



Cañada College

**COMPREHENSIVE
PROGRAM REVIEW
REPORT**

Biological & Health Sciences

Program Context

1. Mission

Share how your program contributes to the College or fits into the College's Mission. For example, what other academic programs and student/academic services does your program engage with? Examples of student/academic services include the Learning Center, Library, STEM Center, SparkPoint, Dream Center, etc. Another example, how does your program fit into any of the College's plans (such as Equity, Technology, Strategic Enrollment, etc.)? If your program has a mission statement, you may include it here.

MISSION: What do we do right now?

The Biology & Allied Health Program uses evidence-based instructional methods to train students in the communal and iterative learning processes of science. We equip students with the knowledge of biological facts and concepts so that they may make scientifically-informed decisions and be prepared for entry to professional programs and more advanced academic degrees.

VISION: What do we hope to achieve?

We strive to enhance or instill in students a driving curiosity to know more about the living world and the confidence that they can understand and participate in the development of scientific knowledge. With this knowledge, we hope to create a more scientifically-literate community.

COLLEGE GOALS: How do we contribute to achieving these goals?

Student Access, Success and Completion - The Biology & Allied Health Program offers its courses in a variety of modalities and schedules in order to reduce barriers to access and increase student success.

Equity-minded and Anti-racist College Culture - The faculty of the Biology & Allied Health Program are actively involved in professional development to deepen our understanding of ourselves and our students, how students learn, and how we can improve our teaching practices to ensure that everyone feels welcome and valued. The more effective we are, the more successful our students may be and the more likely we will see a more diverse future community of biologists and allied health practitioners.

Community Connections - The Biology & Allied Health Program offers courses and degree pathways that are fully-articulated with 4-year institutions and allied health professional programs of study.

Accessible Infrastructure and Innovation - The facilities and instructional equipment of the Biology & Allied Health Program are maintained and regularly updated so that all students have access to learning materials that are current and comparable to those they might encounter in their transfer institution or future workplace.

2. Articulation

Are there changes in curriculum or degree requirements at high schools or 4-year institutions that may impact your program? If so, describe the changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes."

The Biology & Allied Health Program offers two local AS degrees (AS Biological Sciences, AS Allied Health) and two AS-T degrees (AS-T Biology, AS-T Nutrition and Dietetics). All applicable courses are articulated with C-ID course numbers. We do not have any courses that are currently articulated with or offered at local high schools.

We are beginning the process of aligning our courses with our 4-year partners in accordance with the AB1111-mandated Common Course Numbering system. We do not anticipate this process will necessitate significant changes to the content of our curricula. However we are concerned about the differences in course prerequisites that exist between the three educational systems. While our course prerequisites are mostly aligned with those of the CSU system, the most recent draft of the CCN outlines have moved those prerequisites to "Recommended Preparation". We are committed to ensuring that our students are appropriately prepared for their coursework and will keep their success as the central focus of our dialogue that we contribute to the finalizing of the CCN outlines.

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3. Community & Labor Needs

Are there changes in community needs, employment needs, technology, licensing, or accreditation that may affect your program? If so, describe these changes and your efforts to accommodate them. If no changes have occurred, please write "no known changes". CTE programs: identify the dates of your most recent advisory group meeting and describe your advisory group's recommendations for your program.

During our last program review cycle we reported that faculty from our department were involved in starting a new Funeral Services Education (FSE) program at the college. Since that time, the FSE program's application for candidacy for accreditation by the ABFSE was denied. Our department member is now chairing a Program Improvement and Viability (PIV) task force approved in Fall 2024 to assess and provide recommendations regarding the future of the FSE program.

During the pandemic, which started spring 2020, virtually all courses in the District were moved into an online modality but a few were allowed to meet in-person. This exception was made for science courses that were needed by students pursuing certain fields of study in specific labor market sectors. In our department, the lab components of two courses (BIOL 230 and 250) have been offered on campus in-person beginning January 2021. These sections were offered in a hybrid manner or with specific sections devoted to in-person learning while other sections were fully online. Since that time we have been returning many of our courses to in-person modality but are determined to be responsive to our community/student needs. Since our last program review, we have determined that laboratories need to be completed in-person in order to preserve the hands-on learning experience. This decision is further validated by the CSU and UC faculty who, in collaboration with CCC faculty, are proposing CCN course outlines of record which state that labs should consist of greater than 80% hands-on learning. We are currently still providing many of our lectures through a variety of modalities in order to reduce barriers to access and meet student needs. Individual faculty continue to choose whether their online instruction will be asynchronous or synchronous. Additionally there is variability between faculty on what percentage of a lecture is offered online or face-to-face.

There are no known changes in technology that are likely to affect the biology program. There are no licensing or accreditation requirements associated with the biology program.

Looking Back

4. Curricular changes

List any significant changes that have occurred over the prior years in your program's curricular offerings, scheduling, or mode of delivery. For decisions made by your department, explain the rationale for these changes. If applicable, how have state policy changes affected your curricular offerings?

Changes

The most significant change in our curricular offerings was increasing online modality. In 2019-2020, 63% of classes were Face-to-Face, 11% categorized as Hybrid, and 26% Online. By 2023-2024, 28% of classes were Face-to-Face, 44% were Hybrid, 20% Online, and 8% Synchronous (online). Hybrid class offerings, where a portion of the class was offered in some form of online format and Face-to-Face (e.g. Labs), were responsible for the majority increase in online offerings.

We also experimented with fully online Anatomy classes for the first time. Rather than conduct in-person labs, lab kits were sent to student homes. While this approach increased student access, especially during the Covid-19 pandemic, we did have concerns about certain pedagogical aspects and the overall student experience. We no longer offer the fully online anatomy classes.

In 2023 we offered a new course, Biology 133- Emerging Infectious Diseases. The course covers key principles of historic and contemporary diseases including smallpox, tuberculosis, AIDS, Ebola, and COVID. The course also covers antimicrobial resistance and how globalization and climate change will influence future challenges faced.

Rationale

Many of our students work part-time and full-time jobs. We have increased the number of online offerings in both hybrid and fully online formats to accommodate the need for scheduling options. For example, Biol 100 is now offered online, asynchronous.

