

ANNUAL PROGRAM REPORT

College	College of Science
Department	Biological Sciences
Program	B.A., B.S. and M.S. in Biological Sciences
Reporting for Academic Year	2022-2023
Last 5-Year Review	2022-2023
Next 5-Year Review	2028-2029
Department Chair	Ana Almeida
Authors of Review	Ana Almeida, Maria Gallegos, Brian Perry
Date Submitted	September 30th, 2023

I. SELF-STUDY

A. Five-Year Review Planning Goals

- *Increase student participation in the B.S. in Ecology and Evolutionary Biology (EEB) concentration*
- *Increase student opportunities in the B.A. in Biology Education concentration*
- *Increase student opportunities in the B.S. in Forensic Science concentration*
- *Increase preparation of diverse student groups for careers in biotechnology*
- *Increase enrollment in the Masters in Biology graduate program*
- *Increase student success within the major as demonstrated by improved graduation rates and student retention*
- *Build community among the undergraduate and graduate populations through seminar series and research symposia*
- *Improve connections with our alumni*
- *Promote and support the inclusion of anti-racist, equitable and inclusive pedagogy across the curriculum.*

B. Progress Toward Five-Year Review Planning Goals

Increase student participation in the B.S. in Ecology and Evolutionary Biology (EEB) concentration

The department continues to foster interest and participation in our EEB concentration through the hiring of faculty who will offer courses, research opportunities and student mentorship in this area, continued participation with the Oakland Zoo to create student internship opportunities, and renewed student participation in the curation of our expanding natural history collections. Additionally, the department is in the process of developing additional student recruitment materials. While it is difficult to get an exact count of EEB students currently in the department, the EEB concentration has consistently maintained the lowest student enrollment within the department, accounting for only 4-6% of Biology majors over the last five years. In the past this option/concentration has been one of the most popular within the department, but over the last decade student interest has waned. While the reasons for this decline in interest are varied, one of the main issues has been a lack of ecology and organismal biology courses being offered as faculty retire or move into more administrative roles. With existing faculty members Dr. Brian Perry, Dr. Ana Almeida, Dr. Chris Kitting, and Dr. Erica Wildy, and the hiring of Dr. Jenny Hazlehurst in 2019 and Dr. Thomas Jenkinson in 2021, the department is in a unique position to re-grow our Ecology and Evolutionary Biology concentration. New courses, such as BIOL456 –

Ornithology, are being proposed and offered that incorporate cutting-edge technology into both ecological and evolution-themed topics and/or offer opportunities to engage in field-based research. In addition, the EEB concentration has, for the first time in the history of the Department, a newly hired Instructional Support Technician (IST) to support lab and field activities related to this concentration.

Increase student opportunities in the B.A. in Biology Education concentration

The B.A. in Biology Education concentration currently accounts for approximately 7% of actively enrolled biology majors, a consistent enrollment rate for the past 5 years. Although this may seem a small amount, the size of the concentration has been increasing annually by 44-112% since Fall 2018, with the exception of Fall 2022. As indicated in the 5-Year review, this is a concentration with growing demand around the country, and CSUEB has the potential to develop a very strong program. However, with the separation of Dr. Inouye from the university in Spring 2022, and Dr. Wildy also assuming more administrative roles, the Department has struggled to offer courses in the field of Biology Education. In addition, Department was unsuccessful at securing a Biology Education faculty position during our AY2021-22 search. Lack of competitive salary and research space were both cited by the two top candidates as the primary reason for declining our offers. As student enrollment in this concentration grows steadily, the department will again need to request the hiring of a Science Education Specialist, and hopes to receive better support from the Institution to be able to make more competitive offers to qualified candidates. Currently, with the support from the HHMI Inclusive Excellence (IE3) grant, Dr. Ana Almeida is revamping BIOL 602 - Preparation for Undergraduate Teaching in Biology, one of the only Education-focused courses currently offered in the Department.

Increase student opportunities in the B.S. in Forensic Science concentration

The B.S. in Forensic Science concentration continues to grow, and currently accounts for approximately 15% of actively enrolled biology majors. This is an encouraging development since there is estimated to be an 11% growth in the field of Forensic Science projected for the period of 2021-2031 (U.S. Bureau of Labor Statistics, Employment Projections program). Unfortunately, while we are observing a growth in the numbers of students interested in this concentration, it is coinciding with an ongoing reduction in faculty numbers and curriculum offered in the Department of Criminal Justice, with whom we have partnered in its offering. Dr. Chris Baysdorfer, one of our cell and molecular biology faculty, has been the primary department member responsible for this concentration which is largely supported by courses also utilized by the Cell & Molecular Biology concentration. With interest in the field continually increasing, it will be necessary to once again request the hiring of a Forensic Scientist that can offer additional courses in this area and serve as a second departmental mentor for these students. The department has requested such a hire in previous reports. Alternatively, the Department is considering an update to the curriculum to reduce the number of Criminal Justice courses required, and minimize the negative impact that ongoing changes in that department could have on our program.

Increase preparation of diverse student groups for careers in biotechnology

To respond to the projected 9% growth in demand for biological research in the current decade (U.S. Bureau of Labor Statistics, Employment Projections program), and to foster increased representation of underserved student populations in related careers, the Department is discussing the development of a new undergraduate concentration as well as a new Masters track in Biotechnology. The Department's ultimate goal is the creation of a 4 + 1 Blended Program in Biotechnology. These programs will further promote opportunities for student engagement in biotechnology research while also boosting enrollment in our 600-level graduate courses. The department is currently discussing the feasibility of such a Program and the need to strengthen links to biotech companies around the region.

Increase enrollment in the M.S. in Biology graduate program

Enrollment in the graduate program peaked with 45 actively enrolled students in Fall 2020, but declined to 29 enrolled students in Fall 2022. This reduction in actively enrolled students makes it difficult to offer a number of our graduate level courses as they do not meet the minimum class size requirement set by the College of Science, and also minimizes the opportunities for our faculty to mentor students engaging in graduate-level research. Dr. Maria Gallegos, the Graduate program Coordinator, and the Department Chair have worked with the College of Science Social Media Intern to create flyers and posters, as well a larger web and social media presence to advertise the program in an effort to recruit more students. To further address this issue, the department is discussing the creation of a Blended Program in Biological Sciences which will offer our undergraduate students an opportunity to continue their studies towards a Masters degree. The Department is also studying the possibility of a new track within the Biological Sciences M.S. degree allowing students to pursue a project-based, to be offered as an alternative option to our current thesis-based Biological Sciences M.S. degree. These changes, especially the creation of a project-based track, are expected to attract more students to our graduate program as has been shown in other programs in the College of Science (e.g., Chemistry and Biochemistry, Environmental Geosciences). In addition, in order to further support our graduate students in achieving our learning outcomes, the program has established mandatory committee meetings in which students should demonstrate adequate progress through their degree while also providing the committee with opportunities to identify challenges and set-backs. As a result, a student support plan can be put in place to ensure students are receiving the necessary support to thrive during their graduate studies.

