

Annual Assessment Report for 2020-2021 AY

Reports completed on assessment activities carried out during the 2020-21 AY will be due September 30th 2021 and must be e-mailed to the Director of Assessment, Dr. Douglas Fraleigh (douglasf@csufresno.edu).

Provide detailed responses for each of the following questions within this word document. Please do NOT insert an index or add formatting. Furthermore, only report on two or three student learning outcomes even if your external accreditor requires you to evaluate four or more outcomes each year. Also be sure to explain or omit specialized or discipline-specific terms.

Department/Program: Biology Degree: B.S.

Assessment Coordinator: Dr. Alexandria Hansen (akhansen@csufresno.edu)

1. Please list the learning outcomes you assessed this year.

The Undergraduate Biology Program has 7 goals and related learning outcomes identified in the departmental SOAP. During the 2020-21 academic year (AY), the department assessed learning outcomes **E1, E2, and G1**. See Table 1.

Table 1. Alignment of Program Goals, Learning Outcomes, Assessment Methods, and Associated Courses in AY 2020-21.

| Goal | Learning Outcome | Assessment Method(s) | Course(s) Measured |
|--|--|---|--------------------|
| Goal E: Students will understand the interdisciplinary nature of science. | Outcome E1: Students will analyze concepts by combining examples, facts, and theories from more than one scientific field of study. | Exam Questions | BIOL 102 |
| | Outcome E2: Students will demonstrate their advanced understanding of concepts by serving as a sub-discipline knowledge expert on a multi disciplinary team. | Student Research Tabulation | BIOL 190 |
| | | Research Experience Survey ¹ | BIOL 190 |
| Goal G: Students will understand the relationship between science and society. | Outcome G1: Students will communicate and apply biological principles and global perspectives in an ethical manner to current issues in human society. | Final Presentation | BIOL 101L |

¹ Lopatto (2004) - Survey of undergraduate research experiences (SURE)

2. What assignment or survey did you use to assess the outcomes and what method (criteria or rubric) did you use to evaluate the assignment? Please describe the assignment and the criteria or rubric used to evaluate the assignment in detail and, if possible, include copies of the assignment and criteria/rubric at the end of this report.

During the 2020-2021 academic year, our departmental assessment activities for the Undergraduate Biology Program included: (a) exam questions from Biology 102, (b) final presentation assignment from BIOL 101L, (c) survey results from students' undergraduate research experiences in Biology 190 and (d) tabulation of undergraduate research products (oral presentations and publications). Each assessment activity is briefly described below alongside criteria for evaluation.

2a. Exam Questions (BIOL 102)

Relevant *exam questions* were taken from BIOL 102 (Genetics) to assess the **E1** learning outcome. Specifically, two questions were used from a major exam that assessed students' ability to apply knowledge (see Figure 1). The first question assessed students' ability to apply knowledge of chemistry and physics to predict how different sizes of DNA molecules will move through an agarose gel; the second question assessed students' ability to apply knowledge of statistics to predict how frequently a geneticist would expect to observe a particular allele combination by chance.

6) After the first mitotic cell division, there are now two cells (question 5d). You collect one of the cells and perform PCR of its DNA using the primers you designed above. Draw an agarose gel with two lanes (wells) representing the data that would be produced: one well contains the PCR products produced by amplification with the primers you designed, and the other well contains a molecular weight ladder with multiple bands of sizes (that you have labeled) that can be used to accurately identify the sizes of the PCR products in the first well. **(2 points)**

7) We know that the version of chromosome 3 with fewer repeat units is present in the human population at a frequency of 0.25, and the version with more repeats exists at a frequency of 0.5. Calculate and report the expected frequency of individuals, like the one we've been working with that contain both of these versions of chromosome 3 (show your work). **(1 point)**

Figure 1. Exam questions from BIOL 102 used to assess learning outcome E1.

The exam questions were assessed by the course instructor. For the first question, two points were assigned: one point was assigned if the student predicted accurate experimental results, and a second point if the student included a correct molecular weight ladder. For the second question, one point was assigned if the student correctly calculated the frequency.

