Annual Assessment Report of Student Learning Outcomes

Biological and Chemical Sciences Major

2020-2021

I. Program Assessment Meetings

June 2021 - Meetings were held via email between Professors Schnurr, Elliot, and Burwell.

II. Closing the Loop

For AY 2019-2020, we focused on Program Goal 2, Objective a, outcomes i and ii.

Goal 2: Students investigate scientific questions using the scientific method and proper research techniques, and learn to evaluate data and communicate their results both orally and in writing, using proper technology.

Objective a: ***Learn the scientific method and how to properly conduct a scientific study***

Learning Outcome i: Design a lab or field study using the scientific method

Learning Outcome ii: Present results in a lab report and in oral presentation formats

We evaluated the outcomes for the following assignments in the major to determine if this goal being successfully met. This was quantified as 100% of students to score at or above C level; 70% at or above B level; 30% at or above A level. All of the following assignments culminated in a lab report and/or an oral presentation, thus the results reflect both of the learning outcomes.

For Biology 130, in 2020 there was no lab report because of the pandemic. In 2021, of the 35 students 6 (17%) never submitted a final lab report. and an additional 9 (25%) students submitted the final lab report late, receiving only partial credit. Overall the class average on this assignment was 35% (a clearly failing grade). The 0's for nonsubmission and points lost for late submission skews this class average, but considering just the students who successfully completed a final lab report on time is still concerning. Of the 20 with on-time submissions, 6 (30%) earned a grade of F. 3 (15%) scored A or A+, and an additional 3 (15%) earned a B+. Overall, 13 students earned at least a C on the lab report. This represents 37% of the entire class, but 65% of those with on-time submissions. So the success in Biology 130 was a bit less than in Biology 119.

In Biology 130 we broke the first draft into two parts only. Perhaps more frequent drafts and feedback as in Biology 119 would improve student outcomes here. We did introduce a new document to help students write a lab report, with example language and expanded explanation of the form and function of each section of the report. This document or the writing guide that inspired it (*A Short Guide to Writing about Biology* by Jan A. Pechenik) will be tried next year to see if it helps our student writing.

BIOL 119L - Hemlock research project

Students in Ecology and Evolution were tasked with investigating the answer to the question: Why are there no seedlings under hemlock trees? They were required to come up with 2 hypotheses that they proposed on their own in their groups, investigated them in the field (after instructor approval), and wrote a research paper that used 5 literature sources and the proper statistics to analyze their data.

In 2020 the students were assigned sections to be submitted biweekly. Out of 33 students, only 23 (70%) submitted all the sections, and these students are also the only students to have submitted the final lab report. The average of the final draft was a 72% for the students that submitted it – including the 10 students that had 0's it drops to 58%. I also allowed students to submit an optional rough draft of the final lab report. Only 10 students submitted a draft, and all of those students received an 80% or better on the final draft. I will require a rough draft in the future, and will discuss this data with the students so that they can see the value of doing the assignments.

CHEM 214L - Independent research project

Students wrote up their own method document before conducting their independent research projects at the end of the Spring semester. For these independent projects, students were required to utilize the techniques taught throughout Organic Chemistry I (CHEM 213L) and Organic Chemistry II (CHEM 214L) to answer a scientific question that interests them.

15% got an A or above, 70% got a B or above, 85% got a C or above. Therefore, the standard was not met.

CHEM 323L - Enzyme kinetics experiment presentation

For this project students designed their own method to investigate a condition that impacts glutathione peroxidase isolated from *Brassica rapa* (turnip). Students presented their results in a lab meeting style oral presentation where they described to their peers what conditions were tested (temperature, enzyme concentration, substrate concentration, pH, etc.), how they developed a method to test this condition, the data they obtained, and conclusions they obtained based on the data analysis.

35% got A, 80% received B or above and 100% received C or above. Therefore, the standard was met.

Out of the 8 assignments that we assessed, 6 did not meet the standards that we had established to

represent student success regarding Goal 2, Objective a.

IV. Program Changes for the Upcoming Year

There are no anticipated changes for the upcoming year.

V. Action Plan for the Upcoming Year

We will continue to focus on Goal 2, Objective a, and both of its outcomes (i and ii) using the assignments that we assessed for AY 2018-2019. We plan to adjust the assignments that were unsuccessful and the measure the outcomes of these assignments (BIOL 119L, BIOL 130L, BIOL 310L, BIOL 312L and CHEM 214L) next year to determine if these changes were successful.