

Biology and Health Sciences Department Program Review, Fall 2023

Section 1 Description of Program

Summary of Biology and Health Sciences Department

The Biology and Health Sciences Department is a vibrant, successful member of the College community, with healthy student enrollments and a faculty that is focused on student success and is actively pursuing the installation of an anti-racist and equitable program. The Biology and Health Science programs will be stronger and better serve our students and community through the accomplishment of more mindful diversity, inclusive and equitable actions. Our students have a wide range of personal, academic and career goals that we serve through our programs, their regular review and update and through our faculty's regular participation in professional development in a wide range of areas.

Biology and Health Science courses are currently taught by six full-time professors and three adjunct instructors, and is supported by one full-time lab coordinator. One of the full-time faculty is teaching reduced load. The department will be short one full-time instructor after fall 2024, who will be retired at the end of fall 2025. We are in need of support in several areas, including faculty replacement because of attrition and development of new programs and courses that stretches the current faculty time. As described below, the Biology and Health Sciences Department faculty have a long history in participation in workshops, FLEX activities and other professional development focusing on equity, social justice and anti-racism. During our program review we realize the significant knowledge and experiences each individual faculty member has. We believe that these professional development activities combined with the pandemic experience and social justice and anti-racism call to action has coalesced into a situation that has given us more courage to be active in these areas and undergo more reflection and assessment of our practices. While our individual intentions are good, we realized the need to work better together to share our experiences with the intention to create a Department culture of equity, social justice and anti-racism. As a group we intend to more reflectively examine our historical practices and assess our Department outcomes through examining cause and effect, root cause analysis and assess, plan and improve actions. (see section 4)

The department engages students in courses serving a range of educational goals, including transfer to baccalaureate institutions for science and non-science majors, prerequisites for programs including nursing and medical assisting and other allied health fields, and courses for general education, including a health science course and workforce development through the Biotechnology Program. Starting from the year 2019-2020 the department began to see a drop in enrollment that continued through the pandemic years that has begun to recover, although not yet at pre-pandemic levels. The Department has seen a steady increase in retention and success since 2016-2017. Enrollment and unduplicated head counts have shown a ratio of male to female students (reporting) holding steady since 2019 at about 75% male:female. The department has averaged 22.2 program awards per academic year (2018/2019 to 2022/2023) but has seen a shift from local AA degree to AS-T degree during these years. AA:AS-T 2018/2019 was 1.55 and AS-T:AA was 2.4 in 2022/2023. (See sections 2 and 3 for further details). In an effort to make the Biology, Health Science and Biotechnology programs more responsive to student needs we have expanded the use of open education resources (OER) as an academic, financial and

equity goal (see section 4). We encourage our students to take a broader perspective of their careers and futures rather than a limited narrow outlook by presenting challenges as opportunities to be explored. Our various seminar series speakers, workshops, Family Science Day, clubs and “Jams” attest to this approach by creating opportunities to learn and explore. Much of these extra-curricular programs have suffered in the COVID-19 pandemic era.

Impact of the COVID-19 pandemic and recovery has led to some fluctuations in course offerings numbers and student enrollments and success. The changes in course sections offered, the way courses were delivered, fluctuations in enrollment, retention and success the pandemic negatively affected the Department, but there appear to be signs that suggest recovery. Since returning to campus the Department has worked hard to re-implement courses and offerings and has continued some best practices in lab and lecture delivery learned during the pandemic. We have developed a more flexible and accommodating course delivery philosophy. We found that as students returned to campus, they expected more technology help than in the past and as faculty are the first point of contact for all students (see sections 3 and 4), we found ourselves developing more empathy and flexibility toward how we taught them. Our Department has made a significant perspective change from what to teach to how to teach that began before the pandemic and has continued since recovery. (See sections 2 and 3)

Support of Local Statements and Initiatives including DEI

The Biology and Health Sciences Department endorses the CSM Solidarity Statement. We recognize the discriminatory practices that have been imposed on our students. We apologize for these behaviors and strive to correct these wrongs and want to break the legacy of them that lives with us today. We recognize that the “close the gap” mentality is in fact a white supremacist imposition on our students if we use the more successful ethnic groups as the standard to compare and to which we strive. We need to better work together and share our observations and understanding to move individual actions to a departmental culture.