Increase student success within the major as demonstrated by improved graduation rates and student retention

Data available via Pioneer Insights and the CSU Student Success Dashboard indicate that very few of our students graduate with 4 or even 6 years (11% and 47% on average, respectively), and that very few students that begin as Biology majors graduate with a degree in Biology (~25.7%). While there are numerous reasons why our students struggle academically, there are several steps the department has implemented in an attempt to improve these numbers. Beginning in Spring 2021 the department implemented mandatory faculty advising for students with a GPA of 2.5 or lower prior to enrolling in courses for the following semester. During the mandatory advising sessions, the Faculty Advisors focus on checking in with the advisee, identifying potential challenges that may be serving as barriers to their academic success, developing an education plan to complete the degree, and informing the advisee about institutional programs that may offer needed assistance. Although it will be many semesters before we see the possible results of these advising efforts numerically, the department is confident that these advising sessions were very beneficial for the majority of students involved. The department has constructed detailed roadmaps that provide students with a pathway to complete the biology degree within 4 years (and 2 years for transfer students). These roadmaps are widely available on the department website and within the College of Science, and are currently being used by the advising team. Because the University refuses to broadly enforce prerequisites during the class enrollment process, the department for many years simply allowed faculty to enforce course prerequisites as they saw fit. As a result, prerequisite enforcement was largely ignored which resulted in a large number of students enrolling in courses they were not prepared for. The consequences of this were elevated DFW rates and courses being taught at a lower-level to accommodate inadequately prepared students. In order to address this issue, the department has made the commitment to strictly enforce course prerequisites, and has submitted course revisions to add to the University Catalog completion of prerequisites with a grade of C- or better. It will be a few years before the department can assess the effectiveness of these efforts to improve student success as measured by reduced equity gaps, increased graduation rates and increased student retention.

Build community among the undergraduate and graduate populations through seminar series and research symposia

High-impact teaching strategies employed by the department include student involvement in both independent and whole-class research projects. In an effort to recognize and celebrate the research achievements of our students, and provide them with opportunities to polish their presentation skills, the department has been organizing an annual student research symposium that includes student presentations, poster session and a keynote address. All Biology students (both undergraduate and graduate) are encouraged to attend and participate. To date the department has offered two such symposia in Fall 2018 and Fall 2019, both of which were a great success with high student involvement. Unfortunately, the Fall 2020 and Fall 2021 symposia had to be cancelled due to the ongoing Covid-19. The department had planned to reinstate our symposia this academic year (Fall 2023) however due to the current financial crises, the Fall 2023 Symposium had to be cancelled. The department also continues to expand our monthly seminar series which provides our students with exposure to research at the academic and industry level by inviting faculty, postdoctoral associates and research scientists as speakers. In order to increase student participation in our Biology Research Seminar Series, undergraduate and graduate students enroll in BIOL497 – Issues in Biological Sciences and receive 1 unit for their attendance to the seminar. Student involvement at the seminars remains high, with 30-50 attending each session on average. If the budget permits, the department will continue to offer BIOL497 in the upcoming semesters.

Improve connections with our alumni

The department launched an Alumni Map project in Fall 2017 that already includes data for over 55 of our previous undergraduate and graduate students. The department continues to develop an online exit questionnaire so that we can assess where our students are going upon graduation and obtain contact information that will allow us to remain in touch with them once their university email addresses become inactivated. The department still plans to develop a quarterly, electronic alumni newsletter that highlights the academic and research achievements of our students and faculty, and features profiles of our successful graduates. As part of our BIOL 130 – Connecting with Biology introductory course, a career week will invite alumni and advisors to the classroom to provide students with direct knowledge of the variety of career paths pursued by our Biology graduates.

Promote and support the inclusion of anti-racist, equitable and inclusive pedagogy across the curriculum

Several faculty within the department have engaged in professional development aimed at adopting anti-racist pedagogies into their praxis. For instance, Biology faculty has participated in and/or lead Faculty Learning Communities (FLC) on Anti-racist and Liberatory Pedagogy, Alternative Grading and Equitable and Inclusive Online Teaching. In particular, Dr. Erica Wildy served as co-PI on the Faculty Learning Optimizes Student Success (FLOSS) initiative, a multi-institution initiative to support faculty instruction and student learning in introductory biology courses. This initiative, on which other CSUEB Biology faculty (Dr. Jenny Hazlehurst, Dr. Thomas Jenkinson and Dr. Ana Almeida) participated in, resulted in the creation of a Community of Practice (CoP) for faculty at three SF Bay Area institutions of higher education: UC Berkeley, CSUEB, and Berkeley City College. In this CoP, participants share student-centered teaching practices and approaches to boost student achievement and to narrow equity gaps. Overall, this initiative directly impacted 15 faculty and, indirectly, an estimated 1,400 introductory majors' biology course-enrolled students, between the three partner institutions. In addition, equity and inclusion are featured through the Biology curriculum through several activities across courses. For instance, Dr. Erica Wildy developed a Scientist Spotlight activity for BIOL 100 - Biology in the Real World. The focus on this activity is the presentation of a diverse set of scientists and

their achievements that mirror the diversity of students in the class itself. In addition to allowing non-majors an opportunity to examine the scholarship engaged in by California-based biologists, the activity was designed to expand the view of what a biologist looks like. This course is offered to approximately 50 non-major students every Fall semester. Also, Dr. Thomas Jenkinson successfully developed lessons and discussions of scientific racism and eugenics in the history of biology for BIOL 130 – Connecting with Biology, one of the first Biology courses offered specifically to Biology majors. Students were presented with materials and then engaged in student-directed discussions around past attempts in biology to use biological variation to justify social constructs of race, the ethics of past eugenics movements, and the potential for the misuse of human genomics for discriminatory purposes. The department is also part of the HHMI Inclusive Excellence 3 (HHMI-IE3) cohort, specifically its Learning Community Cluster 3 (LCC3), and has focused on improving the experience of first-year biology students through equitable and inclusive approaches. This grant has supported department efforts and initiatives on creating a sense of community among our Biology majors, and promoting professional development for faculty, teaching assistants (TA) and learning assistants (LA). The department chair, together with faculty across CSUEB, in particular Dr. Eve Higby and Dr. Stephanie Zaleski, is also planning professional development opportunities for Biology faculty in equitable and alternative grading strategies.

C. Program Changes and Needs

Overview: Despite our failed search for a Biology Education specialist, the department was successful in fulfilling the two Microbiology TT-faculty positions, after the departure of Dr. Nazy Pakpour and Dr. Pascale Guiton during AY2021-22. The new TT-track hires are scheduled to join the department in Spring 2024. The vacant Equipment Technician position remained vacant and was later modified to an IST position, successfully filled. The new IST, Mr. Mark Callaghan, joined the department in Fall 2023 and will support our Ecology and Evolution concentration labs and field trips. Overall, the department continues to make excellent use of the research and mentoring space provided and will certainly benefit from the space provided by the Applied Science Center in the near future.

Curriculum: During AY2022-2023 the department created a new curricular component, BIOL130 – Connecting with Biology, offered to all biology majors in place of GS101A and GS101B (Foundations for Success series).

Students: Overall, the department has experienced a significant reduction in the number of biology students, both in its graduate and undergraduate programs. Since Fall 2020, when numbers were at an all-time high, the department has experienced a 23.5% reduction in the number of undergraduate students and a 35.6% decrease in the number of graduate students. In terms of student demographics, the percentage of Latinx undergraduates has increased to 41%, the percentage of Blanc/African American students has decreased to 7% while other groups have experienced little to no change. A similar pattern is observed in our Masters program, where the Latinx population represents 38% of the student population. The Masters program has been unsuccessful at recruiting Black/African American students since Fall2020. In general, the number of international students decreased in both graduate and undergraduate programs. During the same period, undergraduate FTES in Biology decreased from 565.3 in Fall2020 to 471.1 in Fall2022, a 16.7% reduction. These numbers suggest that there has been not only a decrease in the number of students but also a reduction in the number of units that each student is enrolling in.

