

Comprehensive Program Review Report



Program Review - Biology

Program Summary

2023-2024

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What are the strengths of your area?: The Biology Department has three categories of course offerings: (1) Majors Courses (2) General Education Courses and (3) Allied Health Courses. This program review will address the academic quality, success, and assessment of these categories independently and summarize workload and internal and external relationships for the entire department.

Academic Quality and Success:

(1) Majors Courses

Considering the last three years of data, the success rates for Biology Majors course BIOL 1 during the fall semesters from 2020 to 2022 were 95.0%, 70.7%, and 60.9% respectively. Spring semester success rates were 66.7%, 56.3%, and 69.2% for the same academic years. Combined success rates for fall and spring were 77.1%, 64.2%, and 65.3% for the same three academic years. The success rates for BIOL 2 went from 79.5% in the spring of 2021, to 68.3% in the spring of 2022, and then to 74.4% in the spring of 2023. Dis-aggregated data for BIOL 1 indicate the multi-year success rate of ethnic groups were not dramatically different compared to the average. Including both fall and spring semesters together, only Hispanic and White groups were represented in the data. Success rates for 2020 to 2022 academic years were 76.1% for Hispanic and 68.0% for White (vs. 77.1% overall), 58.4% for Hispanic and 81.3% for White (vs. 64.2% overall), and 66.2% for Hispanic and 59.1% for White (vs. 65.3% overall) respectively. Variation around the averages seem to reflect small sample sizes in all three years for non-Hispanic individuals. Looking at combined fall and spring semesters for each of the 2020 to 2022 academic years, there was a minimal gender difference compared to the average success rates, with males vs. female values being 71.7% vs 81.0% (77.1% overall), 61.5% vs 65.2% (64.2% overall), and 68.9% vs. 62.3% (65.3% overall) respectively. Dis-aggregated data for BIOL 2 indicates that multi-year success rates were 75% for Hispanics with all other groups being too underrepresented to return statistical results. Female and male students in Biol 2 had very similar success rates of 74.7 and 73.7% respectively.

BIOL 1 FTES went from 38.7 in 2020-2021, to 32.4 in 2021-2022, and 29.7 in 2022-2023. FTES were especially high in 2020-2021, when COVID19 restrictions forced additional sections of BIOL 1 to be created due to the decreased number of students allowed in classrooms. Since then, FTES have remained steady over the past two academic years. BIOL 2 FTES went from 12.6 in 2020-2021, to 12.3 in 2021-2022, and 12.30 in 2022-2023. Overall enrollment in BIOL 2 has been maintained at a relatively high level over a five-year period, compared to 2015-16 when FTES was 8.4. BIOL 2 is being offered for the first time during a spring semester in 2023. It is expected this will increase FTES of BIOL 2 since some students eligible to take BIOL 2 were taking it at other institutions so they did not have to wait a semester to take it at COS. These courses both have 3 hours of lecture and 6 hours of lab per week. These courses represent a significant proportion of the workload of the faculty that teach them (84% of a full-time load). This large load necessitates a reduction in the other courses that these instructors teach. As a result, we continue to see a reduction in some of the general education course sections (BIOL 21 and BIOL 22) and BIOL 40 when those instructors teach the majors. The BIOL 40 reduction will be addressed with a future tenure-track hire at the Tulare campus, which will also allow the Tulare campus to offer all three allied health courses.

(2) General Education Courses

BIOL 20 (Frontiers in Biology) success rates over the last three years are 86% in 2020-2021, 75% in 2021-2022, and 78% in 2022-2023. The 2022-2023 success rate shows a 3% increase from the 2021-2022 rate. This rate brings BIOL 20 back to the levels historically seen for this course (77% in 2017-2018 and 79% in 2018-2019). The higher success rates recorded in 2019-2020 (81%) and 2020-2021 (86%) were anomalous, caused by the college moving to remote learning. The BIOL 20 success rate continues to exceed the departmental rate (71.8%). BIOL 20 had lower FTES in 2022-2023 (155.0) compared to the two previous years--162.60 in 2020-2021, and 163.80 in 2021-2022. This decrease could be due to the elimination of fully online sections of BIOL 20 beginning in Spring 2023. Online versions of BIOL 20 can bring in students from outside the area and more students can be accommodated per section.

BIOL 21 (Plant Biology) success rates excluding EW were 83.8% in 2020-2021, and 62.5% in 2021-22, and 72.7% for 2022-23. Biology 21 FTES was 16 in 2020-2021, 14.5 in 2021-22, and 15.3 in 2022-23. For 2020-2021, 8.2 of the FTES were online. No online courses were offered since the in-person lab requirement returned in the Fall semester of 2021.

BIOL 22 (Animal Biology) success rates went from 78.4% in 2020-2021, to 67.5% in 2021-2022, then to 62.2% in 2022-2023. The success rates are highest in 2020-2021 due to online courses (they tend to be less rigorous). When COS returned to in person classes the success rate dropped. 2022-2023 had the lowest success rate due to having the lowest number of students due to less sections being offered. This fall more sections have been added, this will hopefully increase the success rate due to increases sample size. BIOL 22 FTES were 22.3 in 2020-2021 and decreased to 14.0 in 2021-2022, and then dropped slightly in 2022-2023 to 13.7. The large FTES number in 2020-2021 is due to the addition of online courses caused by the pandemic. No online courses were offered in 2022-2023 since the in-person lab requirement returned when not in emergency authorization due to COVID.

BIOL 25 (Human Ecology) success ranged from 74% and 60% during the 2020-21 fall and spring terms respectively. Success rates were 44% during both the fall and spring terms of the 2021-2022 academic year. Success rates were 31% and 65% during the fall and spring terms of the 2022-2023 academic year. The FTES in BIOL 25 went from 7.9 in 2020-21, to 5.8 in 2021-2022, and then 6.1 in 2022-2023. This course has three hours of lecture per week and no lab component other than one fieldtrip.

(3) Allied Health Courses

Our FTES in BIOL 30 went from 154.2 in 2020-2021, dropped to 130.6. in 2021-2022, and increased to 141.3 in 2022-23. The FTES for BIOL 31 went from 85.2 in 2020-2021, dropped to 75.8 in 2021-2022, and increased to 89.9 in 2022-23. Biology 40 FTES was 70.87 in 2020-2021, dropped to 56.20, and then increased to 82.3 in 2022-23. The enrollment levels of 2020-2021 can be attributed to more students attempting the classes online; many instructors were able to accept more students online because they were not restricted by the physical capacity of the laboratories. When we returned to face-to-face courses in 2021, we had to reduce class size due to social-distancing practices which limited lecture and lab capacity. For the academic year 2022-23 instructors accepted additional students from their waitlists and enrollment was returned, and slightly exceeded, pre-pandemic levels; FTES for allied health course in 2022-23 was 313.5 (it was 303.7 for the 2018-19 academic year).

The success rate for BIOL 030 (Human Anatomy) dropped from 83.8% in 2020-2021 to 61.9% in 2021-2022 then to 60.2% in 2022-2023. Historically, success in this course is below the overall success rate at COS and the division, and is often the lowest of the Biology courses. Although the success in BIOL 30 in 2020-2021 was exciting, it was most likely skewed by the excused withdrawal (EW). In 2020-2021, 23% of all students enrolled in BIOL 30 opted for the EW over an earned grade, presumably because they were doing poorly in the class. Since EW grades are excluded from success rates, the success rate data is confounded by the EW effect. When the EW is included the success rate for 2020-2021 drops from an 83.8% to 64.4%. When success rates are compared across instructional method, the face-to-face multi-year success was 68.2%, online was 75.1% (represented by 2020-2021 and 2021-2022), and hybrid was 58.8% (represented by 2021-22 and 2022-2023).