Our explicit recognition in the classroom concerning the historical white-domination of our curriculum in science and the suppression of ideas originating from, and outright discrimination and mistreatment of certain ethnic groups, women, and gender non-binary people in the name of science is being addressed and corrected in the curriculum. We are trying iterative approaches to methods of delivery that address the needs of our students as we learn more about them and their response to alternatives to lecture-only delivery of course material. The Department strives to be inclusive and equitable to all CSM students. Faculty and staff recognize, value, and reflect the diversity of the community they serve. The department has a dynamic learning and working environment that encourages multiple perspectives and the free exchange of ideas. Biology faculty are very active in supporting the College’s Strategic Goals.

The Biology Department maintains a policy of inclusiveness that recognizes, values, and reflects the diversity of the community it serves. We strive to create a safe and encouraging learning environment so all students feel that they are welcome and have a place where they can be taught and learn.

Just as we encourage our student’s development and growth from many angles, the Biology and Health Sciences Department faculty engage in a wide range of national, state and local activities to learn, grow and develop ourselves both personally and professionally. As a science department part of our core pedagogy is to instill mindful learning, scientific literacy, and critical thinking to ensure that students are prepared to successfully confront and engage the workplace and other transfer programs. Biology and

Health Science Departmental faculty are regularly putting their Course Outline of Record through course review. We have also participate in C-ID and AS-T development and review. We have been involved in not only our own Biology faculty tenure review and regular review process but are active in the reviews of faculty from other departments

Table 1 below shows the District and College priorities, the Biology and Health Science response and individual activities that support these goals. There are more details provided in the specific Program Review sections referenced.

Table 1. Crosswalk of alignment with District and Institutional Priorities

District Strategic Priorities	CSM Institutional Priorities	Biology and Health Science Department Action	Individual efforts	Department Anti- Racism and Equity efforts	Refer to section
Develop and strengthen educational offerings, interventions, and support programs that increase student access & success.	CSM focuses on teaching and learning, and prioritizes student-focused support, especially relating to antiracism/ equity work that supports access and success for students most in need.	<p>New courses in Sports Nutrition and Biotechnology</p> <p>Science Center support</p> <p>Support from MESA, STEM@CSM for our students</p> <p>Mini lunch conferences to engage in DEI topics.</p> <p>Anatomy & Physiology Open Lab</p>	<p>Faculty Professional Development recently supported a sabbatical and attendance at Online Teaching Conference, and Curriculum Institute,</p> <p>Strengthening Student Success conference,</p> <p>And the Alliance of Hispanic Serving Institution Educators conference</p>	<p>Equity Workshop attendance</p> <p>Science Faculty Institute workshops on student identity and creating equitable syllabi</p> <p>FLEX day activities</p>	Sections 2, 3, 4 and 5.

		Anatomy Prosection Program			
--	--	----------------------------------	--	--	--

<p>Establish and expand relationships with school districts, 4-year college partners, and community-based organizations to increase higher education attainment in San Mateo County.</p>	<p>CSM calls for community partnerships to support stronger teaching and learning. This also aligns with the emphasis on effective internal and external communications.</p>	<p>Family Science Day</p> <p>A&P lab tours for outreach to local HS students</p>	<p>Participation in APEX project at San Jose State University to bring programming into our curriculum.</p> <p>Leadership and Participate in State-Wide Community of Practice “Reading Apprenticeship” (CC and CSU)</p> <p>Biotechnology curriculum development as Dual Enrollment experimental courses.</p>	<p>These projects and programs have the goal of outreach to underserved students that might not be considering college as the next steps after high school.</p> <p>Some of these projects were specifically developed to engage CSM students in programs that have a pipeline to CSUs (SJSU)</p>	<p>See sections 2 & 4 and 5</p>
--	--	--	--	--	-------------------------------------

<p>Increase program delivery options, including the expanded use of instructional technology, to support student learning and success.</p>	<p>CSM’s teaching and learning make innovative use of new technology; strategic planning is required to develop delivery options that speak to student need, as well as student-focused support to ensure students are well served in different modalities.</p>	<p>Online and Hybrid course offering.</p> <p>Open Education Resources used in most BIOL/HSCI courses</p>	<p>“Perusall”, a program that is used for. A social annotation tool to encourage student dialog around course content.</p> <p>“Wakelet” used to share images and increase student engagement in online lab activities.</p>	<p>These online and Hybrid efforts address the needs and learning styles of some students.</p> <p>Our efforts to attend ASCCC and State CCCC events keeps us abreast of developing policies and opportunities to educate ourselves.</p>	<p>Sections 2, 3, 4.</p>
<p>Ensure necessary resources are available to implement this strategic plan through sound fiscal planning and management of allocations.</p>	<p>Strategic planning supports sound allocation of CSM’s resources. Planning also calls for effective communication, both internal and external.</p>	<p>Perkins Fund support of CE Biotechnology and Biotechnology Program development and expansion</p> <p>Application to reinstate Anatomy Prosection Internship Program</p>		<p>New curriculum efforts are specifically being created with the intent to reach out to underserved communities and enhance our current student’s applicable experience.</p>	<p>See section 2, 4 and 5.</p>