2b. Final Presentation Assignment (BIOL 101L)

Additionally, while it was the intention to use exam questions to assess the **G1** learning outcome, we instead used a *final student presentation* from BIOL 101L (General Ecology Lab) as it better aligned with the stated learning objective. This assignment required students to select an ecosystem and use their ecological knowledge to predict how climate change is affecting the

system. They were required to reference primary literature about climate change and the selected ecosystem to see if their predictions were accurate. Finally, they created a short presentation to share with the class explaining their predictions and discoveries from the literature. Students were assessed on a 10-point rubric. A copy of the assignment and grading rubric are included in Appendix A.

2c. Student Research Experience Survey (BIOL 190)

Students participating in BIOL 190 (independent study) under the supervision of a Biology faculty member were surveyed in Spring 2020 to assess the **E2** learning outcome. Specifically, we administered the survey according to recommendations in Lopatto, D. (2004). Survey of undergraduate research experiences (SURE): First findings. *Cell Biology Education*, 3, 270-277. The survey is included in Appendix B.

2d. Student Research Tabulation

Data on *research productivity* was collected from each biology faculty member for the 2020-2021 academic year to assess the **E2** learning outcome. Specifically, faculty members were asked to provide a list of research publications and presentations and identify if any students contributed to the accomplishments. While we do not include explicit rubrics to assess research presentations and conference publications in this report, we assume that the research is of outstanding quality if it was accepted for publication in an academic journal or for presentation at a professional conference.

3. What did you learn from your analysis of the data? Please include sample size (how many students were evaluated) and indicate how many students (number or percentage instead of a median or mean) were designated as proficient.

Below, we describe what was learned from each assessment activity described above.

3a. Exam Questions (BIOL 102)

Seventy students completed the major exam in BIOL 102. For the exam question that assessed their ability to *apply knowledge of chemistry and physics* to predict how different sizes of DNA molecules will move through an agarose gel, 65% (n=45) were assessed as proficient and received full credit as they were able to predict accurate experimental results and include correct molecular weight ladders. Additionally, 23% (n=16) received half-credit on the question; only 13% (n=9) had incorrect responses and did not receive any credit. For the exam question that assessed their ability to *apply knowledge of statistics*, 73% (n=51) were assessed as proficient and able to successfully predict how frequently one would expect to observe a particular allele combination by chance.

3b. Final Presentation Assignment (BIOL 101L)

Eight-one students completed the final presentation assignment in BIOL 101L. Of these students, 89% (n = 72) were designated as proficient: 59% (n=48) received all available points on the grading rubric and 30% (n=24) received at least at least 80% of the points available. Only 4% of students (n=3) did not demonstrate proficiency and received a score of below 60%. Finally, 7%

(n=6) did not complete the assignment and thus did not receive a score. Proficient students were able to accurately describe the ecosystem, summarize existing research investigating the impact of climate change on the ecosystem using at least three sources, create an effective presentation to showcase their results, and meaningfully engage with presentations from peers.

3c. Student Research Experience Survey (BIOL 190)

In total, 25 students participated in the research experience survey. See Table 2 for student demographic information. Of the 25 students, 80% (n=20) indicated that they were *very satisfied* with participation in BIOL 190; the remaining 20% (n=5) indicated they were *mildly satisfied* with their participation. No students indicated they were *unsatisfied* with BIOL 190.

Table 2. Nature of Sampled Population (n=25)

| | | |
|-------------------------|--------------------------------|-----|
| Gender Identity | Women | 56% |
| | Men | 44% |
| | Did Not Report | 0% |
| Ethnicity | Latinx | 24% |
| | White | 4% |
| | Asian | 44% |
| | Black | 4% |
| | Multiracial | 4% |
| | Hawaiian / Pacific Islander | 0% |
| | Other | 8% |
| | Did not report | 12% |
| First Generation Status | Identifies as First Generation | 28% |
| Major | Biology | 96% |
| Transfer Student | Yes | 20% |

| | | |
|---------------------|--------------------------------------|-----|
| Future Career Plans | Pre-Med, Pre-Dental, or Pre-Pharmacy | 56% |
| | Biology Graduate School | 24% |
| | Veterinary School | 12% |
| | Teaching K-12 Science | 4% |
| | Other Science Related Career | 4% |
| | Non-Science Career | 4% |

The administered survey also asked students to self-report which skills they felt they learned or gained through participation in BIOL 190. Select skills that most closely align to the E2 learning outcome are included below in Table 3.