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Average enrollment increased from 55 to 73 avg students per term. Average retention rate increased from 76% (Spring 2019- Spring 2021) to 84% (Fall 2021- Spring 2024). Further, we will continue to update our course offerings to meet student interests and needs.

5A. Progress Report - IPC Feedback

Provide your responses to all recommendations received in your last program review cycle.

We appreciate IPC's compliments on our thoughtful and detailed data analysis of our last Program Review Cycle.

Feedback 1: Your mission statement is well fleshed out and student focused. It would be helpful to have a clearer link to how your program contributes to the College's goals.

Response 1: We have directly explained the links between our Program's Mission and how this supports the goals of the College as a whole (see response in question 1).

Feedback 2: For next program review consider incorporating more detailed assessment of and planning for Health Sciences, which understandably, due to staffing was more of a challenge for this year's program review.

Response 2: Our Health Science Program courses have almost entirely been banked due to lack of full-time staff, loss of phlebotomy and nursing programs on our campus, and low interest from students in taking the courses (please see summary of changes in section 5B).

Feedback 3: Good description of labor needs for funeral services program. We'd like to learn more about how your biotech program meets community needs.

Response 3: We do not have a Biotech program on our campus, though we do teach and practice biotechnology-related concepts and lab techniques in our BIOL 230 and BIOL 240 courses.

5B. Progress Report - Prior Program Goals

Provide a summary of the progress you have made on the program goals identified in your last program review.

We identified 8 goals in our Fall 2021 program review.

Goal 1: Future of the Health Science Discipline - The Health Science program was originally developed to house curricula related to specific allied health CTE programs that didn't fit into the BIOL discipline. All but one of the courses were banked between 2014-2017.

- HSCI 104 Nutrition and Physical Fitness (banked 2016) has been modified and replaced by KINE 109.
- HSCI 105 Communicable Disease (banked 2016) has been modified and replaced by BIOL 133 Emerging Infectious Diseases
- HSCI 115 Introduction to Healthcare and Health Professions (banked 2017) belonged to a grant-funded 2+2+2 career pathway that was discontinued.
- HSCI 116 Women's Health (banked 2024) was offered twice but canceled due to low enrollment. The faculty member with expertise in this course is no longer employed at the college.
- HSCI 430 First Aid and HSCI 432 CPR (banked 2016) have been modified and replaced by KINE 119.
- HSCI 480 Phlebotomy and HSCI 481 Phlebotomy Externship (banked 2014) belonged to Cañada's phlebotomy program that was discontinued.

The one remaining active course is HSCI 100 General Health Science. This course is an elective in the Allied Health A.S. degree and in the Interdisciplinary Studies: Natural Science and Mathematics A.A. degrees. It is also classified under GE Area E "Lifelong Learning" which is being eliminated with the adoption of CalGETC. We have proposed reclassifying HSCI 100 into the new Area 7 for local degrees.

Goal 2: Institutionalization of the EPIC tutoring program - The college has integrated EPIC tutoring into the Learning Center and is supported by Fund 1. Goal is complete.

Goal 3: Improve instructional outcomes by investing in equipment for funding in FY 2022-23 - We have received most of the equipment we requested in 2022-23. Please see our response to question 6a to see the impact of these equipment.

Goal 4: Increase department budget for FY 2022-23 - The college approved our budget augmentation request. Goal is complete.

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Goal 5: Update equipment and expand use of Molecular Techniques in the laboratory -

In BIOL 230: Cell and Molecular Biology, we have purchased an additional small centrifuge and new Spectrophotometers that allow faster and more accurate processing of samples, and have allowed students to expand the goals of their self-designed experiments to explore more variables that affect cellular enzyme activity, cellular respiration, and photosynthesis at the cellular and molecular levels.

In BIOL 240: General Microbiology, we currently are exploring how to incorporate some molecular techniques into rapid species identification from wild or other unknown samples, in order to assess microbial diversity and possible contamination in local water, soil, and other environments.

In BIOL 260: We've begun teach students how various medical lab tests (e.g., urinalysis, blood typing) work.

Goal 6: Create opportunities for students to gain experience with anatomy dissection - We offer Honors Contracts to students who are concurrently taking anatomy. These contracts can include a combination of literature research and cadaver dissection. For students who have already completed the anatomy course, we have offered a 695 course to enable them to gain experience with cadaver dissection in addition to literature research. There were four such students who completed the 695 class in Fall 2022 and another student who completed the 695 class in Spring 2024. This 695 class currently has a 100% success rate and we will continue to provide this opportunity for students who have completed the anatomy course and want to gain further experience by performing cadaver dissection and related literature research.

Goal 7: Develop exercise physiology-related laboratory curricula - We have developed a lab in which students are to determine the types of nutrients (carbohydrates or fats) that the body burns under a variety of conditions: rest, hyperventilation, post-exercise following light, moderate and intense exertion. The results from our first attempts at this lab revealed that there is a significant degree of variability between test subjects, test conditions can be difficult to control and experimental methods require optimization. But that's exactly what students need to learn about the "messiness" of doing science! It's an iterative process!

Goal 8: Evaluate optimal modality for biology courses - Please see our response in question 8C.

6A. Impact of Resource Applications

Describe the impact to date of previously requested new resources (assignment, equipment, facilities, research, funding) including both resource requests that were approved and not approved. What impact have these resources had on your program and measures of student success? What have you been unable to accomplish due to resource requests that were not approved?

- In 2022 we received new UV-Visible wavelength range Spectrophotometers from ThermoFisher, with 8-cell changer carousels, and new glass and quartz cuvettes for more accurate and reproducible analyses. These have been a game changer for rapid processing of student samples, and quick collection of data – allowing more time for students to creatively plan more variables/conditions to test with their samples in BIOL 230. In addition, lens-mount attachments for microscopes have allowed students to stably take better photos of their cellular samples for reference, review, and learning, as well as a more thorough record of their laboratory work in both BIOL 230 and BIOL 240. Furthermore, new gel boxes, gel trays, and power supplies have been great replacements for our damaged, leaky, and less reliable old ones. The new gel boxes and power supplies are also easier to use, and the power supplies are programmable with automatic shutoff timers when necessary.
- Also in 2022, the cushioned non-slip floor mats have really helped protect our floors from slippery spills and cellular stains from damaging the floor tiles. These mats are comfortable to stand on, and slip-resistant, though they are already taking a beating and may need replacing in the not-too-distant future with heavier-duty and more rubberized safety mats.
- In 2023 we received a complete set of Visual Stimulus switches for use with our existing Biopac systems in Human Physiology. These switches allow students to compare their reaction time to auditory and visual stimuli. The results correlate with the complexity of the neural networks involved in processing these senses. Additionally, we ask students to investigate the effect of mental distraction

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on reaction time to visual stimuli. The results can be applied to the context of distracted driving. This equipment allows all of our students to investigate more engaging and relevant research questions.