Section 2

Describe the results of your previous Program Review’s action plan and for identified equity gaps.

Previous Goals (2021)

1. Increase enrollment and success for low-income and minority students
2. Increase adoption of Open Educational Resources (OER), such as zero-cost textbooks
3. Increased enrollment and success for students with permanent or temporary disabilities.
4. Increase success for first-time college students
5. Decrease the digital divide for students in the post-COVID-19 era

Results Achieved

1. Increase enrollment and success for low-income and minority students
 - a. Enrollments of Black, Filipino, Hispanic and Pacific Islanders in BIOL/HSCI were 45% of the total enrollments in 20/21, and 47% of enrollments in 22/23, a slight increase. See table below. Our department serves slightly more Filipino students than the college as a whole, 9% compared to 7%. The other minoritized populations in the Bio department mirror the college population.
 - b. For all BIOL/HSCI students, success rates decreased from 85% in 2021 to 73% in 22/23 (15% decrease). See table below. Success rates of Black, Filipino, Hispanic and Pacific Islanders decreased in this time period from 80% to 63%, a decrease of 17% (Native American enrollments are very small and thus cannot be compared to other groups in a statistically significant way). Retention rates for Black, Filipino, Hispanic and Pacific Islanders lagged behind the total population retention rates by 2-3%. Note that Black and Pacific Islander success rates and retention rates were below Filipino and Hispanic students’ rates across all three years of data (not shown in table).

	20/21	21/22	22/23
Total Bio/HSci enrollments	1812	1637	1783
Black, Filipino, Hispanic and Pacific Islanders enrollments	808 (45%)	805 (49%)	834 (47%)
Total Bio/HSci retention rates	97%	92%	87%
Black, Filipino, Hispanic and Pacific Islanders retention rates	95%	90%	83%

Total Bio/HSci success rates	86%	79%	73%
Black, Filipino, Hispanic and Pacific Islanders success rates	80%	73%	63%

Increase adoption of Open Educational Resources (OER), such as zero-cost textbooks

The number of faculty using OER resources increased from five to six faculty since the last program review. Sections using OER texts include BIOL 100, 102, 121, 122, 130, 132, 145, 184, 195, 210, 220, 240, and 250. Across all sections of these courses, we serve almost 800 students per semester, nearly 300 more students than in our last Program Review report. The biology department estimates that students saved an estimated \$60,000 in textbook costs per semester (based upon an average cost of \$75 for at-cost textbooks). Based on the positive results with ZTC-OER thus far, faculty are committed to using zero-cost materials.

2. Increased enrollment and success for students with permanent or temporary disabilities.
 - a. Enrollments for students who identified as having a disability increased by 1.6% from 2021 to 2023 (6.5% of students taking biology to 8.1%). 145 students with disabilities were enrolled in biology classes in 22/23.
 - b. Success rates in this population continue to lag when compared to the non disabled population. There is a 7% lower success rate for Biology students with disabilities. This is worse than two years ago when the difference was 5%.

	20/21	22/23
Total Bio/HSci enrollments	1812	1783
Disabled Students enrollments	117 (6.5%)	145 (8.1%)
Total Bio/HSci success rates	86%	73%
Disabled Students success rates	81%	66%

3. Increased success for first-time students.
 - a. The Biology Department continues to serve increasing numbers of first generation students, however their success rates have declined since 20/21. In 22/23, only 67% of first gen students in biology succeeded, whereas their not first generation counterparts

succeeded at a rate of 79%, a 12% difference. This increased from 20/21, when the difference in these populations' success rates were only 7%. The table below shows first generation success rates compared to overall Bio/HSci success rates.