Now that the EW is only granted with proper verification, the success rate in BIOL 30 decreased to what it has been historically. There are several thoughts as to why BIOL 30 success rates are relatively low. There are no prerequisites for BIOL 30 and this course is a prerequisite to enroll in BIOL 31, Human Physiology. Therefore, any student with any of a huge array of backgrounds can enroll. Not all incoming students to BIOL 30 are truly committed to the rigors of becoming a health care professional. This is not necessarily because of poor instruction or quality of students, but may simply be that the students are not prepared for the rigors of a fast-paced science course which assumes that students know how to effectively absorb highly technical and detailed information and incorporate it into a larger framework. We must maintain continuous improvement by attempting to understand better the reasons why students drop BIOL 30 and the causes of remaining students receiving non-passing grades, and correct those over which we have control. It should be noted that the students who do succeed in completing the allied health prerequisite courses (BIOL 30, 31, and 40) are finding success in the Nursing Program and the Physical Therapy Assistant

Program. Additionally, the relatively high success rates we have in BIOL 31 and BIOL 40 may be facilitated by the grade outcomes of BIOL 30. Students who perform well in BIOL 30 have practiced valuable study techniques and time management skills, and are prone to dedicate more time to studying effectively when enrolled in the more difficult BIOL 31 and BIOL 40 courses.

Biology 31, Human Physiology, is another prerequisite for allied health programs. The success rates including EW for BIOL 31 for the last three academic years have been 67% for 2020-2021, 72% in 2021-22, and 78.4% in 2022-23. This trend is exciting and suggests that our students becoming more dedicated and being proactive in their return to classes. The success in 2022-23 is 2% higher than what we measured pre-pandemic (2018-2019). We are no longer offering Bio 31 as an online course due to the in-person lab requirement, but we are offering a hybrid course option. When we look at success based on Instruction Method, face-to-face success was 68%, 72.9% and 82.6% for 2020-21, 2021-22, and 2022-23, respectively. Entirely online was 66.4% for 2020-2021. The hybrid instruction method success was 68.1% in 2021-22 and 68.2% in 2022-23.

The success rates for BIOL 40 went from 80.5% in 2020-2021, to 72.9% in 2021-2022, and 73.9% in 2022-2023. Due to the increase of EW grades awarded during the 2020-2021 semesters (101) the success rate of Bio 40 did show an inflated percentage when compared to the following and previous years. The 2018-2019 success rates are 77.0%, showing that our current success rates are returning back to pre-pandemic numbers. This course was only offered as an online or hybrid option in 2020-2021 due to the pandemic. When success rates are broken down for the year based on Instruction Method, face-to-face success rate was 89.4%, online was 69.2%, and hybrid was 69%. We are no longer offering BIOL 40 as a hybrid or online course.

A new course was approved and offered in Spring 2023 called BIOL 231: A Science Primer for Pre-Healthcare Students. This 10 week course is focused on providing underprepared pre-healthcare students (e.g., pre-nursing, pre-medicine, pre-physical therapy, etc.) an opportunity to gain knowledge and experience related to the science pre-requisites for healthcare programs (BIOL 030, 031, and 040) in a low-stakes, less high-pressure environment. Its target audience includes COS students who have dropped or not succeeded at one or more of the pre-healthcare science courses, students preparing to take those courses for the first time, and high school students who wish to pursue a healthcare career. The course's focus is on learning and promoting curiosity/exploration of these topics, rather than mastery of the covered topics. The course is positioned as an equity tool to help students that do not feel ready for the rigors of the intense pre-healthcare science courses to become better prepared and to feel more confident. This course is a 2 credit, non-transferrable, optional elective course. Currently, the Biology Department plans to offer this course each semester of the academic year.

Workload:

The Biology Department's productivity was 19.2 in 2020-2021, fell to 16.8, and increased to 17.8 in 2022-2023; the departmental FTES was 551.6 in 2020-2021, fell to 494 in 2021-2022, and increased to 517.4 in 2022-23. This decrease in productivity can be explained by the transition from online courses to face-to-face where class capacities and social distancing rules prevented instructors from accepting additional students. The reduction in FTES is a trend that our College and most Colleges experienced. Current FTES for science is at or exceeding pre-pandemic data (503.4 in 2018-2019).

Regarding seats filled at census, our division is doing exceptionally well; 112%, 97%, and 101%, respectively for 2020-21, 2021-22, and 2022-23. The 112% in 2020-21 was possible due to our courses being online where space restrictions were eliminated. The 101% this past academic year indicates the demand for our classes is robust. We expect this number to increase this upcoming academic year as many faculty members included students from their waitlists into their courses.

The FTEF (full time equivalent faculty) has increased over the past three years. It was 69% in 2020-21, 77% in 2021-22, and 81% in 2022-23. We have successfully recruited, hired and retained faculty members who teach our majors, non-majors, and allied-health courses.

The allied health courses have the highest productivity in the department. In 2022-23, BIOL 31 has a FTES/FTEF ratio of 21.6, BIOL 30 has 21.6, and BIOL 40 has 17.8. These courses also provide the majority of the FTES for the department, 283.7 FTES in 2022-23. Success in the division over the past three year period with the EW included went from 64.6% 2020-21, to 60.6% in 2021-2022, to 59.1% in 2022-2023. Our department's success rates align with what they have been historically.

The Majors biology courses have maintained enrollment over the past three years. In 2021-21 these courses were still being taught as hybrid options so FTES was slightly higher at 51.3 for the majors. In 21-22 the majors had 44.7 FTES and in 22-23 there were 42 FTES. These courses have a significant number of contact hours per week (3 hours of lecture and 6 hours of lab). In order to maintain our productivity, these courses are taught with a single lecture and a double lab. Therefore, the instructor for these courses teach 3 hours of lecture and 12 hours of lab per week for the major courses. This greatly affects the load of the

faculty that teach these courses; it affects the lab room utilization, and it affects the lab preparation requirements. We feel the demand for the major courses is solid. These courses have the highest Tenure FTE ratio in the division at 100%.

BIOL 20 FTES accounts for the largest portion of our department's FTES: 162.6 in 2020-2021, 163.8 in 2021-22, and 155.0 in 2022-23. Several BIOL 20 sections are taught by adjunct faculty and the course is offered face-to-face, hybrid and online. The face-to-face FTE increased from 66.4 to 118.5 over the past two academic years. Online and hybrid FTE decreased in both categories over the past two years; hybrid FTES decreased from 26.6 to 11.4, and online decreased from 82.6 to 45.2. The face-to-face Bio 20 has the lowest Tenure FTE ratio in the division at 49.3% averaged over three academic years.

The demand for the Biology classes is continuing. Our FTES in 2022-23 was 567.4, this was an increase of 30.8 between 2021-22 and 2022-23. Data collected during this time period demonstrates that the Biology department has a Fill-Rate consistently over 100%. This indicates that even while we are increasing the number of courses offered, faculty are continuing to accept additional students into their classes. Since we are increasing course offerings and filling class sections beyond the cap, this demonstrates a continuing unmet demand for biology courses.