- In 2024 we received two new human musculature torso models, a model of the human peripheral nervous system and a model of the circulatory system. The torso models replace our aging and broken ones. They are very well constructed and do a very nice job replicating the muscles of the body. These are especially helpful for studying musculature of the back since it is logistically and physically difficult to rotate our cadavers from front to back. The circulatory and nervous system models have been critical in allowing us to test students on the peripheral nerves and vessels that are not easily revealed in our cadaver specimens. All of our students are benefitting from these new models.

6B. Impact of Staffing Changes

Describe the impact on your program of any changes within the last program review cycle in staffing levels (for example, the addition, loss or reassignment of faculty/staff). If no changes have occurred please write "not applicable."

not applicable

Current State of the Program

7A. Enrollment Trends

Use the data provided by PRIE to examine your enrollments by department or courses. Describe trends in headcount, FTES, and load. If applicable, describe any other enrollment data that is relevant to your program.

Biology's enrollment and headcount trends are similar. Since our last program review cycle in 2021, enrollment in Biology decreased the following academic year: 1719 students in 2021-22 vs 1640 students in 2022-23. In another perspective, Biology's enrollment of 1640 students in 2022-23 was 7.1% lower than Biology's 5-year (2019-2023) enrollment average of 1766 students. In comparison, Cañada College's enrollment of 24000 students in 2022-23 was 6.0% lower than the college's 5-year (2019-2023) enrollment average of 26360 students. Thus, Biology enrollment and the college enrollment in the academic year 2022-23 were comparably lower than their 5-year enrollment average (7.1% Biology; 6.0% college). In the following academic year 2023-24, Biology's enrollment did not significantly decrease and was similar to the previous academic year: 1640 students in 2022-23 vs 1629 students in 2023-24. Thus, Biology's enrollment has stayed steady over the past (and most recent) academic year.

Biology's FTES trend is similar to our enrollment and headcount trends. Since our last program review cycle in 2021, FTES decreased in 2022-23 (301 in 2021-22 vs 272 in 2022-23) but then FTES stayed relatively steady in 2023-24 (272 in 2022-23 vs 266 in 2023-24). Biology's FTEF also has a similar trend; since our last program review cycle in 2021, FTEF decreased in 2022-23 (19 in 2021-22 vs 16 in 2022-23) but then FTEF stayed relatively steady in 2023-24 (16 in 2022-23 vs 15 in 2023-24).

Since our last program cycle in 2021, Biology's section count has decreased over the past two academic years (59 in 2021-22 to 50 in 2023-24) but simultaneously Biology's load has steadily increased over the past two academic years (475 in 2021-22 to 517 in 2023-24). This indicates a steady increase in our efficiency over the past two academic years. Thus, the Biology Department has increased efficiency every year since our last program review cycle in 2021.

7B. Significant Changes in Your Program

Have there been any significant changes in enrollment trends or course offerings? For example, has there been a significant increase or drop in FTES or Load? If applicable, consider trends in class cancellation rates and how it might have affected your course offerings. If needed, consider how the pattern of course offerings (times/days/duration/delivery mode/number of sections) affected your enrollment?

Enrollment in Biology, Biological Sciences, and Health Sciences declined beginning in 2021-2022, following the onset of the Covid-19 Pandemic. Headcount trends followed closely with enrollment. Enrollment and headcount declined from a peak of 1934 and 1610 (2020-2021) to 1629 and 1395 (2023-2024), respectively.

From 2019-2020, enrollment declines appear driven by female students. Male student enrollment remained fairly constant- a peak of 566 (2020-2021) with a low of 518 (2023-2024). In contrast, female enrollment declined almost

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20%, from a peak of 1331 (2019-2020) to 1073 (2023-2024). Headcount trends by gender mirror those of enrollment.

Trends in enrollment and headcount declines were also evident in Hispanic students. Hispanic student enrollment and headcount dropped from a peak of 908 and 744 (2019-2020), to 773 and 651 (2023-2024), a 15% and 13% drop, respectively.

While an increase in enrollment (28%) and headcount (33%) occurred in students 18-22, these gains were offset by 50% and 49% respective declines in the 23-28 age group.

Reported first-generation student enrollment declined the most over the time period (17%), with a decline of 8% for non-first generation.

In response to declining enrollment, sections offered declined from 60 to 50. FTES dropped 20% between the peak in 2020-2021 (333.4) to 2023-2024 (265.9). FTEF also declined from a peak in 2021-2022 (19.0) to 2023-2024 (15.4). Success rate and retention rate increased from 73% to 76% and 85% to 90%, respectively. Load dropped from 551 (2019-2020) to 475 (2021-2022), but increased to 517 by 2023-2024.

7C. Planning for Your Program

What changes could be implemented, including changes to course scheduling (times/days/duration/delivery mode/number of sections), curriculum, marketing, and articulation of pathways that might improve these trends? If applicable, include plans for faculty recruitment and faculty training. NOTE: If other sources of data are used, please upload these documents or provide URLs.

As reported above in section, our students are seeing increasing success in our expanded offerings of hybrid and online courses. Instructors and our Deans have had extensive discussions and planning sessions to make our courses as available and accessible to students as possible – including careful consideration of modality, time of day, etc. This is an ongoing process, and most of our higher-level (200+) courses are filling to capacity or near-capacity on a regular basis, especially the pre-Health courses, BIOL 240/250/260. We offer many of our higher-demand BIOL courses during morning hours, afternoons, and some in-person lab courses in the evenings as well (e.g., currently: BIOL 110 and BIOL 240). We also offer completely online course options for classes without laboratory sections (BIOL 100 and BIOL 130).

