

Instructional Comprehensive Program Review: 2023-24 Natural Sci Program Review

Cover

Overview

Program Review Year 2024**Title** 2023-24 Natural Sci Program Review**Year of Last Comprehensive Review****Year of Last Mini Update, if applicable****Originator** Hays, Lisa**Area Dean** Antoinette Herrera**Division**

Math, Sci. & Engineering

Department

Biology

Subject

- BIOL - Biology
- ENVIR - Environmental Science
- OCEAN - Oceanography

Is this a review for a degree/certificate or all the courses in the subject?

Degree

- General Studies with Emphasis in Natural Science, Associate in Arts - Active

Co-Contributors

*Co-Contributor must be chosen before proposal is launched

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Overview

Evergreen Valley College guides all students to pathways that reach their educational and career goals through equity-centered, innovative academic programs and support services. By creating a learning environment where everyone feels welcomed and supported, we are committed to a culture of inquiry, growth, and respect that creates an equitable society in which all can participate and prosper.

1.Student-Centered: We provide access to quality and efficient programs and services to ensure student success.

- Access
- Curriculum and programs
- Services

2. Community Engagement: We will transform the college image and enhance partnerships with community, business and educational institutions.

Areas of focus are:

- Increase visibility
- Develop strategic partnerships
- Building campus community

3.Organizational Transformation: We create a trusting environment where everyone is valued and empowered.

Areas of focus are:

- Communication
- Employee development
- Transparent Infrastructure

- **1. Provide a brief summary of your program. Please include a brief history and discuss any factors that been important to the program's development.**

The history of the Natural Science Program reaches back to the beginning of San José Junior College in 1921. Housed on the campus of San José High School, the junior college was the pathway between high school and California's oldest state university: San José State Teacher's College (now San José State University). The junior college offered Natural Science courses where students learned about plants and animals, their environment, and the relationship between them. The college also offered field courses which were an opportunity for students to learn about science in the great outdoors. Natural Science 60 classes were like the BIOL 80 courses of today with small groups of less than 20 students and two faculty leading the courses to various destinations like the California desert, coast and mountains.

In 1953 San José Junior College opened a new campus on Moorpark Avenue. As enrollment increased, so did the Natural Science program. To introduce students to organisms they learned about in textbooks, faculty began to collect a large number of taxidermy birds, mammals and insects. They accepted donations of specimens and legend has it that faculty would pick up roadkill and the department paid to have the animal preserved to add to the collection. Twenty years later, the collection increased to over 300 species and San José City College did not have space to display them all.

The planning of the expansion of the San José Junior College District to the foothills of East San José included a new Biology department with a space dedicated to exhibit the animals in a Natural Science Museum. The museum would be housed in the Acacia building and have floor to ceiling glass display cases along with a space for lectures, meetings, and visitors to learn about the specimens.

Biology faculty were given the option to stay at San José City or move to the “country club” of Evergreen Valley College. The department chair, Lee Papkoff, said he was going to EVC and was taking the museum and field biology program with him. Field course faculty quickly joined him and in 1975, Evergreen Valley College opened with 6 full time faculty, all wanting to teach the field biology courses with the initiation of a brand-new college.

In 2002, the Sequoia building opened with the first floor dedicated to the biology department laboratory courses and a larger Natural Science Museum along with a greenhouse for students/faculty to cultivate plants. It took another 10 years, almost 90 years after San José Junior College opened, for EVC to offer a Natural Science degree for students. In 2012 the Associate in Art (AA) degree was created as a General Studies with an Emphasis in Natural Science. Students in this major take required science courses in plants, ecology, environmental science, marine biology, wildlife biology and astronomy. There is no program like it anywhere in the South Bay Area. The diverse course offerings are a rare opportunity for community college students. Throughout the years, the program has purchased transportation field equipment such as hitches, locks & chains, trailer and shares expenses with the college to maintain such equipment and transportation materials & supplies. This equipment depreciates over time and requires a repurchase every 5-10 years. An assigned field program vehicle with cruise control is the next necessary purchase to support and expand the field program.

The Associates of Arts in General Studies with an Emphasis in Natural Science degree was launched in 2012 under the Biology department. This is the first time that the Institutional Effectiveness Committee has directed the Natural Science Program to write a full, comprehensive program review. The biology department is pleased to share the accomplishments of the Natural Science Program and enlighten the college community about this new degree and the opportunities it provides for our students.

- **2. Please provide an update on the program's progress in achieving the goals (3 years) set during the last comprehensive program review.**

This is the first program review for the Natural Science Program.

Although no goals were officially listed in the past, one of the desires was to hire a full-time faculty member who is devoted to expanding the Natural Sciences field courses. We were fortunate to receive a position from the Faculty Hiring Prioritization committee and last year hired Dr. Adam Green who has started the process of cleaning up, organizing, and prioritizing the needs of the field program. He is leading the department in wilderness first aid, water rescue, and preparing the faculty to be ready for remote emergency situations. With his experience, the program now has 7 field courses completed in the curriculum process: Deserts, Birds and Blossoms, California Coast, Forest and Rivers, Mountains, Cliffs and Canyons, and Volcanoes of California. The class is transformational for many students and after they take one, they want to take them all.

- **3. Please state and recent accomplishments for your program and show how it contribute to the College's mission and success.**

There are two goals set by the college:

- 1) Shorten students' time to educational goal completion

2) Eliminate equity gaps in goal achievement.

Faculty in the Natural Science Program are trying to *eliminate equity gaps in goal achievement* by reducing financial barriers for students with zero cost textbook classes.

Natural Science Faculty are **saving EVC students over \$143,000 per year**

The following courses have adopted free online educational resources:

Environmental Science textbook: 250 students/yr x \$150 = **\$27,500** savings/yr

Human Heredity textbook: 200 students/yr x \$130 = **\$26,000** savings/yr

Marine Biology textbook: 100 students/yr x \$220 = **\$22,000** savings/yr

Marine Biology lab manual: 100 students/yr x \$130 = **\$13,000** savings/yr

Oceanography textbook: 300 students/yr x \$130 = **\$39,000** savings/yr

Wildlife Biology textbook: 80 students/yr x \$200/yr = **\$16,000** savings/yr

One of our associate faculty, Dr. Sara Kappus, received a grant from the EVC Office of the President to write an Ecology textbook that is now shared across the world for free on LibreText. Dr. Kappus spent 2 years writing the textbook.

Ecology textbook: 60 students/yr x \$120 = **\$7,200** in savings/yr

The Educational Master Plan has several key actions to meet the two goals. One action of the Shorten students' time to educational goal completion is to *include more students in early outreach programs and dual enrollment in the underserved communities in East San José*. The Natural Science Program works closely with the dean responsible for Dual Enrollment. During the summer session, the Natural Science Program offers an Environmental Science course specifically for **Dual Enrollment students** from Yerba Buena High School. High school students come to the college on high school buses and spend the morning in lab and lecture class. The dual enrollment class offers an extra day of field trips during the summer with the Environmental Science faculty and assistants from the high school. Students enjoy the college and the outdoor experience.

- **4. If you received resource allocation for your last program review cycle, please indicate the resources you received and how these resources were utilized to impact student success and / or importance to your program. (The resources can be personnel or fiscal)**

The Natural Science Program did not ask for funds in the last review cycle.

- **5. Please describe where you would like your program to be three years from now (program goals) and how these support the college mission, strategic initiatives and student success.**

The Natural Science program fills a critical niche that is becoming increasingly important as we face biodiversity loss, climate change, and the ongoing disconnect between humans and the natural world they depend on. The direct connection between people and the environment this program creates can be a catalyst for a community that supports many of the goals of the college, including ILO's.

Goal 1: Increase the number of awarded degrees in Natural Science. In fall 2022 there were 109 students with a declared major of Natural Science. However, less than 10 graduate with an AA degree each year. Our goal is to increase the number of two-year graduates who have competent knowledge in the natural sciences and can apply concepts across scientific disciplines. Graduates will be able to use science practices necessary for technical literacy. Students will also become environmental educators for all learners, as well as acknowledge and honor the contributions made by historically oppressed individuals that include investigators & researchers in the field of science and education.

Goal 2: Strengthen the BIOL 80 series. Secure the necessary equipment and funding to ensure these courses continue and provide safe and effective field-based experiences. The field-based courses of the Natural Science degree, namely the BIOL 80 series, provide students with experience that no other courses at EVC can provide. These courses bring together students from different backgrounds, generations, and levels of experience, creating an environment of learning and collaboration. Several students are community members who attend classes for enrichment and include our retired neighbors from the Villages. When students immerse themselves in the biology and ecology of a region while camping and hiking together, walking among the plants they are learning, and listening to the dawn chorus of birds as they prepare breakfast, they come together in ways that on-campus and online courses cannot replicate. There are few courses at EVC that students enjoy so much that they contemplate failing simply to allow them to take the course again.

Each course will require approximately \$2500 in ongoing funding each year to cover the cost that students currently pay out of pocket for campsites, trailer rental and park fees, in addition to replacement of camping gear for students, such as tents, sleeping bags, and cooking stoves. This added fee for students of \$100/each is an obstacle for low-income students who are often the ones who could benefit most from the opportunity. The college paying for students who cannot afford to join the class would help meet the Educational Master Plan: Eliminate equity gaps in goal achievement. Although more expensive than other courses, the BIOL 80 series achieves goals for EVC students that other courses cannot and have the potential to generate significant community support.

A logistical challenge is the lack of a dedicated trailer for these courses. The department trailer is locked and stored in parking lot 6 at EVC so police can easily drive by and check it as they make their rounds. During COVID it was stolen. Currently, we must rent a trailer from U-Haul which requires that we arrive early to the college and retrieve the trailer before we can pack. It also requires that we return the trailer after a long day in the field and driving. The rental cost adds another \$300 to the cost of the trip each and every trip. There will be five BIOL 80 courses each year, so this translates to \$1500/year for trailer rental fees alone.

A strong volunteer program associated with these courses will relieve some of the logistics stress on instructors, allowing them to put more energy toward the educational experience and provide more opportunities for community involvement. This requires an efficient and easy-to-follow volunteer approval process that places the approved volunteers under the college's insurance and liability protection.

Goal 3: Make the Sequoia building a hub for biology students interested in natural science. Making the museum more accessible, repairing the greenhouse, and creating a native plant garden provides the physical spaces for gathering, learning, creating, and exploring. Combining this with a growing biology club, an informative department website, and community outreach will attract more students and community support to the program.

The MSE division is developing a science day that will bring students and the community onto campus to explore the MSE programs and learn some fun science. With the above plan in place, we could better host this type of event and showcase our programs to potential students and show the community our commitment to the natural sciences.

Goal 4: Expand the AA, AST, and Certificates offered in the Natural Sciences. EVC has the necessary expertise and the foundational courses to provide AA and AST degrees in Environmental Science and Wildlife Biology, and certificates in Environmental Science technician and Wildlife technician. Nearby UC and CSU programs have strong degrees in these and related fields, and the Bay Area and Central Coast have numerous non-governmental organizations, consulting firms, and state and federal agencies that provide opportunities for graduates.

Goal 5: Support the development of the proposed community museum. A well-designed museum is a great resource for students and our biology courses. The museum would also be a community resource for K-12 educators and families. There could be no better advertisement for EVC science programs. When we provide a location where EVC students and the surrounding community can come together we also create the opportunity for emergent benefits that can provide unique opportunities.

Goal 6: Equity for Students. Currently, students are required to pay an extra fee of \$100-\$150 for the BIOL 080 courses to cover camping and various consumables. The course also requires specialized gear that many students do not own. The cost of the course combined with the necessary gear can be an obstacle for low-income students. The fact that we must pass the cost on to students also limits the activities we can engage in during these trips. A proper level of funding for these unique courses would allow more students to participate and would allow us to add many more engaging activities- i.e., whale watching on Monterey Bay for the Coastal CA course, and river rafting/kayaking for the Forests and Rivers course.

Goal 7: Volunteer Program: Developing a volunteer program for these field-based courses has many benefits for the instructor and the students. Volunteers can assist with some of the logistics pre-trip, during the trip, and post-trip, freeing up time and energy for instructors to do the planning and teaching. Volunteers would be those that have already taken the courses, so they would have experience in the areas we visit and with the course logistics, serving as another resource for students. Additionally, this set of courses attracts many from the community that have specialized skills and experience that is valuable for a field-based class. For example, alumni interested in volunteering currently include a registered nurse and a retired fire captain with years of experience with emergency response, team building, and coordination- someone who also happens to love cooking- an added bonus. A final benefit is that these community members then develop a strong connection with the courses and, by association, EVC. Their support in the community can be beneficial when the college looks to the community to pass a bond measure or raise funds for a critical project. Their presence in the course also creates a multi-generational experience that the younger students greatly enjoy.

Program Set Standards

Overall, EVC's Institution Set Standard for success rate is 72%, and the aspirational goal for student success is 75%.

Success Rate (completion with "C" or better)	Program	EVC	Program Set Standard (established during last comprehensive PR)	Program Success Goal (new)
F'16-F'22 average		72.31%		

Program Success Rate 69.50%

Program Set Standard : It is recommended that programs identify a success standard. This standard should reflect the baseline success rate.

Program Set Standard 62.55%

Recommendation: 90% of the 6 year average success rate could be your program standard (average x 0.9).

Program Success Goal : It is recommended that programs identify a success goal. This goal should reflect the success rate to which your program aspires.

Program Success Goal 71%

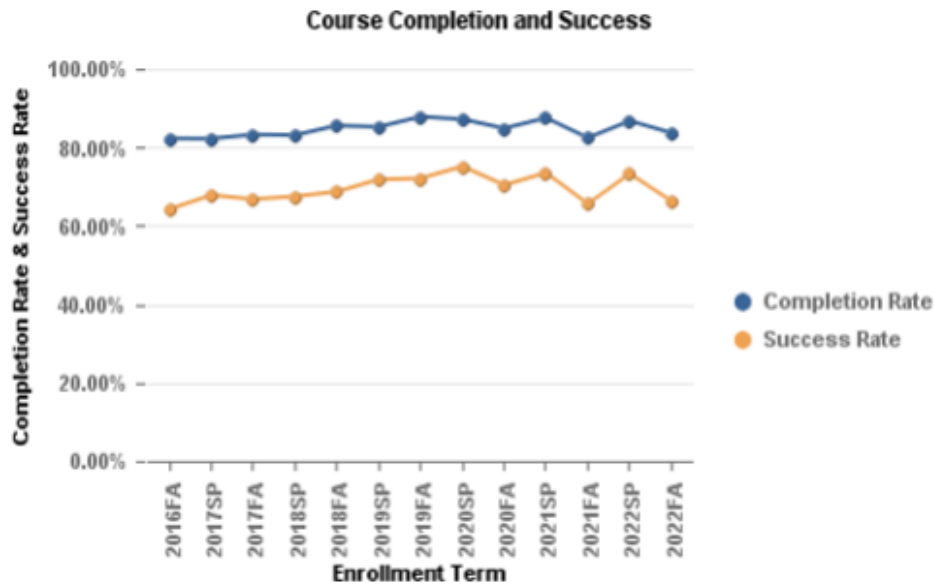
- Is your program success rate higher or lower than the campus?

Our program success rate is 2.81% lower than the campus.

- If your success rate is higher than the campus, how are you helping students succeed in and outside the classroom? If your program success rate is lower, what are some strategies your program is implementing to improve?

Our success rate is currently lower (-2.81%) than the campus success rate. In our department, full-time instructors are working closely with one another and our associate faculty to design course syllabi and schedules for each course. This allows us to standardize our course content and student learning outcome evaluations across different sections of each course and ensure adherence to our course outlines of record. Additionally, our department regularly reviews our Student and Program Learning Outcomes in order to identify and target weaknesses and improve our course and program materials. Our department faculty members also regularly participate in Early Alert in order to identify students who may need additional tutoring or support to be successful in our courses.

Natural Science Degree Course Completion and Success Rates (2016 – 2022):



- Is the current program success rate higher than the program set standard?

Yes, the current program success rate is higher than the program set standard (+6.95%).