Table 3. Reported skills gained through participation in BIOL 190 (n=25)

| Research Skills | Students reporting moderate to large gains |
|--|--|
| Understanding the research process | 100% |
| Understanding how scientists work on real problems | 96% |
| Ability to integrate theory and practice | 96% |
| Ability to analyze data and other information | 76% |
| Learning laboratory techniques | 84% |
| Learning ethical conduct in your field | 76% |
| Becoming a part of a learning community | 92% |

3d. Student Research Tabulation

Of the 17 biology faculty members who presented research at a conference in the 2020-21 academic year, 58 undergraduate students contributed to the presentation through participation in BIOL 190. Students presented research at the following conferences: The Allied Genetics Conference, North American Ornithological Conference, Worm Evolution Conference, Society of Integrative & Comparative Biology annual meeting, National Association for Research in

Science Teaching annual meeting, ASM Microbe, SACNAS The National Diversity in STEM Conference, and the Central California Research Symposium. An additional 55 students contributed research at Fresno State's High-Impact Practice (HIP) symposium through participation in coursework.

Of the 13 biology faculty members who published research papers in the 2020-21 academic year, 9 undergraduate students contributed to the publications through participation in BIOL 190. Papers were published in the following journals: *Integrative and Comparative Biology*, *Journal of Medical Entomology*, *Journal of Experimental Zoology*, *International Journal of Technology in Education*, and *Public Library of Science ONE*.

4. What changes, if any, do you recommend based on the assessment data?

Based on the assessment data collected for the 2020-21 AY, students assessed through the use of exam questions in 102 were mostly proficient at learning outcome **E1**: Students will analyze concepts by combining examples, facts, and theories from more than one scientific field of study. In future assessment years, however, it is advised that additional data is collected from other courses to determine proficiency levels for a larger number of students in the undergraduate major. While BIOL 102 (genetics) is an important course, the departmental assessment committee will target other core courses to determine how this learning outcome can be more widely assessed. Specifically, we will assess exam questions from BIOL 105 (Evolution) and BIOL 101 (Ecology) as those are considered capstone courses that allow students to integrate and apply knowledge learned from earlier courses in the major.

Similarly, the department assessment committee recommends that additional courses are targeted to better assess the **G1** learning outcome: Students will communicate and apply biological principles and global perspectives in an ethical manner to current issues in human society. While it was the committee's initial intention to assess this outcome in BIOL 102 and 103, it was found that those courses did not explicitly assess this outcome in existing assignments and exams. Instead, the committee had to use another assignment in BIOL 101L that better aligned with the learning outcome. The fact that we were unable to adequately assess this outcome in several core courses also indicates that this outcome should be made more explicit in the existing teaching and assessment within the biology core courses for undergraduate students. This is a concrete recommendation for the department.

5. If you recommended any changes in your response to Question 4 in last year's assessment report, what progress have you made in implementing these changes? If you did not recommend making any changes in last year's report please write N/A as your answer to this question.

Due to the COVID-19 pandemic, departmental assessment measures were strained. Many of the courses targeted for assessment in the biology department were drastically changed when moved to an online format. This has made assessment more challenging than previously. Further, during the last assessment review (2018-2019), the department indicated that it might be necessary to revise the SOAP to better articulate which courses will be assessed at which frequency for specific learning objectives. This has not been done. Instead, the biology department's

assessment committee will make this a priority in the upcoming academic year (2021-2022). Additionally, the committee will work to proactively inform faculty teaching courses that are now being targeted for assessments (101, 105) about this change to allow for appropriate time in planning and collection of assessment data.

6. What assessment activities will you be conducting during the next academic year?

Next academic year, we plan to assess the following student learning outcomes (SLO):

- **SLO A1:** Students will demonstrate an understanding of biology in the context of the five core concepts of biology: (a) Evolution, (b) Structure and function, (c) Information flow, exchange, and storage, (d) Pathways and transformations of energy and matter, (e) Living systems are interconnected and interacting.
- **SLO A2:** Students will apply the five core concepts of biology to solve relevant problems.
- **SLO B1:** Students will identify and apply the scientific methods of observation, experimentation, hypothesis formulation, and hypothesis testing.
- **SLO B2:** Students will obtain and evaluate information and information resources.
- **SLO F2:** Students will demonstrate effective collaboration by working with each to discuss scientific concepts (e.g. through active learning practices such as think-pair-share).