	20/21	20/22
Total Bio/HSci enrollments	1812	1812
First Generation Students enrollments	827 (46%)	827
Total Bio/HSci success rates	86%	79%
First Generation Students success rates	82%	67%

4. Decrease the digital divide for students in the post-COVID-19 era

While many of our courses have returned to traditional face-to-face classroom settings, the resources and skills that our dedicated faculty developed during the pandemic remain invaluable for our current students, whether they are learning online or in person. Our Biology faculty members have made a strong commitment to enhance their use of the Canvas course management system. They are now utilizing it extensively to curate comprehensive libraries of course materials, ensuring accessibility through accessible file formats and closed captioned videos, and fostering improved communication with all students. Furthermore, our college remains steadfast in its support for students' digital requirements. We provide loaner laptops, maintain open labs and centers equipped with computers and printing capabilities, and offer learning community programs that bolster students' digital skill acquisition.

All data from CSM PRIE Office, 2023.

<https://downloads.smccd.edu/browse/csmprrie?fo=%2Fsites%2Fdownloads%2Fcsmprie%2FShared%20Documents%2FProgram%20Review%2FInstructional%2FBiology%20and%20Health%20Science&n=Biology%20and%20Health%20Science>

Changes Implemented

Over the past year, our Biology department underwent significant changes in its course delivery methods. While many courses were transitioned back to predominantly in-person instruction, the department also retained and integrated valuable elements from the online teaching experience. Additionally, faculty members actively engaged in professional development activities, including Canvas

training and participation in conferences and workshops. These endeavors were directed towards enhancing teaching methodologies and expanding faculty expertise. Furthermore, faculty members took a proactive role in enhancing the overall student experience through various initiatives and collaborative research projects with Honor's students. These collective efforts underscore the department's unwavering commitment to continuous improvement and robust support for our students.

Plans Still in Progress and Summary of Results

As the threat of COVID receded, the department transitioned course offerings back to more in-person lectures and labs. This shift, coupled with a shift away from crisis-mode teaching by faculty, has led to notable changes in success rates. It's important to acknowledge that these changes may be influenced by post-COVID socioeconomic factors, which disproportionately affect minoritized populations. Our faculty's dedication to reducing equity gaps remains steadfast, and we will continue to adapt our strategies and closely monitor outcomes to ensure all students receive the support they need for success.

In our unwavering commitment to narrowing equity gaps in student success rates, the Biology Department faculty has diligently implemented a range of strategies rooted in the principles of inclusive teaching. Faculty members continually embrace reflective and iterative teaching practices, staying informed about best practices in instruction, both in person and in distance education. Concurrently, our focus remains steadfast on advancing departmental resources and student support services beyond the traditional classroom setting, encompassing initiatives such as peer tutoring, supplemental instruction, small learning communities, workshops, and student clubs.

Of notable mention, the Math/Science division's METaS and MESA programs have been instrumental in our ongoing efforts. Throughout 2023, these programs actively recruited and provided support to low-income and minority students. With funding from MESA and STEMatCSM, the Math/Science division expanded its provision of tutors and supplemental instruction across various STEM disciplines. Within the framework of MESA and METaS, students can access additional support, including dedicated counseling services, Academic Excellence Workshops (AEWs), and broader campus resources. Many MESA and METaS students are affiliated with Year One or EOPS, ensuring access to advising, career services, and tutoring support.

B) Explain any curriculum or programmatic changes since last program review

In response to the evolving circumstances surrounding the COVID-19 pandemic, many biology courses have reverted to their pre-COVID instructional formats. Notably, Biol 260 has undergone a significant change, transitioning into a combined double section that accommodates both day and evening students who share a lecture scheduled from 5:15 PM to 6:30 PM. This format resulted in lower enrollments in the evening section and needs to be re-examined. Additionally, revisions were made to the AS Biology: Pre-Nursing degree program student-facing materials, specifically highlighting the previously "hidden" prerequisites for Bio 240, 250, and 260.

Faculty members within the Biology Department have been actively engaged in professional development, including participation in the QOTL 2 training program, aimed at enhancing curriculum quality. Furthermore, the department has expanded its course offerings, introducing three new

biotechnology courses and an exercise nutrition course to cater to diverse student interests and academic needs.

For more detailed information, please refer to Table 1, Section 1, which provides a comprehensive overview of these changes and updates.