- How close is the program to meeting the program success goal?

Our average program success rate is currently lower than our program success goal (-1.5%).

Although our success rate fluctuates from semester to semester, ranging from a low of 64.26% in fall 2016 to a high of 75.18% in spring 2020, our program success rates have generally been increasing, although with greater fluctuation since the pandemic (2020 to 2022). A closer examination of our success rates for this program also revealed a trend of lower success rates in the fall semesters compared to the spring semesters. As most of the courses in this program do not require a prerequisite before enrollment, new students entering the program or college each fall may be new to the rigorous curriculum found in college-level courses.

- Are these measures (program set standard and program success goal) still current/accurate? If not, please describe here and reset the standards.

Yes – the program set standard and program success goal are still current and accurate.

Success Rates: Measures by IPEDs Race/Ethnicity

- American Indian: 91 - 75.500%**

Program Average Total Enrolled

4.000

Program Success Rate

64.840

- Asian: 9182 - 79.970%**

Program Average Total Enrolled

480.000

Program Success Rate

78.110

- **Black or African American: 455 - 61.770%**

Program Average Total Enrolled

28.000

Program Success Rate

60.180

- **Hawaiian/Pacific Islander: 85 - 62.970%**

Program Average Total Enrolled

7.000

Program Success Rate

56.370

- **Latinx: 8952 - 64.890%**

Program Average Total Enrolled

537.000

Program Success Rate

61.860

- **Two or More Races: 609 - 70.560%**

Program Average Total Enrolled

41.000

Program Success Rate

68.950

- **Unknown: 1397 - 72.850%**

Program Average Total Enrolled

72.000

Program Success Rate

68.140

- **White: 1207 - 73.590%**

Program Average Total Enrolled

79.000

Program Success Rate

74.410

Success Rates: Measures by Gender

- **Female: 12034 - 74.070%**

Program Average Total Enrolled

717.000

Program Success Rate

69.110

- **Male: 9868 - 70.160%**

Program Average Total Enrolled

525.000

Program Success Rate

69.980

- **No Value Entered: 76 - 72.420%**

Program Average Total Enrolled

4.000

Program Success Rate

76.680

Success Rates: Measures by Age

- **17 & Below: 791 - 87.140%**

Program Average Total Enrolled

45.000

Program Success Rate

85.290

- **18-24: 14936 - 69.850%**

Program Average Total Enrolled

945.000

Program Success Rate

68.100

- **25-39: 4313 - 75.310%**

Program Average Total Enrolled

217.000

Program Success Rate

70.880

- **40 & Over: 1929 - 78.380%**

Program Average Total Enrolled

38.000

Program Success Rate

76.360

- **Unknown: 11 - 65.690%**

Program Average Total Enrolled

1.000

Program Success Rate

40.000

- a. With respect to disaggregated success rates, list any equity gaps that are identified and discuss interventions your program will implement to address these equity gaps? Please include a timeline of implementation and reassessment.**

An examination of the disaggregated success rates revealed that the majority of the natural science program disaggregated success rates were very similar to or higher than our campus success rates. Student groups that appear to reveal the most significant equity gaps include the following: American Indian students (-10.66%, n=4), Hawaiian/Pacific Islander students (-6.6%, n=7), female students (-4.96%, n=717), and students aged 25-39 (-4.44%, n=217). Recent strategies that have been implemented by some of the courses in this program since the Spring 2023 semester include video-based student discussions, video-based instructor feedback, and discussions framed by the Practical Inquiry Model. These strategies have also been shown in the literature to improve student success rates for underrepresented students in STEM. We will reassess the effectiveness of these learning strategies in closing the equity gaps described above within 2 years (Fall 2025).

- b. With respect to disaggregated success rates (ethnicity / race, gender and age), discuss student performance in reaching your program set standard for student success as well as reaching the program success goal.**

Most of our Natural Science program's disaggregated success rates are much higher (ranging from +2.29% for American Indian students to +22.74% for students ages 17 & below) than our program set standard of 62.55%. Student groups with success rates that are lower than the program set standard for Natural Science include the following: Black or African American students (-2.37%, n=28), Hawaiian/Pacific Islander students (-6.18%, n=7), and Latinx students (-0.69%, n=537). These lower values reflect the current literature on underrepresented students' success rates in STEM, which we hope to address with the new course and strategies described in the previous section.

As our program success goal of 71% is higher (+8.45%) than our program set standard, this means the success rates of the student groups described above are even lower when compared to our program success goal: Black or African American students (-10.82%, n=28), Hawaiian/Pacific Islander students (-14.63%, n=7), and Latinx students (-9.14%, n=537). The higher percentage of the program success goal also reveals notable student performance differences in an additional group: American Indian students are performing at a 6.16% (n=4) lower success rate compared to our program success goal.

- c. If your program offers course sections fully online, please contact the office of Research, Planning and Institutional Effectiveness to obtain a student success report on the online sections. Address any differences in student success rates between fully online courses and classroom courses.**

Analysis of the differences between fully online and face-to-face biology courses for the Natural Sciences Program reveal the following differences for our program when examining average rates from 2016 to 2022:

Average rates from 2016-2022	Fully online biology courses	Face-to-face biology courses
Completion rate	89.00%	87.66%
Success rate	78.65%	74.67%

Our fully online courses have greater completion and success rates compared to our face-to-face courses. A closer examination of the success rates for each semester reveal similar trends: success rates for our online courses were consistently higher than our face-to face courses, even prior to the Covid pandemic.

Although a review of the current educational literature regarding online learning suggests that success rates tend to be higher in face-to-face courses, we believe our high online success rates are due to the training our faculty have completed through the online teaching courses offered to our instructors, including EVC's EDIT courses, as well as courses offered through the California Virtual Campus @ONE program.

We have continued to offer an online curriculum that is as interactive and rigorous as our face-to-face courses by incorporating multimedia content and maintaining the contact hours critical to student success in online courses.

Program Awards - If Applicable

If the classes in your program lead to a degree or certificate, please visit the DataMart and indicate how many degrees/certificates were awarded in your program:

**http://datamart.cccco.edu/Outcomes/Program_Awards.aspx
(http://datamart.cccco.edu/Outcomes/Program_Awards.aspx)**

You will need to select drop down menus and then “select program type by major of study” (for example, select Legal for paralegal studies).

Then at the bottom of the report, select the box “program type- four digits TOP”, then update report to get program specific information.

Degree Type

- **AA**

Number of Awards (Examine 2018-19, 2019-20 data, 2020-21 data and 2021-22 data)

12

Discussion

The number of AA awards for this program in recent years is listed as follows:

2018-2019: 1 award

2019-2020: 4 awards

2020-2021: 2 awards

2021-2022: 5 awards

The total awards between 2018 and 2022 is 12.

The faculty in the Biology department are working overtime to attend outreach and recruitment events to advertise this degree. So far in 2023-24, we have attended the following events:

- First Year Experience
- Summer Evening on the Green
- Transfer Day
- Biology department open house first week of each semester

- Spooktackular
- Spring Day on Green
- UC Davis transfer day
- TECH museum Teen week

The department is also working towards increasing degrees awarded with the \$10,000 Biology NSF scholarship as well as "Head Smart into the Sciences" to guide students towards graduation and transfer.

Student Enrollment Types

Student Enrollment Type: Day or Evening Student

- **Day: 4505 - 50.500%**
Program Average Headcount
605.000
Program Percentage of Total
52.410
- **Day & Evening: 2656 - 29.800%**
Program Average Headcount
431.000
Program Percentage of Total
37.270
- **Evening: 951 - 10.700%**
Program Average Headcount
72.000
Program Percentage of Total
6.200
- **Unknown: 807 - 9.000%**
Program Average Headcount
45.000
Program Percentage of Total
4.110

Student Enrollment Type: Academic Load

- **Full Time: 2919 - 32.700%**
Program Average Headcount
580.000
Program Percentage of Total
50.310
- **Half Time or less than half time: 5843 - 65.500%**
Program Average Headcount

281.000

Program Percentage of Total

24.330

- **a. Discuss any changes in program enrollment types (day vs evening, full-time vs part-time) since your last program review?**

It is difficult to make a direct comparison as the last program review did not disaggregate the various biology programs data. Across all biology programs, since our last program review, we have served significantly more daytime students (an average of 390 students F11-F16 compared to an average of 590 students F16-F22) and a slight decrease in day & evening (434 students F11-F16 compared to 402 students F16-F22) and evening students (41.2 F11-F16 compared to 57 students F16-F22). Overall, the biology program serves more daytime students and fewer evening students compared to the rest of EVC. This holds true for the Natural Science degree program which also serves predominantly day students, followed by day and evening students.

- **b. Discuss how do your program enrollments (Pct of total) compare to EVC?**

During the last program review, the biology department had an average headcount of 400.9 (46.3%) full time students and 229.7 (26.5%) half time or less students. Since then, we have served approximately the same total number of full-time students (438) despite the growth of our program, meaning the overall percentage of full-time students has decreased (44.3%). On the other hand, we have significantly more half-time or less than half time students (534 on average, 54.1%). However, the Natural Science degree has a greater percentage of full-time students (50.31%) and a lower percentage of half time or less than half time students (24.33%). Compared to EVC on a whole, the Natural Sciences program has a much higher percentage of full-time students (50.31% vs. 32.7% EVC-wide), and a lower percentage of half time or less than half time students (Natural Sciences = 24.33% while EVC = 65.5%).

- **c. Based on the data, would you recommend any changes?**

Compared to the rest of the campus, our Natural Sciences students are much more likely to be full-time day only students. This suggests that these students are less likely to hold full-time jobs or be caregivers. Since these students are mostly full-time, we may want to re-evaluate the Natural Sciences program map and class schedules to ensure that the required courses are not scheduled with conflicting times so that students who are full-time can graduate on time.

Student Demographics - Headcount

Student Demographic: Gender

- **Female: 4914 - 55.170%**

Program Headcount

666.000

Program Percentage of Total

57.730

- **Male: 3965 - 44.400%**

Program Headcount

483.000

Program Percentage of Total

41.920

- **No Value Entered: 38 - 0.430%**

Program Headcount

4.000

Program Percentage of Total

0.340

Student Demographic: Age

- **17 & Below: 517 - 5.810%**

Program Headcount

42.000

Program Percentage of Total

3.660

- **18-24: 5364 - 60.090%**

Program Headcount

874.000

Program Percentage of Total

75.750

- **25-39: 2101 - 23.600%**

Program Headcount

202.000

Program Percentage of Total

17.460

- **40 & Over: 931 - 10.440%**

Program Headcount

36.000

Program Percentage of Total

3.090

- **Unknown: 6 - 0.060%**

Program Headcount

1.000

Program Percentage of Total

0.110

Student Demographic: Race/Ethnicity (IPEDs Classification)

- **American Indian: 35 - 0.390%**
Program Headcount
4.000
Program Percentage of Total
0.350
- **Asian: 3634 - 40.800%**
Program Headcount
443.000
Program Percentage of Total
38.470
- **Black or African American: 205 - 2.310%**
Program Headcount
26.000
Program Percentage of Total
2.240
- **Hawaiian/Pacific Islander: 33 - 0.360%**
Program Headcount
6.000
Program Percentage of Total
0.500
- **Latinx: 3608 - 40.490%**
Program Headcount
499.000
Program Percentage of Total
43.290
- **Two or More Races: 248 - 2.800%**
Program Headcount
37.000
Program Percentage of Total
3.170
- **Unknown: 598 - 6.590%**
Program Headcount
67.000
Program Percentage of Total
5.770
- **White: 556 - 6.260%**
Program Headcount
73.000

Program Percentage of Total

6.250

- a. Based on the program total headcount and percent change year to year, discuss if your program growing or declining. If so, what do you attribute these changes in enrollment to and what changes will the program implement to address them?**

This is the first program review for the Associate in Arts Degree program in General Studies with Emphasis in Natural Science. The data above is based on student enrollment in Astronomy, Biology, Chemistry, Environmental Science, Oceanography and Physics.

Enrollment in the program has been greatly impacted by Covid pandemic as is the case for the entire college.

Prior to the pandemic, with the exception of Spring 2018 (-5.42%), enrollment in the Natural Science Program was growing every semester at about 4% since Spring 2017. Even in Fall 2020 during the lockdown, student enrollment increased though only by 0.23%.

However, student enrollment began to drop beginning with Spring 2021(-2.15%, during lockdown), and continued dropping the following semester, Fall 2021(-9.72%). This coincides with both Physics and Astronomy offering fully in-person labs for the first time after the lockdown while Chemistry and Biology had piloted hybrid labs, with 50% of the lab sessions taking place in-person at 50% capacity and 50% of the lab sessions taking place online (through simulations). The steepest drop in enrollment in this program occurred in Spring 2022 (-34.99%).

This decrease may be attributed to confusion and uncertainties for students who had grown accustomed to online teaching and online exams, as had been the practice during lockdown. The program's decrease in enrollment is consistent with overall decreased enrollment at the college.

As of Fall 2022, the Natural Science program has experienced a 20.56% increase in enrollment, a significant recovery which coincides with a significant recovery in the Biology Health Science programs as well. This increase may be attributed to a resumed confidence felt by students and faculty members alike in the return of some normalcy after having experienced ever-changing course-offering and exams modalities, inconsistencies in faculty members' expectations of students, and overall anxiety and confusion associated with the pandemic.

- b. Discuss any gaps have you identified in your program. Discuss how your program enrollment is similar or different from the campus. Discuss which gender, age, and/or ethnic group are proportionally smaller than campus make up.**

Female students make up the majority of students enrolled in the Natural Science program (57.73%), as well as of the campus more generally (55.16%). The majority of students in the program are ages 18-24 (75.75%), as is the case for the campus overall (60.11%). The percentage of Latinx (43.29% %) students enrolled in the program is higher than the percentage enrolled at EVC overall (40.50%). However, Asian students make up 38.47% of the enrollment in the program, compared to 40.79% for the campus.

The American Indian, African American, Hawaiian/Pacific Islander and white student population headcounts in the program are significantly lower than the Asian and Latinx student populations, which is consistent with overall EVC enrollment rates.

- **c. Discuss what interventions the program can implement to address any gaps in enrollment.**

As indicated in Section (b), enrollment in the Natural Science program among Asian students has been lower than that of enrollment at the college overall, and it needs to be improved. Additionally, while enrollment rates of other diverse groups in the program are comparable to those of the college overall, such enrollment needs to grow. Furthermore, there is a gap between the female and male student populations enrolled in both Natural Science program courses and at the college overall, and the disparity should be addressed.

This gap may be due to insufficient outreach from EVC to encourage Asian students to enroll in courses such as astronomy, oceanography, environmental biology, etc. and pursue careers in Natural Science. The gap may be ameliorated through greater outreach to Asian students enrolled at EVC and to prospective students from local high schools.

A significant challenge for the program is the absence of a building devoted to Biological Sciences. Program growth and expansion requires physical space and funding.

EVC's Strategic Initiatives emphasize "building campus community" and "transparent infrastructure", access to quality and efficient programs", "increased visibility" and promise to "transform the college image and enhance partnerships with community and educational institutions." These goals may be furthered through the establishment of a student center within a Biological Sciences building where we could organize speaker events and invite speakers from local educational institutions and biotech companies in order to introduce students to future employment options within the field. We could hold outreach events to improve enrollment for underrepresented populations. In addition to serving as a learning environment, the Biological Sciences building would be a place where those with common interests and career goals in the field could gather, exchange ideas, and build community.

The EVC Educational Master Plan states that EVC is "committed to a culture of inquiry, growth, and respect that creates an equitable society in which all can participate and prosper." The Educational Master Plan aims to "shorten students' time to educational goal completion" by "investing in innovations and technology", and to "eliminate the Equity Gaps in Goal Achievement" by "including more students in early outreach programs in the underserved communities in East San Jose."