We will collect the following types of data to assess the SLOs identified above:

- Pre/Post instruction survey in BIOL 1A to assess SLOs A1 and A2.
- Student term paper in BIOL 105 to assess SLOs B1 and B2.
- Pre/Post research experience survey and research tabulations to assess SLOs B1 & B2.
- Classroom observations of laboratory sections using the “Classroom Protocol for Undergraduate STEM” observation tool (Smith, et al. 2013) to assess SLO F2

7. Identify and discuss any major issues identified during your last Program Review and in what ways these issues have or have not been addressed.

As stated above, the COVID-19 pandemic disrupted many of our planned assessment activities for the 2019-2020 AY. Our last assessment report was conducted in 2018-2019. During the last program review, it was noted that the SOAP would need to be revised and assessment activities more closely analyzed to ensure the plan was reasonable and not too demanding of the department assessment coordinator. However, due to pandemic disruptions, these conversations are still occurring. As such, during the current 2020-2021 AY, the department assessment committee will meet regularly to ensure active steps are being taken to collect relevant data to assess the SLOs identified above. Additionally, the SOAP will be analyzed to better align specific types of assessments (e.g., exam questions, term papers, surveys) with SLOs. Finally, the committee will work with biology faculty (tenure-track and lecturers) to ensure individuals have sufficient notice of any planned assessment activities that are scheduled to occur in their

courses. The assessment activities will be conducted by all members of the assessment committee, not just the chair.

References:

Lopatto, D. (2004). Survey of undergraduate research experiences (SURE): First findings. *Cell Biology Education*, 3(4), 270-277

Smith, M. K., Jones, F. H., Gilbert, S. L., & Wieman, C. E. (2013). The Classroom Observation Protocol for Undergraduate STEM (COPUS): A new instrument to characterize university STEM classroom practices. *CBE—Life Sci Ed*, 12, 618-627.

Appendix A

Lab 13: Ecological Consequences of Global Change

Submitting: a file upload

Points: 10

Introduction

Environmental change, whether natural or anthropogenic, profoundly affects ecosystems. An important challenge for modern ecologists is to predict the effects of habitat alteration, urbanization, invasive species, global climate change, etc, on ecosystems and to develop mitigation strategies. You are now budding ecologists that can begin making such predictions. For this lab, you will work with lab partners to predict the ecological consequences of global change for an ecosystem of your choice. You will then test your predictions using published scientific literature. Finally, you will create a short presentation summarizing your findings for the rest of the class and provide feedback on your peers' presentations. By the end you should have an increased appreciation for the complex ways that environmental change affects ecosystems with specific knowledge about your ecosystem of choice.

Learning Objectives

- Apply knowledge of ecosystem processes and climate change to form predictions.
- Test predictions using the primary literature.
- Integrate prior knowledge and research findings to create a presentation showing impacts of climate change on an ecosystem.

Exercise

With a 2-3 person lab group, please work through the items below. I recommend filling out a Google Document together as you answer questions 1-4. You will then use the information in this document to create a 5-10 minute video presentation for question 5. Finally, you will present this during our final synchronous class session.

1. Select an ecosystem
2. Without research: What do you know about the ecosystem? What abiotic factors do you think are MOST important for the ecosystem to persist in its historic state?
3. Without research: Given what you know about the ecosystem and ongoing patterns of global change (e.g. habitat alteration, temperature change, sea level change, precipitation change, etc.), make specific predictions for how you think the ecosystem will be (or has been) affected by global change. Consider all ecological levels (i.e. individual through community)