Faculty: During AY 22-23 the hired two new Tenure-Track faculty members in Microbiology, as replacement hires. The committee did an excellent and timely job of screening the hundreds of

applications and conducting phone and in-person interviews, resulting in a highly successful search. Unfortunately, during the same period, and despite similar efforts by the search committee, the search for a Biology Education Tenure-Track position failed. The department was unable to offer a competitive salary and an acceptable research space, leading to the rejection of our offers by the two top candidates.

Staff: The Department Equipment Technician (ET-II) position that remained unfilled since the retirement of Brian Sowers in 2019 was modified to an IST-II position and recently filled. The lack of an Equipment Technician since 2019 has been a very problematic issue for the Department and College, and with the recent departure of William Roan (IST-II) the department will face even greater challenges regarding equipment maintenance and upkeep. The department also recently hired Irene Rodriguez to support our introductory series (BIOL130, BIOL140A and BIOL140B, as well as our Cell and Molecular Biology courses). The department also employs three additional ISTs (Annapurna Chandra, Mica McCarty-Glenn, and Blanca Ruiz) that support our Physiology and Microbiology courses and manage the department stockroom.

During the Summer, the Biology ASC staff (Ms. Natalie Granera and Ms. Kathy Palmer) were reorganized into the Natural Science Hub, together with ASC staff from the Physics, Chemistry & Biochemistry and Earth and Environmental Sciences Departments.

Resources: The department continues to replace existing, aging equipment and add new equipment through the use of A2E2 and College of Science funds. However, great need still exists for additional equipment and resources required to offer our courses at a level deserving of our students. In particular, the maintenance of equipment required for classes, student mentorship and research, in the form of service contracts, has consumed a significant part of the department's budget. The impact of these service contracts in the department's budget has become even more evident with the current financial crises, and a more sustainable approach should be discussed, especially for resources, equipment and facilities shared across departments in order to avoid excess burden on any particular department.

The historic need for space with regards to office and research space is still the case. Nearly all faculty in the department (tenure track and lecturers) currently share office space, and we have no available space in which to house all of our lecturers or graduate teaching associates while they prepare for courses or hold office hours. Some of the additional space provided by the new Applied Science Center will certainly help alleviate the department's needs.

Assessment: The department continues to assess our program learning outcomes. We have included a Summary of Assessment for both the undergraduate and graduate programs here.

Other: No significant program modifications to report.

II-A. SUMMARY OF ASSESSMENT – UNDERGRADUATE PROGRAMS

A. Program Learning Outcomes (PLO)

Students graduating with a B.S. or B.A. in Biological Sciences from Cal State East Bay will be able to:

- 1. Explain core biological concepts, including evolutionary processes, structure-function relationships across all levels of biological organization, homeostasis, information flow, matter and energy transformations, and the interactions and interconnectedness of living systems (ILO 6);*

2. Apply quantitative reasoning to explain biological phenomena and to address biological problems (ILO 1);
3. Clearly communicate biological information in a variety of formats (written, oral, visual) using a style appropriate for the intended audience (ILO 1,2,6);
4. Apply methods of scientific inquiry by formulating testable hypotheses, collecting and analyzing data, and reporting conclusions (ILO 1,6);
5. Gather, interpret, and evaluate published scientific information (ILO 1,6).

B. Program Learning Outcome(s) Assessed

B.S./B.A. Programs: According to our Long-term Assessment Plan, Year 2 Assessment focused on PLO4 (*apply methods of scientific inquiry by formulating testable hypotheses, collecting and analyzing data, and reporting conclusions*). PLO4 is aligned to ILO 1 (*think critically and creatively and apply analytical and quantitative reasoning to address complex challenges and everyday problems*) and ILO 6 (*demonstrate expertise and integration of ideas, methods, theory and practice in a specialized discipline of study*). In order to assess this outcome, the department used the Cornell University Biology Measuring Achievement and Progression in Science (Bio-MAPS) to survey students enrolled in BIOL 320 - Evolutionary Biology during Fall 2021.

C. Summary of Assessment Process

Instrument: For PLO4 assessment, the online Bio-MAPS focusing in Ecology and Evolution (EcoEvo-MAPS)¹ was used to survey students enrolled in BIOL320 during Fall 2021. The EcoEvo-MAPS survey is aligned to the 4-Dimensional Ecology Education (4DEE) framework, which includes the assessment of Ecology Practices as one of the dimensions. Our PLO4 assessment focused exclusively in this particular dimension (Dimension 2: Ecology Practices), comprising a total of 16 assessment items divided into *Quantitative reasoning/computational thinking* and *Designing and critiquing investigations*, both in the context of Ecology and Evolution. Students were able to complete the survey online and were offered extra-credit for survey completion.

Sampling procedure: All 79 students enrolled in BIOL320 during Fall 2021 were given equal opportunity to anonymously complete the EcoEvo-MAPS survey. In total, we received fifty-four (54) valid responses, corresponding to 67% of the total BIOL320 student population for that semester. BIOL 320 is the last upper-division course all biology majors take prior to focusing on their specific concentration courses. BIOL320 is a required course for all Programs (BS and BA) offered by the Department of Biological Sciences.

Data Collection and Analysis: All valid responses to the EcoEvo-MAPS surveys were used for downstream analysis. In particular, our PLO assessment focused on Dimension 2 (Ecology Practices), as described above. Quantitative analysis was performed using a distribution of student responses to the 16 items related to Dimension 2 (Ecology Practices), and presented in a box-and-whiskers plot depicting the median, 1st and 3rd quartiles.

D. Summary of Assessment Results

Main Findings: The EcoEvo-MAPS asked students to evaluate a total of 16 statements within Dimension 2 (Ecology Practices), with 5 items specifically focusing on *Quantitative reasoning/computational thinking* and 11 items focusing on *Designing and critiquing investigations*. Student's performances in

¹ Summers et al. EcoEvo-MAPS: An Ecology and Evolution Assessment for Introductory through Advanced Undergraduates. CBE Life Sci Educ June 1, 2018 17:ar18. DOI:10.1187/cbe.17-02-0037.

these two areas were significantly divergent (**Figure 1D**). While assessing *Quantitative reasoning/computational thinking* statements, the vast majority of students (71/79) performed below mastery (70% of correct answers) with only 8 students scoring at or above mastery. This category also exhibited the highest and lowest percentages of correct answers, with three students scoring 100% of correct answers and one student missing all 5 items. On the other hand, students' performances on *Designing and critiquing investigations* were far superior, with variations in performance ranging from 40% to 90% of correct answers. In total, 54 students (68%) performed at or above mastery, while 25 students (32%) performed below mastery (**Figure 1D**).