C) Discipline-level and SLO assessment

In Spring 2023, the Biology department implemented an assessment in Canvas for many sections of our lab courses, evaluating both majors and non-majors. This quiz aimed to assess skills in data interpretation, which is one facet of scientific literacy. The quiz consisted of a uniform set of questions for each faculty to administer at the end of their course.

We tested 237 students across many lab courses, including Biol 110, 210, 220, 250, and 260. The first question aimed to test student's knowledge of which type of graph is best for conveying data on averages. 82% of our lab students got it correct. The second question aimed to test student's knowledge of calculating a majority. 91% of our lab students got it correct. The third question aimed to test student's knowledge of calculating an average. 83% of our lab students got it correct. The fourth question aimed to test student's knowledge of interpreting independent variables. 73% of our lab students got it correct. The fifth question aimed to test student's knowledge in reading and interpreting data from a line graph. 79% of our lab students got it correct. The sixth and final question aimed to test student's knowledge of understanding units of volume. 70% of our lab students got it correct.

The threshold for SLO success has typically been set at 70% or higher. Based on these results from the lab exit quizzes, our lab courses have all achieved mastery of the qualitative and analytical skills that we deem important in scientific data interpretation. For our next Program Review, we will assess another facet of scientific literacy across some subset of the Biology Program.

Section 3

a) Student population equity: Discuss any gaps in student success, persistence, satisfaction, utilization or enrollment across student populations (statistics provided for ethnicity, first-generation, age, gender and total enrollment), or student population served.

Findings

Enrollment: Biology % closely match college, same for 1st gen, higher young (88% under 24 vs 76%), higher female (57% vs college 48%) We have navigated from online only to in-person courses after the pandemic years. Gaps have resurfaced in retention and success rates across the student population. Gaps in equity, success and retention have remained and any advancement in closing these has been overshadowed by the movement to in person instruction.

Reduced restrictions on options due to a decline in pandemic protocols, students can opt to engage in employment or other venues. Thus, the competing factors have increased, and students may choose to align with those factors that appear more fruitful,

Analysis

It is evident that the occurrence of the shift from in-person to online modalities forced on by the Covid pandemic resulted disadvantageous for students under marginalized spectrums. In that these students may not have had adequate access to technology nor the adequate training to use or implement the software that this technology provided. However, this issue was circumvented by unrelenting efforts that first acknowledged such a discrepancy then enacted mechanisms to minimize their impact.

Some decline was seen between 20/21 and 21/22 but most of the drop was 21/22 to 22/23

Resources

PRIE for College and for Biology

Plans to Address Opportunity Gaps

As staff we continued and expanded access both in-person and online. For example extended due dates and or suggested due dates for some assignments. Extended access to in-person items by implementing open lab hours. However, it is too early to assess the impact of these approaches. In addition, the pivot from online to in-person instructions has challenged the adaptability of incoming students thereby increasing previously seen gaps that may have diminished during the pandemic.

b) Modes of Delivery equity: Discuss any gaps in student success, persistence, satisfaction, utilization or enrollment, and student population served across different delivery modes. Please comment on in person services/instruction vs hybrid services options/instruction vs completely online services/instruction.

Findings/changes

Before COVID the Biology faculty read, met and were guided in workshops to improve our students' equity imbalances.

During COVID we saw the reality of inequity in technology; Biology faculty developed a wider range of tools in teaching to deal with this, as the College provided student resources. Biology faculty became more aware of our College's imbalance during COVID, more than expressed previously by data

Analysis

Some decline was seen between 20/21 and 21/22 but most of the drop was 21/22 to 22/23

The novel dilemma inherited from the experiences during the COVID 19 pandemic has resulted in a lackluster transition from dependence on asynchronous and or web-based learning to in-person learning.

Plans to Address Opportunity Gaps

Efforts need to be made promoting positive transition that results in increasing student knowledge about the use of CANVAS at a minimum.

(c) Challenges and Opportunities: Describe any other particular challenges, opportunities, or other factors that impact the success of your program (e.g., natural or health disasters, assessing whether a degree program is meeting its learning outcomes, developing new degree programs or courses, adapting to a changing student population, keeping a flagging program alive, starting a learning community, resources, etc.).