Most of our students are from underserved communities in East San Jose. Many are first-generation college students. Many are struggling economically. Many are also increasingly unprepared for college. The time to interest them about science is from K-12. EVC could be where K-12 students and their families could go to learn about the local fauna and flora, sustainability practices, effects of climate change on our local ecosystem, and stars and planets, and to attend science workshops and exhibitions. EVC could be the place to plant the first seeds in the minds of children to get them excited about science, to feel that they belong to a greater community, and to spark their interest in pursuing careers in science. EVC could support the expansion of our current Museum of Natural Science and our vision of creating a Museum of Science and Art to serve our students and the community.

Institutional Effectiveness (6.5 year average)

EVC Capacity: 61.69% EVC Productivity: 14.27

Program Capacity

77.86%

Program Productivity

18.45

Is your capacity rate higher or lower then the campus?

Our average capacity rate is 16.17% higher than the campus.

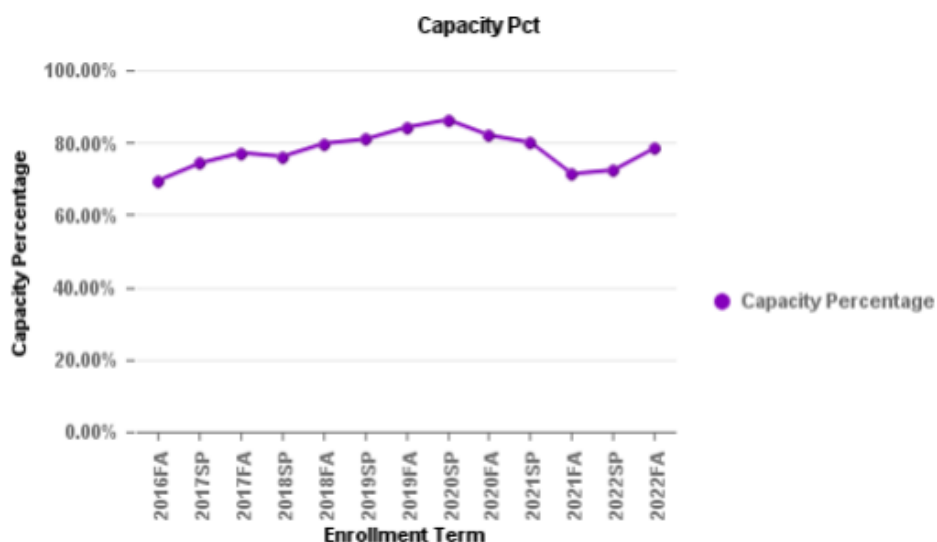
Is your productivity goal higher or lower than the campus?

Our average productivity goal is 4.17 points higher than the campus.

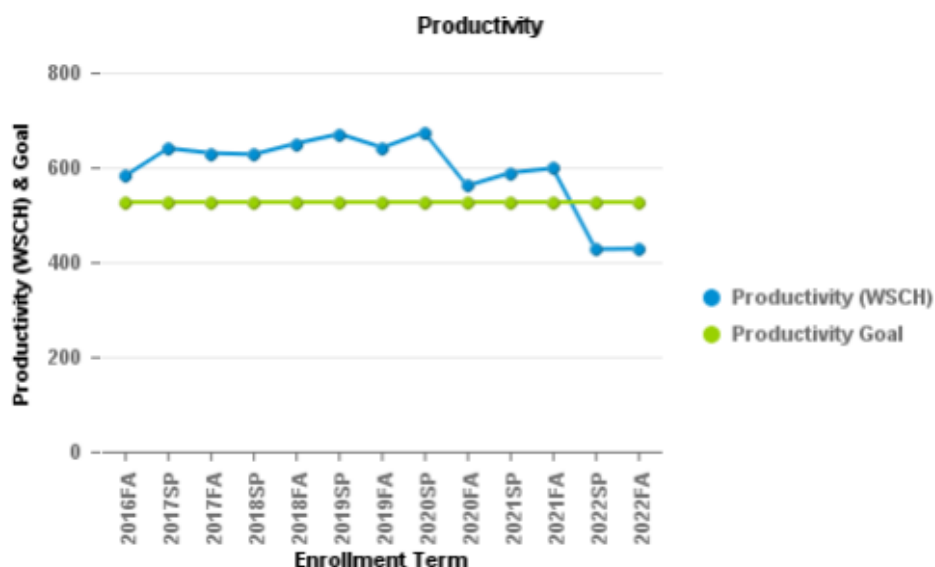
If the program capacity and/or productivity is lower than the campus, please provide rationale

Our average program capacity and productivity are both higher than the campus values (2016 – 2022):

- Capacity percentage at census date in the past 5 years (2016 – 2022):



- Program productivity vs EVC goal for the past 5 years (2016 – 2022):



Curriculum

Related Assessments

ASTRO 010 - Introduction to Astronomy Spr 2021- Created: 10/14/2021 New Section Level SLO Assessment
Report Originator: Celso Batalha (/Form/Module/Index/1552)

Associate in Arts Degree program in General Studies with Emphasis in Natural Science - Created: 09/15/2023
New PLO Assessment Report Originator: Adam Green (/Form/Module/Index/3864)

ASTRO 10 - SPR 22- Created: 02/27/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2293)

ASTRO 010 - SPR 22- Created: 02/27/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2294)

ASTRO 10asy spr23- Created: 08/26/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/3688)

ASTRO 10 - FA23- Created: 12/20/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5189)

ASTRO 010 SPR23- Created: 08/24/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/3655)

ASTRO 010 - Introduction to Astronomy Spr 2021- Created: 10/19/2021 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/1646)

Astro 10- Created: 12/31/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2073)

Astro 10- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2609)

Astro 10 (online)- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2610)

ASTRO 10L - SPR 22- Created: 06/09/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2622)

ASTRO 10L - FA23- Created: 12/20/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5191)

Astro 10L- Created: 12/31/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2075)

Astro 10L- Created: 08/28/2023 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/3704)

Astro 10L- Created: 08/28/2023 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/3705)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1810)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1811)

Biol 021 Spring 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1812)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1813)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1814)

Biol 021 Fall 2021- Created: 11/08/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1821)

Biol 021 Fall 2021- Created: 11/06/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1805)

BIOL 062 Plants- Created: 09/04/2023 New Section Level SLO Assessment Report Originator: Lisa Hays (/Form/Module/Index/3736)

BIOL 063- Created: 10/23/2023 New Section Level SLO Assessment Report Originator: Sara Kappus (/Form/Module/Index/5047)

BIOL 063 Spring 2021- Created: 11/05/2021 New Section Level SLO Assessment Report Originator: Sara Kappus (/Form/Module/Index/1799)

064 Marine Biology- Created: 09/12/2023 New Section Level SLO Assessment Report Originator: Darcy Ernst (/Form/Module/Index/3801)

BIO 064- Created: 09/15/2023 New Section Level SLO Assessment Report Originator: Karen Moody (/Form/Module/Index/3866)

Wildlife Biology- Created: 09/15/2023 New Section Level SLO Assessment Report Originator: Karen Moody (/Form/Module/Index/3882)

BIOL 080D Death Valley I24- Created: 02/29/2024 New Section Level SLO Assessment Report Originator: Lisa Pang (/Form/Module/Index/5320)

CHEM 015 SP 2021- Created: 01/12/2022 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/2128)

CHEM 015 FA 2021- Created: 01/28/2022 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/2192)

CHEM 015 FA 2023- Created: 03/15/2024 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/5412)

CHEM 015 SP 2021- Created: 01/12/2022 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/2127)

CHEM 030A- Created: 03/01/2024 New Section Level SLO Assessment Report Originator: Charles Chau (/Form/Module/Index/5348)

Environmental Science 10- Created: 02/28/2024 New Section Level SLO Assessment Report Originator: Alfred Gonzalez (/Form/Module/Index/5310)

ENVIR 010 Fall 2021- Created: 11/09/2021 New Section Level SLO Assessment Report Originator: Alfred Gonzalez (/Form/Module/Index/1828)

Ocean fall 2023 data- Created: 02/28/2024 New Section Level SLO Assessment Report Originator: Lisa Hays (/Form/Module/Index/5313)

PHYS 02A- Created: 12/31/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5214)

PHYS 02A - Fa23_new- Created: 01/01/2024 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5220)

PHYS 2A f23- Created: 03/15/2024 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5406)

PHYS 2A - spr23- Created: 08/26/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/3689)

Phys 2A- Created: 01/01/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2077)

Phys 2A- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2602)

Phys 2A- Created: 10/20/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/1667)

Courses in the program

ASTRO 010 - Introduction to Astronomy - Active. Implemented on Jan 6 2021 12:00AM (/Form/Course/index/3858)

CHEM 015 - Fundamentals of Chemistry - Active. Implemented on Feb 3 2021 12:00AM (/Form/Course/index/3986)

ENVIR 010 - Environmental Science - Active. Implemented on Jan 11 2021 12:00AM (/Form/Course/index/3901)

OCEAN 010 - Descriptive Oceanography - Active. Implemented on Feb 24 2023 12:00AM
 (/Form/Course/index/5186)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Active. Implemented on Mar 7 2022 12:00AM
 (/Form/Course/index/3784)

ASTRO 010L - Introductory Astronomy Lab - Active. Implemented on Feb 24 2022 12:00AM
 (/Form/Course/index/3859)

BIOL 062 - Plants and Human Welfare - Active. Implemented on Feb 24 2023 12:00AM
 (/Form/Course/index/5185)

BIOL 064 - Marine Biology - Active. Implemented on Feb 28 2023 12:00AM (/Form/Course/index/4873)

BIOL 065 - Wildlife Biology - Active. Implemented on Mar 16 2023 12:00AM (/Form/Course/index/4374)

ENVIR 010 - Environmental Science - Active. Implemented on Jan 11 2021 12:00AM
 (/Form/Course/index/3901)

BIOL 063 - Ecology - Active. Implemented on Jan 11 2021 12:00AM (/Form/Course/index/3911)

BIOL 021 - General Biology - Active. Implemented on Sep 27 2021 12:00AM (/Form/Course/index/4476)

BIOL 080C - Field Biology - Coastal California - Active. Implemented on Sep 25 2023 12:00AM
 (/Form/Course/index/5300)

BIOL 080D - Field Biology - Desert and Dunes - Active. Implemented on Sep 25 2023 12:00AM
 (/Form/Course/index/5301)

BIOL 080F - Field Biology - Forest and River Ecology - Active. Implemented on Sep 26 2023 12:00AM
 (/Form/Course/index/5302)

BIOL 080G - Field Biology - Volcanoes of California - Active. Implemented on Oct 16 2023 12:00AM
 (/Form/Course/index/5303)

CHEM 030A - Introduction to Chemistry - Active. Implemented on Feb 27 2023 12:00AM
 (/Form/Course/index/5182)

- 1. Identify and updates to curriculum since the last comprehensive program review, including and new programs and indicate the 6-year timeline for scheduled course outline revision. For CTE, the time line is 2 year.

In the table below (Table B.1.a) are identified all the courses offered by the Biology Department. The data are currently found in the EVC CurriQunet curriculum database. This is a new program review. Courses with "Need..." in the "next review date" column are awaiting the last step of approval for implementation. Please note that the next review date is approximately two years in the future, to take into account the time needed for departmental review of the course outlines and to allow for the course outlines to move through the curriculum process. The impending implementation of scheduling courses for the entire academic year necessitates shortening the time between revisions to ensure the courses offered are continuously up-to-date.

Table B.1a. List of active courses offered by the Biology Department

Course Number	Course Title	Last Revision Date/ Implement Date	Next Review Date
BIOL 004A	General Principles and Cell Biology	05/26/2023	2024-25
BIOL 004B	Organismal Biology and Biodiversity	05/26/2023	2024-25
BIOL 014	Head Smart into the Sciences	01/28/2022	2024-25
BIOL 020	Human Biology	10/19/2021	2024-25

BIOL 021	General Biology	09/27/2021	2024-25
BIOL 061	Human Heredity	03/16/2023	2024-25
BIOL 062	Plants and Human Welfare	02/23/2023	2024-25
BIOL 063	Ecology: Connections of Life, Environment and Humans	03/10/2023	Need draft implement
BIOL 064	Marine Biology	02/28/2023	2024-25
BIOL 065	Wildlife Biology	03/16/2023	2024-25
BIOL 071	Human Anatomy	09/27/2022	2024-25
BIOL 072	Human Physiology	03/21/2023	2024-25
BIOL 074	General Microbiology	09/27/2022	2024-25
BIOL 080A	Field Biology – Canyons and Cliffs	05/16/2023	Need draft implement
BIOL 080B	Field Biology – Birds and Blooms	10/12/2023	Need VP approval
BIOL 080C	Field Biology – Coastal California	09/25/2023	2024-25
BIOL 080D	Field Biology – Desert and Dunes	09/25/2023	2024-25
BIOL 080E	Field Biology – Mountains	05/16/2023	Need draft implement
BIOL 080F	Field Biology – Forest and River Ecology	09/26/2023	2024-25
BIOL 080G	Field Biology – Volcanoes of California	03/10/2023	Need draft implement
BIOL 098	Directed Study in Biology	09/27/2023	2024-25
ENVIR 010	Environmental Science	01/11/2021	2024-25
OCEAN 010	Descriptive Oceanography	02/23/2023	2024-25

Compiled by Lisa Pang on 10/15/2023

The following table (Table B.1b) identifies the programs associated with the Biology Department. The data are currently found in the EVC CurriQunet curriculum database.

Please note that the next review date is approximately two years in the future, to take into account the time needed departmental review of the program outlines and to allow for the program outlines to move through the curriculum process. The impending implementation of scheduling courses for the entire academic year necessitates shortening the time between revisions to ensure the programs offered are continuously up-to-date.

Table B.1b. Degree programs offered by the Biology Department

Degree Program	Program Title	Last Revision Date/ Implement Date	Next Review Date
AA	Biology	Implemented 06/22/2022 (State control number 18991)	Fall 2024
AA	General Studies with Emphasis in Health Science	Implemented 06/22/2022 (State control number 18693)	Fall 2024
AA	General Studies with Emphasis in Natural Science	Implemented 06/22/2022 (State control number 18695)	Fall 2024
AS-T	Biology	Implemented 02/01/2023 (State control number 35478)	Spring 2025

Compiled by Lisa Pang on 10/15/2023

- 2. Identify all the courses offered in the program and describe how these courses remain relevant in the discipline. For courses your program has not offered in the past two years, please discuss a plan on how to deal with these courses (if your program is not going to deactivate these courses, please explain why).**

Table B.2a. Courses offered by the Biology Department with descriptions of relevancy

Course Number	Course Title	Relevancy in the discipline and real life experiences
BIOL 014	Head Smart Into the Sciences	AA/AS applicable; transfers to CSU and UC
BIOL 021	General Biology	Fulfills requirement for GE science with lab (life science); prerequisite course for BIOL 071
BIOL 061	Human Heredity	Fulfills requirement for GE science (life science)
BIOL 062	Plants and Human Welfare	Fulfills requirement for GE science (life science)
BIOL 063	Ecology	Fulfills requirement for GE science (life science)
BIOL 064	Marine Biology	Fulfills requirement for GE science with lab (life science)
BIOL 065	Wildlife Biology	Fulfills requirement for GE science (life sci)
BIOL 080A	Field Biology – Canyons and Cliffs	AA/AS applicable; transfers to CSU and UC
BIOL 080B	Field Biology – Birds and Blooms	AA/AS applicable; transfers to CSU and UC
BIOL 080C	Field Biology – Coastal California	AA/AS applicable; transfers to CSU and UC
BIOL 080D	Field Biology – Death Valley National Park	AA/AS applicable; transfers to CSU and UC

BIOL 080E	Field Biology – Mountains	AA/AS applicable; transfers to CSU and UC
BIOL 080F	Field Biology – Forest and River Ecology	AA/AS applicable; transfers to CSU and UC
BIOL 080G	Field Biology – Volcanic Northern California	AA/AS applicable; transfers to CSU and UC
BIOL 098	Directed Study in Biology	AA/AS applicable; transfers to CSU and UC
ENVIR 010	Environmental Science	Fulfills requirement for GE science with lab (life science or physical science)
OCEAN 010	Descriptive Oceanography	Fulfills requirement for GE science (life science or physical science)

Compiled by Darcy Ernst on 10/18/2023

The next table (Table B.2b) summarizes the frequency and time of course offerings by semester (fall, spring, summer) and time of day (day, evening, weekend).