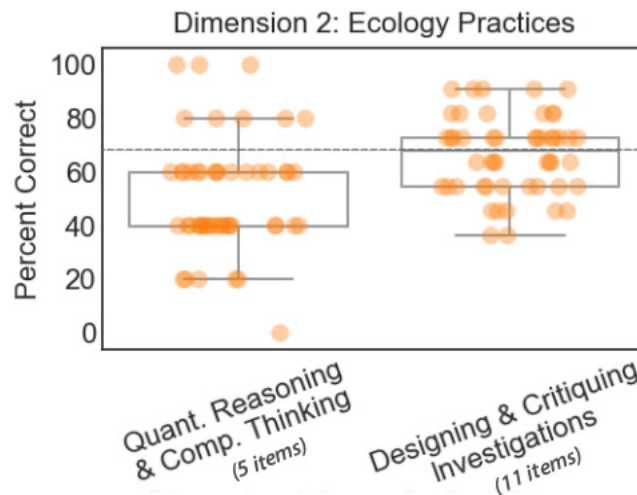


Figure D1 – Median, 1st and 3rd quartiles of percent correct answers for Dimension 2 (Ecology Practices) two aspects: quantitative reasoning/computational thinking and designing and critiquing investigations. The number of questions in each of the main Dimension 2 aspects is presented below its respective label. The dashed line denotes a score of 70% correct answers, and scores at or above the dashed line indicates mastery. Colored dots represent the performance of each student in each of the 16 items addressing Dimension 2.

Recommendations for Program Improvement: The Department should expand this assessment throughout the Program in order to identify where in our Roadmaps we are failing to support student mastery of PLO4. In addition, and given the diversity of concentrations offered within the Department of Biological Sciences, it would be useful to collect data on students' concentrations in order to assess differences in student performance across concentrations. This knowledge would help the department design interventions that specifically address our shortcomings in meeting our PLO4. Overall, BIOL320 students are challenged by quantitative reasoning/computational thinking and would benefit from sustained development of these skills throughout their academic career in the department. The inclusion of quantitative reasoning/computational thinking across the curriculum would promote consistent exposure of students, and provide multiple opportunities for development and mastery of this skill.

Next Step(s) for Closing the Loop: The department is planning to offer BIOL602 – Undergraduate Biology teaching for the first time in Spring 2024. This course is being organized as a faculty-student learning community in which faculty and students will work together on revising course syllabi, activities and assignments. Quantitative reasoning/computational thinking will be one of the main topics discussed

and incorporated into the various assignments planned for this course. Over time, we expect that Biology faculty will engage with BIOL602 as an opportunity for Professional Development, while also incorporating student feedback into course revisions focusing in promoting quantitative reasoning/computational thinking skills.

Other reflections: The EcoEvo-MAPS surveys used here have proven to be an effective tool for assessment purposes at the department. It provides a validated and independent way to deploy Program-level, large scale assessments, and their ease-of-use can potentially lead to the engagement of many Biology faculty. Likewise, reports are automatically generated by these tools, and they provide an easy way to quickly analyze the data, and can potentially reveal relevant information regarding PLO mastery across Programs.

II-B. SUMMARY OF ASSESSMENT – GRADUATE PROGRAM

A. Program Learning Outcomes (PLO)

Students graduating with a M.S. in Biological Sciences from Cal State East Bay will be able to:

- 1. Demonstrate a broad and sophisticated understanding that contributes to biological concepts and principles across all levels of biological organization, from ions to ecosystems (ILO 1,2,6);*
- 2. demonstrate expertise in a specific area of biological science (ILO 6);*
- 3. independently apply the scientific method to formulate testable biological hypotheses, analyze empirical data, and synthesize the results of the analysis (ILO 1,2,6);*
- 4. clearly communicate the design and results of an observational or experimental analysis in a variety of formats, including the graduate thesis, scientific paper, scientific poster, and oral presentation (ILO 1,2,6);*
- 5. gather and evaluate primary scientific literature and judge the value of the information presented in relation to particular biological questions (ILO 1,6).*

B. Program Learning Outcome(s) Assessed

Instrument: For the M.S. program we used the “Inquiry and Analysis Rubric” and the “Oral Communication Rubric” to assess the oral defense, a capstone event in partial fulfillment of the Master of Science Degree. A copy of these rubrics is included in the Appendix (Fig. A10). These rubrics are based on the VALUE rubrics developed by teams of faculty experts representing colleges and universities across the United States. The Value Rubric Development Project was sponsored by the Association of American Colleges and Universities.

Sampling Procedure: The combined “Inquiry and Analysis” and “Oral Communication” rubric was applied to all 9 M.S. students that scheduled an oral defense in during AY 2022-23. The oral defense is one of the final requirements that our M.S. students complete. By the time a student schedules the oral defense, the University Thesis has been written and submitted for format review.

Data Collection: For the M.S. program, all three committee members (including the thesis advisor) are tasked to complete a combined “Inquiry and Analysis” and “Oral Communication” rubric just after the completion of the oral defense by the student. This rubric was converted to a Google Form and can be reviewed here: (Link: https://docs.google.com/forms/d/e/1FAIpQLScK-3JmxzQKct2i2TLc-zrJoirCol6LoRW19tJilv59qLSRg/viewform?usp=sf_link). For each student that passes the oral defense, the graduate coordinator forwards a Completion Memo to the University Graduate Evaluator. For assessment purposes, the Graduate Coordinator simply downloads the raw data now available in excel

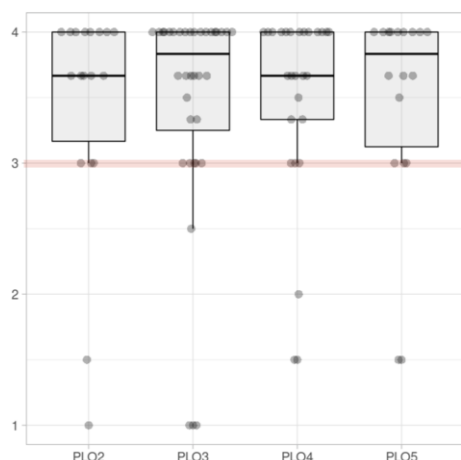
format. This year, a majority of students (n=8) were reviewed by three faculty members. Where that failed, two faculty members submitted an assessment.

Data Analysis: For the M.S. program, the results shown in C (Summary of Assessment Results) include all individual data points (filled black circles). The black horizontal line represents the average. The gray boxes represent the first and third quartile and the vertical lines represent the minimum and maximum. Figures C1 through C3 below include data for all 9 students evaluated in AY 2022-23.

C. Summary of Assessment Process

Main Findings: For the M.S. program, we aim for all of our students to score at 3 (proficient) or above for all PLOs assessed. By looking at the data for individual PLOs assessed (Figure C1), you can see that on average we are meeting our goal. That said, the same graph shows that some students (individual data points) are scoring between 1 and 3 (2= basic, 1=minimal) for PLOs 2, 3 and 4 (not 5). In fact, one student scored a 1 for PLO3 (*independently apply the scientific method to formulate testable biological hypotheses, analyze empirical data, and synthesize the results of the analysis*). In Figure C2, the average earned score for individual assessment criteria is provided. This data also demonstrates that on average, we again are meeting our goal of 3 or above. That said, the average score for **background knowledge** was at 3 and was the lowest among all the criteria assessed. This was true last year as well. Finally, in the assessment of individual students (Figure C3), one can see that only two of the fourteen students (1 and 3) earned an average score below 3. This is a drop from last year although numbers are small and is not likely a significant difference. In summary, while the data look acceptable on average, we can still make improvements for individual students and individual categories (i.e. background knowledge. See “Next Step(s) for Closing the Loop”.