Also, we have hired Michael Limm, Ph.D., as our newest instructor for teaching our Majors students in Organismal Biology (replacing Dr. Carol Rhodes), as well as a selection of Nonmajors Students in Principles of Biology and Human Biology. Julie Luu, Ph.D. has replaced Dani Behonick, Ph.D. as our additional faculty for Human Anatomy and Human Physiology courses, which remain in very high demand among our high numbers of students preparing for careers in Nursing, Physicians' Assisting, Radiologic Technology, and other Allied Health fields.

Finally, as described in part 8B below, we are beginning to make plans for marketing our Program and degree pathways using strategies that encourage broader access and success to underrepresented or less successful racial and ethnic groups.

8A. Access & Completion

Describe the student completion and success rate in your courses and/or program using the data provided by PRIE. Look at your course offerings, in the last program review cycle was it possible for a student to complete your certificates or degrees while only completing courses at Cañada College? How can the college help you improve student completion and success? What changes could be made?

Students are able to complete their entire program of study at Cañada. Every semester the college offers all the science courses necessary for students to complete each of the four degrees in our program. We offer (1) a local AS degree in Biological Sciences, (2) a local AS degree in Allied Health, (3) an Associate in Science Degree for Transfer (AS-T) in Biology and (4) an Associate in Science Degree for Transfer (AS-T) in Nutrition & Dietetics.

Local AS in Allied Health

- In 2023-2024, the largest percentage of the students in the Biology and Allied Health Program (59%) were pursuing the Allied Health AS degree. Enrollment in this degree has increased 97% (from 117 to 231) over the past 5-years. Since 2019-20, there have been 204 students graduating with an AS in Allied Health. Students seeking this degree most often transfer into academic workforce training programs such as Radiologic Technology, Nursing, Respiratory Therapy, Physician Assistant, Occupational Therapy and others. These programs do not require applicants to have an AS degree;

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students need only have completed their prerequisite courses. Consequently, not all students who complete our program actually apply to graduate with the degree. We do not have disaggregated data to determine the completion rate for this degree. However, aggregate data from the AS Health Science, AS-T Nutrition and AS Biological Sciences reveal that 75% of students successfully complete one of the three degrees and transfer, 21% of students successfully complete the degree but do not transfer, and 4% transfer without completing one of the degrees.

AS-T in Nutrition and Dietetics

- In 2023-2024, 7% of students in our program were pursuing the Nutrition and Dietetics AS-T degree. Enrollment in this relatively new degree has increased 155% (from 11 to 28) over the past 5 years but is still low relative to other degree options in our program. Since 2019-20, there have been 5 students graduating with an AS-T in Nutrition and Dietetics.

Local AS in Biological Sciences

- In 2023-2024, 8% of students in our program were pursuing the Biological Sciences AS degree. This is a 29% decrease in enrollment (from 48 to 32) over the past 5 years. Since 2019-20, there have been 20 students graduating with this degree. We suspect that the decrease in demand for this degree may be attributed to the development of the AS-T in Biology which has shown a substantial increase in enrollment over the same period (see below).

AS-T in Biology

- In 2023-2024, 27% of students in our program were pursuing the Biology AS-T making it the second-most popular degree option in our program. Enrollment in this degree has increased 186% (from 37 to 108) over the past 3 years. 95% of those students successfully complete the degree and transfer. On average, less than 2% will earn the degree without transferring and 3% will transfer without earning the degree. Since 2019-20, there have been 34 graduating with the AS-T.

8B. Student Equity

One of the goals of the College's Student Equity plan is to close the performance gaps for disproportionately impacted students. Use the data provided by PRIE that indicates which groups are experiencing a disproportionate impact in your program. Which gaps are most important for improving outcomes in your program? How can the college help you address these gaps? What changes could be made?

Unfortunately, the Biology department has several persistent performance gaps impacting some of the most marginalized members of our college community. First, we will list and describe the performance gaps that we observed in our PRIE data. We will address and describe gaps that have been persistent for at least three years, as these gaps are most important to close to improve our program outcomes. Additionally, we will discuss supports and interventions that could be made at the department, division, and college level to help close these gaps.

Success and Retention Gap for Black Non-Hispanic Students:

The most consistent and persistent success gap the biology department has is with Black Non-Hispanic students. This gap has existed for the past five years (25%, 16%, 17%, 15%, 27%). In terms of actual student numbers, the biology department would need between eight and twelve more Black students to succeed in their courses each year to close the success gap.

Possible interventions: As this is our largest and most persistent success gap, interventions are needed. We feel that a greater understanding of what is driving these gaps is needed, and hope to partner with PRIE to gain more understanding as to what is driving these gaps. Perhaps surveys and study groups with past students may be a useful way to gain more understanding of why Black students are doing disproportionately worse in biology courses compared to other divisions in the college. We hope to discuss and partner with other groups on campus including the Equity and Antiracism Planning Council and UMOJA in hopes that they may be able to advise us in better practices we can use with our students. In addition to reflecting on

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pedagogical changes, we are considering ways to better help students find a sense of identity and belonging in biology. We hope that things such as a speaker series or peer mentorship program might be helpful.

Success Gap for Hispanic Students:

A success gap ranging between 5.5% and 7% has existed for Hispanic students for the past five years. To close this gap, the biology department would need between 39 and 72 more students to succeed in their courses to close this success gap.

Possible interventions: While the success gap for Hispanic students is smaller than our success gap for Black Non-Hispanic students, it is equally persistent and needs addressing. We hope to seek support from the Equity Director, Faculty Equity Coordinator, PUENTE and the Equity and Antiracism Planning Council to strategize changes that can be implemented in our individual classrooms and program-wide. Professional development from PUENTE will also hopefully be helpful.

Access Gap for Male Students:

For the past five years, the biology department enrolled disproportionately fewer males than the college average (Range 6%-10%). This gap is magnified when in 200 and 300 level courses where we enroll between 10%-12% fewer males than the college average. These courses are typically taken by students pursuing biology degrees, nursing, and other skilled medical careers. This gap does not exist in 100 level biology courses.

Possible interventions: It could be helpful to intentionally bring in male biologists and health professionals to serve as role models for male students. It might be appropriate to share this information with the counseling department. Counselors might be able to play a role in encouraging male students to pursue courses in biology. As a department, we could potentially encourage male biology students to form a fraternity or support community. Possibly a male pre-nursing club might be particularly impactful. Having a visible sense of community might encourage students to enroll in biology courses. Lastly, it could be appropriate to partner with Brothers Achieving Milestones to hear their suggestions about ways to address this gap.