Table B.2b. Frequency and time of course offerings

Course Number	Course Title	Frequency of Offering	Time of Offering
BIOL 014	Head Smart Into the Sciences	Fall, spring	Day
BIOL 021	General Biology	Summer, fall, spring	Day, evening
BIOL 061	Human Heredity	Summer, fall, spring	Online
BIOL 062	Plants and Human Welfare	Summer, fall, spring	Day, evening
BIOL 063	Ecology	Summer, fall, spring	Online
BIOL 064	Marine Biology	Fall, spring	Day
BIOL 065	Wildlife Biology	Summer, fall, spring	Online
BIOL 080A	Field Biology – Canyons and Cliffs	Spring	Day, evening, weekend
BIOL 080B	Field Biology – Birds and Blooms	Spring	Day, evening, weekend
BIOL 080C	Field Biology – Coastal California	Fall	Day, evening, weekend

BIOL 080D	Field Biology – Death Valley National Park	Intercession	Day, evening, weekend
BIOL 080E	Field Biology – Mountains	Summer	Day, evening, weekend
BIOL 080F	Field Biology – Forest and River Ecology	Spring	Day, evening, weekend
BIOL 080G	Field Biology – Volcanic Northern California	Summer	Day, evening, weekend
BIOL 098	Directed Study in Biology	Fall, spring	Day
ENVIR 010	Environmental Science	Summer, fall, spring	Online
OCEAN 010	Descriptive Oceanography	Summer, fall, spring	Online

Compiled by Darcy Ernst on 10/18/2023

BIOL 080A, 080B, 080E, and BIOL 098 are new curriculum, either waiting for implementation (Bio 80s) or will be offered starting Spring 2024 (BIOL 098).

- **3. If you have a degree or certificate, please include a diagram of your program's guided pathways program map. (A program map indicates courses suggested for each semester, across two years, upon completion a student would qualify for a degree/certificate).**

Table B.3a AA General Studies with an Emphasis in Natural Science (60.0 Units)

Fall Term 1	Spring Term 2	Fall Term 3	Spring Term 4
Chem 15	Bio 21	Bio 80G	Envir 10
Math 21	Bio 62	Area C	Bio 63
Eng 1A	Area C2	US History (2 classes)	Bio 80C, 80F
Area C1	Area A1	Area A3	Area F
	Bio 80D, Physical Activity	Area E	Ocean 10

- **4. Identify and describe innovative strategies or pedagogy your department/program developed/offered to maximize student learning and success. How did they impact student learning and success?**

Over the past few years biology faculty have been curating, implementing, and creating open educational resources (OER) for use in our courses. Overall, the goal is to give students free, high quality resources for use in their courses. Reducing financial barriers for students improves student

learning and success; they can spend less time working outside the classroom to pay for classroom materials, thus spending more time on their studies, and free materials reduces student withdrawal from courses, improving student success.

Several courses in biology have adopted existing OER resources (Biol 21, Biol 4A, Biol 4B), several other courses have faculty that have created free materials for students (Biol 71, Biol 21), and several faculty applications for creation of OER have been funded by the office of the president over the last two years. An Ecology (Biol 63) OER textbook was written by Sara Kappus and two OER resources (a lab manual and instructor resource guide) were written for Biol 4A and 4B by May Chen, Darcy Ernst, Katie Folz, and Bridget Greuel.

Adam Green created the Biol 21 lab manual in 2023. It includes canvas page background material, worksheets, and question banks. This made the lab manual free for all students in BIOL 21. This also allows us to highlight local ecology and the resources we have available in our department. Having control over the lab manual will also allow us to fine tune and update the material to better fit our course. This is the first semester the new manual has been adopted and we are continuing to troubleshoot the lab exercises. The savings to students is immediate, but the impact on student learning is not yet clear. The benefit of having our own manual is that if any lab exercise is not meeting the outcomes we hoped for, then we can make the changes ourselves and incorporate them quickly.

In Biol 4B, Darcy Ernst has implemented a Course-Based Undergraduate Research Experience (CURE), culminating in a student research symposium at the end of each semester. This CURE and presentation give all students authentic and professional research and presentation experiences, which greatly increase student learning and success. Students see themselves as scientists and take ownership of their own projects, increasing student investment in the classroom and attainment of real-world skills. In 2023, Darcy Ernst was granted Student Equity Program and Basic Needs funding to expand the student research symposium to the entire MSE division with the goal of supporting student equity, particularly for economically disadvantaged students.

The curriculum for BIOL-020 (Human Biology) was updated in 2021 to reflect the current approach to human biology – reducing the focus on pure anatomy and physiology, and emphasizing human evolution, population growth, the role humans play in the environment and human effects on climate change. At this point, the biology faculty transitioned the class from a traditional textbook to an OER (OpenStax). Additionally, Jennifer Kurushima wrote an in-house lab manual consisting of a series of handouts. These handouts are provided to students for free. This reduced the cost of the course materials from \$200 (for the lecture and lab texts) to zero. The lab handouts improved upon the lab activities in the prior iteration of the course by incorporating more hands-on activities, student designed experiments, and opportunities for students to interact with each other, thus promoting community building in the classroom. This class is now accepted as a pre-requisite for BIOL-071 (Human Anatomy), giving our pre-health students an alternative pathway into the health science course series.

For BIOL 071, there was a complete overhaul of the laboratory portion of the course since the last program review. Previously, labs and homework were mainly focused on completing diagrams of tissues/organs to turn in for points. The lab manual was a checklist of structures that students had to learn from the models, specimens, etc. The lab now uses handouts written by Jennifer Kurushima which ask the students to perform a variety of tasks from labeling diagrams, models, drawing histology, and other hands-on activities. These are turned in at the end of each lab and the instructor can provide feedback to the students on their comprehension. There is also the incorporation of weekly/semiweekly assessments to provide students with examples of lab practical questions. The

lecture portion of the course was also modified, most noticeably with the increase in number of homework assignments which provides formative assessments and the addition of Scientist Spotlights. Scientist Spotlight assignments allow students to connect with the scientific field by introducing them to scientific leaders who are not the typical representation of scientists shown in most scientific textbooks. Students frequently comment that they go through the same struggles these scientists face. Students benefitted immensely from these changes. Previously, 50% of the class from census remained enrolled by the end of the semester, now 75-90% of the class completes the course.

In the BIOL 80 series we have incorporated more interaction with researchers and state and federal agency employees. This has provided insight to the ecology of the areas we visit and the possible careers available in associated disciplines. This has also led to more opportunities for locations and possibly decreased cost as the National Park Service grants free camping when school groups are involved in NPS education programs in some parks.

A future hope for the BIOL 80 series is to develop a volunteer program where former students can volunteer to assist in the course allowing them to revisit locations and provide valuable assistance to the instructors and further support for the program on campus and in the local community.

Adam Green is developing a new department website that will provide more detail on our courses, faculty, staff, opportunities, and events. This online presence will improve the navigation of Biology and hopefully attract students to the program and course offerings. This website can also be linked to Guided Pathways and to the online course descriptions adding detail for students.

May Chen led a research study in the spring of 2023. Biology students participated in a research study designed to evaluate the effectiveness of learning activities designed to increase student interaction and collaboration with both their peers and their instructors in online and hybrid biology courses. These activities included video-based student discussions, video-based instructor feedback, and a text-based discussion framed by the practical inquiry model. Four instructors implemented the learning activities across four fully online and hybrid courses and over 80 students. Quantitative and qualitative data collected from 26 student survey and interview participants were encouraging and suggested that the implementation of these activities promoted student perceptions of social, cognitive, and teaching presence and also positively influenced student perceptions of classroom community. These learning strategies continue to be implemented in several online and hybrid courses across the department to promote student success on our online and hybrid courses.

Darcy Ernst, Lisa Hays, and Jennifer Kurushima developed a new course, Biol 14: Head Smart into the Sciences. This course is a biology careers course, exposing students to the hidden curriculum required for success in STEM fields and helping them explore biology career options. This innovative course teaches soft skills and transferrable skills, such that students are more prepared for success in their STEM courses and ultimately supporting student degree attainment, transfer, and career placement. It was offered for the first time in the fall of 2022 and enrollment has increased each semester since.

- **5. Discuss plans for future curricular development and/or program degrees & certificates included) modification.**

The biology department is interested in developing two certificates and a skills competency designation in the future:

- Field Biology Technician Certificate:

Wildlife Biology, Ecology, Marine Biology lecture/lab courses

Biology 80 series as field experience

Independent study- research experience

- Environmental Science Technician Certificate:

Wildlife Biology, Ecology, Marine Biology, Enviro lecture/lab courses

Biology 80 series

Independent study- environmental science-based research

- Skills competency transcript designation for students completing BIOL 80 courses.

- **6. Describe how your program is articulated with High School Districts, and/or other four year institutions. (Include articulation agreements, CID, ADTs...)**

The courses offered by the Biology Department are not currently articulated with high school districts within the SJECCD service area, other than by its policy regarding awarding college credit based on Advanced Placement (AP) test scores (pages 19-20 in the current college catalog).

BIOL 071 will accept AP Biology Exam with a 3, 4, or 5.

Many courses offered by the Biology Department are transferable to both CSU and UC, as shown in the table (Table B.6a) below. One course does not have IGETC transfer status— BIOL 014, while the remaining eight courses do not have either CSU or IGETC status – BIOL 080A-G and BIOL 098 (refer to ASSIST.org)

Table B.6a. Biology courses transferable to CSU and UC campuses

Course Number	CSU GE Areas	IGETC Areas
BIOL 014	E (lifelong understanding and self-development)	None
BIOL 021	B2, B3	5B, 5C
BIOL 061	B2	5B
BIOL 062	B2	5B
BIOL 063	B2	5B
BIOL 064	B2, B3	5B, 5C
BIOL 065	B2	5B
ENVIR 010	B1 (physical science), B2, B3	5A (physical science), 5B, 5C
OCEAN 010	B1	5A

Compiled by Lisa Pang 10/15/2023

The Biology Department currently has four courses with C-ID approval. These courses are found in the table (Table B.6b) below. The courses were revised to match the C-ID course descriptors when they were last updated.

Table B.6b. Biology Department active courses with C-ID numbers

C-ID Course	Descriptor Title	EVC Course	Course Title
BIOL 110B	Human Anatomy with Lab	BIOL – 071	Human Anatomy
BIOL 120B	Human Physiology with Lab	BIOL – 072	Human Physiology
BIOL 135S	Biology Sequence for Majors	BIOL – 004A	General Principles and Cell Biology
		BIOL – 004B	Organismal Biology and Biodiversity
BIOL 140	Organismal Biology	BIOL – 004B	Organismal Biology and Biodiversity
BIOL 190	Cell and Molecular Biology	BIOL – 004A	General Principles and Cell Biology

Compiled by Lisa Pang 10/15/2023

- **7. If external accreditation or certification is required, please state the certifying agency and status of the program.**

Our program does not require external accreditation or certification.

Student Learning Outcome and Assessment

Related Assessments

ASTRO 010 - Introduction to Astronomy Spr 2021- Created: 10/14/2021 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/1552)

Associate in Arts Degree program in General Studies with Emphasis in Natural Science - Created: 09/15/2023 New PLO Assessment Report Originator: Adam Green (/Form/Module/Index/3864)

ASTRO 10 - SPR 22- Created: 02/27/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2293)

ASTRO 010 - SPR 22- Created: 02/27/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2294)

ASTRO 10asy spr23- Created: 08/26/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/3688)

ASTRO 10 - FA23- Created: 12/20/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5189)

ASTRO 010 SPR23- Created: 08/24/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/3655)

ASTRO 010 - Introduction to Astronomy Spr 2021- Created: 10/19/2021 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/1646)

Astro 10- Created: 12/31/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2073)

Astro 10- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2609)

Astro 10 (online)- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2610)

ASTRO 10L - SPR 22- Created: 06/09/2022 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/2622)

ASTRO 10L - FA23- Created: 12/20/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (/Form/Module/Index/5191)

Astro 10L- Created: 12/31/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/2075)

Astro 10L- Created: 08/28/2023 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/3704)

Astro 10L- Created: 08/28/2023 New Section Level SLO Assessment Report Originator: Michael Masuda (/Form/Module/Index/3705)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1810)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1811)

Biol 021 Spring 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1812)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1813)

Biol 021 Fall 2021- Created: 11/07/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1814)

Biol 021 Fall 2021- Created: 11/08/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1821)

Biol 021 Fall 2021- Created: 11/06/2021 New Section Level SLO Assessment Report Originator: Azita Tavana (/Form/Module/Index/1805)

BIOL 062 Plants- Created: 09/04/2023 New Section Level SLO Assessment Report Originator: Lisa Hays (/Form/Module/Index/3736)

BIOL 063- Created: 10/23/2023 New Section Level SLO Assessment Report Originator: Sara Kappus (/Form/Module/Index/5047)

BIOL 063 Spring 2021- Created: 11/05/2021 New Section Level SLO Assessment Report Originator: Sara Kappus (/Form/Module/Index/1799)

064 Marine Biology- Created: 09/12/2023 New Section Level SLO Assessment Report Originator: Darcy Ernst (/Form/Module/Index/3801)

BIO 064- Created: 09/15/2023 New Section Level SLO Assessment Report Originator: Karen Moody (/Form/Module/Index/3866)

Wildlife Biology- Created: 09/15/2023 New Section Level SLO Assessment Report Originator: Karen Moody (/Form/Module/Index/3882)

BIOL 080D Death Valley I24- Created: 02/29/2024 New Section Level SLO Assessment Report Originator: Lisa Pang (/Form/Module/Index/5320)

CHEM 015 SP 2021- Created: 01/12/2022 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/2128)

CHEM 015 FA 2021- Created: 01/28/2022 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/2192)

CHEM 015 FA 2023- Created: 03/15/2024 New Section Level SLO Assessment Report Originator: Michael Ghebreab (/Form/Module/Index/5412)

CHEM 015 SP 2021- Created: 01/12/2022 New Section Level SLO Assessment Report Originator: Michael Ghebream (Form/Module/Index/2127)

CHEM 030A- Created: 03/01/2024 New Section Level SLO Assessment Report Originator: Charles Chau (Form/Module/Index/5348)

Environmental Science 10- Created: 02/28/2024 New Section Level SLO Assessment Report Originator: Alfred Gonzalez (Form/Module/Index/5310)

ENVIR 010 Fall 2021- Created: 11/09/2021 New Section Level SLO Assessment Report Originator: Alfred Gonzalez (Form/Module/Index/1828)

Ocean fall 2023 data- Created: 02/28/2024 New Section Level SLO Assessment Report Originator: Lisa Hays (Form/Module/Index/5313)

PHYS 02A- Created: 12/31/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (Form/Module/Index/5214)

PHYS 02A - Fa23_new- Created: 01/01/2024 New Section Level SLO Assessment Report Originator: Celso Batalha (Form/Module/Index/5220)

PHYS 2A f23- Created: 03/15/2024 New Section Level SLO Assessment Report Originator: Celso Batalha (Form/Module/Index/5406)

PHYS 2A - spr23- Created: 08/26/2023 New Section Level SLO Assessment Report Originator: Celso Batalha (Form/Module/Index/3689)

Phys 2A- Created: 01/01/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (Form/Module/Index/2077)

Phys 2A- Created: 06/06/2022 New Section Level SLO Assessment Report Originator: Michael Masuda (Form/Module/Index/2602)

Phys 2A- Created: 10/20/2021 New Section Level SLO Assessment Report Originator: Michael Masuda (Form/Module/Index/1667)

Student Learning Outcomes

ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Historical)

ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Active)

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ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the fundamentals of spectroscopy and photometry, the basic techniques employed in retrieving physical properties of celestial objects. (Active)