Average scores for AY 2022-2023 organized by PLO



PLO2 through PLO5:

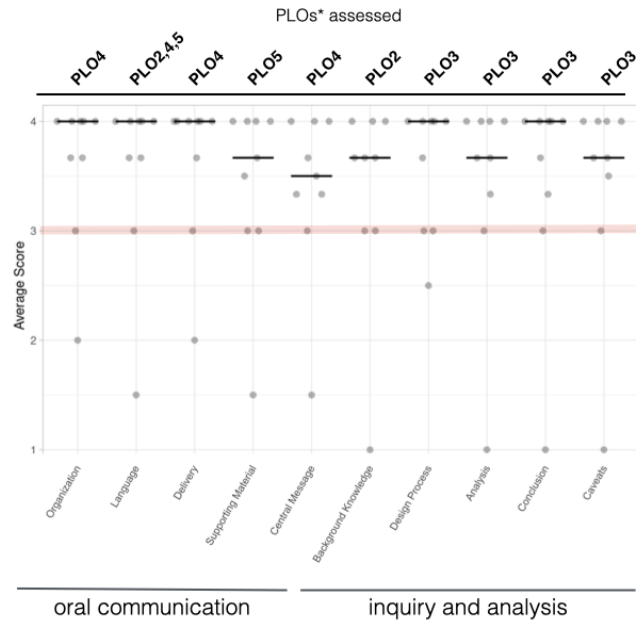
2. Demonstrate expertise in a specific area of biological science.
3. Independently apply the scientific method to formulate testable biological hypotheses, analyze empirical data, and synthesize the results of the analysis.
4. Clearly communicate the design and results of an observational or experimental analysis in a variety of formats, including the graduate thesis, scientific paper, scientific poster, and oral presentation.
5. Gather and evaluate primary scientific literature and judge the value of the information presented in relation to particular biological questions.

Figure C1. Average rubric score for each PLO evaluated. Please note that PLOs were evaluated by more than one criteria (see rubric in Appendix and list of individual criteria in Figure C2). The red line marks the position of proficient.

Average scores for individual categories in the rubric

Scores:
4 = Exemplary / Mastery,
3 = Proficient,
2 = Basic,
1 = Minimal.

Organization: The introduction, approach, results and conclusions are sequenced skillfully. Overall, the content of the presentation is cohesive with seamless transitions.
Language: Uses language appropriate to the discipline as well as the audience. Discipline specific jargon is minimized or clearly defined.
Delivery: Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation compelling. Speaker is polished and confident.
Supporting Material: Supporting material (illustrations, analogies etc) are relevant to the presentation and central message and establish the presenter's authority on the topic.
Central Message: Main claim is clear and compelling (precisely stated, appropriately repeated, memorable, and supported with evidence).
Background Knowledge: Synthesizes relevant information from reliable sources. Answers questions accurately.
Design Process: Develops methodology that is appropriate and clearly outlined. Includes proper controls.
Analysis: Performs an accurate analysis of the evidence to reveal the presence or absence of patterns related to the hypothesis/question.
Conclusion: States a conclusion that is a logical extrapolation from the evidence outlined.
Caveats: Insightfully discusses relevant and supported (if possible) caveats, limitations and implications.



*PLOs 3,4,5 align with the critical thinking ILO

Figure C2. Average rubric score for each criteria outlined in the rubric. A list of categories listed in the rubric is found at right. The red line marks the position of proficient.

Average Scores for Individual Students

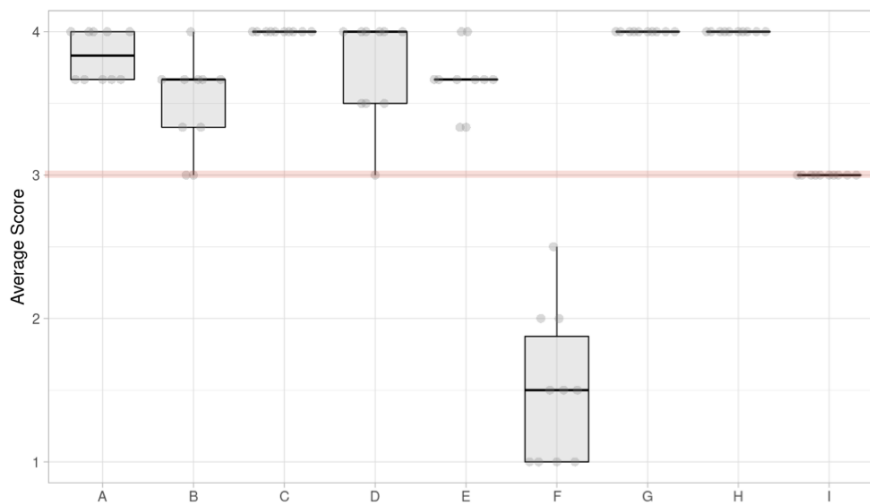


Figure C3. Average scores for each student. Students were numbered 1-11 from left to right. The red line marks the position of proficient.

D. Summary of Assessment Results

Recommendations for Program Improvement: We are aware of the areas in which our students require additional instruction and experience, and have decided upon steps that should be taken to improve student outcomes (see Next Step(s) below).

Next Step(s) for Closing the Loop: It is clear, that some of our students need more guidance as they progress through the program. Faculty have discussed the possibility of instituting a departmental requirement that students meet with committee members once a semester to demonstrate progress towards completion of their degree courses and thesis research. Unfortunately, we have yet to agree on making this a requirement. Instead, it remains, “strongly encouraged”. Most faculty cite a lack of time. While we attempt to make a policy change that we can agree on, our new Graduate Policy Committee met twice last year to discuss other steps we can take to 1) increase the likelihood that students get useful feedback from thesis committee members during the proposal writing process and 2) facilitate progression through the program in a timely manner.

Changes to the Proposal Submission Process. In 2022, we changed the Proposal Submission Process to be more specific about deadlines. Students are now required to submit their **advisor-approved proposal to their thesis committee no later than 7 days prior to the 1st day of classes**. Again, the aim of this change was to ensure that committee members have more time to evaluate the proposal and provide feedback to students. This new policy was implemented for the first time in the Fall of 2022. What we found was that the implementation of this policy was unnecessarily time consuming for the Graduate Coordinator (Maria Gallegos).

To streamline the process the graduate coordinator worked with IT to build an online version of the Proposal Submission Form so that the graduate coordinator can still monitor adherence to the policy but that signatures can be gathered through Adobe Sign. The Adobe Form was implemented for the first time this past Fall (2023). It worked fairly well. Most students were able to complete the form correctly and gather all the needed signatures by the deadline. That said, the College of Science switched to a hub system to better support all the departments while the form was created during the old system and so the Adobe form will have to be updated to reflect that change. Moreover, student signatures were not included in the Adobe workflow. Feedback from students indicated that they would like to be able to monitor progress as well through Adobe Acrobat. They wanted to know who had yet to sign as the final deadline approached. They also wanted to know if they needed to resubmit the form if say an email address had been entered incorrectly (this happened). They were right. Students are best at monitoring the progress of the form and so we will add them to the Adobe workflow in a future iteration of the Adobe form. We hope to have these changes made to the Adobe form workflow before the next cycle in Spring 2024.

Rules about TA eligibility. Graduate Policy Committee continues to refine new rules about who can TA in an effort to encourage students to progress through the program in a timely manner. To this end, the graduate committee has met to discuss the latest draft of a document entitled “Biology TA Eligibility Requirements”. The rules currently state:

1. The MS student must be in good standing (3.0 GPA).
2. The MS student must be making satisfactory progress towards degree completion:

- a. Students that have NOT submitted their proposal but have completed all other units are NOT be allowed to TA again until after their proposal is written and approved by their committee.
 - b. Students are no longer eligible to TA once two years have elapsed since enrollment in all BIOL 691 units.
3. No student can serve as a TA for more than 6 semesters (summers excluded).
 4. The MS student must complete a TA application by the deadline:
 - a. Fall semester deadline: early July.
 - b. Spring semester deadline: mid-September.