Success Gap for First Generation Students:

For the past five years, the biology department has had between 4% and 5% worse success rates with first generation students than the college average.

Possible interventions: First-generation students are a population that could be invisible if faculty are not using tools to get to know their students. Welcome surveys that identify first-generation students may be particularly helpful for faculty to help first generation students connect with important college resources. Additionally, First generation students experience several unique obstacles including imposter syndrome to lack of understanding of college systems and procedures. It might be helpful for biology faculty to learn more strategies that have been shown to be successful at supporting first generation students. Also, resources such as the learning center, tutors, librarians, and even office hours may be particularly helpful for first generation students, but they may also be the least likely to know about them. Making sure that these valuable resources are marketed to students in several ways (canvas, in-person fliers, messages, etc.) may be particularly impactful for first generation students. Partnerships with MESA might also be helpful as they have a specific charge to help first generation students.

Access and Success Gap for Low Income Students:

The biology department enrolled disproportionately fewer non-low-income students compared to the college average over the last three years (4%,7%,7%). Additionally, Low-income biology students have done disproportionately worse than the college average over the last two years (6%, 7%).

Possible interventions: We are unclear if the actual cost of lab and course materials are serving as an obstacle, but it may be helpful to reduce the access gap if faculty were to adopt low cost or no cost textbook options.

Success Gap for Less than Part Time Students:

Students taking fewer than part-time units, have been disproportionately less successful in biology courses compared to the college average for the last three years in a row (Range: -18% to -20%)

Possible interventions: As a department we do not have a clear understanding as to why this gap exists in our department. Our best guess is that we have a lot of students who return to take prerequisite courses for career changes after being away from school for a long time. These courses tend to be very challenging courses (ex. Microbiology, Anatomy, Physiology) for students who have not been in school for a long time. A

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possible intervention might be to embed more resources and supports in these courses, such as information about tutoring.

Gaps by Course Modality:

Hybrid biology courses have not had any gaps compared to the college average over the past three years. Face-to-face biology courses have had an access gap for the past three years (11%, 15%, 29%), and a success gap for the past two years (8%, 8%). Additionally, we enroll disproportionately fewer students in asynchronous courses than the college average (23%, 15%, 17%). Lastly, biology students did disproportionately worse in our synchronous courses in 21-22 (4%) and 23-24 (19%)

Possible interventions: To address success gaps in fully face to face and fully online courses, we may consider transitioning fully online and fully face-to-face sections to hybrid modality.

No Persistent Gaps by Age Group:

In our 2021 program review, we addressed a success gap for younger students. The success gap for younger students didn't persist past that year. In 2023-2024 there was a withdrawal gap for older students, but this gap has fluctuated dramatically over the past three years and doesn't seem to warrant intervention. (3.3%, 4%, 24%). Doesn't seem like an area where additional resources are needed.

8C. Completion – Success Online

The college has a goal of improving success in online courses. Using the data provided by PRIE, what significant gaps do you see in success between online/hybrid and non-online courses? What changes could be made to reduce these gaps? If your program does not offer online/hybrid courses, please write "not applicable".

We have determined that laboratories need to be completed in-person in order to preserve the hands-on learning experience. This decision is further validated by the CSU and UC faculty who, in collaboration with CCC faculty, are proposing CCN course outlines of record which state that labs should consist of greater than 80% hands-on learning. We are currently still providing many of our lectures through a variety of modalities in order to reduce barriers to access and meet student needs. Individual faculty continue to choose whether their online instruction will be asynchronous or synchronous. Additionally there is variability between faculty on what percentage of a lecture is offered online or face-to-face.

- BIOL 100 - online lecture
- BIOL 110 - hybrid: online lecture + F2F lab
- BIOL 130 - online lecture; OR F2F lecture
- BIOL 225 - hybrid: online lecture + F2F lab
- BIOL 230 - hybrid: F2F lecture + online lecture + F2F lab
- BIOL 240 - hybrid: F2F lecture + online lecture + F2F lab
- BIOL 250 - F2F lecture and lab; OR hybrid: online lecture + F2F lab
- BIOL 260 - hybrid: F2F lecture + F2F lab + online lab; OR hybrid: online lecture + F2F lecture + F2F lab + online lab
- BIOL 310 - online lecture

Data show that our department's average 5-year success rate is 69.5% for F2F courses, 75.1% for online and synchronous courses, and 85.2% for hybrid courses. When limiting the data to post-pandemic semesters (2021-2024) the average 3-year success rate is similar: 69.7% in F2F courses; 71.7% for online and synchronous courses, and 84.8% for hybrid courses. These aggregate data suggest increased success of students in online and hybrid courses.

When disaggregated by course, the conclusions may be more nuanced due to (a) limited sample size and (b) differing instructors between modalities. There are higher success rates in BIOL 100 and BIOL 310 when taught online or synchronously than when taught F2F.* Success is higher in BIOL 130 when taught online than F2F, but not when taught synchronously online. Three-year average retention is equal between F2F and

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online sections of BIOL 130 but lower in synchronous sections.** And there is no significant difference for the success in BIOL 250 when taught in either F2F or hybrid modality.***

*BIOL 100 1-year success rate of 57.1% when F2F, 3-year success rate of 63.9% for online/synchronous sections. BIOL 310 1-year success 70.% F2F, 3-year success rate of 75.5% for online/synchronous sections.
**BIOL 130 3-year average success of F2F 66.0%, online 78.5%, synchronous 62.6%. 3-year average retention rate F2F 92.7%, online 94.3%, synchronous 84%

***BIOL 250 3-year average 75.2% when F2F compared to 2-year average success of 76.2% in hybrid courses

9A. SLO Assessment - Compliance

Are all active courses being systematically assessed over a three-year cycle? Refer to the Program's /Department's Three-Year Assessment Plan and describe how the plan is completed across sections and over time.

All active courses in the Biology & Health Sciences are systematically assessed over the 3-year cycle. The plan is completed across all sections and over time through a scheduled process. Courses are assigned for SLO and PLO review in the Fall and Spring semester. A new PLO is assessed each year. ILO's are assigned every year as well.