Internal Relationships:

The Biology Department interacts with internal support services including the MESA program and the Student Success Center on the Hanford and Visalia campuses, which provides tutors, models, workshops, microscope slides and study areas for Biology students. The STEAgM program was introduced on the Tulare campus in 2022 to meet the needs of STEM and AG students and help qualifying students transition into the full MESA program during the latter part of their degree program. Historically the department has benefited from grants which provide the department with resources including funding for our supplemental instruction leaders (SI). Faculty volunteer time to mentor and supervise the SI leaders and tutors supporting their discipline.

Faculty also volunteer their time to advise and support science/biology related student clubs including SETA and the Alliance of Biological and Chemical Sciences (ABCS). In 2019-20, members of the biology and chemistry departments formed the Alliance of Biological and Chemical Sciences. This club helps students realize the intimate connection between biology and chemistry, expands on COS' course offerings through a mixture of activities including educational talks by COS faculty, special guest speaker talks, hands-on laboratory experiments, community service activities, and social activities. ABC meets every other Friday from 12:00pm to 1:00 pm, averages about 20 attendants for each meeting. The students conduct experiments relating to their interests, such as recreating the chemistry of Mono Lake to make tufas and extracting DNA from strawberries. In the spring of 2023, the club collaborated with SHPE on a two-day trip to San Francisco to tour UC Berkeley and tour a local aquarium. In the fall of 2023, the club, held a biology and chemistry Jeopardy gameshow, held a biology-themed movie night, will hold a titration-based competition, and host a volunteer day at Kaweah Oaks Preserve. The ABCS club has also been working in close collaboration to provide students mentorship, career, and research opportunities.

In Spring of 2023, a new student science-focused club was formed called the Pre-Healthcare Student Association (PHSA). This club focuses on providing students wishing to, or interested in pursuing healthcare careers with a community to be part of, and opportunities for professional development. At the time of writing, the club has ca. 50 members with an average meeting attendance of about 25 students. The club has partnered with the COS Nursing Program and the UCSF-Fresno State "MedPathway" program which helps provide club members with opportunities to shadow or meet with medical professionals as well as gain both classroom and hands-on experiences related to healthcare. Some current activities planned for the club include CPR certification, hands-on training in the COS nursing practical skills lab (e.g., vital sign taking, assessing breathing sounds, physical assessment of adults and pediatrics). The club also hosts social and fun activities like movie nights, medical-themed gameshow events, and mixers where both students and healthcare professionals are invited to socialize and network. The club has two faculty advisors, Tess Hernandez and Dr. Josh Puhl.

In 2022, MESA received full funding from the State of California. MESA has used this funding to expand into JM 115 to provide additional study space and tutoring for STEM students. The tutoring program has also been expanded to facilitate more one-on-one interaction between students and tutors. Faculty have also been hired to conduct Academic Excellence Workshops to provide additional educational support outside of lecture times for historically challenging STEM topics in their courses. Three part-time academic coaches were also hired to provide wraparound holistic student-centered support. Academic coaches have certifications in at risk mental health and in coaching skills for leaders and managers. MESA funding was also used to fund a fulltime MESA director. This position oversees the daily operations of the MESA center, provides a point person for STEM opportunities such as internships, coordinates outreach events, plans fieldtrip, and supports faculty through student development. MESA has been able to expand the number and breadth of workshops offered to students. Workshops have included soft skills, scholarship applications, internship applications, and transfer preparations. MESA has focused more on

transfer and career exposure by touring over 9 campuses and multiple local research labs, attending 2 MESA conferences, and the UC Davis Pre-Health conference. Within this initiative they have also heavily promoted and supported students in pursuing Undergraduate Research/Clinical Experiences over the summer, since this initiative they have sent students to Auburn University, UC San Diego, UC Los Angeles, UC San Francisco (Fresno), and CalTech.

MESA is continuing to work on offering an orientation held right after the start of the Fall semester will help establish rapport among students and between students and faculty, integrate new students into the rich STEM community (and thus helping sustain the community), and provide students with information to help them begin their COS journey well-informed and feeling confident to rise to the challenges of college life. MESA discontinued the lab experience component; however, Friday Night Labs will be going under the MESA director duties which will provide lab experience for STEM students.

In the summer of 2024, MESA plans to bring back the Math, Chem, and Physics Jams. This is a summer 'bootcamp' program to help students prepare for the rigors of college level courses. The program will have a community building component and work on helping students develop foundational skills to support their success in STEM subjects that historically have lower success rates.

External Relationships:

The Biology Department has facilitated several external relationships. COS science classes such as BIOL 2 and BIOL 25 use the Kaweah Oaks Preserve for educational purposes. Additionally, COS students use the greenhouse for botany related activities. A greenhouse experiment has been added as part of the BIOL 2 curriculum. Efforts are being made to develop a working collaboration with the educational outreach leaders at Sequoia National Park and Wind Wolves Nature preserve. A fieldtrip to these locations is currently being planned for BIOL 2.

MESA has been extremely active in developing external connections in and out of the Central Valley. Within the Central Valley, MESA has developed a collaboration with Fresno State's Center for Access to Science for All (CASA) to aid in facilitating transfer and research exposure and opportunities. They have also developed a collaboration with the Fresno State MESA Prep Program to connect to local high schools and increase recruitment of STEM students at COS. In Fall of 2022, MESA was invited by UC San Francisco to develop the San Joaquin Valley MedBridge Program. This program is the first of its kind in the San Joaquin Valley to bridge community college students to medical school. The program focuses on "connecting students to resources, avenues, and mentors that will help them reach their goals and further explore the world of medicine." As part of the MedBridge program, COS has developed the Pre-Healthcare Student Association to feed into the SJV-MedBridge program and bring additional support and opportunities to COS students. This association provides transfer support, hands on opportunities in a clinical-like setting, and healthcare related certifications for students at the community college level. MESA has also been active in working with local nonprofits such as Tulare County Office of Education – Future Student Ready/Education Resource Services and American Chemical Society Fresno Chapter, for student leadership opportunities while conducting outreach to local middle schools and high schools. MESA also has developed industry collaborations with Kaweah Health, APPL Labs, Golden Pacific Labs, and Microsoft to provide career exposure to STEM students at COS. Outside of the Central Valley, the MESA director recently submitted a grant with UC Santa Cruz and UC Riverside to provide equitable high caliber research opportunities for COS STEM students.

Wayne Preston, a former anatomy and physiology professor, partnered with the COS Foundation to establish an endowment which will provide two Biology student scholarships (\$500/each). Heather Moore and Jesse Wilcoxson worked together to identify the scholarship recipients for the 2022-2023 academic year. In addition to the scholarships, Mr. Preston also provided a small fund to help assist with the costs of anatomy and physiology instruction.

What improvements are needed?: The Biology Department must be able to grow our course offerings while maintaining the consistency and rigor of the curriculum. The coordination of offerings, along with coordination of course materials at the different campuses, needs to be a priority.

The science division has two full-time faculty members on our Hanford campus. We are currently offering all three nursing/allied health prerequisites on this campus, in addition to providing other science offerings for the general education pattern. FTES had increased to 107 in 2019-2020 when the majority of our courses were taught online and we were not limited by spatial constraints. It dropped to 62 in 2020-2021, grew to 74.2 in 2021-22, and then grew again to 96.5 in 2022-23. This growth is most likely due to students wanting to return to face-to-face classes and the removal of the social distancing requirements that limited course capacity. For this current academic year, Bio 30, 31, and 40 were waitlisted and many of the waitlisted students were able to enroll. Overall the growth in FTES and total offerings in Hanford is beneficial, but it has also introduced some unforeseen growing pains. We have inadequate lab space and storage, and have only part-time tech support. The Hanford campus has expansion plans in the near future, specifically more infrastructure including additional science classrooms by 2026.

