camera is also useful for various Friday Night Lab activities. Currently, we are using a light source that Dr. MacPherson is borrowing from a personal friend. As this is not a long-term solution, we are requesting funds for a mounted light as well as a Macro lens for a close-up photograph total of \$529 from Amazon. (\$230 for the light, \$22 for the mount, and \$277 for the lens.)

Priority: Medium

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Equipment - Instructional - Buy accessories for our high-speed camera. (Active)

Why is this resource required for this action?: This year we would like to request accessories for the high-speed camera the department already owns. The high-speed camera is an excellent pedagogical tool for lab demos for waves on strings (PHYS 55, PHYS 57, PHYS 20, and potentially PSCI 20) as well as quickly rotating objects (PHYS 55 and PHYS 20). However, due to the high frame rate, a bright light source is needed. The high-speed camera is also useful for various Friday Night Lab activities. Currently, we are using a light source that Dr. MacPherson is borrowing from a personal friend. As this is not a long-term solution, we are requesting funds for a mounted light as well as a Macro lens for a close-up photograph

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total of \$529 from Amazon. (\$230 for the light, \$22 for the mount, and \$277 for the lens.) We round up to \$550 for the total cost to account for price increase by time of approval.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 550

Related Documents:

[HighSpeedCameraExtras.pdf](#)

Link Actions to District Objectives

District Objectives: 2018-2021

District Objective 1.1 - The District will increase FTES by 1.75% over the three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years

Action: (2020-2021) Maintain increased student enrollments, success, transfer and degree completion in physics. (Replacement Faculty Member)

Hire a full-time, tenure-track professor in physics to replace a retiring faculty member.

Leave Blank:

Implementation Timeline: 2020 - 2021

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Identify related course/program outcomes: By continuing to have two full-time faculty members, students get exposed to a different viewpoint and new ways of approaching physics. That helps to achieve the following Program Outcomes:

1. Physics Problems: Students will develop the ability to identify, formulate, and solve physics problems.
2. Experiment Design: Students will develop the ability to design and conduct experiments, as well as to analyze and interpret experimental data.
3. Critical Thinking: Students will develop the ability to use critical thinking in problem solving.

By having two full-time faculty members, we can offer expanded opportunities in student scheduling of physics courses. We have already shown that by adding a parallel, but offset track in the calculus based physics sequence, our enrollments in those courses essentially doubled. The numbers of successful students in those courses as also seen dramatic increases. Enrollments are up, success is up, and students can minimize their time to degree and/or transfer. That helps to achieve the following District Objectives:

District Objective 1.1 The District will increase FTES by 1.75% over the three years

District Objective 2.1 Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

District Objective 2.2 Increase the number of students who transfer to a four-year institution by 10 percent over three years

Person(s) Responsible (Name and Position): Francisco Banuelos (Dean), Ryan Froese (Division Chair), Larry Owens (Faculty)

Rationale (With supporting data): To support student needs in physics and related courses (astronomy, natural science, and physical science), the physics department needs at least two full-time faculty. Current course offerings provide load (plus overload) for two full-time physics faculty, plus courses for one or more adjunct faculty. Having two full-time physics faculty allows us to continue offering the expanded course offerings in the two majors physics sequences (20/21 and 55/56/57) that has increased enrollments and facilitated improved student scheduling and degree completion. The physics sequences are needed for ASTs in biology, mathematics, chemistry, computer science, engineering, and physics.

The CCC Chancellor's Office is working with the University of California system in developing a UC Guaranteed Transfer Pathway for Physics. The draft template closely matches our current offerings, so this may become an attractive incentive for increasing numbers of transfer students. This will likely increase demand for our courses and the physics major.

The position being requested is for replacement for a faculty member who has indicated they will be retiring at the end of the spring 2021 semester. That faculty member was hired in 1989 as a replacement for a retirement at that time. We are

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requesting the replacement position to support students by continuing to cover physics program offerings.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Personnel - Faculty - Replacement full-time, tenure-track faculty member in physics. (Active)

Why is this resource required for this action?: To support student needs in physics and related courses (astronomy, natural science, and physical science), the physics department needs at least two full-time faculty. Current course offerings provide load (plus overload) for two full-time physics faculty, plus courses for one or more adjunct faculty. Having two full-time physics faculty allows us to continue offering the expanded course offerings in the two majors physics sequences (20/21 and 55/56/57) that has increased enrollments and facilitated improved student scheduling and degree completion. The physics sequences are needed for ASTs in biology, mathematics, chemistry, computer science, engineering, and physics.

The CCC Chancellor's Office is working with the University of California system in developing a UC Guaranteed Transfer Pathway for Physics. The draft template closely matches our current offerings, so this may become an attractive incentive for increasing numbers of transfer students. This will likely increase demand for our courses and the physics major.