ASTRO 010 - Introduction to Astronomy - Explain the causes of astronomical cycles such as eclipses, seasons, phases of the moon, sunspots, stellar evolution, and others. (Active)

ASTRO 010 - Introduction to Astronomy - Explain the causes of astronomical cycles such as eclipses, seasons, phases of the moon, sunspots, stellar evolution, and others. (Active)

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ASTRO 010 - Introduction to Astronomy - Explain the causes of astronomical cycles such as eclipses, seasons, phases of the moon, sunspots, stellar evolution, and others. (Historical)

ASTRO 010 - Introduction to Astronomy - Describe the physical processes underlying the properties of light such as reflection, refraction, diffraction, and scattering. (Historical)

ASTRO 010 - Introduction to Astronomy - Describe the physical processes underlying the properties of light such as reflection, refraction, diffraction, and scattering. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the physical processes underlying the properties of light such as reflection, refraction, diffraction, and scattering. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the physical processes underlying the properties of light such as reflection, refraction, diffraction, and scattering. (Active)

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ASTRO 010 - Introduction to Astronomy - Describe the physical processes underlying the properties of light such as reflection, refraction, diffraction, and scattering. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the main physical processes driving the evolution of low and high mass stars and their relation to the increasing metallicity in the universe. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the main physical processes driving the evolution of low and high mass stars and their relation to the increasing metallicity in the universe. (Active)

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ASTRO 010 - Introduction to Astronomy - Describe the main physical processes driving the evolution of low and high mass stars and their relation to the increasing metallicity in the universe. (Historical)

ASTRO 010 - Introduction to Astronomy - Describe the main physical processes driving the evolution of low and high mass stars and their relation to the increasing metallicity in the universe. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the main physical processes driving the evolution of low and high mass stars and their relation to the increasing metallicity in the universe. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Historical)

ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Active)

ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Active)

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ASTRO 010 - Introduction to Astronomy - Describe the origin of the universe as suggested by the Big Bang theory, along with the supporting evidence collected by astronomers since the early 20th Century. (Active)

ASTRO 010L - Introductory Astronomy Lab - Demonstrate proficiency in using telescopes and accessory parts to observe and analyze celestial objects. (Active)

ASTRO 010L - Introductory Astronomy Lab - Demonstrate proficiency in using telescopes and accessory parts to observe and analyze celestial objects. (Active)

ASTRO 010L - Introductory Astronomy Lab - Demonstrate proficiency in using telescopes and accessory parts to observe and analyze celestial objects. (Active)

ASTRO 010L - Introductory Astronomy Lab - Describe the main characteristics of sky objects observed with equipment available at the Montgomery Hill Observatory. (Active)

ASTRO 010L - Introductory Astronomy Lab - Describe the main characteristics of sky objects observed with equipment available at the Montgomery Hill Observatory. (Active)

ASTRO 010L - Introductory Astronomy Lab - Describe the main characteristics of sky objects observed with equipment available at the Montgomery Hill Observatory. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain the causes of astronomical cycles such as eclipses, moon phases, seasons, day-night, and others. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain the causes of astronomical cycles such as eclipses, moon phases, seasons, day-night, and others. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain the causes of astronomical cycles such as eclipses, moon phases, seasons, day-night, and others. (Active)

ASTRO 010L - Introductory Astronomy Lab - Verify the wave-like behavior of light with a combination of lasers, lenses, mirrors, and sensors. (Active)

ASTRO 010L - Introductory Astronomy Lab - Verify the wave-like behavior of light with a combination of lasers, lenses, mirrors, and sensors. (Active)

ASTRO 010L - Introductory Astronomy Lab - Verify the wave-like behavior of light with a combination of lasers, lenses, mirrors, and sensors. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain stellar evolution with data available online and incorporate into an evolutionary H-R diagram. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain stellar evolution with data available online and incorporate into an evolutionary H-R diagram. (Active)

ASTRO 010L - Introductory Astronomy Lab - Explain stellar evolution with data available online and incorporate into an evolutionary H-R diagram. (Active)

ASTRO 010L - Introductory Astronomy Lab - Measure the age of the universe using astronomical data available in the literature. (Active)

ASTRO 010L - Introductory Astronomy Lab - Measure the age of the universe using astronomical data available in the literature. (Active)

ASTRO 010L - Introductory Astronomy Lab - Measure the age of the universe using astronomical data available in the literature. (Active)

BIOL 021 - General Biology - Apply the scientific method to conduct guided experiments in the laboratory and analyze and communicate scientific data, individually and/or in collaboration with other students. (Active)

BIOL 021 - General Biology - Apply the scientific method to conduct guided experiments in the laboratory and analyze and communicate scientific data, individually and/or in collaboration with other students. (Historical)

BIOL 021 - General Biology - Apply the scientific method to conduct guided experiments in the laboratory and analyze and communicate scientific data, individually and/or in collaboration with other students. (Historical)

BIOL 021 - General Biology - Identify the basic principles of biological molecules, cells, human heredity, evolution, and organismal biology. (Historical)

BIOL 021 - General Biology - Identify the basic principles of biological molecules, cells, human heredity, evolution, and organismal biology. (Historical)

BIOL 021 - General Biology - Identify the basic principles of biological molecules, cells, human heredity, evolution, and organismal biology. (Active)

- BIOL 021 - General Biology - Explain the importance of conservation biology and the human impact on the environment. (Active)
- BIOL 021 - General Biology - Explain the importance of conservation biology and the human impact on the environment. (Historical)
- BIOL 021 - General Biology - Explain the importance of conservation biology and the human impact on the environment. (Historical)
- BIOL 062 - Plants and Human Welfare - Identify, compare, and contrast the anatomical structures of different types of plants, algae and fungi. (Active)
- BIOL 062 - Plants and Human Welfare - Differentiate the ways that people use plants, including as food, medicine, recreation, clothing and building materials. (Active)
- BIOL 062 - Plants and Human Welfare - Analyze the advantages and disadvantages of growing genetically modified plants around the world. (Active)
- BIOL 063 - Ecology - Identify important biotic and abiotic factors, trophic structure and roles, and key biogeochemical cycles in the biosphere. (Active)
- BIOL 063 - Ecology - Identify important biotic and abiotic factors, trophic structure and roles, and key biogeochemical cycles in the biosphere. (Historical)
- BIOL 063 - Ecology - Identify important biotic and abiotic factors, trophic structure and roles, and key biogeochemical cycles in the biosphere. (Active)
- BIOL 063 - Ecology - Evaluate biological populations and the factors that influence their distributions, patterns of growth, and evolution. (Historical)
- BIOL 063 - Ecology - Evaluate biological populations and the factors that influence their distributions, patterns of growth, and evolution. (Active)
- BIOL 063 - Ecology - Evaluate biological populations and the factors that influence their distributions, patterns of growth, and evolution. (Active)
- BIOL 063 - Ecology - Compare ecological systems and anthropogenic effects such as pollution and introduced species on those systems. (Active)
- BIOL 063 - Ecology - Compare ecological systems and anthropogenic effects such as pollution and introduced species on those systems. (Active)
- BIOL 063 - Ecology - Compare ecological systems and anthropogenic effects such as pollution and introduced species on those systems. (Historical)
- BIOL 063 - Ecology - Compare primary and secondary ecological succession, and be able to identify and describe examples of each. (Historical)
- BIOL 063 - Ecology - Compare primary and secondary ecological succession, and be able to identify and describe examples of each. (Active)
- BIOL 063 - Ecology - Compare primary and secondary ecological succession, and be able to identify and describe examples of each. (Active)
- BIOL 063 - Ecology - Describe and critique approaches to preserve or conserve ecosystems, and to regulate and mitigate their exploitation. (Active)
- BIOL 063 - Ecology - Describe and critique approaches to preserve or conserve ecosystems, and to regulate and mitigate their exploitation. (Active)
- BIOL 063 - Ecology - Describe and critique approaches to preserve or conserve ecosystems, and to regulate and mitigate their exploitation. (Historical)
- BIOL 064 - Marine Biology - Explain how abiotic physical, chemical and geological factors in ocean and estuarine systems determine the distribution and zonation of marine organisms. (Active)
- BIOL 064 - Marine Biology - Describe recurring patterns of interactions between organisms in different marine habitats, including kelp forests, rocky, sandy and muddy shorelines, coral reefs, estuaries, pelagic ocean, and deep sea. (Active)
- BIOL 064 - Marine Biology - Use the scientific method to investigate the biological characteristics and relationships among and between marine plankton, algae, plants, invertebrates, and vertebrates, including

humans. (Active)

BIOL 065 - Wildlife Biology - Describe wildlife issues that can and or may affect national, regional and local political activities. (Active)

BIOL 065 - Wildlife Biology - Explain and relate how human activities have accelerated the rate at which wildlife becomes threatened, endangered or extinct, and how humans can develop species value through alternative lifestyles and social expectations. (Active)

BIOL 065 - Wildlife Biology - Explain and identify wildlife requirements, abiotic & biotic resources and their function within the ecological system. (Active)

BIOL 080D - Field Biology - Desert and Dunes - Explain the ecology of the ecosystem they visit, including associated communities. (Active)

BIOL 080D - Field Biology - Desert and Dunes - Summarize the human and geological history of the area and how that affects the biological community. (Active)

BIOL 080D - Field Biology - Desert and Dunes - Properly and safely prepare for camping and hiking in the ecosystem visited, and demonstrate the correct application of the tenets of Leave No Trace. (Active)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Draft)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Draft)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Historical)

CHEM 015 - Fundamentals of Chemistry - Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Active)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Historical)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Draft)

CHEM 015 - Fundamentals of Chemistry - Distinguish between elements and compounds, their physical and chemical properties, along with ionic and covalent compounds and the writing of their names and formulas. (Draft)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Draft)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Draft)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Historical)

CHEM 015 - Fundamentals of Chemistry - Describe the internal structure of atoms using subatomic particles; the meaning of nuclear symbols for isotopes while predicting the nature of chemical bonds and molecular polarity from the periodicity of the elements. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Draft)

CHEM 015 - Fundamentals of Chemistry - Explain the concepts of chemical stoichiometry at both the macroscopic and particulate level while applying these concepts to solving chemical reaction problems from real-world information and predicting products of simple chemical reaction types. (Draft)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Draft)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Draft)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain gas behavior using macroscopic properties and microscopic molecular dynamics and solve problems of gases using the combined gas law and ideal gas law. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Active)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Historical)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Draft)

CHEM 015 - Fundamentals of Chemistry - Explain how liquids, solids and solution behavior can be understood using intermolecular dynamics and modified kinetic molecular theory, and solve solution concentration problems along with explaining acid-base reactions, electrolytic behavior, and performing pH and titration calculations. (Draft)

CHEM 030A - Introduction to Chemistry - Express measurements using proper units and significant figures. (Active)

CHEM 030A - Introduction to Chemistry - Describe simple atomic structure, write the names and formulas of ionic and molecular compounds, simple acids, bases, and salts, and distinguish between compounds and mixtures. (Active)

CHEM 030A - Introduction to Chemistry - Predict chemical reactivity, bond types, and molecular polarity from the Periodic Table. (Active)

CHEM 030A - Introduction to Chemistry - Apply the concept of chemical stoichiometry, quantitatively determine the percent yield of a reaction, and solve real-world chemical problems. (Active)

CHEM 030A - Introduction to Chemistry - Solve gas law problems and use Kinetic Molecular Theory to explain how gases behave. (Active)

CHEM 030A - Introduction to Chemistry - Explain how liquids, solids, solutions, acids, and bases react and calculate the various types of solution concentrations including titration values for both lab and real-world situations. (Active)

ENVIR 010 - Environmental Science - Evaluate the differences between scientific and non-scientific approaches to environmental questions using basic principles of the scientific method. (Active)

ENVIR 010 - Environmental Science - Evaluate the differences between scientific and non-scientific approaches to environmental questions using basic principles of the scientific method. (Active)

ENVIR 010 - Environmental Science - Assess threats to the environment and human health resulting from air, water, and land pollution, and describe waste-management strategies for each. (Active)

ENVIR 010 - Environmental Science - Assess threats to the environment and human health resulting from air, water, and land pollution, and describe waste-management strategies for each. (Active)

ENVIR 010 - Environmental Science - Compare and contrast world agricultural practices, including modern-industrial methods, subsistence-level cultivation, and sustainable practices with respect to their relative efficiencies and their impacts on soil, water, and air resources, and on human health. (Active)

ENVIR 010 - Environmental Science - Compare and contrast world agricultural practices, including modern-industrial methods, subsistence-level cultivation, and sustainable practices with respect to their relative efficiencies and their impacts on soil, water, and air resources, and on human health. (Active)

ENVIR 010 - Environmental Science - Describe and evaluate the environmental and socioeconomic costs and benefits of exploiting renewable and non-renewable resources. (Active)

ENVIR 010 - Environmental Science - Describe and evaluate the environmental and socioeconomic costs and benefits of exploiting renewable and non-renewable resources. (Active)

ENVIR 010 - Environmental Science - Identify and explain the likely environmental and socioeconomic effects of continued growth in human population and consumption, global climate change, decreasing biodiversity, and appropriate responses to these challenges in education, law, and social policies and practices. (Active)

ENVIR 010 - Environmental Science - Identify and explain the likely environmental and socioeconomic effects of continued growth in human population and consumption, global climate change, decreasing biodiversity, and appropriate responses to these challenges in education, law, and social policies and practices. (Active)

OCEAN 010 - Descriptive Oceanography - Interpret and illustrate oceanographic concepts. (Active)

OCEAN 010 - Descriptive Oceanography - Use evidence and critical thinking skills to analyze the oceanographic processes and to assess oceanographic problems. (Active)

OCEAN 010 - Descriptive Oceanography - Relate oceanographic processes to global systems such as plate tectonics, ocean circulation, the water cycle, biological processes and civilization. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply kinematic equations to predict the motion of a uniformly accelerated object. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Apply Newton's laws of motion to solve problems involving multiple forces acting on an object. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Formulate and solve mechanics and thermodynamics problems using the laws of conservation of energy and momentum. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Present experimental findings in a scientific manner, using critical thinking and logic. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Analyze static and rotating systems using concepts of torque and angular acceleration. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Draft)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Historical)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Active)

PHYS 002A - Algebra/Trigonometry-Based Physics I - Estimate error propagation on data collected in lab, using appropriate units and consistent number of significant figures. (Draft)

Program Learning Outcomes

General Studies with Emphasis in Natural Science - Associate in Arts: Associate in Arts - Employ the scientific method in the design, implementation, data collection, and analysis of experiments or observational studies. (Active)

General Studies with Emphasis in Natural Science - Associate in Arts: Associate in Arts - Practice current or industry-standard laboratory techniques and lab safety procedures. (Active)

General Studies with Emphasis in Natural Science - Associate in Arts: Associate in Arts - Explain scientific concepts and processes from levels ranging from biochemical to ecological. (Active)

- 1. On the program level, defined as a course of study leading to degree or certificate, list the Program Learning Outcomes (PLOs), and how they relate to the GE/ILOs. Please also indicate how the course SLOs have been mapped to the PLOs. If you are completing this program review as a department or discipline and do not offer any degrees or certificates, please write N/A in this space.

General Studies with Emphasis in Natural Science AA

PLO 1: Employ the scientific method in the design, implementation, data collection, and analysis of experiments or observational studies.

Mapped to the following ILO's:

- Inquiry and Reasoning: The student will critically evaluate information to interpret ideas and solve problems.
- Information Competency: The student will utilize information from a variety of sources and make an informed decision and take action.

SLO's mapped to this PLO:

- BIOL 021: Apply the scientific method to conduct guided experiments in the laboratory and analyze and communicate scientific data, individually and/or in collaboration with other students.
- The PLO is introduced, mastered and measured in the course.
- BIOL 064: Explain the nature of science, apply principles of the scientific method, and employ safe procedures in a laboratory and field settings.
- The PLO is introduced, mastered and measured in the course.

PLO 2: Practice current or industry-standard laboratory techniques and lab safety procedures.