As science classrooms and labs are added, we will need more technical support and additional storage.

In Tulare our FTES was 40.7 in 202-2021, grew to 69.4 in 2021-22, and grew again to 71.3 in 2022-23. Starting in the Spring of 2022 we began offering two of the three nursing/allied health prerequisites on this campus, in addition to providing other science offerings for the general education pattern.

The laboratory space is very limited on the Hanford campus because all laboratory courses for all divisions of the College share the same classroom which prevents these courses from overlapping on the schedule. This includes courses that would draw very different students and not create student course conflicts. On the Visalia and Tulare campuses, Biology 20, the non-major general education science, and the nursing/allied-health science classes can be taught at the same time. In Biology, we assess our students using applied laboratory exams (identification of microscopic/macrosopic samples, gross anatomical structures, etc). Since these exams require microscopes, models, and/or specimens, they require a significant amount of time to set up and clean up between classes. This creates scheduling conflicts and prevents back-to-back course offerings, and ultimately decreases efficiency and greatly limits which courses can be offered and the times we can offer them. In the future, the lack of available laboratory space would prevent science, and other divisions who utilize the laboratory classroom, from offering additional sections during normal business hours. It is our division's hope that as additional classroom and laboratory space is provided on the Hanford campus that our division membership can be part of the planning to ensure that the space is properly equipped.

Recently the California Community Colleges Board of Governors passed a resolution to build the efforts of the Zero Textbook Cost Program to ensure sustainable no-cost or low-cost textbook solutions for every California community college student. However, the current OER options for Human Anatomy and Human Physiology are not considered well organized, clear or rigorous enough by our faculty to be used alone. As of now, all of our Human Anatomy and Human Physiology professors at least supplement the OER with another textbook or courseware. As such, we are prevented from offering a zero-textbook option. Having a class set of textbooks to provide to our students at zero cost would remedy this situation. The textbook used by Human Physiology costs each student \$113.25. The Human Anatomy textbook costs each student \$355.50 to buy new from the bookstore.

Describe any external opportunities or challenges.: The most significant external challenge to our division has been COVID-19. In March of 2020, the pandemic caused our on-campus activities to immediately cease and we quickly moved all of our courses online. The academic years immediately following 2020 can be described as a slow but progressive transition back to primarily face-to-face courses within the Biology division. There is no doubt that the changes in modality brought about challenges to our faculty's pedagogy. Maintaining rigor and fairness within online assessments, covering the course material with proper breadth and depth as modalities changed, ensuring students are engaged and interacting (even if they are not physically in the classroom) and many more concerns were balanced by our faculty.

The past few academic years were an arduous time for educators, but for many of our students the struggles became more significant. Students are returning back to face-to-face classes and in many ways it feels like we have achieved a new normalcy that resembles pre-pandemic education; but, the students have all been changed by their experiences during the pandemic. Many were in high school, and not only were they affected by learning loss but they were isolated from social interaction during formative years and missed out on societal norm experiences (sports participation, prom, graduation). Some students and their families were affected economically. Others were affected by the loss of a loved one to COVID. Some students have shared these struggles openly while others have probably become more introverted as a result. Some generalizations I have noticed is that students seem more afraid to fail so they seem more afraid to try or commit; it is taking some students longer to engage in conversation with their peers before/after class or in the laboratory; and, many expect to learn passively (they want to watch videos or read something where the answers are clearly included) rather than critically think.

Another clear area where students are struggling is with mental health. Awareness of the importance of mental health has increased on our campuses but so has the need for services. The demand for these services is outpacing the District's resources. Students in Hanford have face-to-face access to a mental health counselor only once a week. Students in Visalia are waiting weeks for face-to-face appointments with providers. The District is being proactive by providing online screening, peer support and SilverCloud. Telehealth and online options work well for some students, but for others, they would benefit most from a face-to-face conversation with a provider sooner, rather than later.

Overall SLO Achievement: In the Fall semester of 2022, we assessed the majority of our biology offerings (BIOL 40, BIOL 31, BIOL 22, BIOL 25, BIOL 02). All of these SLO's made great progress as the majority of them were evaluated at or above their goals.

The BIOL 01, BIOL 30, and BIOL 20 Student Learning Outcomes will be assessed in Fall 2023. Overall, the results for the 2022-2023 academic year were meaningful and we will continue to develop new assessments and reconfigure our pedagogical approaches to improve student success.

Changes Based on SLO Achievement: No changes are recommended. Our immediate work will focus on developing accurate assessments that can be completed in the 2022-2023 academic year.

Overall PLO Achievement: During the 2022-2023 academic year the biology department assessed the Biology AS-T. The results from the biology courses were near or above the goal levels for the course. However, Biology 01 had significantly less data due to the fact that the primary instructor retired a semester before it was reviewed and the data sets from his classes were never able to be obtained. Biology 01 was still evaluated with the data obtained by the current instructors.

Changes Based on PLO Achievement: Biology is on-track with our SLO assessment cycle and our PLO is progressing. However, to ensure no further loss of data during PLO assessment a Biology AS-T committee was formed in the biology department made up of the current instructors for BIOL 01 and BIOL 02. This committee will collect the data for the PLO assessment and store it until the next cycle for Biology AS-T PLO assessment is required. We have no plans to change the cycle at this time

Outcome cycle evaluation: The three-year evaluation cycle for the Biology Department appears to be effective. No changes to the cycle are being contemplated.

Action: 2023-2024 Expand course offerings at Tulare campus (TCC)

Hire a full-time faculty member to teach BIOL 40 and BIOL 20 at TCC.

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Implementation Timeline: 2023 - 2024

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Identify related course/program outcomes: SLO in BIOL 40 and BIOL 20

District Objectives:

Goal 1: increase enrollment relative to workforce development needs

Goal 2: improve rate at which students complete degrees

Goal 3: tailor and implement programs to match the demands of ongoing changes in workforce development

Person(s) Responsible (Name and Position): Linda Flora, faculty; Francisco Banuelos, Dean; Louann Waldner, TCC Provost, and Jonna Schengel, Dean of Career Technical Education, Nursing and Allied Health

Rationale (With supporting data): To provide equity across campuses for allied health students, Microbiology (BIOL 40) should be offered on the Tulare campus(TCC). Microbiology is a required course for students wishing to apply to the COS Registered Nursing program. The addition of a second full-time faculty position at TCC will provide an opportunity to increase the Anatomy and Physiology sections offered. These increased resources are strongly supported by California's K-16 Education Collaboratives Grant Program, specifically by the Strong Workforce 7 initiative that is dedicated to producing more local nurses in Tulare County. To this end, COS CTE has partnered with Tulare, Visalia, and Lindsay School Districts, CSU Fresno, and several southern valley medical facilities to create the PRE Nursing Pathway project. The objective is to create a healthcare pathway for Tulare County high school students. Students chosen for the program will begin their preparatory coursework during their senior year of high school and continue into cohort groups sponsored at the Tulare campus. It is therefore vital to increase the availability of Anatomy, Physiology, and Microbiology courses to provide adequate opportunities for students in this program as well as students whose primary campus is TCC.

This action was first proposed in the 2022-2023 program review to be implemented in 2023-2024. However, this position was not funded. We are putting this request forward again as the need for BIOL 40 at TCC has only increased. During the 2023-2024 academic year, faculty, staff, and the TCC Provost have worked hard procure several pieces of microbiology-specific equipment. We have rearranged the science prep areas, as well as the lab room in order to provide space for microbiology lab equipment and the additional materials required for BIOL 40 lab sessions.