4. Research: "Test" your predictions using the scientific literature. Locate 3--5 peer-reviewed journal articles published within the last 10 years about the impacts of global change on your selected ecosystem. You should be able to find plenty of papers using [Google Scholar](#) or the [Fresno State Library](#). Summarize the affects of global change that scientists are observing. Attempt to address questions such as: How will a changing climate impact the ecosystem? Will these changes influence other ecosystems/species? If so, how? What are the major risks? How can we reduce anthropogenic impact?
5. Compare/contrast your predictions from question 3 to what you discovered from the scientific literature. Are your predictions supported? Are there consequences of climate change for the ecosystem that you hadn't considered? If so, what are they? Are there predictions that still need to be tested?
6. Create a ~10 min presentation that summarizes your research for the effects of global change on the ecosystem. Use your responses to questions 1-5 to help structure this presentation, and be sure to include your initial predictions, what you learned from the published literature, and whether or not your predictions were supported. Be sure to include a literature cited slide to give credit to your sources.
 - Watch and comment/ ask questions on at least two of your peers presentations. Comments should be substantive. For example, you might comment on something you found surprising or had not thought about in the way presented. You could also point out additional predictions that you might have, or additional questions you have after the presentation.
 - When you are finished make sure you upload a copy of your presentation to this assignment.

Grading Rubric for Ecological Consequences of Climate Change Assignment

| Criteria | Ratings | | | | | Pts |
|---|--|-------------------------|--|-------------------------|--|-------|
| Describe the Ecosystem Initial description of the ecosystem, with predictions for how it will be affected by climate change | 2 pts Excellent | 1.4 pts Good | 1 pts Needs Work | 0.4 pts Poor | 0 pts Missing or Unacceptable | 2 pts |
| Summarize research testing the effects of climate change for the ecosystem. Explain what effects of climate change on the ecosystem have been documented. Explain whether or not your predictions were supported. If your predictions were not supported, describe why. | 2 pts Excellent | 1.4 pts Good | 1 pts Needs Work | 0.4 pts Poor | 0 pts Missing or Unacceptable | 2 pts |
| Cite at least three sources Must be from the primary literature (i.e. peer-reviewed scientific journals). Show a slide with full citations at the end (same guidelines as your full lab reports for format). Within your presentation use parenthetical citations. These can be at the bottom of your slide, or within sentences. | 2 pts Excellent | 1.4 pts Good | 1 pts Needs Work | 0.4 pts Poor | 0 pts Missing or Unacceptable | 2 pts |
| Well formatted video presentation Avoid too many words. Slides should not have full paragraphs, but rather short bullet points and images. Correct grammar. | 2 pts Excellent | 1.4 pts Good | 1 pts Needs Work | 0.4 pts Poor | 0 pts Missing or Unacceptable | 2 pts |
| Comment on two presentations from your peers Comments should be substantive. For example, you might comment on something you found surprising or had not thought about in the way presented. You could also point out additional predictions that you might have, or additional questions you have after the presentation. Please attempt to provide comments for presentations that do not already have them so that all groups get feedback. | 2 pts Excellent Substantive comments to at least two peer videos | | 1 pts Good Substantive comments to only one peer video | | 0 pts Missing or Unacceptable | 2 pts |
| Total Points: 10 | | | | | | |

Appendix B

Exploring Undergraduate Research Experiences in Biology Survey

Have you done undergraduate research in both the summer and the academic school year?

Yes (1)

No (2)

Display This Question:

If Have you done undergraduate research in both the summer and the academic school year? = Yes

Q63 Summer/Academic Year:

Please indicate how strongly you agree or disagree with the following statements.

| | Strongly Disagree (1) | Disagree (2) | Neutral (3) | Agree (4) | Strongly Agree (5) | Not applicable (7) |
|---|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Summer research experiences are more stressful than academic year experiences. (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Academic year experiences take less time than summer experiences. (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The college or university should never interfere with a student's summer. (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| During the academic year it was difficult to balance research and coursework. (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| During the academic year it was difficult to get sufficient time with my mentor to discuss the project. (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| During the academic year it was easy to plan and schedule work with my research team. (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Overall, research is more interesting than course work. (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I learned more from my courses than from my research experience. (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q66 Benefits Part I:

In this section of the survey you will be asked to consider a variety of possible benefits you may have gained from your research experience. If, for any reason, you consider the question to be irrelevant to you, please choose the "Not applicable" option.

What influence has your undergraduate research experience had on you:

| | No gain or very small gain (1) | Small gain (2) | Moderate gain (3) | Large gain (4) | Very large gain (5) | Not applicable (6) |
|---|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Clarification of a career path (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Skill in the interpretation of results (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tolerance for obstacles faced in the research process (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Readiness for more demanding research (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Understanding how knowledge is constructed (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Understanding of the research process in your field (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ability to integrate theory and practice (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Understanding of how scientists work on real problems (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q67 Benefits Part II:

In this section of the survey you will be asked to consider a variety of possible benefits you may have gained from your research experience. If, for any reason, you consider the question to be irrelevant to you, please choose the "Not applicable" option.