9B. SLO Assessment - Impact

Summarize the dialogue that has resulted from these course SLO assessments. What specific strategies have you implemented, or plan to implement, based upon the results of your SLO assessment?

Below are representative reflections on our SLO assessment processes.

BIOL 110

The biggest recent change in Biology 110 is the shift to a hybrid model, with students learning lecture material online and attending in-person labs weekly. Initially, students struggled with online assessments, and by Fall 2022, many voiced concerns that labs weren't aligning with the online material. I also noticed that students were passing the course without fully understanding the content due to grade weighting that favored participation.

In Spring 2023, I revised the grading system to focus more on student understanding. I reduced the weight of homework and lab participation, added low-stakes assessments, and introduced in-person quizzes during lab sessions. Students take the quiz individually, then collaborate briefly before grading each other's work.

This change appears to be boosting final exam scores. While 80% of students passed the open-note exam in Fall 2022, 77% passed without notes in Spring 2023, and 83% did so in Fall 2023. The fact that students are performing similarly without notes suggests improved learning.

The in-person quizzes have also enhanced classroom culture, promoting engaging discussions and providing immediate feedback. Students value this format for helping them prepare for high-stakes exams and motivating timely attendance.

BIOL 230 and BIOL 240:

While students previously performed well on Laboratory Practical exams, which helped evaluate Laboratory skills and knowledge (applicable to SLO #5 in each class), we noted in the 2021 program review that they added stress that extra exams instilled at the end of the semester. Also, at the time, practical exams were no longer possible under pandemic circumstances, which gave us cause to reevaluate their necessity. So, Lab Finals (Practical Exams) were removed in favor of an extra lab group report (Enzyme Kinetics for BIOL 230, and Hand-Washing effectiveness for BIOL 240) for each course, which encouraged both qualitative and quantitative reasoning and analysis. We have maintained this practice post-pandemic, due to its effectiveness.

Students are benefitting from this group work, and the reports are presented as Discussion Assignments – so that students can learn from others' explanations and presentation/analysis of data. Students perform well on these assignments, averaging 85% for BIOL 230 and 90% in BIOL 240 on these extensive and challenging lab reports. Also, the Lab reports seem to cause less stress, since they occur a bit earlier in the semester than lab practicals and without timed exam conditions. Furthermore, we have kept offering these courses in the very successful Hybrid modality, which creates more schedule flexibility for increased student access, but still providing fully in-person hands-on lab activities for important experience as

Program Review

future scientists and/or medical professionals. ??

Students are doing VERY well in these classes across the last few semesters. Considering students who finished the courses (since we cannot control most random early semester drops that often arise from family issues, changing major plans, changing work schedules, etc.), success rates have stayed very high. Among students who finished the course in fall 2023, 96% of BIOL 240 students passed the course and earned an A or B, while 98% passed the course with a C/C+ or better! Also in fall 2023, among BIOL 230 students who finished the course, 89% earned an A or B in the course and 94% passed the course with a C/C+ or better. In spring 2024, among BIOL 230 students who finished the semester, 91% earned an A or B in the course, and 100% passed the course with a C/C+ or better! Furthermore, overall success rates in these courses from fall 2021 through spring 2024 have remained near or above 80% overall, even when including withdrawals post-census. These are truly impressive performance results for these extremely challenging courses, and we are very proud of our students. Increased use of Canvas Discussion Assignments for regular chapter study questions, as well as discussion assignment formats for lab reports and lab preparatory writeups (Pre-Labs) are increasing student engagement and interaction, and resulting in enhanced academic success and consistently high-level performances from students – which often improve more and more as the semester progresses (exam average percentage scores start in the high 70s to low 80s, and improve into the mid-high 80s by mid- or late semester).

BIOL 250

During the pandemic all assessments in BIOL 250 were converted to online quizzes. In this modality there are few acceptable means for ensuring students do not consult notes or other resources. Once the lab portion of this course was returned to face-to-face modality, I chose to assess student learning of gross anatomy using both the online quiz in addition to the traditional in-person lab practical. In online assessments, students are presented with a series of photographs each with an anatomical landmark highlighted. They may use a word bank, or memory, to correctly identify the landmark. The quiz is time-limited so as to minimize the opportunity to look up answers. During in-person assessments students are presented with a specimen with an anatomical landmark indicated. They must recall from memory (without the use of a word bank) the correct name of the indicated landmark. This has been the traditional mode of assessment in face-to-face anatomy labs. How do these two alternative assessment methods compare? In 2023 I used a paired t-test to compare individual student scores for matched online and in-person assessments. On average, students were able to correctly identify anatomical structures with nearly 90% accuracy when provided a word bank (i.e. in an online assessment). Their success rate falls to about 75% accuracy when asked to recall the name of structures from memory (without a word bank in an in-person context). Statistically, students have a significantly ($p < 0.0001$) harder time recalling the names of anatomical structures from memory and are much more successful at correctly identifying a structure when allowed to choose from a word bank. It's clear that recognition is easier than identification from recall. Both skills are necessary for workers in the allied health professions and therefore are important for us to develop in our programs's students. As a result of this analysis I have adjusted how I weigh the different assessment methods in my course and am experimenting with ways of improving student recall skills.

10 PLO Assessment

Describe your program's Program Learning Outcomes assessment plan using your Program/Department's Three Year Assessment Plan Summarize the major findings of your PLO assessments. What are some improvements that have been, or can be, implemented as a result of PLO assessment?

PLO assessments have gone very well for the last couple of years, using appropriately mapped SLOs from our Majors courses in Biology and Health Sciences as our major sources of evaluation. So far, we have had great success meeting our PLO Standards – Scientific Method/Data Analysis, Structure-Function Relationships in Biology, and Critical Evaluation of the Impact of Biological Information. We have focused our evaluations on the core Biology Majors courses, BIOL 230: Cell & Molecular Biology and BIOL 225: Organismal Biology (and one look at an Allied-Health focused course, BIOL 240: General Microbiology).

In general, students show good competency in all areas, with notably more mixed results discussing molecular and cellular structure and function relationships on exam essays. Students do reasonably well at this, but not always quite up to the standard (75% success, vs. actual success rates closer to 70%) that we

Program Review

aspire to reach. For this standard, a notable difference from evaluation of the other standards is that it is evaluated regularly on the first exam of the semester. Historically, many students struggle most with the first exam as they are still adjusting to the rigor and new material of the demanding course. We will plan to evaluate this PLO again later in the semester in future terms – perhaps on the Final Exam.