Further, the TCC 2024-2025 room/course offering schedules have been redesigned to incorporate the newly added courses. The need to accommodate additional lab sessions in the single biology lab room required many changes to the previous schedules. The alterations will maximize the use of the TCC biology lab room while still providing adequate preparation time between lab sessions.

Further startup costs can be partially or fully funded by the above-mentioned COS partner programs. Plus there are additional monies available for program support staff and/or education supplies.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Program Review - Biology

Update on Action

Updates

Update Year: 2023 - 2024

09/15/2023

Status: Continue Action Next Year

This action is continued because the position was not funded last year. The need to add a second FT faculty position on the Tulare campus remains a high priority for the Biology Dept.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Personnel - Faculty - Full-time biology faculty for the Tulare Campus. (Active)

Why is this resource required for this action?: Payroll costs (Salary and Benefits)

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 125000

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

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: 2023-2024 Increase budget for biology laboratory supplies at Tulare campus (TCC)

Necessary to support increased biology course offerings at TCC from 2018-2023. Also required for the increased costs of supplies in general. This increased budget will also support the added sections of BIOL 30 and BIOL 31 proposed for the 2023-24 academic year.

Leave Blank:

Implementation Timeline: 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in BIOL 20, 22, 30, and 31

District Objectives:

Goal 1: increase enrollment relative to workforce development needs

Goal 2: improve rate at which students complete degrees

Program Review - Biology

Goal 3: tailor and implement programs to match the demands of ongoing changes in workforce development

Person(s) Responsible (Name and Position): Linda Flora, faculty; Francisco Banuelos, Dean; Louann Waldner, TCC Provost, and Jonna Schengel, Dean of Career Technical Education, Nursing and Allied Health

Rationale (With supporting data): To provide equity across campuses for allied health students additional Human Anatomy (BIOL 30) and Human Physiology (BIOL 31) should be offered on the Tulare campus (TCC). BIOL 30 and 31 are the foundational courses for multiple COS Allied Health programs. The addition of a second full-time faculty position at TCC, teaching BIOL 40 and BIOL 20, will allow the single full-time faculty member to offer additional sections of Anatomy and Physiology. These increased resources are strongly supported by California's K-16 Education Collaboratives Grant Program, specifically by the Strong Workforce 7 initiative that is dedicated to producing more local nurses in Tulare County. To this end, COS CTE has partnered with Tulare, Visalia, and Lindsay School Districts, CSU Fresno, and several southern valley medical facilities to create the PRE Nursing Pathway project. The objective is to create a healthcare pathway for Tulare County high school students. Students chosen for the program will begin their preparatory coursework during their senior year of high school and continue into cohort groups sponsored at the Tulare campus. It is therefore vital to increase the availability of Anatomy and Physiology courses to provide adequate opportunities for students in this program as well as students whose primary campus is TCC.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Equipment - Instructional - Increase budget for biology laboratory supplies at Tulare campus (TCC) Required for the increased costs of supplies in general. This increased budget will also support the added sections of BIOL 30 and BIOL 31 proposed for the 2023-24 academic year. (Active)

Why is this resource required for this action?: Necessary to support increased biology course offerings at TCC.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 4000

Link Actions to District Objectives

District Objectives: 2018-2021

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

Action: 2023-2024 Buy access to Mastering A&P with eText for 500 Human Physiology Students

Program Review - Biology

Buy access to Mastering A&P with eText for 500 Human Physiology Students

Leave Blank:

Implementation Timeline: 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: Biol 031

Person(s) Responsible (Name and Position): Courtney Traugh

Rationale (With supporting data): Recently the California Community Colleges Board of Governors passed a resolution to build the efforts of the Zero Textbook Cost Program to ensure sustainable no-cost or low-cost textbook solutions for every California community college student. However, the current OER options for Human Physiology is not considered well organized, clear or rigorous enough by our faculty to be used alone. As of now, all of our Human Physiology professors use a textbook published by Pearson to ensure the class maintains the rigor necessary for our students to meet their goals in the Allied Health field. As such, we are prevented from offering a zero-textbook option. Having the school provide to our students with an eText at zero cost would remedy this situation. The textbook used by Human Physiology costs each student \$113.25. Since knowledge on Human Physiology is rapidly growing, as a department we would like to purchase the students etexts rather than a class set of textbooks which would quickly become outdated.

Priority: Medium

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Technology - Mastering A&P (Active)

Why is this resource required for this action?: This resource is currently being paid for by the student, we want to pay for their access as a department

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 55063.81

Link Actions to District Objectives

District Objectives: 2018-2021

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

Action: 2023-2024 Buy class sets of Human Anatomy textbooks

Program Review - Biology

Buy class sets of Human Anatomy textbooks

Leave Blank:

Implementation Timeline: 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: Biol 030

Person(s) Responsible (Name and Position): Courtney Traugh

Rationale (With supporting data): Recently the California Community Colleges Board of Governors passed a resolution to build the efforts of the Zero Textbook Cost Program to ensure sustainable no-cost or low-cost textbook solutions for every California community college student. However, the current OER options for Human Anatomy is not considered well organized, clear or rigorous enough by our faculty to be used alone. As of now, all of our Human Anatomy professors at least supplement the OER with another textbook or courseware. As such, we are prevented from offering a zero-textbook option. Having a class set of textbooks to provide to our students at zero cost would remedy this situation. The Human Anatomy textbook costs each student \$355.50 to buy new from the bookstore.

Priority: Medium

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Resources Description

Equipment - Instructional - Bio 30 Textbook set (Active)

Why is this resource required for this action?: To pay for a class set of textbooks

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 25059.6

Link Actions to District Objectives

District Objectives: 2018-2021

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

Action: 2022-2023 Expand course offerings on our Visalia campus for allied-health and non-majors biology students

Program Review - Biology

Hire a full-time faculty member to teach BIOL 20 and BIOL 30

Leave Blank:

Implementation Timeline: 2022 - 2023

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in BIOL 20 and BIOL 30

Person(s) Responsible (Name and Position): Heather Moore and Brad Goodbar

Rationale (With supporting data): FTES in BIOL 20 and BIOL 30 are the highest in the division, and both courses are in demand and fill to capacity and beyond each semester. It has become unfeasible to expect adjunct instructors to cover this demand. There are not enough adjunct faculty in our area and historically we have a high turnover rate among our adjunct faculty due to a highly competitive job market; we have lost very capable adjunct instructors to full-time employment opportunities at other Colleges. Current faculty are teaching the maximum number of sections and overfilling sections to meet the demands of the students and College administration.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

09/15/2023

Status: Action Completed

We conducted a search for a new Biology faculty member to teach non-majors Biology and Human Anatomy. The search was successful and Mr. Juan Nunez has joined the full-time, tenure-track Biology faculty. His teaching assignments, currently, are Frontiers in Biology (BIOL 020) and Human Anatomy (BIOL 030).