What influence has your undergraduate research experience had on your:

| | No gain or very small gain (1) | Small gain (2) | Moderate gain (3) | Large gain (4) | Very large gain (5) | Not applicable (6) |
|--|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Understanding that scientific assertions require supporting evidence (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ability to analyze data and other information (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Understanding science (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Learning ethical conduct in your field (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Learning laboratory techniques (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ability to read and understand primary literature (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q68 Benefits Part III:

In this section of the survey you will be asked to consider a variety of possible benefits you may have gained from your research experience. If, for any reason, you consider the question to be irrelevant to you, please choose the "Not applicable" option.

What influence has your undergraduate research experience had on your:

| | No gain or very small gain (1) | Small gain (2) | Moderate gain (3) | Large gain (4) | Very large gain (5) | Not applicable (6) |
|---|--------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Skill in how to give an effective oral presentation (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Skill in science writing (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Self-confidence (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Understanding of how scientists think (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Learning to work independently (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Becoming part of a learning community (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Confidence in my potential to be a teacher of science (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q71 Overall Experience:

This section has six questions about your overall experience doing undergraduate research.

Q70 Think about the expectations you had about the research experience before it began. Use the scale below to evaluate your current feelings.

- The experience was worse than I expected (1)
- The experience was a little worse than I expected. (2)
- The experience met my expectations. (3)
- The experience was a little better than I expected. (4)
- The experience was much better than I expected. (5)
- Not applicable (6)

Q72 Think about the person who was your most direct or primary supervisor. How would you describe this person?

- He or she is a college or university professor. (1)
- He or she is a post-doctoral student (a "postdoc"). (2)
- He or she is a graduate student. (3)
- He or she is a professional researcher or practitioner. (4)
- Other (5) _____

Q73 Think about the person who was your most direct or primary supervisor. Evaluate the performance of your direct supervisor.

- I feel that my supervisor was not a good teacher and mentor. (4)
 - I feel that my supervisor was below average as a teacher and mentor. (5)
 - I feel that my supervisor was about average as a teacher and mentor. (6)
 - I feel that my supervisor was above average as a teacher and mentor. (10)
 - I feel that my supervisor was an outstanding teacher and mentor. (11)
 - Not applicable (12)
-

Display This Question:

If Think about the person who was your most direct or primary supervisor. Evaluate the performance o... = I feel that my supervisor was not a good teacher and mentor.

Or Think about the person who was your most direct or primary supervisor. Evaluate the performance o... = I feel that my supervisor was below average as a teacher and mentor.

Q85 Explain how and in what ways your mentor could be more supportive in your research experiences.

Display This Question:

If Think about the person who was your most direct or primary supervisor. Evaluate the performance o... = I feel that my supervisor was above average as a teacher and mentor.

Or Think about the person who was your most direct or primary supervisor. Evaluate the performance o... = I feel that my supervisor was an outstanding teacher and mentor.

Q86 Explain how and in what ways your mentor has been supportive in your research experiences.

Q76 Think about the undergraduate students you worked with during the research experience. Choose a statement that describes your experience with other students.

- Working with other students was one of the worst part of the research experience. (1)
- Working with other students moderately detracted from my research experience. (2)
- Working with other students did not affect my research experience one way or another. (3)
- Working with other students moderately enhanced my research experience. (4)
- Working with other students was one of the best parts of the research experience. (5)
- Not applicable (6)

Q77 Evaluate your overall sense of satisfaction from your research experience by choosing one statement below.

- I am very dissatisfied with this experience. (1)
- I am mildly dissatisfied with this experience. (2)
- I feel neutral about the experience. (3)
- I am mildly satisfied with this experience. (4)
- I am very satisfied with this experience. (5)
- Not applicable (6)

Q78 If it is in your power to do so, will you choose to have another research experience as an undergraduate?