This document will be posted in the Life Sciences Hub, emailed to each graduate student (currently enrolled and not) and posted on the BioGrad SLACK channel. It will also include a link to a Google Form where they can apply to be a TA and at the same time indicate their progress in the program so that we can easily confirm their eligibility. To view the form, you can click on this link:

https://docs.google.com/forms/d/e/1FAIpQLSetx9LQ7MKbrP0KvwO1gSAmMpvaGj6DnXvxnzjLDrwYFW2MLA/viewform?usp=sf_link

Changes to our Graduate Foundations Course. Last spring 2023, we submitted changes to Curriculog for our year-long foundations course (1 unit/semester) entitled, “Foundations of Scientific Research”. Specifically, we changed the description of BIOL 601A to include new verbiage that reflects that fact that faculty thought it premature for our first semester graduate students to begin work on a research proposal. The new description for BIOL 601A will now read, “BIOL 601A aims to provide practical training in skills that are essential for conducting and presenting research including but not limited to accessing/evaluating/citing the scientific literature, creating compelling graphics, maintaining an organized lab notebook and delivering effective presentations.”. The new description for BIOL 601B will now read, “This course will focus on the format and conventions of scientific communication in various contexts. The emphasis will be on the iterative process of creating, revising and refining a thesis proposal aided by the critical evaluation of peer writing samples.” Consequently, the student learning outcomes (SLOs) have also been updated to reflect the course description changes. These changes will take effect for the AY 2023-24 course catalog.

Effective Fall 2023, we also changed the classification of both BIOL 601A and BIOL 601B from a lecture course to an activity. This allowed us to increase the amount of time we have with the graduate students each week from 50 minutes to 1 hour and 40 minutes without changing the number of units earned. We hope the increase in the amount of time we have with the students will be sufficient for in class practice of skills and discussion of the writing reading and presenting talk about their research and writing progress. By the end of this year, we should know better if we are successful. Again, our goal is that students have a useable first draft of their research proposal by the end of the academic year. The increased amount of time should help. We will not have to rush through student presentations on their planned master’s research as we did last year.

Other Reflections: We are also confident that the modifications we are making to our year-long course in the curriculum that specifically focuses on the PLOs of the program will have a positive impact on the success of our M.S. students. We also anticipate that the changes we are making to our Proposal Submission process and TA eligibility will also help our students progress through the program.

Assessment Plans for Next Year: In general, the faculty continue to value the rubric as an effective measure for assessing if our students are meeting our program learning outcomes. Thus, we plan to

continue to use this same rubric to assess our MS students during the oral defense. By using the same rubric year after year, we will increase our statistical power and be able to evaluate if any of our programmatic changes make a difference in student outcomes. The Graduate Policy Committee will also discuss whether or not we should implement new rules to ensure our students obtain the **content knowledge** they need master PLO2 (*Demonstrate a broad and sophisticated understanding that contributes to biological concepts and principles across all levels of biological organization, from ions to ecosystems*). This process may require that we assess PLO2 at an earlier stage of the program. These conversations are ongoing.

III. DISCUSSION OF PROGRAM DATA & RESOURCE REQUESTS

A. Discussion of Trends & Reflections

Notable Trends: Program summary data for 2018 through 2022 is presented as tables and graphs in the appendix to this document (**Figures A1 and A2 and Tables A1 through A7**). The student data presented includes Biology enrollment and FTES, degrees conferred, and breakdown of student population by gender, ethnicity and first-generation status. Coursework data includes FTEF, FTES and SFR statistics. Please note that due to the small size of the graduate program (29 actively enrolled students), changes of a single student can result in large but non-significant shifts in enrollment and demographic measures. For this reason, trends in these data will only be highlighted if deemed significant based on other observations and data points.

The following trends can be observed from the student demographics:

- Biology undergraduate enrollments decreased significantly, particularly during Fall2021-2022. Overall, undergraduate enrollment has declined 21% in the last 5 years (**Figure A1**);
- The graduate student population has been declining since Fall2021, reaching the lowest number of graduate students for the past 5-years in Fall 2022 with only 29 actively enrolled students (**Figure A1**);
- In terms of degrees awarded (**Figure A2**), both undergraduate and graduate programs awarded the highest number of degrees since 2016-2017. It is possible that the large number of students graduating in 2021-22 has also contributed to the reduction in the number of graduate and undergraduate students in the Biology Department;
- In Fall 2022, all concentrations experienced a decline in the overall number of students, with Forensic Science being the least affected, and Cell and Molecular Biology the most affected (**Table A1**);
- Our undergraduate program experienced a decline of about 50% of the international student population in Fall2022. Similarly, the number of international graduate students has declined since Fall 2021 (**Table A2**);
- Over the past 5-years the Latinx student population majoring in Biology represents between 37 and 41% of our undergraduate population (**Table A2**);
- The percentage of Black/African American undergraduate students majoring in Biology has declined since Fall2021 and it represents about 7% of our undergraduate student population (**Table A2**);
- The graduate program in Biological Sciences has been unsuccessful in recruiting Black/African American students since Fall 2020. In turn, our Latinx graduate student population has sustained consistent numbers and as of Fall2022 they represent 38% of our graduate student population (**Table A2**);

- The ratio of undergraduate Biology majors identifying as male or female remains relatively consistent from year to year at or near 30%/70%, respectively (**Table A3**). The number of female graduate students, however, has declined significantly in Fall2022 changing the female/male ratio from 64%/36% in Fall2020 and Fall2021 to 55%/45% in Fall2022 (**Table A3**);
- The percentage of first-generation students in both the undergraduate as well as the graduate programs have remained somewhat consistent over the past five years, ranging from 61-64% and 25-31% respectively (**Table A4**);
- Despite an overall reduction in the number of incoming students, the percentage of first-time freshman and transfer students has remained somewhat consistent throughout the past five-years with a slight increase in the percentage of transfer students (**Table A5**);
- First-time freshman biology undergrads take on average 5.1 years to graduate, while transfer students take on average 3.2 years to graduation (**Table A6**). Meanwhile, URM frosh take 5.2 years to graduate and URM transfers take on average 3.5 years to graduate;
- Since its peak in Fall2020 (30.1), SFR has progressively decrease to 25.7 in Fall2022, while still remaining above the Fall2018 census (25.4). Similarly, FTES exhibited a peak in Fall2020 (565.3), decreasing to 471.1 in Fall2022, the lowest FTES of the past five years. During the same 5-year time, FTEF has remained consistent, ranging from 17.6 in Fall2021 to 18.8 in Fall2020 (**Table A7**).