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Personnel - Faculty - Full-Time Biology Faculty (Active)

Why is this resource required for this action?: The associated payroll costs (salary and benefits) to hiring a new faculty member.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 125000

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year

Program Review - Biology

institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: 2022-2023 Expansion of the MESA program

Build a more comprehensive MESA+ (MESA-plus) program to support incoming and current STEM majors

Leave Blank:

Implementation Timeline: 2022 - 2023

Leave Blank:

Leave Blank:

Identify related course/program outcomes:

Person(s) Responsible (Name and Position): Josh Puhl

Rationale (With supporting data): Recently, a long-standing initiative to provide support to incoming STEM Freshmen students came to an end at COS with the ending of the REALM grant and program. Historically, a grant aimed at supporting incoming Freshmen STEM majors has been in place serving COS students for over 10 years, but due to interruptions in federal funding cycles, funding for such a program has ended abruptly leaving a noticeable gap in support structure for newer STEM majors. On a more positive note, the state of California has established funding for the MESA programs, which is similar to many aspects of the REALM-like programs. We are proposing to harness the advantages of these new funds by proposing improvements to the MESA programs at COS to incorporate some of the features of REALM to expand MESA offerings in an effort to disconnect the beneficial student programs of REALM from funding cycles and, instead, establish a more permanent set of offerings using COS funds (which could be supplemented with grant funding in the future). We propose the current MESA coordinator position be expanded to establish a new full-time classified position to oversee the MESA program as well as to establish a permanent and formal program to support incoming STEM majors in their first year that retains the most important aspects of the REALM program.

The value of the REALM program to student outcomes is tangible in retaining STEM majors and in success within STEM courses. In Cohort 4 of the REALM program (2019-2020 academic year) 36 students were enrolled in the program. Out of these 36 students, 33 were still enrolled at COS a year later (92% retention rate) and 28 remained as STEM majors (78% of original group; 85% of remaining students). The successful outcomes also extend to students transferring to universities. The REALM cohort from 2018-2019 had 38 students, 15 of which transferred and 15 were still enrolled at COS as STEM majors (accounting for 79% of students; as of Fall 2021). REALM students realized better outcomes during summer classes, too. For CHEM 20 the success rate for all students taking the class during the summer terms was 44%, but the success rate among REALM students was 92%. Summer MATH classes saw similar increases in success rates with Math 154 having an overall 47% success rate and 100% of REALM students succeeding. Math 65 has a 42% overall success rate, but again, 100% of REALM students successfully completed the course.

The REALM program consisted of several summer orientation events, requiring students to take two summer courses (a college skills seminar course and a STEM course), a hands-on laboratory experience and several community-building events scheduled through the school year (usually in partnership with MESA). Students were required to join the MESA program and meet regularly with a MESA academic coach throughout their first year. Another part of the program was to provide textbooks for STEM courses during the first year. A final part of the program was for REALM students to have a dedicated counselor, with whom they were required to meet, regularly.

We are proposing to continue some or all of these activities but with modification, lumping all parts into a more comprehensive MESA+ (MESA-plus) program. We intend to continue having a formal program that students join to create collaboration and community-building opportunities, which helps students feel included and to be part of a community from the beginning of their COS journey. The class requirements will remain and are financially self-sufficient through tuition income. A one or two day orientation held right before the start of the Fall semester will help establish rapport among students and between students and

Program Review - Biology

faculty, integrate new students into the rich STEM community (and thus helping sustain the community), and provide students with information to help them begin their COS journey well-informed and feeling confident to rise to the challenges of college life. We propose to keep the MESA membership requirement and to continue requiring incoming STEM majors to regularly meet with their assigned MESA coach. Continued inclusion of a counselor specializing in STEM students is also part of our request. We suggest to eliminate the lab experience as this was one of the most expensive line-items from REALM. Perhaps, these could be brought back after securing extramural funding in the future. We, also, recommend phasing-out the textbook loan program by not purchasing new textbooks, but we should continue loaning any textbooks already owned that are still being used by teachers.

Costs associated with this proposal include supporting a COS classified employee serving as a full-time MESA+ coordinator (\$75k + benefits), an orientation event with food and a few giveaways to students (\$500-\$1000), supporting 50% (or an appropriate percentage based on workload) of a dedicated STEM counselor (\$35k), and four community-building events with food and giveaways (2/semester, \$500 each, \$2000 total). The MESA coaches and tutors are part of the MESA program and already receive funding, so they are not included in this proposal. The part-time MESA coordinator is already partially supported by COS, and we request that some of the additional MESA funding coming from the State be used to expand this position to full time. The dedicated counselor is, also, already partially supported and we request that institutional funds continue to support this important resource for students.

Priority: High

Safety Issue: No

External Mandate: Yes

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

09/08/2023

Status: Action Discontinued

MESA received full funding from the MESA Statewide Program. This made it no longer necessary to pursue a MESA+ program. The MESA program has now been expanded to meet STEM student needs. MESA includes 3 part-time fully funded coaching positions and a fulltime director. MESA has also added additional study space for STEM students, developed additional collaborations and leadership opportunities, and provides a comprehensive set of workshops to prepare students for research, transfer, and clinical opportunities.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Personnel - Classified/Confidential - Classified Employee to Coordinate MESA (Active)

Why is this resource required for this action?: Payroll expenses

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 95000

Adjustment to Base Budget - Increase STEM counseling hours to support at least 10-15 hours per week of STEM counseling. Currently, MESA offers only 5 hours per week in STEM counseling. (Active)

Why is this resource required for this action?: Doubling or tripling the number of hours for a part-time MESA STEM Counselor to 15 hours will help serve over 170 MESA students.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 35000

Link Actions to District Objectives

District Objectives: 2018-2021

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

Program Review - Biology

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: 2022-2023 Improve student laboratory engagement with PCR technology in Hanford

Purchase thermocycler and PCR reagents to update the Hanford campus lab materials.

Leave Blank:

Implementation Timeline: 2022 - 2023

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in BIOL 40

Person(s) Responsible (Name and Position): Erik Arteaga

Rationale (With supporting data): Currently the Hanford campus does not have a thermocycler for PCR experimentation. This will update the Hanford lab materials to match what is offered at the Visalia campus for BIOL 40, thus ensuring student lab experiences in BIOL 40 are equitable across our campuses that offer BIOL 40.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

09/14/2023

Status: Action Completed

We have purchased the required materials to support PCR laboratories at the Hanford campus. The materials were purchased during the summer of 2023, and should be in use by the fall 2023 semester.

Impact on District Objectives/Unit Outcomes (Not Required):

Link Actions to District Objectives

District Objectives: 2018-2021

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

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

Program Review - Biology

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: 2022-2023 Improve student access to environmental laboratory experiences which utilize our greenhouse

Renovate irrigation for green house and expand inventory of equipment and consumables for plant science experimentation

Leave Blank:

Implementation Timeline: 2022 - 2023

Leave Blank:

Leave Blank:

Identify related course/program outcomes: Bio 2 and Bio 21 SLO

Person(s) Responsible (Name and Position): Brad Goodbar and Matthew Waterhouse

Rationale (With supporting data): The environmental laboratory experiences ceased in 2020 due to COVID. It has taken investment, financial and time spent, to reinvigorate our greenhouse and native garden. It is going well but we are still looking to improve our student experience within the environmental labs.

In the last year, we have hired a landscape maintenance company to come in once a week and trim plants, remove weeds and maintain the irrigation system for the native plant garden. By maintaining the garden once a week, we can handle the extremes in temperature that take place throughout the year with regards to water requirements. It also gave us a much better opportunity to make new modifications to the garden by removing dead plant material, making changes in soil structure, and adding new plants.

We also have been able to hire several students throughout the years to clean out the greenhouse of debris and broken materials. The drains on the floor have been cleared and nonessential materials have been removed from the floor. Part of the problem is the excess water built up from the spray water system. This standing water ultimately leads to a buildup of algae on the floors which becomes slippery and adds excess weeds and pests. We are at the point now re-potting many of the plants into larger pots and the acquisition of new plants to replace plants that were lost during the past few years. Ultimately, we would like to make this part of the lab tech position at the Tulare campus.