Findings

Post-pandemic at CSM is a truly complex and novel combination of students, and while we apply practices developed before and during COVID (see Table 1 of Section 1), we find some "groups" who struggle with basic know-how, application and attention for college work. This is about more than pure academic preparedness

Analysis

There are numbers of students who are "back to square one" in how to smoothly attend college as well as how to succeed, including just how to use Canvas sites. Some students seem to have "online fatigue" while others do not understand what is expected of them, nor what to expect in college classes. This seems to especially impact the youngest students, whose high school classes were online, but in many cases with none of the efforts familiar to us to include, engage, instruct, and guide students through distance education. The generous efforts to make college more affordable have added numbers of students are even less aware of how to "do" college, because they are attending almost as an afterthought since it's free. We may anticipate that, in the short term, students will struggle to succeed even as we offer our utmost support.

Resources

Data is scanty but this consideration begins with the basic data on retention and success: mid-pandemic (20/21), transition (21/22), early post-pandemic (22/23). Both retention and success have declined over those three-year periods. Beyond that we have Biology faculty experiences with students in this time-period, and it is ongoing.

Plans to Address Opportunity Gaps

We strongly encourage the College to require both campus and online tours when students register, including a survey of College resources and mandatory Canvas guidance for all students.

Section 4 Planning

First, we will discuss five major goals for the department regarding planning. After that, we discuss professional development activities, institutional support, and collaborations that most effectively ensure that the program achieves its goals and plans.

Program Goals

Goal 1: Increase enrollment and success for low-income and minority students

STEM@CSM and MESA. Our Division has acquired funds for a new Title V grant program called STEM@CSM that will continue many of our previous METaS Program goals for the next five years through the academic year 2026-27. The institutional organization MESA (Mathematics, Engineering, Science Achievement) has funding through at least 2027 and most likely beyond.

Curriculum that is inclusive of underrepresented communities. We want to ensure that we include the contributions of women, people of color, LGBTQI+ individuals, and other underrepresented groups in our courses, particularly those relating to the history of science and biological discovery. Even though we have discipline expertise for this endeavor, we will seek assistance with pedagogical and culturally responsive techniques at Flex Day activities and then share these techniques with colleagues at our department meetings.

Strategies for recruiting students of color and low-income students into the program. MESA and STEM@CSM actively recruit students in all science and engineering classes and support student success through various measures. Over the past years, the Math/Science division has been offering Math Jam and Bio Jam. These Jams aim to increase students' success considering STEM careers or already in a bio major path.

How to investigate the obstacles students of color must overcome. African American and Hispanic students have at least 10% lower success and retention in Biology than the College overall. Thus, the Biology faculty participates in College committees and professional development activities investigating, testing, establishing, and institutionalizing teaching and learning methods that improve student achievement. Using funding from MESA and STEM@CSM, the Math/Science division has provided more tutors and supplemental instruction in many STEM disciplines. As part of MESA and STEM@CSM, additional support is available to students, including a dedicated counselor, Academic Excellence Workshops (AEWs), and access to other campus services. Most of the MESA and STEM@CSM students are part of either Year One or Extended Opportunity Program and Services (EOPS); they have advising, career services, and tutoring available.

The new Science Faculty Institute for Teaching and Learning (SFIT) has been established with Title V funds, and one biology faculty is co-leader to organize faculty professional development from Fall 2022 through Fall 2026. In this institute, groups of STEM faculty will share and implement best practices, including antiracist and equitable teaching practices. So far, one adjunct biology faculty has completed the first cohort. STEM faculty will share results with the campus community at a January 2024 Flex Day panel discussion.

Goal 2: Increase adoption of Open Educational Resources (OER), such as zero-cost textbooks

The Biology department actively discusses OER resources and ensures new faculty know OER materials. Six biology faculty have adopted peer-reviewed Zero Textbook Cost (ZTC) over the past two years as of the beginning of Fall 2023 for many highly-enrolled sections of BIOL 100, 102, 121, 122, 130, 132, 145, 184, 195, 210, 220, 240, and 250. Across all sections of these courses, we serve almost 800 students per semester, nearly 300 more than in our last Program Review report. The biology department estimates that students saved an estimated \$60,000 in textbook costs per semester (based upon an average cost of \$75 for at-cost textbooks). Based on the positive results with ZTC-OER thus far, faculty are committed to using zero-cost materials. Please see Section 2 for more information.

Goal 3: Increased enrollment and success for students with permanent or temporary disabilities

The Biology department continues to complete a thorough evaluation and updating of instructional materials, especially those used in the laboratory environment. Some current data acquisition tools are over ten years old, and many rely on outdated technologies. It has also been brought to our attention that new systems would better serve students with sensory, mobility, and learning disabilities. Many of our Biology courses provide online video lectures with closed captions for asynchronous viewing and text transcript files. The Biology department is also actively engaged with the DRC support staff to ensure we are meeting the needs of DRC students, which is particularly important for our hands-on lab courses.