Mapped to the following ILO's:

- Communication: The student will demonstrate effective communication, appropriate to the audience and purpose.
- Inquiry and Reasoning: The student will critically evaluate information to interpret ideas and solve problems.
- Information Competency: The student will utilize information from a variety of sources and make an informed decision and take action.
- Personal Development: The student will demonstrate growth and self-management to promote life-long learning and personal well-being.

SLO's mapped to this PLO:

- BIOL 064: Explain the nature of science, apply principles of the scientific method, and employ safe procedures in a laboratory and field settings.
- The PLO is introduced, mastered and measured in the course.
- CHEM 015: Apply safety rules learned in lab to safely conduct lab operations and present laboratory data using graphing and precision of data with simple statistics.
- The PLO is introduced, mastered and measured in the course.
- ENVIR 010: Evaluate the differences between scientific and non-scientific approaches to environmental questions using basic principles of the scientific method.
- The PLO is introduced, mastered and measured in the course.

PLO 3: Explain scientific concepts and processes from levels ranging from biochemical to ecological.

Mapped to the following ILO's:

- Communication: The student will demonstrate effective communication, appropriate to the audience and purpose.
- Inquiry and Reasoning: The student will critically evaluate information to interpret ideas and solve problems.

SLO's mapped to this PLO:

- BIOL 021: Identify the basic principles of biological molecules, cells, human heredity, evolution, and organismal biology.

- The PLO is introduced, mastered and measured in the course.
 - BIOL 065: Explain how all forms of life depend upon biogeochemical cycles in some combination.
 - The PLO is introduced, mastered and measured in the course.
 - ENVIR 010: Compare and contrast world agricultural practices, including modern-industrial methods, subsistence-level cultivation, and sustainable practices with respect to their relative efficiencies and their impacts on soil, water, and air resources, and on human health.
 - The PLO is introduced, mastered and measured in the course.
- **2. Since your last program review, summarize SLO assessment activities and results at the course and program level. Please include dialogue regarding SLO Assessment results with division/department/college colleagues and/or GE areas. Provide evidence of the dialogue (i.e. department meeting minutes or division meeting minutes, etc.) List any SLOs or PLOs that have not been assessed in the last two years and provide an explanation of why they have not been assessed. This will be reviewed by the IEC to determine if your Program Review is approved or not.**

The biology department **completed all course SLO's and PLO's** with the associated mapping to ILO's in Fall 2023.

BIOL 021 - General Biology

Apply the scientific method to conduct guided experiments in the laboratory and analyze and communicate scientific data, individually and/or in collaboration with other students.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency.
- **Assessment Results:**
2023 results are from 4 sections taught by 1 instructor using different assessment methods than previous reports. For this SLO, lab exercise completion combined with Post-lab quizzes were used (total of 85 students)

Average: 79%; 75/85 (88%) achieved 70% or higher

(2021) The results were obtained from part-time faculty teaching the 13 sections of Biol 021 in Spring 2021. There were 28 students enrolled in each section. 73% of students responded correctly to the question shared by all faculty compared to 77% from the previous SLO assessment. In order to develop a satisfactory competency for this SLO, students need to be in labs and actively performing experiments. However, students did not have that option. Using lab simulation software has provided a limited level of competency.

Identify the basic principles of biological molecules, cells, human heredity, evolution, and organismal biology.

- **Rating:** 1: Few (0-49%) of the students have mastered the competency.
- **Assessment Results:**

2023 results are from 4 sections taught by 1 instructor using different assessment methods than previous reports. For this SLO, a cumulative final exam was used (total of 85 students).

Average: 68%; 40/85 (47%) achieved 70% or higher

(2021) The results were obtained from part-time faculty teaching the 13 sections of Biol 021 in Spring 2021. There were 28 students enrolled in each section. 72.1% of students responded correctly to multiple questions addressing all components of SLO #2 compared to 80% from the previous SLO assessment. Students' competency for the evolution component, at 78.5%, was the highest. Students' performance for learning the biological molecules and human heredity concepts and pedigree analysis, at 67%, was the lowest. This indicates that there is a need for extra effort on the part of the faculty in the form of practice questions, concept diagrams and instructional video clips.

Explain the importance of conservation biology and the human impact on the environment.

- **Rating:** 1: Few (0-49%) of the students have mastered the competency.

- **Assessment Results:**

2023 results are from 4 sections taught by 1 instructor using different assessment methods than previous reports. For this SLO, a section exam and lab exercise was used (total of 85 students).

Average: 65%; 36/85 (42%) achieved 70% or higher

(2021) The results were obtained from part-time faculty teaching the 13 sections of Biol 021 in Spring 2021. There were 28 students enrolled in each section. 77% of students responded correctly to multiple questions addressing both components of SLO #2 compared to 79% from the previous SLO assessment. Students correctly responded to conservation biology and the importance of biodiversity overwhelmingly (88%) compared to 66% for recognizing the human impact on the environment. In the 2016 SLO assessment, 79% of students had achieved competency in each component. These results indicate the need to spend more time discussing the variety of ways that humans affect the environment.

BIOL 062 - Plants and Human Welfare

Identify, compare, and contrast the anatomical structures of different types of plants, algae and fungi.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency

- **Assessment Results:**

36/37 students mastered this SLO as assessed by scoring an average of 70% or above on 7 exam questions.

There was an improvement in student performance compared to the last assessment period. Previously, there were 2 questions that students failed to master. The missed questions were about using a microscope to view plant stems and roots. This time, 37/39 students mastered this topic. The homework was changed after the last assessment to focus more on this topic of microscopic plant anatomy.

Analyze the advantages and disadvantages of growing genetically modified plants around the world.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency

- **Assessment Results:**

35/37 students mastered this SLO with a grade of C or higher on this homework question. Students mastered this topic of genetically modified organisms.

The assessment results for this SLO was excellent. Students are excited about the topic of genetic modification, genomic research, and learning that sometimes advancements in science are not all positive. No changes will be made at this time.

Differentiate the ways that people use plants, including as food, medicine, recreation, clothing and building materials.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency

- **Assessment Results:**

31 students wrote the research paper and 31/31 received a C or higher. The average score of the paper was 96%.

This SLO was well covered and students have mastered it. However, there is room for improvement.

BIOL 063 - Ecology

Evaluate biological populations and the factors that influence their distributions, patterns of growth, and evolution.

- **Rating:** 2: Some (50-69%) of the students have mastered the competency

- **Assessment Results:**

Student performance is slightly below satisfactory for this SLO at 67%. However, students have improved from spring 2021 (63% correct) suggesting that the new assignments that were introduced are improving student performance in this area. To improve students' performance a new free online libretex textbook will be adopted starting fall of 2023. Interactive elements will be added to the new text that will allow more opportunities for students to practice evaluating populations, their growth and evolution.

Identify important biotic and abiotic factors, trophic structure and roles, and key biogeochemical cycles in the biosphere.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency

- **Assessment Results:**

Performance on this SLO was above satisfactory (81%). This is an improvement over Spring 2021 where students correctly answered question on this topic only 75% of the time. Most all students were able to identify important biotic and abiotic factors (77%). Most students could also identify trophic levels in a food web and impacts of changes to each level on community structure (90%). Over half of the students correctly identify reservoirs in the phosphorus cycle (69%). Although performance on this SLO was satisfactory students could benefit from more discussion and homework on the topic of biogeochemical cycles. To improve students' performance a new online free libretex textbook will be adopted starting fall of 2023.

Compare ecological systems and anthropogenic effects such as pollution and introduced species on those systems.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency.

- **Assessment Results:**

Students demonstrated good performance on this SLO (81.5%). Most students correctly identified the impacts of overfishing, climate change, deforestation, and invasive species on ecosystem structure and functioning. Performance on this SLO has increased substantially since Spring 2021 (70%). However, this data should be interpreted loosely due to the small class size this semester. To improve students' performance a new free online libretex textbook will be adopted starting fall of 2023.

Compare primary and secondary ecological succession, and be able to identify and describe examples of each.

- **Rating:** 2: Some (50-69%) of the students have mastered the competency

- **Assessment Results:**

Some students mastered the competency (65%) and improvement is still needed. Data this semester suggests a slight improvement over 2021 (where only 63% of students answered exam questions correctly on this topic) suggesting the new written homework assignment is improving student performance in this area (average score 81%). But, unfortunately this improvement is not translating to higher exam scores (which remain low at 61% correct). To improve students' performance a new free online libretex textbook will be adopted starting fall of 2023. The textbook will included interactive elements and videos which to provide additional opportunities for students to practice applying these concepts.

Describe and critique approaches to preserve or conserve ecosystems, and to regulate and mitigate their exploitation.

- **Rating:** 2: Some (50-69%) of the students have mastered the competency

- **Assessment Results:**

Performance on this SLO was slightly below satisfactory (63%). Most students demonstrated an understanding of the need to maintain biodiversity, and slow the effects of climate change, to ensure ecosystem functioning. Additionally, students correctly identified goals of modern conservation biology and approaches such as habitat restoration, and reducing habitat fragmentation, as approaches to conserve terrestrial ecosystems. However, students were less successful at identifying problems and conservation approaches to protect marine life and manage fisheries.

This is a change from Spring 2021 when students performed at a satisfactory level.

However, it may not be a fair comparison because the course was offered in a hybrid formate, rather than online, during Spring 2021. To improve students' performance a new online libretex textbook will be adopted starting fall of 2023. The reading will include more examples of marine conservation and interactive elements.

BIOL 064 - Marine Biology

Explain how abiotic physical, chemical and geological factors in ocean and estuarine systems determine the distribution and zonation of marine organisms.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency.

- **Assessment Results:**

SLO 1 was assessed by Test 1 -Multiple choice and short essay questions applying understanding of physical, geological, and chemical oceanography principles. 12/17 (71%) scored C or higher. Not all students achieved mastery of the competency in applying principals of chemical, physical, and geological oceanography. This is a decrease from last year, and may be because of how the test was provided (proctored and in class vs remote). Assignments that create opportunities to use the information provided in this unit will be developed to increase mastery.

Describe recurring patterns of interactions between organisms in different marine habitats, including kelp forests, rocky, sandy and muddy shorelines, coral reefs, estuaries, pelagic ocean, and deep sea.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**

SLO 2 was assessed by 2 in class assignments, one lab, and one final project. Seventeen students were assessed, and all but one achieved mastery (as defined by a grade of 70% or better) of all 4 assessments. The class average for each assessment was over 90%. The information revealed is that these assignments are successfully enabling the students to achieve mastery.

Use the scientific method to investigate the biological characteristics and relationships among and between marine plankton, algae, plants, invertebrates, and vertebrates, including humans.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency.
- **Assessment Results:**

This SLO was assessed by two tests and two labs. Seventeen students were evaluated. For the lab grades, students achieved 100% mastery (17/17 students mastered the material with a 70% or better, and the average grade was above 90%). For the test grades, 15/17 students mastered the material with a 70% or better. The issue that is revealed is that two students are mastering the class activities, but it is not wholly translating to the test assessments.

BIOL 080F - Forest and River Ecology

Explain fundamental ecological concepts (such as, habitat, niche, range, trophic structure and role, symbiosis, and adaptation) and apply them to species or biological communities commonly found in the forests and rivers of west-central California.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**

16 out of 16 students mastered this SLO. Mastery was determined as scoring 70% or above on the final exam short answer question.

This is the first assessment of this SLO in the BIOL 80F field course. Ecological concepts are introduced in the on campus, pre-trip meetings and reviewed again while hiking on the weekends.

Prepare informative oral and written reports regarding important biological, ecological, and descriptive and functional features of selected species of flora and fauna commonly observed in the areas of study.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.

- **Assessment Results:**

16 out of 16 students mastered this SLO. Mastery was determined as scoring 70% or above on the oral report students shared with the entire class.

Before the field trips, students research one plant and one animal that they will likely see on the trip. They write a short paper and then give an oral presentation to the class when hiking. All students who participated in this assignment mastered the SLO.

Identify examples of human resource exploitation, past and present, and explain the impacts they have had on the forests and rivers of west-central California.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.

- **Assessment Results:**

16 out of 16 students mastered this SLO. Mastery was determined as scoring 70% or above on the final exam short answer question.

All 16 students mastered this SLO. They see examples of climate change, loss of resources, and the impact of humans on the environment. Anecdotally, students are more aware of how humans are altering the world in which we live.

Perform simple ecological analyses (such as water temperature, turbidity, and oxygen content, nearest neighbor analysis, transects for species diversity, or soil compaction) in the forest and river ecosystems studied.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.

- **Assessment Results:**

16 out of 16 students mastered this SLO. Mastery was determined as participating in the field exploration at Hastings UC Reserve in Carmel Valley, CA.

Students performed simple experiments with guidance from professors. Guest lecturers were on site at the UC Reserve on this particular trip. All 16 students mastered this SLO.

Properly and safely prepare for camping and hiking in forests and along rivers, and explain and demonstrate the correct application of the tenets of Leave No Trace.

- **Rating:** 3: Most (70-89%) of the students have mastered the competency.

- **Assessment Results:**

16 students were assessed. 13/16 students came fully prepared for camping and hiking. Mastery was determined as coming fully prepared for the weekend field course with gear, course paperwork, signed hold harmless forms, payment for class costs such as food, camping fees, and park entrance.

A mastery of this SLO of 70% is insufficient. Not every student comes fully prepared as instructed. The department does not have enough backup equipment and supplies for all students who cannot afford to purchase camping gear.

BIOL 080G - Volcanic Northern California

Apply fundamental ecological concepts (such as niche, range, trophic role) to the flora and fauna of volcanic northern California.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**
Summer 2023 Our assessments matched the Fall 2022 assessments. Students were able to give two oral presentations - one on a plant and one on an animal demonstrating mastery of this SLO.

Successfully and safely prepare for hiking, camping, or other excursions within volcanic northern California while applying the basic tenets of Leave-No-Trace and adhering to the rules set by the Lassen Volcanic National Park, Lava Beds National Monument, and authorities.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**
Summer 2023 Similar to the Fall 2022 assessment, students were able to set up, maintain, and take down a campsite. Additionally, students demonstrated their knowledge of hiking safety and trail etiquette on each of our hikes.

Relate past and present human activities to the resources present or once present in the environs of volcanic northern California. Identify and explain a modern controversy regarding the use of resources found in this region.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**
Summer 2023 Similar to the Fall 2022 assessment, students learn from their camping and hiking experiences in the doors outdoors, and all students were able to recall the required concepts from this SLO using the final exam for the assessment.

Identify, describe, and classify volcanic landforms and deposits using geological taxonomic guides, and explain the tectonic models for these formations.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**
Summer 2023 Similar to the Fall 2022 assessment, students learn from their camping and hiking experiences in the doors outdoors, and all students were able to recall the required concepts from this SLO using the final exam for the assessment.

Perform simple ecological and geological analyses (such as, nearest neighbor analysis, biodiversity transects, water quality tests, soil compaction analysis, or particle size measures) and relate results to topics covered in this course.

- **Rating:** 4: Almost all (90%+) of the students have mastered the competency.
- **Assessment Results:**
Summer 2023 Simliar to the Fall 2022 assessment, students were able to perform simple ecological and geological analyses as we hiked.

Dialogue

During Professional Development at the start of Fall 2023 the department met and planned out the SLO and PLO process with corresponding deadlines and task leads for the different courses and programs. The MSE division was the first division to complete all SLO, PLO, and ILO reporting. SLO Updates were discussed during the following biology department meetings: 10-20-23, 9-15-23, 5-20-22, 3-18-22, 2-25-22, 11-19-21, 8-27-21, 3-19-21, 2-5-21, 1-22-21, 12-11-20, 10-23-20, 10-2-20.

- **3. What plans for improvement have been implemented to your courses or program as a result of SLO assessment? Please share one or two success stories about the impacts of SLO assessment on student learning.**

The latest SLO assessment for all biology courses was completed this fall semester (2023), so there has not been time to implement any changes because of these assessments.

Additionally, the biology department has hired several faculty members over the past five years and these new faculty bring new perspectives and are updating courses and their corresponding SLO's. This much needed reassessment means course design and SLO's in many of our courses are changing simultaneously making comparisons to past SLO results challenging.