We are no longer sharing the greenhouse with the Sequoia Riverlands Trust due to their inability to maintain and monitor their half of the greenhouse. We have now doubled our workspace and want to now have the ability for students to develop and run long-term labs within the facility.

In the near future, we would like to hire an irrigation company to redesign and implement a new irrigation system for the greenhouse. This system would be integrated in the current system but would run above the plants on the side tables and down the center. This system would consist of drip extensions that would hang down from the central lines running east/west on the top beams of the greenhouse. A combination of sprayers and misters would also be incorporated into this system. The sprayers would be for smaller, more delicate plants and the misters would increase humidity levels within the greenhouse. The estimated cost of the renovation is \$10,000,

We want to purchase additional equipment and consumables to support experimentation within the Bio 2 course. Students will design and conduct an experiment testing the influence of one abiotic variable on plant growth. This experiment requires that students employ scientific to properly propose a hypothesis, critically think through the variables and design an appropriate experiment, run the experiment, collect data, analyze data, and form meaningful conclusions. The estimated cost of the experimental supplies is \$5,000,

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Program Review - Biology

Update Year: 2023 - 2024

09/08/2023

Status: Action Completed

Last year we hired an irrigation company to redesign and implement a new irrigation system for the greenhouse. This system has been installed and has improved the environmental conditions within the greenhouse. At this point we are making small adjustments with the plants currently in the greenhouse to make sure they are experiencing optimum levels of water, sunlight, and nutrients. Unfortunately, we have lost many plants over the past few years due to inadequate conditions within the greenhouse. Since conditions have improved, we would like to purchase more plants to replace the ones we have lost. These are plants that we will be utilizing in various labs for several of our courses. The estimated cost of the plants is \$1,000.

Consumable materials, such as soil and pots, were purchased to facilitate student led research projects in the greenhouse. During the spring of 2023, BIOL 2 students designed and implemented independent research projects in the greenhouse investigating the impact of various abiotic variables on plant growth. Students also conducted hydroponics experiments which showed the result of nutrient deprivation on plant growth. BIOL 2 Students will be conducting similar experiments during the 2023-2024 academic year.

We are continuing to expand our native plant garden into several landscape areas surrounding the John Muir Science building. To continue this process, we will need to purchase more plants and soil improvement amendments for these areas. We have also added signage to our native plant garden. These signs include a galvanized steel post which contains a placard containing the plant's scientific name and information explaining special features for each plant. Additional signs would need to be purchased for these new areas. We are also interested in purchasing park benches to be placed in and around the native plant garden to enhance the experience for our students. The gardens have attracted a wide range of individuals for a variety of different purposes on campus. The gardens' uses have ranged from subjects for photography students to just providing a quiet place for students and staff to relax during the day. However, the primary purpose of these benches would be to provide areas for students to work during lab experiences involving the greenhouse and native plant garden. The estimated cost of these benches and upgrades would be \$10,000.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Equipment - Instructional - Renovation of green house irrigation system. (Active)

Why is this resource required for this action?: Updating the deteriorated green house irrigation system to maintain the plants, which are used for educational purposes and support the plant biology laboratories.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 6000

Link Actions to District Objectives

District Objectives: 2018-2021

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

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: 2022-2023 Establish a leaf-cutter ant-farm display for STEM student engagement

Purchase ant-farm display to be housed in the John Muir building

Leave Blank:

Program Review - Biology

Implementation Timeline: 2022 - 2023

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in non-majors and majors Biology courses

Person(s) Responsible (Name and Position): Josh Puhl

Rationale (With supporting data): We are requesting support to establish a new educational and community-engagement resource at COS in the form of a live leaf-cutter ant-farm display. This display would be fully enclosed, built and maintained by COS STEM faculty and students, and available for viewing/study by both COS students, staff and faculty as well as the public.

The display would be established in a publicly-accessible area on the Visalia Campus (e.g., hallway in John Muir) and would be totally self-contained to eliminate any individual ants getting out. The ant farm would be used for several purposes including as a teaching tool where students will observe living social insects interacting with each other and their environment. It would also be used by students participating in the Friday Night Lab program and potentially in computer science courses for automated monitoring and tracking of live subjects by machine learning and artificial intelligence computer programs.

The ant farm would serve several different goals/missions of COS. It would provide immediate and ongoing academic and instructional value by making available interactive and hands-on activities useful in Biology courses such as Human Ecology, Animal Biology, and Major's General Biology 2 to teach students about insect structure, animal/fungus symbiosis, social organization among animals and self-contained ecosystems; all critical and contemporary issues of Biology. The farm creates many opportunities for exploring and creating computer vision and automated computer tracking/monitoring systems to observe colony members which could provide exciting and distinctive ideas from which lessons in computer science and computer programming could be developed. The farm also serves as a unique and interesting community-engagement tool. It would be an exhibit to share with members of the COS community as well as the general public and will hopefully become a Visalia Campus landmark and regular stop for campus tours for new students and dignitaries alike to show off COS' STEM programs and accomplishments.

The display will be built and maintained by COS students along with assistance and mentoring by COS faculty and staff. Initially, Drs. Josh Puhl and Matt Waterhouse will take ownership of the display's creation and maintenance. The plan is to assign several interested students to perform the maintenance duties but Drs. Puhl and Waterhouse will provide oversight and supplemental support, as needed. To help reduce risks associated with the project, COS resources will obtain guidance from the curators of a similar display at the California Academy of Sciences museum in San Francisco. We will consult these external mentors prior to construction to ensure containment and safety for all involved.

The project's costs will initially be for construction and will be around \$1000-\$1500 (one-time costs). These funds will be to purchase materials and to acquire some ants to start a colony. Ongoing costs are estimated at \$200-\$500 per year to purchase food, replacement substrates, and to cover any repairs/maintenance of the enclosures as well as to add new sensors and instrumentation (e.g., cameras, additional environmental sensors, etc.). The facility costs will be focused on running several low-power lighting systems, a small air circulation system and, if necessary, a small heater. The Dean over the sciences has expressed a preliminary willingness to help with ongoing costs but is hoping the initial costs, plus the first year or two of maintenance will be funded through above-base funding awards. We will, also request ongoing maintenance funds from the COS Foundation and/or the Friday Night Lab program. Total funds requested here total \$2000.

The ant-farm display we are proposing would be a unique addition to COS STEM offerings for direct and immediate use in the classroom and would provide a truly unique exhibit to share with people across the COS community and general public. We hope the display will show-off the great things happening in the STEM programs at the College all while helping provide educational opportunities to a variety of students across multiple STEM disciplines.

Priority: High

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

09/15/2023

Program Review - Biology

Status: Action Discontinued

Because the ant farm project received low priority by the science faculty and instructional council, this project has been de-prioritized indefinitely. Other funding mechanisms will be explore in the future, however currently, the Biology Faculty has decided to allocate their efforts and plans towards other projects. This project will continue to be discussed as a possibility for the future due to its value in both instruction as well as student and community engagement.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Equipment - Instructional - Purchase ant-farm display to be housed in the John Muir building (Active)

Why is this resource required for this action?: The ant fram display will be used to educate students on their particular ecosystem. It will support learning in and outside of biology labs.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 2000

Link Actions to District Objectives

District Objectives: 2018-2021

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 Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 3.1 - Reduce equity gaps in course success rates across all departments by 40% from 2021-2025.