Goal 4: Increase success for first-time college students

Approximately 50% of the current Year One students are declared STEM majors. The biology faculty recognizes the need to emphasize student support services during the first few weeks of instruction and provide quick links to these services on our Canvas course websites. Through the MESA program, first-generation and low-income students can participate in field trips to transfer institutions and other MESA events, like the MESA Student Leadership Institute, where students listen to various speakers and engage in funded STEM activities. The department thinks it would be helpful if first-time college students could be identified, similar to how Middle College students are identified. It would help us

better support first-time college students' success and retention if we knew who they were. The department also needs a mandatory CSM Canvas Bootcamp to onboard new students to online learning.

Goal 5: Decrease the digital divide for students in the post-COVID-19 era

Even as we return to the face-to-face classroom, we recognize that several instruction parts, such as lectures, will remain online. Including at least one component of our instruction as online activities can decrease the student's responsibility of commuting to campus as frequently so that they can focus on the many facets of their lives in a post-COVID-19 society. As a department, we want to make sure that students can succeed in this hybrid environment. Communication is critical. Biology faculty are committed to sending many announcements and reminders with links to the Canvas course to make it more accessible for students to complete the work. A continued effort to provide a well-organized Canvas course website with videos, captions, and transcripts is a great way to increase student success.

Professional and Community Development

In this final part of our Planning Program Review section, we discuss professional development activities, institutional support, and collaborations that would most effectively ensure that the program achieves its goals and plans.

Canvas Training

What We Did

One biology faculty is an Accessibility and Universal Design Specialist. They lead distance education planning, development, implementation, and evaluation.

Our department routinely has Canvas best-practice training and discussions at our monthly meetings.

Most of our faculty have recently completed Quality Online Teaching and Learning Level 2 (QOTL2), with the rest completing by the end of Fall 2023. Everyone in the department finished the Regular and Substantive Contact training.

One biology faculty attended an Online Teaching conference.

What We Need

Continued and advanced training in increasing student participation, community building, and success in the Canvas environment.

Conferences

What We Did

Another faculty attended a Student Success conference in October 2022.

Another faculty attended the Science Faculty Institute and focused on improving equity in the classroom.

What We Need

Continued funding and opportunities to attend conferences that help us better serve all students.

Flex Day Workshops

What We Did

Participated in CSM workshops, including Alok and their presentation on the transgender community and Heather McGee and her presentation on solutions to racial inequality.

Several faculty have presented skills and techniques in online teaching and lab practices during Flex days.

What We Need

Continued opportunities to attend workshops that help us better serve all students.

Student Life

What We Did

Biology faculty have significantly contributed to Student Life at the College of San Mateo.

Several faculty have continued with Family Science Day.

One of our faculty led a Biotech/Biomanufacturing workshop and led a Microscopy Jam between semesters.

One of our faculty advised the Medical Scholars Club and started the Anatomy Dissection Internship with Strong Workforce funding.

What We Need

Continued funding to develop new opportunities and programs for our students that enrich their academic life out of the classroom.

Student Honor's Projects

What We Did

Several of our faculty have been Foundation Faculty for Honor's students in recent years; one Honor's student Physiology project explored inequalities in the healthcare system last year.

What We Need

Continued interest from students to engage in Honor's research projects with us.

Other Professional Development

What We Did

One faculty member co-leads an inquiry-based professional development training center around creating equity in the classroom.

One faculty member took a sabbatical last year in which they explored active student engagement and equitizing student voice in the classroom.

What We Need

Continued support for both grant funding and sabbaticals.

Lab Classroom Concerns

What Happened

B36 has been under orders to shut the building down for improvements in the past and future.

The new native plant garden was planted on a steep slope along the new parking lot.

What We Need

Backup lab space to keep our crucial f2f labs going during building closures.

Stairs or accessible pathways allow biology lab students to study the plants.