Students are VERY successful on Scientific Method/Data Analysis, recently showing 85% scoring 80% or higher on designing, explaining, and analyzing data on lab reports. This is a very high level and success rate at reaching proficiency at this task! **PLO data doesn't yet map directly from our SLO data yet, so we don't have recent direct input of student success on PLO #3: Evaluation of Information. This will need to be updated soon. In addition, it will be interesting to look at SLO/PLO success across all areas of our Program: Majors, Nonmajors, and Allied Health majors. We have not formally done this yet.**

Finally, in planning for the future, we are currently in very active discussions about potential state requirements for common course numbering, common course titles, and possibly even common course prerequisites across state college curricula in California. This October, 2024, the head Biology 230 instructors from all three SMCCD Colleges have been having active discussions and an upcoming formal meeting in November to try and fully align prerequisites across the three colleges. Our goal is to ensure that students are properly prepared to take this rigorous course, while still giving them equitable access to courses towards timely matriculation and completion of their degrees. We hope that we can come to a consensus that is supported by student success data, without over-complicating their path to successful completion of the program.

Looking Ahead

11. Planning for the future is an important part of Program Review. This is your opportunity to identify new directions for growth and improve your program. Based on your analysis of the data and your responses to the questions above, identify specific and measurable goals and action plans for achieving those goals. Consider goals such as, but not limited to: updating curriculum, closing equity gaps, responding to student and community needs, etc. Please enter your response in the textbox below

Looking ahead, we hope to develop a proposal to IPC for a program coordinator with 0.2 FTE reassigned time. This person would be responsible for Coordinate PLOS and SLO mapping and assessment. They would also help in communicating with adjunct faculty about programmatic changes and needs. This person would also be responsible for coordinating with groups on campus such as UMOJA, PUENTE, EAPC, MESA and STAR to help implement interventions to address our success gaps. Lastly, as a department we plan to continue to discuss what we are trying in our classrooms to address equity gaps.

Next Step: If your program is requesting resources, please go to "STEP 2: Resource Request (OPTIONAL)" and submit your specific requests there. Otherwise, this is the last prompt in the comprehensive program review form.

Supporting Information

Non-Personnel Item (2024 - 2025)

Requested Year

2024 - 2025

Program Requesting Resources

Biological Sciences

Item Requested

Refrigerated High Speed Centrifuge with rotors and adapters for multiple 50ml and 15ml samples tubes.

Item Description

There are 4 parts: The Centrifuge itself, which is HIGHLY discounted in the offer, to us, including necessary rotors (1) and adapters (2 types) which they are including for FREE!!

1.) 1 EA 75009261 SORVALL X1R PRO-MD 120 V 11,005.00 11,005.00
Thermo Scientific Thermo Scientific Sorvall X1R Pro-MD, 120 V 10 %, 60 Hz, Model: IVD certified, Voltage: 120 V, Capacity: 4 x 400 mL with TX-400 rotor, Max. RCF: 25830 xg with Microliter 30 x 2 rotor, Max. Speed: 15200 rpm with Microliter 30 x 2 rotor, Product Line: general purpose centrifuge
Vendor Catalog # 75009261
This item is being sold as 1 per each

(Note that there is an optional EXTENDED WARRANTY for \$1312.00: Optional extended warranty below available to purchase per unit: | 13 100 732 EXT WARRANTY GP CENT CW SPDVAC)

2.) 75003663 F15-8X50C FIBERLITE ROTOR N/C N/C
Thermo Scientific Fiberlite F15-8 x 50cy Fixed Angle Rotor, For Use With: Thermo Scientific Sorval Legend T Plus and Multifuge 3 Plus Centrifuges, Capacity: 8 x 50mL, Max. Speed: 12,000rpm, Max. RCF: 16,743 x g, Angle: 25 deg.
Vendor Catalog # 75003663
This item is being sold as 1 per each

3.) 0100377 ADPT 50ML CON TO 50ML PK/2 N/C N/C
Thermo Scientific 50mL Nalgene Oak Ridge Tube Adapter, For Use With: Fiberlite F13-14x50cy, Fiberlite F15-8x50cy rotors, Description: 50mL Nalgene Oak Ridge Tube Adapter
Vendor Catalog # 010-0377
This item is being sold as 2 each per pack

4.) 75100378 ADPT 50 TO 15ML CONICAL 2/PK N/C N/C
Thermo Scientific Fiberlite Rotor Adapters, Description: Adapter for 15mL conical tubes
Vendor Catalog # 75100378
This item is being sold as 2 each per pack

MERCHANDISE TOTAL 11,005.00

Resource Requests

Estimated Sales Tax 1,086.75

TOTAL 12,091.75 (WITHOUT Extended Warranty!)

NOTES:

DELIVERY: FREE SHIPPING DOCK TO DOCK

****Also NOTE that prices will increase by 5%-10% on January 1 of each upcoming year!!

Program Goals this Request Supports

Maintaining and enhancing our Majors courses, particularly BIOL 230, with necessary equipment to support Lab Experiments that are relevant in modern scientific and biomedical careers.

Status

New Request - Active

Type of Resource

Instructional Expenses (over \$5,000) e.g., equipment

Cost

12,091.75

One-Time or Recurring Cost?

One-time Cost

Critical Question: How does this resource request support closing the equity gap?

Provides all Biological Sciences students with direct access to advanced laboratory equipment at an inexpensive community college and a Biological Sciences program that are both student-focused and equity-focused.

Critical Question: How does this resource request support Latinx and AANAPISI students?

Latinx and AANAPISI students are key members of our Biological Sciences programs, and Latinx students in particular make up a very large portion (ranging from 33% to 57%) of our Biological Sciences and Allied Health Majors.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?

Student Access and/or Success and/or Completion

Which of Cañada College's Strategic Initiatives does this resource request support?