Reflections on Trends and Program Statistics:

The number of undergraduate students majoring in Biology at CSUEB increased steadily from 698 in Fall 2018 to our maximum of 720 in Fall 2020 (**Figure A1**). Since this time our enrollments have been decreasing annually, with our Fall 2022 count at 551 students (a decrease of 23.5% from Fall 2020). A similar pattern can be observed across the university and indeed most of the CSU campuses in the northern portion of the state. On top of this enrollment decline, the department also graduated significantly more students in AY 2021-22 (Table D-3) compared to the previous three years of the review period (a 25-40% increase over AY 2018-19 through 2020-21). Enrollment in our M.S. program also peaked in Fall 2020 with 45 actively enrolled students, but declined since then to an enrollment of only 29 in Fall 2022 (**Figure 1A**). In addition to reduced application numbers, the department also graduated significantly more MS students in AY 2020-21 (a 37.5% increase over previous years of the review cycle) and 2021-22 (a 50% increase over AY 2017-18 through 2019-20). Additionally, the data on **Figure 1A** does not accurately reflect the number of active students in the program. While only 29 graduate students in Biology were enrolled in courses or thesis units in the Fall 2022 semester, there were approximately 20-25 additional students that were actively working with faculty and/or writing theses, that were not enrolled in any units. It is these latter students that demand a greatest amount of faculty time and support as they complete their thesis projects, even if they are not enrolled in courses or thesis units.

The diversity of undergraduate students in Biology at CSUEB is largely reflective of the university student body (**Figure 4A**). The majority of our undergraduate students identified as Latinx (37% in Fall 2018, increasing to 41% in Fall 2022), with the second largest percentage identifying as Asian (26% in 2018, increasing to 27% in Fall 2022). The percentage of students identifying as Black has decreased from 9% in Fall 2018 to 7% in Fall 2022. The percentage of Biology undergraduate students identifying as NHPI, International, Multiple Race, Unknown and White have remained relatively constant throughout the review period. For our graduate program, the small number of incoming students each year makes for wide swings in the ethnic makeup of the program. However, in each graduate cohort students identifying as White, Asian or Latinx make up the majority of students in most years (**Figure 4A**). Given that roughly 39% of our current majors are transfer students, we expect that the move to all in-person classes will continue to have a significant impact on student numbers and student-faculty ratios.

The department of Biological Sciences previously had one of the highest SFRs within the College of Science, and was asked by Dean Singley to reduce this number to a value more in-line with those of other College of Science departments. This has been accomplished through the hiring of an additional tenure-track faculty and/or lecturers and TAs.

In general, student demographics indicate that the department maintains a very diverse student body that is largely representative of the College of Science and University populations. The Department, College and University have launched several initiatives over the past two years that we are confident will continue to positively impact these students. Diversity, inclusiveness and equity (DEI) are at the forefront of these initiatives as well as many of our department, and even individual, faculty activities. The majority of Biology faculty and lecturers, and even some of our teaching assistants, have participated in campus workshops and learning community activities focused on DEI, and several are highly involved in committee work devoted to DEI and social justice. The Department of Biological Sciences Assessment Committee has for the past two years been focused on identifying equity gaps that exist within our courses, and we recently launched the Department Equity Gap and Assessment Team that will be working with individual faculty to critically examine and address equity gaps that exist within courses, and to examine the myriad factors that play a role in creating these gaps within the department and broader campus community.

B. Request for Resources

The department is well aware of the budget crises we currently face, and does not expect to be able to fill the following positions in the next academic year. However, the request has been included here as we feel this represents the program's faculty hire need going forward.

1. Tenure-Track Hires

- *Forensic Biologist* – The department offers a concentration in Forensic Science as part of our transformed semester curriculum. This is another field of growing demand in the United States, and student enrollment in the concentration at Cal State East Bay continues to increase. We request the hiring of a Forensic Scientist at the assistant professor level that could offer specific courses in the field, as well as teach general biology courses for majors and non-majors.

- *Cell and Molecular Biologist* – Spring 2022 was the last semester of FERP teaching for Dr. Donald Gailey. With Dr. Gailey's and Dr. Maria Nieto's departures we are once again left with a shortage of qualified faculty to cover basic courses such as Genetic Analysis I (BIOL 310) and upper division Cell and Molecular Biology electives. As our Cell and Molecular Biology concentration continues to account for a greater percentage of our enrollments (4% increase from Fall 2018 to Fall 2021), so does our need for faculty to offer the courses required by these students. We request the hiring of a Cell and Molecular Biologist at the assistant professor level that can offer specific courses in the field, as well as teach general biology courses for majors and non-majors.

- *Biology Education* – The department continues to experience sustained interest in the B.A. in Biology Education, despite the lack of courses offered or Department expertise. As discussed above, the department believes that CSUEB can offer a strong Biology Teaching program and be able to attract more interested students. We request the hiring of a Biology Education specialist at the assistant professor level that can offer specific courses in the field, as well as teach general biology courses for majors and non-majors.

Additionally, with the FERP of Dr. Michael Hedrick in Fall 2023, we also anticipate the eventual need for replacement hires in the area of Animal Physiology.

2. Staff Hires

The department previously employed an Equipment Technician who was vital to the continued upkeep, repair and installation of teaching and research equipment for both the Biology and Chemistry/Biochemistry departments. This position had been filled by a single employee (Mr. Brian Sowers) for nearly 40 years until he retired at the end of AY 2018-2019. Several attempts to fill this vacant position during the following academic years were unsuccessful, and it was concluded that this was primarily due to the university's inability to offer a competitive salary for a position that required significant technical expertise. The position was subsequently converted to an IST-II and was recently filled. The addition of this new IST position to the department is very welcome as a number of faculty, particularly in the Ecology and Evolution concentration, have historically set up their own laboratory sections, and carried out field trips without IST support or any compensation. However, the loss of the equipment technician position requires that the department now rely entirely on outside vendors for the upkeep and repair of equipment used in the classroom and for faculty-mentored student research, which creates a significant increase in our annual budgetary needs.

3. Office Space

The department continues to replace existing, aging equipment, and add new equipment through the use of A2E2 and College of Science funds. However, great need still exists for additional equipment and resources required to offer our courses at a level deserving of our students. The department continues to be "bursting at the seams" with regards to office and research space. Nearly all faculty in the department (tenured/tenure-track and lecturers) share office space, and we have no available space in which to house our graduate teaching assistants (they currently hold office hours in classrooms during non-class periods). All of the research space that has been allocated to Biology is currently in use or slated to be filled by our recent hires, and many research faculty must utilize classrooms (when available) to conduct their research. Completion of the Applied Science Center in late 2024 is expected to provide the additional research space needed to accommodate our anticipated future faculty hires.

IV. APPENDIX

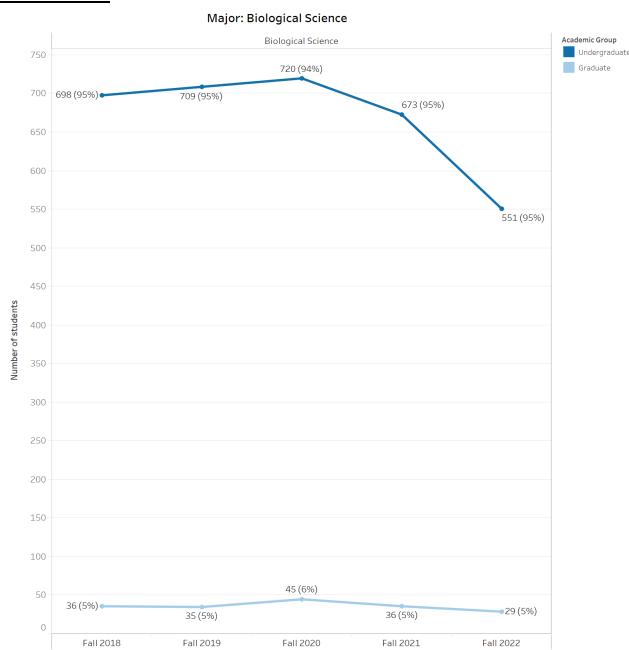


Figure A1. Five-year trend on number of undergraduate and graduate students in the Dept. of Biological Sciences (Fall 2018 – Fall 2022).