What follows is a summary of some common themes in our SLO assessments and plans for improvement.

Content Mastery

Many of our courses and programs have SLO's and PLO's associated with content mastery. BIOL 21, the largest course in the biology department, serves as an example of this assessment and the resulting ideas for improvement.

Experience with students in class combined with SLO results made clear the lack of preparation most students have for college level science. The course has every component for student success, but students are not making the effort to view the lecture videos, read the text, or study on a regular basis.

In Fall '23, as part of the new lab manual, lab #1 addressed the scientific method by using research on student learning and different study techniques that are shown to work across disciplines. Students read and discussed the results of research that showed distributed studying and self-testing were two methods that showed consistent benefits while cramming, highlighting, and re-reading (more than 2 times) were ineffective and inefficient. They also analyzed a paper on the benefit of a learn, sleep, re-learn method for better and longer retention of material. Despite this lab and the clear results, students continue to falter and have not adopted the prescribed strategies. A post mid-term discussion assignment asked them to reflect on what worked and what didn't work for Exam 1. The students who responded indicated that cramming was unsuccessful and the techniques they learned about in lab 1 would likely have been better strategies. Results from Exam 2 were better, but not by much.

Discussions among faculty in the biology department elucidated a common theme, our students are seriously lacking in basic study skills, and many students seem to be striving for the minimum effort to simply pass a course. There also appears to be a lack of appreciation for the skills and effort they will need to succeed when they transfer to a 4-year academic program or further career technical training like nursing.

Tutoring may help some, but most do not make use of the available help, and for tutoring to work students need to study ahead of time and bring questions. One option we are discussing is whether we offer new versions of courses that include a component centering on the skills necessary to succeed in college level science courses. This could be an added discussion component to a course that centers on skills development for studying and succeeding in science.

The solution to this problem, however, may be at a scale beyond the course. Another option under discussion is a “week 0” where students attend the week prior to the start of the semester focusing on the skills and effort required to do well in biology with some focus on the Health Sciences for the many students heading toward the nursing program.

The isolation of COVID seems to have disconnected our students from the reality of what is required of them. Building more of a community around the biology program through the new biology club and department and division events may counter this isolation, bringing together students with different goals and at different levels in their education. Maybe in this way motivated students doing well in biology could influence those that are struggling and provide help and support. The department is currently working toward this goal, supporting a new biology club, adding more department events, and working to create, update, and staff the needed facilities to support this community such as the museum, biology skills lab, and surrounding landscape.

The Scientific method, inquiry and reasoning and the practice of current or industry-standard laboratory techniques and lab safety procedures.

Many biology courses include in-person laboratory exercises where students learn basic techniques and skills while applying the scientific method of inquiry. The nature of the in-person, hands-on modality results in all students completing the exercises, but the effectiveness of the exercises in achieving the associated SLO's can be limited by available materials and equipment. Biology is a rapidly advancing science requiring regular updates of equipment, quality samples for observation and experimentation, and regular maintenance. Simply put, students cannot practice current or industry-standard techniques if they do not have current and industry-standard equipment.

Certain equipment is important to the basic skill development for students in Natural Science, i.e. binoculars for field observation, equipment to assess water quality, soil composition, and environmental factors such as wind, noise, and light. Some of this equipment is basic and does not require frequent updates, such as binoculars, while other equipment is more technical and needs to be up to date for accuracy and effectiveness, such as data loggers and probes for water quality testing.

This year we purchased 10 pair of 10x32 binoculars. This simple equipment allowed for new lab exercises and opened an entirely new field component for students in BIOL 21 and is essential for the field-based courses of the BIOL 80 series. To make this equipment more accessible and useful for the other courses we need to purchase enough pairs for at least one section (25) and preferably enough for more than one section to use them at the same time.

Courses like General Biology (BIOL 21), Marine Biology (BIOL 64), Wildlife Biology (BIOL 65), and Environmental Science (ENVIR 10) would all benefit from higher quality samples to observe in lab. Learning about the various taxa of plants and animals requires a diversity of fresh samples.

The inquiry component of many SLO's can also be improved. With proper equipment, access to fresh samples, and proper facilities, students can take on more student designed inquiry.

To address both the need for fresh samples and increase opportunities for student designed inquiry we need to (1) repair and maintain the department greenhouse to allow us to grow and maintain plants and fungi, (2) develop an outdoor garden of native and hard to find species in the planting areas adjacent to S-112, S-113, and the faculty offices, (3) obtain a collecting permit to allow faculty and staff to collect live and fresh samples of invertebrates, marine algae, plants, and fungi from the field to bring into lab, and (4) update, maintain, and make more accessible the existing museum.

These elements will provide a diversity of better-quality samples for labs, and indoor and outdoor facilities for student-designed experiments allowing students to better achieve the associated SLO's and PLO's.

Overall, our SLO assessments identify a lack of preparation in our students, possibly due to the impacts of COVID, a need for updated and fresh samples, new equipment, consistent equipment maintenance, and opportunities for inquiry. Discussions among faculty and fresh perspectives from an influx of new hires has generated course modifications to improve relevance, development of new SLO's, and plans to address issues common among different biology courses with creative department wide approaches.

Faculty and Staff

Part D: Faculty and Staff

- 1. List current faculty and staff members in the program, areas of expertise, and describe how their positions contribute to the success of the program.

Name	Areas of Expertise	Position Contribution
May Chen	Microbiology, physiology and cell biology	Teaches microbiology to students interested in the health professions. Teaches general and cell biology for biology majors intending to transfer.
Darcy Ernst	Organismal biology, animal physiology and field biology	Teaches biology majors in organismal biology as well as human physiology for allied health majors. Also teaches biology field and careers in biology course.
Alfred Gonzalez	Environmental science education, general biology, oceanography and genetics	Prepares students for matriculation into higher education and completion of general education science requirements. Also, serves as the ENLACE bio/science coordinator, assists with Chicano/Latino student recruitment into Biology Program and as faculty advisor for the EVC SACNAS student chapter.
Adam Green	Wildlife ecology, toxicology, chemistry and permaculture design	Teaches general biology and field biology courses. Previously taught environmental science, projects in sustainability and methods in field biology.
Lisa Hays	Physiology, oceanography, and plants and human welfare	Teaches oceanography, plant biology and field courses for natural science majors. Also teaches careers in biology course. Chair of the college budget committee.

Jennifer Kurushima	Anatomy and physiology, microbiology, genetics, molecular biology, bioinformatics, evolution, population ecology, marine ecology biology education research	Teaches human anatomy, human biology, and careers in biology course. Also teaches biology field courses. Chair of the professional development committee.
Hoai Nguyen	Microbiology	Prepares and organizes classroom materials essential for teaching students, such as chemical solutions, reagents and science related materials.
Linh Grace Nguyen	Mathematics	Biology skills Lab coordinator. Provides access to anatomy models and biology tutoring services.
Lisa Pang	Molecular and cellular biology, Neurobiology	Teaches both human anatomy and human physiology for allied health students.
Margarita Savageau	Biology, Molecular Microbial, Chemistry	Buys and prepares materials to support biology labs. Maintains inventory of lab supplies and equipment, manages lab budget, assists with planning, coordinates equipment maintenance, and supervises student employees.
Azita Tavana	Microbiology, general biology, genetics, immunology, virology, parasitology	Teaches general biology for non-majors and microbiology for students interested in nursing and allied health occupations.
Thu Tran	Microbiology	Prepares and organizes classroom materials essential for teaching students, such as media, microbiological culture reagents and science related materials.

- 2. In addition to major professional development activities completed by faculty and staff in the past, in particular with regards to students' success, equity, distance education, SLO assessment, guided pathways and/or innovative teaching/learning strategies, are there any additional professional development needs of your department in the future? What are they? Please provide details about a timeline.**

Recent Professional Development

1. May Chen

1. Completed EdD program at Johns Hopkins University in Summer 2023
2. Recent Coursework: Current Topics in Biosciences (UCB), Online Course Development (EDIT 022 at EVC), Introduction to Asynchronous Online Teaching & Learning (@ONE), Introduction to Live Online Teaching & Learning (@ONE), Advanced Techniques with

Canvas (@ONE), Equitable Grading Strategies (@ONE), Online Teaching and Design (@ONE)

2. Darcy Ernst

1. Certificate in Online Teaching and Educational Technology (EDIT courses)
2. Student equity grant for MSE division student research symposium (2023-2024)
3. Funded Open Educational Resources cohort (2022-2023, 2023-2024)
4. ESA Life Discovery Conference (2023)
5. NSF S-STEM Mentoring Conference and workshop (2023)
6. EVC Excelencia Seal of Excellence project (2023-2027)
7. BCEENET Course-based undergraduate research experience (CURE)fellowship + CURE implementation (2022-2023)
8. SLO, PLO, ILO assessment and implementation

3. Alfred Gonzalez

1. Involved with the local chapter (AFT 6157) American Federation of Teacher's Union and faculty workplace rights.
2. Mentor new associate and full-time faculty at EVC and Biology department
3. Assist with SLO, PLO and ILO assessments & implementation.
4. Instruct non-science major transferrable bio courses for the ENLACE Academic Program and participants.
5. Maintain DE competency to qualify and maintain certification to teach online.
6. Completed multiple workshops and official distance education courses. Competent with online instruction management system of Canvas for courses offered (Environmental Science 10, Human Heredity Bio 61 and Oceanography 10).

4. Adam Green

1. Developed online texts for lectures and lab courses and has recently developed a new online lab manual for BIOL 21. He incorporates many years of photography experience into his courses and online materials and now includes videography and web design for both courses and departmental materials.
2. Involved with SLO, PLO, and ILO assessments and implementation and represents the MSE division on SLOAC. In addition, involved in updates to biology courses and the biology degrees on CurriQunet.
3. Wilderness First Aid Certification, including use of an epi-pen, and completed a kayak rescue training.
4. EDIT 22: Online Course Development
5. OFAR (Open for Anti-Racism) program sponsored by EVC President's office.

5. Lisa Hays

1. Chair of College Budget Committee

2. Completed 5 college courses in Online Teaching and Educational Technology
 1. Online Course Development (EDIT 22)
 2. Accessible Course Content (EDIT 23)
 3. Women in STEM (EDIT 26)
 4. Online Course Design (EDIT 15)
 5. Copyright and Creativity (EDIT 25)
3. Attended webinars such as College Deaf Culture, Active Learning Strategies, Pathways to Inclusive Higher Education, and College Student Mental Health Crisis
6. Jennifer Kurushima
 1. Chair of the Professional Development Committee
 2. PI (Principal Investigator) for the Biology department's NSF S-STEM Grant funding our Biology Scholars Program.
 3. Maintains DE (Distance Education) competency/certification to teach online.
 4. Mentor new associate and full-time faculty at EVC and Biology department
 5. Assist with SLO, PLO and ILO assessments & implementation.
 6. Training in various online teaching software (PlayPosit, Respondus, VisibleBody, Canvas Studio, etc.)
 7. SFSU SEPAL Scientific Teaching Institute - EVC's Humanizing Curriculum & Instruction Faculty Inquiry Group
 8. Human Anatomy and Physiology Society Conference, cc Bio INSITES (Community College Biology Instructors Network to Support Inquiry into Teaching Education Scholarship)
 9. Attended the California Community College Online Teaching Conference
 10. Presented twice at SABER conferences (Society for the Advancement of Biology Education Research)
 11. Invited guest editor for CBE-LSE Journal (a biology education research journal) & scholarly research of community college biology student science identity.
 12. Published scholarly articles in the field of biology education research
 1. Perkins, H., Royse, E. A., Cooper, S., Kurushima, J. D., & Schinske, J. N. (2023). Are there any "science people" in undergraduate health science courses? Assessing science identity among pre-nursing and pre-allied health students in a community college setting. *Journal of Research in Science Teaching*.
 2. Alvares, S. M., Gonzalez, B., Hewlett, J. A., Kurushima, J. D., McFarland, J. L., Schinske, J. N., ... & Vemu, S. (2022). Centering the Experiences of Community College Students and Faculty in Biology Education Research. *CBE—Life Sciences Education*, 21(3), ed1.
 13. Participated with the Humanizing Curriculum Initiative

14. Attended and participated in cc Bio INSITES conferences (2019, 2020, 2021, 2022, 2023)

15. Attended the Western Society of Naturalists conference in 2023.

7. Hoai Nguyen

1. Laboratory Safety Training (Fall 2023)

8. Linh Grace Nguyen

1. Prepare pre-nursing students to have access to anatomy models, provide one-on-one and in group biology tutoring services inclusive to all students of diverse and ability backgrounds, facilitate study workshops to prepare students for exams and boost performance.

9. Lisa Pang

1. Involved with the Curriculum committee which has helped with program/course state mandated updates.
2. SLO, PLO, and ILO assessments and implementation. Updated the BIO AA program on CurriQunet.
3. Physiology lead and changed the format of the physio course from 2 labs and 1 lecture/week to 1 lab and 1 lecture (with incorporated discussion)/week. Modified the SLOs to match a general scheme of 3 (more broadly defined) SLOs/course instead of 5.
4. Participated with the Humanizing Curriculum Initiative and contributed to a proposal that was grant funded.

1. Maintains DE (Distance Education) competency/certification to teach online.

2. Literate with *mentimeter* to get real time feedback from students.

3. Migrated from scantrons to answer sheets for students.

10. Margarita Savageau

1. Laboratory Safety Training (Fall 2023)

11. Azita Tavana

1. SLO, PLO and ILO assessments and implementation(2016-current)

2. New associate faculty mentorship (2016-current)

3. Drafted (2014) and updated (Fall 2022, Spring 2023, and Summer 2023) the Biology Laboratory Guidelines for Biol 021 faculty

4. Served on SLOAC (Student Learning Outcomes and Assessment Committee) (2019-2023)

5. Organized guest speaker event open campus-wide on animal farming and food safety (Fall 2022)

6. Updated Biol 021 Course Outline of Record (Fall 2021)

7. Coordinated SLO assessment and collected data on 13 sections of Biol 021 (2016-2021)

8. Served on multiple hiring committees for full-time and associate biology faculty (2016-2022)
 9. Completed Hazardous Waste Management Training for Laboratory (Spring 2023)
 10. Completed a DE boot camp (Summer 2021), EDIT 22 (Online Course Development) (Fall 2021), and EDIT 23 (Accessible Course Content) (Fall 2022)
 11. Attended multiple webinars on effective use of Studio, Canvas, Proctorio, and Respondus (Spring 2020-Present)
 12. Attended webinar: "Proactive and positive ways to engage students about academic integrity" presentation by Jessica Bernards and Wendy Fresh, Portland Community College (Spring 2022)
 13. Attended webinar: "Equitable Success for All: The Vision for Success and the Roadmap for California's Future" (Spring 2022)
 14. Completed "Humanizing the Curriculum" course (Spring 2022) – Co-wrote a proposal for an initiative to increase awareness of diversity in biology, and was awarded a grant
12. Thu Tran
1. Laboratory Safety Training (Fall 2023)

Future Professional Development for Department

1. Cadaver prosection training for anatomy faculty.
2. Training for faculty to integrate CUREs (course based undergraduate research experience).
3. Training for wilderness first aid and other field-related training for field course instructors.
4. Distance education training during professional development day per semester.

Budget Planning

Part E: Budget Planning

- **1. With your Dean, review the department Fund 10 budget (operational budget) and discuss the adequacy of the budget in meeting the program's needs.**

Account no.	Balance 10/1/2023	Title	Discussion
10-21-6050-00000-55200	\$8,688.74	Hope Grant for student symposium and student conference	Funds provided by President Gilkerson in spring 2023
10-21-6050-00000-55200	\$500	Conference	Used in addition to Professional Development Conference funds.