- I will not choose to have another research experience. (1)
- I am unlikely to choose another research experience. (2)
- I am likely to choose another research experience. (3)
- I am very likely to choose another research experience. (4)
- Not applicable (5)

Q80 Additional Program Components Many undergraduate research programs include a number of components in addition to the time you spend in the lab or in the field engaged in your research. If your program had the following components, please rate their effectiveness, and provide any brief comments that you would like to direct to your program director in the box following. The aggregate ratings for your institution and all anonymous comments will be sent to your program director. Please rate your thoughts about the following additional components related to your undergraduate research experiences.

| | Very negative (1) | Moderately negative (2) | Neutral (3) | Moderately positive (4) | Very positive (5) | Not applicable (6) |
|---|-----------------------|-------------------------|-----------------------|-------------------------|-----------------------|-----------------------|
| Preparing an application or writing a proposal at the start of the project (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Seminars at which local or visiting scientists discussed their research (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Seminar(s) on safety in the laboratory (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Training in research ethics (9) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Instruction and discussion on ethics (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| A program of social activities (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| On--campus housing (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| On--campus meal plan (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| The final presentation of my work - either a written report, a platform presentation, a poster presentation, or a combination (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q81 Comments:

Please write any additional comments you have about your research experience here. (If there are several programs on your campus, please mention the name of your program or source of funding along with your comments. Also, if you have any comments regarding the survey itself, please enter them here.)

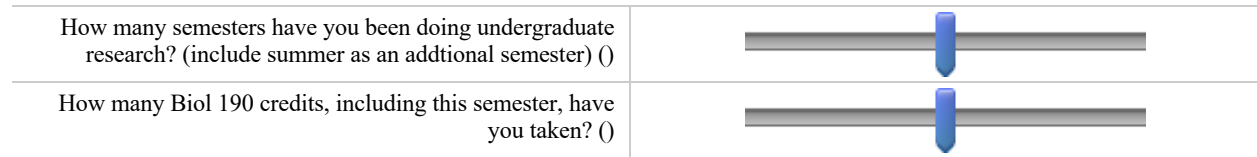
End of Block: Exploring Undergraduate Research Experiences in Biology

Start of Block: Demographics

This final section of the survey focuses on demographic questions.

Q83 Time involvement in undergraduate research:

0 2 3 5 6 8 10 11 13 14 16



Q87 What is your Fresno State student ID number?

Q57 What is your gender identity?

- Male (1)
- Female (2)
- Trans or non-cisgender (3)
- Prefer not to respond (4)

Q51 Which ethnic or racial identity do you MOST identify with?

▼ Asian (1) ... Prefer not to respond (9)

Q1 I am a _____.

- Freshman (1)
 - Sophomore (2)
 - Junior (3)
 - Senior (4)
 - Other (5) _____
-

Q2 What is your current major?

- Biology (1)
 - Chemistry (2)
 - Physics (3)
 - Biochemistry (6)
 - Natural Science (9)
 - Other science (4) _____
 - Other (5) _____
-

Q58 Are you a transfer student from a junior or community college?

- Yes (1)
- No (2)
- I'm not sure (3)

Q50 Are you the first person in your immediate family to go to college?

- Yes (1)
 - No (2)
 - My sibling(s) came before me, but we are the first generation to go to college. (3)
-

Q57 Currently, what is your interest in research?

- Very low (1)
 - Low (2)
 - Medium (3)
 - High (4)
 - Very high (5)
-

Q84 Do you plan to do research in your future career?

- Yes (1)
 - No (2)
 - Maybe (3)
-

Q3 Currently, what is your interest in biology?

- Very low (1)
 - Low (2)
 - Medium (3)
 - High (4)
 - Very high (5)
-

Q59 What is your field of research (best fit)?

- Molecular Biology (1)
- Cell Biology (2)
- Microbiology (4)
- Ecology (5)
- Organismal Biology (6)
- Science Education (7)
- Virology (8)
- Parasitology (3)
- Genetics (9)
- Animal Behavior (10)
- Other (11) _____

Q4 My future plans are_____.

Graduate school (1)

Medical, dental or pharmacy school (2)

Teaching K-12 science (3)

Veterinary school (6)

Other science-related career (4) _____

Other career outside of science (5) _____

Q58 Who is the primary investigator for your research?

▼ Dr. Blumenshine (1) ... Other (20)

End of Block: Demographics