Action: Improve Stockroom Efficiency

Buy tabletop ice machine for the biology stockroom

Leave Blank:

Implementation Timeline: 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: Biol 01, Biol 02, Biol 40, Biol 31, Biol 20

Person(s) Responsible (Name and Position): Courtney Traugh

Rationale (With supporting data): Many of the lab activities in the biology department require ice. As of now, our laboratory technician has to either run up to our chemistry stock room between classes, which is often a very short period of time filled with other responsibilities, to get ice. Or she is preparing for each lab by making ice in trays which she keeps in buckets in our freezer. This system takes up our limited freezer space. In addition, the type of ice that can be made using trays is not small enough and cannot adequately cool biological samples.

Priority: Medium

Safety Issue: No

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

08/30/2023

Status: Action Completed

Chairs were purchased and divided across the Biology, Chemistry, and Physics departments. Two rooms in Biology JM 120 and

Program Review - Biology

121 were furnished with new chairs as well as two rooms in Chemistry and one room in Physics.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Equipment - Non-Instructional - Ice Machine (Active)

Why is this resource required for this action?: There is no ice machine in the biology stockroom

Notes (optional):

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

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.

Action: 2023-2024 Microbiology lab equipment at Tulare campus (TCC)

BIO 40 Microbiology has never been taught at TCC and therefore the specialized equipment must be purchased and/or obtained.

Leave Blank:

Implementation Timeline: 2022 - 2023, 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in BIOL 40 and BIOL 20

District Objectives:

Goal 1: increase enrollment relative to workforce development needs

Goal 2: improve rate at which students complete degrees

Goal 3: tailor and implement programs to match the demands of ongoing changes in workforce development

Person(s) Responsible (Name and Position): Linda Flora, faculty; Francisco Banuelos, Dean; Louann Waldner, TCC Provost, and Jonna Schengel, Dean of Career Technical Education, Nursing and Allied Health

Rationale (With supporting data): To provide equity across campuses for allied health students, Microbiology (BIOL 40) should be offered on the Tulare campus(TCC). Microbiology is a required course for students wishing to apply to the COS Registered

Program Review - Biology

Nursing program. The addition of a second full-time faculty position at TCC will provide an opportunity to add non-majors courses such as BIOL 20, as well as additional sections of Anatomy and Physiology. These increased resources are strongly supported by California's K-16 Education Collaboratives Grant Program, specifically by the Strong Workforce 7 initiative that is dedicated to producing more local nurses in Tulare County. To this end, COS CTE has partnered with Tulare, Visalia, and Lindsay School Districts, CSU Fresno, and several southern valley medical facilities to create the PRE Nursing Pathway project. The objective is to create a healthcare pathway for Tulare County high school students. Students chosen for the program will begin their preparatory coursework during their senior year of high school and continue into cohort groups sponsored at the Tulare campus. It is therefore vital to increase the availability of Anatomy, Physiology, and Microbiology courses to provide adequate opportunities for students in this program as well as students whose primary campus is TCC.

BIOL 40 startup costs can be partially or fully funded by the above-mentioned programs. Plus there are additional monies available for program support staff/ education supplies

Priority: High

Safety Issue: Yes

External Mandate: No

Safety/Mandate Explanation:

Update on Action	
<i>Updates</i>	
Update Year: 2023 - 2024	09/22/2023
Status: Continue Action Next Year	
Action is continued because the position for a full time faculty member to teach Microbiology was not funded last year.	
Impact on District Objectives/Unit Outcomes (Not Required):	

Resources Description

Equipment - Instructional - Microbiology lab equipment (Active)
Why is this resource required for this action?: Microbiology (BIOL 40) has never been offered in Tulare. Specialized equipment, such as an autoclave and incubators will be needed for labs.
Notes (optional):
Cost of Request (Nothing will be funded over the amount listed.): 50000

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
District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points
District Objectives: 2021-2025
District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.
District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.
District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.
District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10%

Program Review - Biology

from 2021-2025.

Action: 2023-2024 Microbiology supplies at Tulare campus (TCC)

Expand biology course offerings in Tulare, specifically in BIOL 40 and BIOL 20.

Leave Blank:

Implementation Timeline: 2022 - 2023, 2023 - 2024

Leave Blank:

Leave Blank:

Identify related course/program outcomes: SLO in BIOL 40 and BIOL 20

District Objectives:

Goal 1: increase enrollment relative to workforce development needs

Goal 2: improve rate at which students complete degrees

Goal 3: tailor and implement programs to match the demands of ongoing changes in workforce development

Person(s) Responsible (Name and Position): Linda Flora, faculty; Francisco Banuelos, Dean; Louann Waldner, TCC Provost, and Jonna Schengel, Dean of Career Technical Education, Nursing and Allied Health

Rationale (With supporting data): To provide equity across campuses for allied health students, Microbiology (BIOL 40) should be offered on the Tulare campus(TCC). Microbiology is a required course for students wishing to apply to the COS Registered Nursing program. The addition of a second full-time faculty position at TCC will provide an opportunity to add non-majors courses such as BIOL 20, as well as additional sections of Anatomy and Physiology. These increased resources are strongly supported by California's K-16 Education Collaboratives Grant Program, specifically by the Strong Workforce 7 initiative that is dedicated to producing more local nurses in Tulare County. To this end, COS CTE has partnered with Tulare, Visalia, and Lindsay School Districts, CSU Fresno, and several southern valley medical facilities to create the PRE Nursing Pathway project. The objective is to create a healthcare pathway for Tulare County high school students. Students chosen for the program will begin their preparatory coursework during their senior year of high school and continue into cohort groups sponsored at the Tulare campus. It is therefore vital to increase the availability of Anatomy, Physiology, and Microbiology courses to provide adequate opportunities for students in this program as well as students whose primary campus is TCC.

BIOL 40 startup costs can be partially or fully funded by the above-mentioned programs. Plus there are additional monies available for program support staff/ education supplies

Priority: High

Safety Issue: Yes

External Mandate: No

Safety/Mandate Explanation:

Update on Action

Updates

Update Year: 2023 - 2024

09/22/2023

Status: Continue Action Next Year

This action is continued because the full time position to teach Microbiology was not funded last year.

Impact on District Objectives/Unit Outcomes (Not Required):

Resources Description

Adjustment to Base Budget - Offering BIOL 40: Microbiology courses require on-going costs for supplies to conduct the new labs in Tulare. Updated to reflect that the budget for Microbiology labs will be separate from the general biology annual running budget. The reason is that biology needs a budget increase even if the new Microbiology position is not filled. (Active)

Why is this resource required for this action?: The on-going funds will be used to purchase the following lab supplies: slides; test tubes; petri dishes; growth mediums, both solid and liquid; inoculation loops; pipettes and tips;

Program Review - Biology

These are in addition to weekly supplies that support all of the new biology labs that will be offered.

Notes (optional):

Cost of Request (Nothing will be funded over the amount listed.): 12000

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

District Objective 2.4 - By 2021, Increase the percentage of CTE students who achieve their employment objectives by 5 percentage points

District Objectives: 2021-2025

District Objective 1.1 - The District will increase FTES 2% from 2021 to 2025.

District Objective 2.1 - Increase the number of students who earn an associate degree or certificate (CTE and non-CTE) by 5% from 2021-2025.

District Objective 2.2 - Increase the number of students who are transfer-ready by 15% and students who transfer to four-year institutions by 10% from 2021-2025.

District Objective 2.4 - Increase the percentage of CTE students who achieve their employment objectives by five percentage points (job closely related to field of study and attainment of a livable wage) and the number of CTE students who successfully complete 9+ CTE units in a single year by 10% from 2021-2025.