10-21-0400-00000-55210	\$500	Field Trips	<p>Need: \$13,000</p> <p>Educational Master Plan Goal: remove barrier of extra fees from students needed to pay for campsites, ice, propane, and park entrance fees. Replace aging camping gear and purchase safety equipment.</p> <p>Cost of courses: \$2,000 x 5 courses = \$10,000/year + equipment</p>
10-21-0400-00000-55230	\$55	Mileage Expense	Adequate
10-21-0400-00000-54300	\$0	Supplies Non-Instructional	<p>Need: \$1,000</p> <p>Safety of students: Need items such as detergent for glassware washer and other cleaning supplies.</p> <p>Quality Programs: Basic office supplies such as folders and sheet protectors are required for supporting a large department laboratory that includes 6 classrooms, 1 skills lab for students to study, 4 classified professionals, and 22 faculty.</p>
10-21-0400-00000-55220	\$0	Subscription/Membership	<p>Need: \$240</p> <p>Safety and State Regulations: Zoleo is a satellite phone service used by faculty to reach emergency personnel during field courses each semester. The department owns a device that transmits signal to a phone via Bluetooth connection. Need yearly service to use device.</p>
10-21-0400-00000-55550	\$0	Waste/Garbage	<p>Need: \$500</p> <p>Safety and State Regulations: Biohazard waste is garbage that needs to be sterilized and cannot be placed in garbage bins. OSHA requires proper disposal or college is fined \$200,000</p>
10-21-0400-00000-55110	\$0	License Renewal Instruction	<p>Need: \$2,500</p> <p>Relate to Mission: Collecting permit for General Biology and Marine Biology (\$1100 for a 3 yr permit) to save \$3500/yr in live specimens.</p> <p>Educational Master Plan Goal: To provide free lab manuals to students need Biorender software for faculty to draw scientific images and publish in public domain free to all students (\$1400/yr)</p>

10-21-0400-00000-55620	\$0	Repair	Need: \$2,500 Safety and State Regulations: Sterilizer for bacteria, microscope repair, refrigerators (total of 7, some aging), deionized water system, glassware dishwasher
10-21-0400-00000-5562510-21-6551-00000-55625	\$0	Preventative Maintenance Agreements	Need: \$21,000 Safety and State Regulations Maintain microscopes used by 1,600 students each year (\$3,850/yr), sterilizer used to kill bacteria (\$16,884/yr)
10-21-0400-00000-56411	\$0	Equipment	Need: \$4,000 Safety of students: New equipment is needed each year to upgrade for safety Innovation: science changes and students need access to modern equipment
10-21-0400-00000-56420	\$0	Equipment Replace	Need: \$5,000 Safety of students: broken equipment must be replaced each year. Things like broken, chipped, cracked glassware and other sharps are physical hazards; special grow lamps, broken models, hot plates, and balances need to be replaced periodically.
10-21-0400-00000-55100	\$0	Personal/Contract Services	Need: \$1,000 Safety and State Regulations: The Natural Science Museum in Sequoia room 109 needs yearly fumigation to inhibit growth of insects among the taxidermy specimens

- 2. List all external funds, i.e. fund 17, the department/program receives, and describe their primary use.

Account no.	Balance 10/1/2023	Title	Comments
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17-25-0401-22500-54100	\$48,800	Supplies Instructional	Amount was determined by College Budget Committee and President. Funds may need to be transferred to other accounts to cover costs that receive \$0. Primary use: Chemicals, reagents, consumables, mammal organs and animals for dissection, microbiology media to grow bacteria, live specimens for student experimentation, bacterial cultures to grow in lab and provide to students for experiments, two cadavers for anatomy labs, personal protective equipment
17-25-6044-26201-54100	\$54,663.73	Strong workforce R6 in conjunction with Dean Angel Fuentes	Anatomy models, prepared tissue slides, blood-typing cards for pre-nursing courses and biology skills lab for student study
17-21-6050-20400-55820	\$2,975	Student Equity and Achievement Program	Granted for Math/Sci/Engineering Student research symposium (2023-2024)
	\$2,000	Basic Needs	Granted to purchase food and drinks for Math/Sci/Engineering Student research symposium (2023-2024)
17-25-0401-10935-51400	\$107,859.40	NSF S-STEM – Faculty summer NIA	
17-25-0401-10935-53120	\$18,302.48	NSF S-STEM – Faculty summer NIA (Benefits)	
17-25-0401-10935-53320	\$1,565.30	NSF S-STEM – Subaward to Iowa State University	
17-25-0401-10935-53620	\$1,851.86	NSF S-STEM – Faculty summer NIA (Benefits)	
17-25-0401-10935-54100	\$8,200.00	NSF S-STEM - Noninstructional supplies	

17-25-0401-10935-55200	\$8,090.00	NSF S-STEM – Conference Travel	
17-25-7310-10935-57314	\$18,175.00	NSF S-STEM – Indirect costs	
17-25-7323-10935-57601	\$430,000.00	NSF S-STEM – Student scholarships	

Technology and Equipment

Part F: Technology and Equipment

- **Review the current department technology and equipment needed and assess program adequacy. List and changes to technology or equipment since the last program review. If changes were made please indicate how the change impacted student success.**

The Biology Department comprises six laboratory classrooms and several preparation and storage areas. Two of the labs are equipped with gas, air, and vacuum outlets, three have gas and air outlets, and one has gas outlets. Three of the labs feature fume hoods, while one is equipped with a biological hood. Additionally, there is a dedicated Anatomy lab with an adjacent room equipped for cadaver dissections and a separate lab for teaching Microbiology. Another lab is dedicated to the study of Botany and is located adjacent to a small greenhouse without plumbing for water. The remaining three labs are versatile and can be used for various Biology courses. All labs are furnished with computers and data projectors.

BIOLOGY COURSES WITH LABS:

Biol - 004A – General Principles & Cell Biology

Biol – 004B - Organismal Biology & Biodiversity

Biol – 014 – Head Smart into the Sciences

Biol – 020 – Human Biology

Biol – 021 - General Biology

Biol – 064 - Marine Biology

Biol – 071 - Human Anatomy

Biol – 072 - Human Physiology

Biol – 074 - General Microbiology

Envir – 010 - Environmental Science

BIOLOGY FIELD COURSES:

Biol – 080A – Field Biology – Canyons and Cliffs

Biol – 080B – Field Biology – Birds and Blossoms

Biol – 080C – Field Biology - Coastal California

Biol – 080D – Field Biology – Desert and Dunes

Biol – 080E – Field Biology – Mountains

Biol – 080F – Field Biology - Forest and River Ecology

Biol – 080G – Field Biology - Volcanoes of California

EQUIPMENT:

Analytical Balances

Anatomical Models

Articulated skeletons

Audiometers

Autoclave

Botanical models

Cadaver dissecting tables

Cadavers

Centrifuges

Combination Hot Plates/Magnetic Stirrers

Dissecting Microscopes

Explosion-proof refrigerators

Glassware washer

Grow labs

Incubators

Laboratory carts

Laptop computers

Microscopes

pH meters

Refrigerated cadaver storage unit

Sliding door refrigerators

Spectrophotometers
Thermocyclers
Unarticulated skeletons
Water baths
Zoological models

MATERIALS:

Blank microscope slides and cover slips
Blood
Blood sera
Blood testing supplies
Buffers
Chemicals
Cuvettes
Dissecting materials
Dissecting tools
Dissecting trays
Face Masks
Glassware (beakers, flasks, pipettes, graduated cylinders of different sizes)
Gloves
Ice buckets
Lab aprons
Lab coats
Lancets
Masking tape
Micropipettes
Microscope bulbs
Petri dishes
Pipette aids
Prepare microscope slides
Reagents
Safety goggles
Sleeve protectors

Solutions

Test Tube racks

Test tubes

Thermometers

WASTE:

Hazardous waste (once-a-semester pickup) currently paid for by the District Office

Biomedical waste (once-a-semester pickup) paid for by the Biology Department

EQUIPMENT MAINTAINANCE and COST:

Stericycle Biohazardous waste pick-up

\$500 paid by the department

ADDITIONAL MAINTAINANCE NEEDED

Microscopes serviced once a year

Sterilizer and glassware washer serviced four times a year and as needed

Fumigating the museum, needs to be an annual event, currently done as needed

Since the last program review, there has been a gradual replacement of biology equipment. Unfortunately, this process has been slow due to budget constraints. The microscopes and models, which are extensively used across by 1,600 students each year, have suffered wear and tear without sufficient funds for maintenance or replacement. As a result, we have had to resort to using damaged equipment and models. It is essential that equipment and materials are regularly replaced and updated. There should be a dedicated ongoing fund 10 budget to do this.

Since the last program review, the Biology Program received COVID Higher Educational Relief Funds to bring students back to campus safely during the pandemic. We added a set of new classroom laptops and BioPac software to run physiology experiments that include electrocardiograms (EKG), pulmonary lung volumes, reaction times, biofeedback, and electromyograms (EMG). The department received new microscopes for the microbiology lab classroom. In addition, the cadaver refrigerator unit, three refrigerators, sterilizer, and glassware washer have been replaced. Some of the anatomy models and prepared slides have been replaced. The department received four thermal cyclers/PCR, new Bunsen burners, audiometers, lab chairs, one microbiology incubator, grow lab lamps, binoculars, dissection kits, pH meters, salinity testers, electrodes, micropipettes, and balances.

Unfortunately, there is currently no dedicated budget for the repair of biology equipment the Fund 10. This leaves us in a precarious situation, especially when critical equipment like refrigerators, ovens, incubators, and the sterilizer experience issues. The uncertainty surrounding the availability of repair funds can lead to disruptions in classes, particularly in the Microbiology department, which heavily relies on the sterilizer to clean items of bacteria.

There is also no dedicated budget for equipment maintenance in Fund 10. Sometimes the District covers the cost and sometimes it doesn't. When the instructional budget is uncertain, the cost of \$500 Biohazard waste removal or \$240 emergency satellite communicator annual subscription for field courses lowers the quality of the experiments we can offer our students in lab classes. The District should assume responsibility for all equipment maintenance costs, allowing the instructional budget to be exclusively allocated to instructional supplies.

ESSENTIAL OPERATIONAL SUPPLIES

Aluminum foil saran wrap - all

Aquifer kits – Envir 10

Autoclave parts - all

Blood agar plates – Biol 74

Enteropluri media strips - Biol 74

Band-aids— Biol 71, 72

Bibulous paper – Biol 4A, 4B

BioPac electrodes and replacement parts-- Biol 72

Blood sera— Biol 72

Bottled water-- Biol 72

Calculators – all

Camping equipment – Biol 80

Centromeres—Bio 4A

Chara—Bio 21

Chemicals—all

Clothespin – Biol 4A, 4B

Containers for biohazard waste - all

Coffee filters— Biol 20, 21, 4A

Cow eyes— Biol 71 and 20

Crabs— Biol 64, 4B

Cultures— Biol 4A, 4B, 21 and 64

Cut flowers— Biol 4B

Dialysis clamps

Dialysis tubing

Disinfectants – Biol 4A, 4B, 74

Disposable aprons— Biol 71

Dissection equipment— Biol 71, 4A, 4B, 64

Dissection materials

Dixie cups— Biol 20, 21, 4A

DNA fingerprinting— Biol 4A

Dogfish— Biol 4B and 64

Dropper bottles – all

Eldon cards—blood testing— Biol 71

Elodea— Biol 4A, 4B, 20, 21, 64

Frogs— Biol 4B

Gladiolas— Biol 21

Glassware—all

Gloves--all

Grocery items (milk, eggs, meats, veggies, flowers) - all

Household solutions – Biol 4A, 14, 21, 74,

Hydrometers – Biol 4A, 64

Immersion oil – Biol 74

Inoculating loops – Biol 4A, 74

Kimwipes – Biol 4A, 64

Lab coats – 4A, 74, 4B, 72, 74

Labeling tape--all

Lambda DNAs— Biol 4A

Lancets— Biol 71, 72

Lens paper—all

Lightbulbs – Envir 10, Biol 21, 72

Live plants – Biol 21, 4A, 4B

Magnifying glasses – Biol 21, 64

Microbiology cultures – Biol 4A, 4B, 21, 20, 74

Microbiology media - Biol 4A, 4B, 74

Microbiology stains - Biol 4A, 4B, 74

Micropipette tips— Biol 4A

Moss—Bio 21

Pasteur pipettes, disposable - all

Parafilm— Biol 4A, 4B, 64

Perch— Biol 4B and 64

Petri dishes – Biol 4A, 4B, 20, 21, 74

pH paper— Biol 4A, 21, 72

Pine nuts— Biol 21

Plants— Biol 4A, 4B, 21

Plastic bags/Ziploc – Biol 21, 71

Posters Bio - all

PTC paper— Biol 4A, 4B 20, 21, 72

Red biohazard bags - all

Recombinant DNA and transformation—4A

Refractometers – Biol 4A, 64

Rulers - all

Scissors – all

Sandwich bags— Biol 20, 21, 4A

Seeds— Biol 4B

Sharpies

Sheep brains— Biol 71 and 20

Sheep hearts— Biol 71

Sheep kidneys— Biol 71

Sigma Aldrich sera and chemicals— Biol 4A

Slides and coverslips—all

Soil testing kits – Envir 10

Staining trays – Biol 4A, 4B, 72, 74

Stopwatches – Biol 4A, 14

Strawberries— Biol 20, 21, 4A

Thermometers

Tuning forks

Ulva— Biol 4B

Urine strips— Biol 4B, 20, 72

UV lights – Biol 20, 74

V 8— Biol 72

Water testing kits – Envir 10

Wax pencils - all

Wisconsin Fast Plants kits— Biol 4A, 4B

NEEDED EQUIPMENT

Anatomy models

Botany models

Biology models

Microscopes with cameras for instructor desks

3D printer to create biological models and replace broken parts

Analytical balances (3)

Cactus garden, shed, tools, water

Combination hot plates/magnetic stirrers (3) – do not have enough to meet the needs of classes

Distilled water cartridges – for all lab courses needing water and solutions

DNA transformation

Forensic DNA

Glass shelves for museum – need additional shelving for display cases and need to secure existing shelves

Greenhouse renovation for water and air ventilation

Histology slides

Ice machine – use of ice is greater than ice trays from freezers can supply

Instructional outdoor garden for general biology

Liverwort (Marchantia)

Moss (Mnium)

Club moss (Lycopodium)

Spike moss (Selaginella)

Horsetail (Equisetum)

Whisk fern (Psilotum)

Other types of Ferns

Cycad (Zamia)

Cactus

Lilium

Ephedra

Pine tree

Cup fungi

Mushrooms

Puffballs

Fruticose lichen

Microscopes for General Biology (30) - Compound microscopes (15) and Dissecting microscopes (15)

Models (botanical, biological, anatomical) – need to replace worn and broken models

Museum computer and projector

Museum sun-blocking screen – retractable for ceiling

Native plant garden

pH electrodes (6) – need for replacement

Physician's scale – 40 years old and broken

Prepared microscope slides – classroom sets

Shaking water bath for microbiology lab

Student kits: majors biology

Trailer for field courses

Vegetable and flower seeds – majors biology

NEEDED REMODEL TO BUILDING

Light switches near entrance doors – currently the switches are only by the inside door which requires crossing unsafely across a dark classroom to turn lights on and off.

Plumbing for water to the greenhouse and air ventilation

Repair kick plates and table legs in all biology labs

Blind pulls need repair in several biology labs

Coat racks in all lab classrooms

Microbiology lab lockers need repair – doors don't close and doors missing

Additional space in Sequoia remodel for anatomy theater

Additional space in Sequoia remodel for biology skills lab

Additional space in Sequoia remodel for additional biology lab classroom

Additional space in Sequoia remodel for Faculty offices- currently, one full-time faculty does not have an office in Sequoia making the day to day challenging, and the department is planning on hiring another full-time faculty member.

Additional Information

Part G: Additional Information

Future Needs and Resource Allocation Request

Total Cost

Attach Files

Attached File

SLO Discussion BioMtgNotes-PR.pdf (/Form/Module/_DownloadFile/5086/43692?fileId=456)

Natural Science Budget Request 2023_2024.pdf (/Form/Module/_DownloadFile/5086/43692?fileId=457)

IEC Reviewers

IEC Mentor

Henry Estrada

IEC Second Reader

Guy Ras