Section 5: Career Education

The Biology and Health Science Department has a Biotechnology Certificate and a robust program feeding into the Nursing Program. In 2018 faculty decided to de-activated our Biotechnology local AA degree program because we determined that our students were better served by the ADT in Biology. The last AS degree in Biotechnology was awarded in 2019-2020 , but there may be still a few legacy students earning degrees. We decided to focus on our current certificate program and develop a new transcript reportable certificate of achievement in "Biotechnology Business". We

believe this new track in the Biotechnology Certificate will better serve more students and fulfill workforce demand and fulfill a niche in the programs offered in the district. This new certificate curriculum development has been encouraged, guided and supported by the Statewide Director of Life Sciences/Biotech, Workforce and Economic Development Division of the California Community Colleges, Terri Quezner. We anticipate the new program working in partnership with the Dual Enrollment program at CSM as part of a larger outreach to the local High Schools.

Since the last Program Review (2021) we have started 3 new course to support the current program. We now have a new 1 unit workshop course in Immunoassays that was offered for the first time Fall 2023 term. This workshop was designed to complement the established workshop. We also have 2 new 1 unit seminar courses designed to provide more theoretical support to the hands-on workshop courses. Because of College administrator support and encouragement and discussion with our Advisory board, we have decided to implement a Dual Enrollment 1 unit workshop style course in Biomanufacturing Quality Control/Quality Assurance as an experimental course.

In the fall 2022, we had a very encouraging meeting with our Advisory Board on the program offerings and plans. Included in the meeting with our advisory board were current and past students. An outcome of this meeting and from College Administration encouragement we applied for and were awarded a Perkins Grant to purchase equipment to support our workshops and modernize our offerings to students.

Our short term goals are to submit a new certificate program supported by a new 3 unit biotechnology course in the "Business of Biotechnology" in addition to the experimental dual enrollment course. Students have expressed interest in a pharmacology course to cover theory of pharmacology.

Labor market data.

In 2020, six of the top ten occupations with fastest job growth (% change) in San Francisco-Redwood City-South San Francisco Metropolitan District are related to the Biotech or Biomedical fields. Currently, there is projected growth for both SOC 19-1020 Biological Scientist and SOC 19-4020(1) Biological Technician employment in the San Francisco Bay Area, including San Francisco, San Mateo and Santa Clara counties. Job listings have grown from 2018 levels of 733 and 474 job listings to 1052 and 601 listings in 2020. There are a projected 2987 openings from 2016 to 2026 in SOC 19-4020(1).

Our current and future programs focus primarily on the SOC 19-4020(1) area that is Biology Technician/Biotechnology Laboratory Technician. These are programs that prepares individuals to apply scientific principles and technical skills in support of biologists and biotechnologists in research, industrial, and government settings. Our new certificate and eventual new AS degree will target High School students by offering something more of a career exploration model, CSM students a path to employment or transfer and to students already employed in the biotechnology field a skills builder approach to advancing their careers.

Summarize student outcomes in terms of degrees and certificates. Identify areas of accomplishments and areas of concern

Our program has deactivated the AS in Biotechnology as commented on above. According to CCCC Datamart the CSM awards for our Biotech Certificate and AS degree are shown in the table below.

	Annual 2016- 2017	Annual 2017- 2018	Annual 2018- 2019	Annual 2019- 2020	Annual 2020- 2021	Annual 2021 - 2022	Annual 2022- 2023
San Mateo Total	7	10	13	7	2	2	2
Associate of Science (A.S.) degree	2	4	1	1			
Certificate requiring 6 to < 18 semester units	5	6	12	6	2	2	2

Our major concern for this program is that we have fallen behind our sister college Skyline and their more robust program is attracting all the students. We hope that the envisioned new program will create a stronger biotech academic environment at CSM.

Furthermore, we have undertaken an analysis of certificate earners to try to understand why, what should be at least 20 students per year that take our only dedicated Biotechnology course are not earning certificates.

Our major accomplishment this program review cycle has been to recruit an Advisory Board of local industry representatives at different levels of career position to review our curriculum.

Review and update the program’s Advisory Committee information. Provide the date of most recent advisory committee meeting.

We have recently formed a Biotechnology Advisory committee and last met Dec 5, 2022. Student and former student attendees were: Myles Harris and Jeremy Cheang. Arnold Ascucion, TVS Inc; Julianne Averil, Danforth advisors; Jeffery Palin, Dean of Business Santa Clara College. Local attendees were Christopher Smith, Professor Biology and Health Science; Alex Kramer and Andrea Vizenor, CSM Workforce administrators. This meeting was to discuss the plans for CSM Biotechnology Certificate and courses.