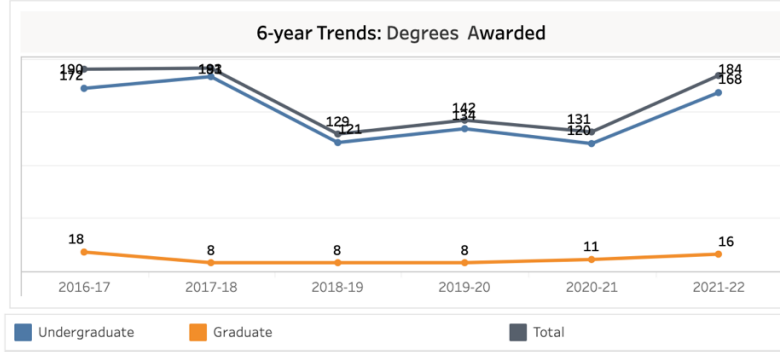


Figure A2. Five-year trend on the number of degrees awarded for both undergraduate and graduate programs in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Biological Science: Concentration										
	Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
	n	%	n	%	n	%	n	%	n	%
Undergraduate	97	14%	47	7%	20	3%	9	1%	4	1%
Biology Education	20	3%	41	6%	48	7%	47	7%	37	7%
Biomedical Lab Sciences	3	0%	1	0%	1	0%				
Cell & Molecular Biology	93	13%	124	17%	133	18%	149	22%	117	21%
Ecology & Conservation Biol	27	4%	18	3%	9	1%	3	0%		
Ecology & Evolutionary Biol	9	1%	31	4%	36	5%	38	6%	29	5%
Forensic Science	69	10%	88	12%	85	12%	83	12%	80	15%
General Biology	111	16%	62	9%	36	5%	17	3%	5	1%
Micro/Biomedical Lab Scienc..	77	11%	47	7%	22	3%	18	3%	9	2%
Microbiology & Biomed Lab S..	16	2%	99	14%	142	20%	144	21%	134	24%
Physiology	176	25%	151	21%	188	26%	165	25%	136	25%
Total	698	100%	709	100%	720	100%	673	100%	551	100%
Graduate	36	100%	35	100%	45	100%	36	100%	29	100%
Total	36	100%	35	100%	45	100%	36	100%	29	100%
Grand Total	734	100%	744	100%	765	100%	709	100%	580	100%

Table A1. Five-year trend on the number of students in each of the six concentrations as well as in the graduate program offered in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Biological Science: Race/Ethnicity											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Asian	180	26%	175	25%	194	27%	183	27%	151	27%
	Black	64	9%	71	10%	63	9%	53	8%	38	7%
	International	39	6%	34	5%	38	5%	38	6%	17	3%
	Latinx	258	37%	272	38%	276	38%	265	39%	226	41%
	Multirace	37	5%	32	5%	30	4%	25	4%	28	5%
	Native American	1	0%								
	NHPI	5	1%	7	1%	7	1%	6	1%	5	1%
	Unknown	32	5%	28	4%	24	3%	22	3%	15	3%
	White	82	12%	90	13%	88	12%	81	12%	71	13%
	Total	698	100%	709	100%	720	100%	673	100%	551	100%
Graduate	Asian	8	22%	8	23%	8	18%	6	17%	5	17%
	Black	2	6%	1	3%						
	International	1	3%	2	6%	5	11%	4	11%	1	3%
	Latinx	5	14%	7	20%	11	24%	9	25%	11	38%
	Multirace	2	6%	2	6%	3	7%	3	8%	2	7%
	Unknown	1	3%	1	3%	2	4%	2	6%	2	7%
	White	17	47%	14	40%	16	36%	12	33%	8	28%
		Total	36	100%	35	100%	45	100%	36	100%	29
Grand Total		734	100%	744	100%	765	100%	709	100%	580	100%

Table A2. Five-year trend on race and ethnicity of undergraduate and graduate students in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Biological Science: Sex											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	Female	478	68%	493	70%	506	70%	470	70%	379	69%
	Male	220	32%	215	30%	212	29%	202	30%	170	31%
	Nonbinary			1	0%	2	0%	1	0%	2	0%
		Total	698	100%	709	100%	720	100%	673	100%	551
Graduate	Female	19	53%	21	60%	29	64%	23	64%	16	55%
	Male	17	47%	14	40%	16	36%	13	36%	13	45%
		Total	36	100%	35	100%	45	100%	36	100%	29
Grand Total		734	100%	744	100%	765	100%	709	100%	580	100%

Table A3. Five-year trend on sex of undergraduate and graduate students in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Biological Science: First Generation											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	FG	423	61%	453	64%	456	63%	436	65%	336	61%
	Non-FG	275	39%	256	36%	264	37%	237	35%	215	39%
		Total	698	100%	709	100%	720	100%	673	100%	551
Graduate	FG	9	25%	10	29%	13	29%	11	31%	9	31%
	Non-FG	27	75%	25	71%	32	71%	25	69%	20	69%
		Total	36	100%	35	100%	45	100%	36	100%	29
Grand Total		734	100%	744	100%	765	100%	709	100%	580	100%

Table A4. Five-year trend on first-generation status of undergraduate and graduate students in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Biological Science: Admit Type											
		Fall 2018		Fall 2019		Fall 2020		Fall 2021		Fall 2022	
		n	%	n	%	n	%	n	%	n	%
Undergraduate	First-time Fr..	452	65%	438	62%	418	58%	383	57%	324	59%
	Transfer	246	35%	271	38%	302	42%	290	43%	227	41%
	Total	698	100%	709	100%	720	100%	673	100%	551	100%
Graduate	First-time Gr..	36	100%	35	100%	45	100%	36	100%	28	97%
	Transitory									1	3%
	Total	36	100%	35	100%	45	100%	36	100%	29	100%
Grand Total		734	100%	744	100%	765	100%	709	100%	580	100%

Table A5. Five-year trend on admission type of undergraduate and graduate students in the Department of Biological Sciences (Fall 2018 – Fall 2022).

Time to Degree Years (and Headcount)				
		Transfer	Masters & Ed.D	First-time Freshmen
Overall		3.2 (102)	3.0 (16)	5.1 (66)
CSCI	Biological Science	3.2 (102)	3.0 (16)	5.1 (66)

Table A6. Time to degree in years of undergraduate and graduate students in the Department of Biological Sciences.

APR Coursework Data: Summary: Fall Term as of Census

FTES, FTEF (instruction), and SFR of all state-side coursework

College	Department	Term & Year														
		Fall 2018			Fall 2019			Fall 2020			Fall 2021			Fall 2022		
		FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR	FTES	FTEF	SFR
CSCI	BIOL	472.2	18.6	25.4	499.5	17.3	28.8	565.3	18.8	30.1	521.0	17.6	29.6	471.1	18.3	25.7
	Total	472.2	18.6	25.4	499.5	17.3	28.8	565.3	18.8	30.1	521.0	17.6	29.6	471.1	18.3	25.7
Grand Total		472.2	18.6	25.4	499.5	17.3	28.8	565.3	18.8	30.1	521.0	17.6	29.6	471.1	18.3	25.7

Table A7. Five-year trend on FTES, FTEF and SFR in the Department of Biological Sciences (Fall 2018-Fall2022).