The position being requested is for replacement for a faculty member who has indicated they will be retiring at the end of the spring 2021 semester. That faculty member was hired in 1989 as a replacement for a retirement at that time. We are requesting the replacement position to support students by continuing to cover physics program offerings.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 100000

Link Actions to District Objectives

District Objectives: 2018-2021

District Objective 1.1 - The District will increase FTES by 1.75% over the three years

District Objective 2.1 - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years

Action: (Completed 2020-2021) Enhancing student learning through real time data acquisition and analysis experience.

Purchase 8 PASCO Air Links to be able to interface existing equipment to computers in the physics laboratory.

Leave Blank:

Implementation Timeline: 2020 - 2021

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Identify related course/program outcomes: This equipment supports the laboratory-components in the following courses:

Physics 55

Physics 57

This equipment supports the following program-level outcomes:

1. Physics Problems: Students will develop the ability to identify, formulate, and solve physics problems.
2. Experiment Design: Students will develop the ability to design and conduct experiments, as well as to analyze and interpret experimental data.
3. Critical Thinking: Students will develop the ability to use critical thinking in problem solving.

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By using up-to-date equipment and making the labs more relevant and interesting, student enrollment, success and transfer will be positively impacted. These effects would support the following District Objectives:

District Objective 1.1 The District will increase FTES by 1.75% over the three years.

District Objective 2.1 Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years.

District Objective 2.2 Increase the number of students who transfer to a four-year institution by 10 percent over three years.

Person(s) Responsible (Name and Position): Quinn MacPherson (Physics Faculty), Larry Owens (Physics Faculty)

Rationale (With supporting data): We currently have a set of 8 multi-use PASCO rotary motion sensors as well as a set of eight PASCO PASport light sensors that can be used to take real time data for multiple labs for the PHYS 055 and PHYS 057 courses. However, these existing sensors need to be connected to computers (such as the laboratory laptops that we already have) so that the data can be recorded. Recording the data allows students to plot the results of their experiments in real time as well as export the data in an Excel file so that the students can further analyze the data. The PASCO air-links connect the sensors to the computers. We currently have a single PASCO Universal Interface which allows up to 4 four sensors to be connected to a single computer. This existing interface works for teacher demos but – because there is only one interface – is not amenable to allowing each student (or each lab group once COVID is over) to take their own data. As we have 8 lab benches, we are requesting a total of 8 PASCO Air links. Note that many of the labs for PHYS 57 require both the rotary motion sensor and light sensor in tandem, so two PASCO airlinks are needed for each computer. However, there are currently only 4 of these setups (less the two airlinks needed to connect the two sensors) so a total of 8 airlinks are needed to record data from them. At a total of \$600 (including tax and shipping), this option is considerably cheaper than purchasing 4 universal interfaces which are \$499 apiece. As electronic equipment, these airlinks are expected to continue working with our existing equipment and other sensors that we may acquire for many years to come.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Equipment - Instructional - Purchase 8 PASCO Air Links to make use of equipment we already have. Without a these computer interfaces, existing equipment is going unused. (Active)

Why is this resource required for this action?: We currently have a set of 8 multi-use PASCO rotary motion sensors as well as a set of eight PASCO PASport light sensors that can be used to take real time data for multiple labs for the PHYS 055 and PHYS 057 courses. However, these existing sensors need to be connected to computers (such as the laboratory laptops that we already have) so that the data can be recorded. Recording the data allows students to plot the results of their experiments in real time as well as export the data in an Excel file so that the students can further analyze the data. The PASCO air-links connect the sensors to the computers. We currently have a single PASCO Universal Interface which allows up to 4 four sensors to be connected to a single computer. This existing interface works for teacher demos but – because there is only one interface – is not amenable to allowing each student (or each lab group once COVID is over) to take their own data. As we have 8 lab benches, we are requesting a total of 8 PASCO Air links. Note that many of the labs for PHYS 57 require both the rotary motion sensor and light sensor in tandem, so two PASCO airlinks are needed for each computer. However, there are currently only 4 of these setups (less the two airlinks needed to connect the two sensors) so a total of 8 airlinks are needed to record data from them. At a total of \$600 (including tax and shipping), this option is considerably cheaper than purchasing 4 universal interfaces which are \$499 apiece. As electronic equipment, these airlinks are expected to continue working with our existing equipment and other sensors that we may acquire for many years to come.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 600

Related Documents:

[PASCO AirLink Description and Price Quote.pdf](#)

Link Actions to District Objectives

District Objectives: 2018-2021

District Objective 1.1 - The District will increase FTES by 1.75% over the three years

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District Objective 2.1 - Increase the percentage of students who earn an associate degree or certificate (CTE and Non-CTE) by 5 percentage points over three years

District Objective 2.2 - Increase the number of students who transfer to a four-year institution by 10 percent over three years