Provide adequate access to technology

Non-Personnel Item (2024 - 2025)

Non-Personnel Item (2024 - 2025)

Requested Year

2024 - 2025

Program Requesting Resources

Biology

Item Requested

Microscope Objective Lenses of Various Magnifications

Resource Requests

Item Description

10 Obj. Achromat 40x/0.65 lenses
10 Obj. Achromat 100x/1.25 oil lenses
10 Plan 40X/0.65 NA, 0.31MM W.D. lenses
10 Plan 100x/1.25 NA, 0.10MM W.D., Oil lenses

Program Goals this Request Supports

This equipment is essential for teaching students laboratory skills and the scientific method. It is also key for teaching students about cellular structures and properties of living things.

Status

New Request - Active

Type of Resource

Instructional Expenses (over \$5,000) e.g., equipment

Cost

6,418.97

One-Time or Recurring Cost?

One-time Cost

Critical Question: How does this resource request support closing the equity gap?

When resources are scarce in educational environments, it is often the most marginalized students who are most impacted. Providing high-quality laboratory educational experiences for each of our students is essential to the goals of our program.

Critical Question: How does this resource request support Latinx and AANAPISI students?

Our program serves many Latinx and AANAPISIS students. This request will ensure that they have access to enough high quality laboratory materials.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?

Student Access and/or Success and/or Completion

Which of Cañada College's Strategic Initiatives does this resource request support?

Support innovative teaching that creates more equitable and antiracist learning environments

Non-Personnel Item (2024 - 2025)

Non-Personnel Item (2024 - 2025)

Requested Year

2024 - 2025

Program Requesting Resources

Biology

Item Requested

Thermo Scientific Owl EasyCast B1A Mini Gel Electrophoresis System
with Buffer Exchange Ports

Item Description

Biology 110 needs four more Gel Electrophoreses Systems. Specifically, Thermo Scientific Owl EasyCast B1A Mini Gel Electrophoresis System with Buffer Exchange Ports, Description: EasyCast w/Buffer exchange ports, Certifications/Compliance: CE marked, Dimensions: 6.31 x 4.13 x 3.75 in. (16 x 10.5 x 9.5 cm), Height: 3.75 in., 9.5 cm, Length: 6.31 in., 16 cm
Vendor Catalog # B1A-BP

11/12/2024

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Resource Requests

Program Goals this Request Supports

This material will allow more students to effectively practice loading gel boxes before they load gels with their actual DNA samples. This will help ensure more students have successful lab results.

Status

New Request - Active

Type of Resource

Instructional Expenses (under \$5,000) e.g., lab supplies, Student Athletic supplies, calculators, etc.

Cost

2,738.52

One-Time or Recurring Cost?

One-time Cost

Critical Question: How does this resource request support closing the equity gap?

Typically students from marginalized backgrounds have less experience in biotechnology lab techniques. Thus having enough materials to allow students to practice will be particularly helpful for underserved students.

Critical Question: How does this resource request support Latinx and AANAPISI students?

A large number of our students are from Latinx and AANAPISI backgrounds. Thus, ensuring we have adequate lab resources helps support their success in our classes.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?

Student Access and/or Success and/or Completion

Which of Cañada College's Strategic Initiatives does this resource request support?

Support innovative teaching that creates more equitable and antiracist learning environments

Non-Personnel Item (2024 - 2025)

Non-Personnel Item (2024 - 2025)

Requested Year

2024 - 2025

Program Requesting Resources

Biology

Item Requested

Autoclave and supporting Equipment

Item Description

1 3870ELP Lab Line, 230V, 3-ph with Free Printer (Autoclave)
1 Stand F/ All 3850 & 3870 Bench
1 Acme Buck/Boost Transformer
1 Chamber Brite
1 Printer Paper For Autoclaves (5 Rolls Per Case)
1 Tape - Autoclave- Chemical Indicator
1 Self-Adhesive Tape/Type 1
1 Freight (LTL)

Program Goals this Request Supports

This equipment ensures that we are able to safely and efficiently process equipment for several courses, in particular microbiology courses.

Status

New Request - Active

Resource Requests

Type of Resource

Non-Instructional Expenses (over \$5,000) e.g., equipment

Cost

23,746.87

One-Time or Recurring Cost?

One-time Cost

Critical Question: How does this resource request support closing the equity gap?

Having adequate laboratory prep equipment ensures that all students have a high quality educational experience. It does this by allowing faculty to create labs that are in line with current laboratory practices and techniques. Helping students have these experiences is part of closing the equity gap.

Critical Question: How does this resource request support Latinx and AANAPISI students?

Many of our students are from Latinx and AANAPISI backgrounds. Providing them with the highest quality equipment and supplies is essential for our program goals.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?

Student Access and/or Success and/or Completion

Which of Cañada College's Strategic Initiatives does this resource request support?

Ensure students (particularly part-time students) experience a sense of belonging and connection to the College that helps them persist and complete

Non-Personnel Item (2024 - 2025)

Non-Personnel Item (2024 - 2025)

Requested Year

2024 - 2025

Program Requesting Resources

Biology - Anatomy

Item Requested

Male and female reproductive system models

Item Description

Male and female pelvis models that include reproductive organs and musculature. We are requesting 2 male models (each \$770) and 2 female models (each \$400).

Vendor: Anatomy Warehouse

Female model: A-112925

Male model: A-112923

Program Goals this Request Supports

Providing modern instructional equipment that supports active engagement and student learning

Status

New Request - Active

Type of Resource

Instructional Expenses (under \$5,000) e.g., lab supplies, Student Athletic supplies, calculators, etc.

Cost

2,400

One-Time or Recurring Cost?

One-time Cost

Resource Requests

Critical Question: How does this resource request support closing the equity gap?

Students learn best when they have hands-on access to instructional materials. Students take turns learning from our models. However we currently have insufficient numbers of models which significantly limits each student's hands-on time. Having additional models may help reduce disproportionate impacts of limited learning time.

Critical Question: How does this resource request support Latinx and AANAPISI students?

Students learn best when they have hands-on access to instructional materials. Students take turns learning from our models. However we currently have insufficient numbers of models which significantly limits each student's hands-on time. Having additional models may help reduce disproportionate impacts of limited learning time.

Map Request to College Goals and Strategic Initiatives

Which of Cañada College's Goals does this resource request support?

Accessible Infrastructure and Innovation

Student Access and/or Success and/or Completion

Which of Cañada College's Strategic Initiatives does this resource request support?

Support innovative teaching that creates more equitable and antiracist learning environments