CAL POLY POMONA
ASSESSMENT & PROGRAM REVIEW

Annual Assessment Report 2022-2023

BS Chemistry – ACS, Biochemistry, General Chemistry

Chemistry & Biochemistry

College of Science

CONTACT

Name of Program Assessment Lead Kathryn McCulloch
Name of Person Completing Report Kathryn McCulloch

DISCIPLINARY ACCREDITATION Yes

DEVELOPMENT AND DOCUMENTATION OF STUDENT LEARNING OUTCOMES

How were the program's SLOs developed? (select all that apply)

- Our disciplinary accrediting agency has recommended learning outcomes, so we used and/or modified them.
- We developed them as a program/department using our own knowledge and expertise of the field.

Other than the CPP Catalog and the Office of Assessment and Program Review website, where else are your SLOs published? Select all that apply.

- Department Website - provide URL: https://www.cpp.edu/sci/chemistrybiochemistry/about-thedepartment/learningoutcomes.shtml
- Course Syllabi

ASSESSMENT ACTIVITIES IN 2022-2023

This section provides the opportunity for programs to share and discuss assessment activities conducted in **AY 2022-2023.** This includes data collection, rubric development, data analysis, discussion of findings, development or implementation of closing the loop improvement strategies, update of your assessment plan and/or curriculum matrix, etc.

How many total SLOs does your program assess according to your assessment plan?

- 7

How many SLOs did your program assess this past year in 2022-2023?

- My program assessed SLOs in AY 2022-2023 (e.g., artifact collection, scoring, closing the loop, etc.). May also have engaged in assessment planning activities unrelated to specific SLOs (e.g., modified curriculum matrix, assessment plan, etc.).

Please list the SLOs examined

- SLO #1: (SLO 2) Students will be able to design and execute an experimental procedure, work independently, interpret experimental results, and draw a reasonable, accurate conclusion. Students will synthesize, isolate, purify and characterize compounds using modern methods and instrumental techniques.
- SLO #2: (SLO 4) Students will use computer technology to gather, process, analyze, and present chemical data, and communicate critical analysis of scientific information through written reports, laboratory notebooks, and oral presentations.
- SLO #3: (SLO 5) Students will use chemical literature and computer resources to gather research information.

Student Learning Outcome (SLO): **(SLO 2) Students will be able to design and execute an experimental procedure, work independently, interpret experimental results, and draw a reasonable, accurate conclusion. Students will synthesize, isolate, purify and characterize compounds using modern methods and instrumental techniques.**

Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence
• Created/modified/discussed assessment procedures (e.g., SLOs, curriculum matrix, mechanism to collect student work, rubric, survey, etc.)		
• Collected direct evidence (e.g., student work, exam items, etc.) • Scored direct evidence of student learning • Interpreted and made meaning of findings for direct evidence	• Assignment/exam/paper completed as part of regular coursework	• Used rubric or scoring guide

Findings			
N of Artifacts	**Criterion Used**	**Goal Met**	**Eye-opening Result**
30	A rubric was designed to assess three components of the SLO and students were scored 1 – 4 for each component (1: beginning; 2: developing; 3: proficient; 4: advanced). Both the average score and the percentage of students scoring at proficient or advanced were used to measure success. The target goal to indicate success is an average score of 3.0 or more than 2/3 of students at least at the level of proficient.	This SLO had three components that were evaluated – design and execution of the experiment, interpretation and drawing conclusions, and use of modern methods and instrumentation. The program met its goal for the design and execution component (average score: 3.2 and 76% of students at proficient or higher). The program did not meet its goal for interpretation and conclusions (average score: 2.9 and 50% of students at proficient or higher) or use of modern methods (average score: 2.6 and 37% at proficient or higher).	This lab exercise challenged students to use their knowledge to develop their own experimental approach; as a capstone course taken near the very end of the chemistry program it is reaffirming to see that more than 75% are at proficient or mastery level for design and execution of an experiment. The results also revealed that only a third were at proficient or mastery level for using modern methods. This likely reflects the nature of the exercised used for assessment; the results are consistent with the instructor anecdotal evidence that students struggle with installing software and efficiently using the programs.

Student Learning Outcome (SLO): **(SLO 4) Students will use computer technology to gather, process, analyze, and present chemical data, and communicate critical analysis of scientific information through written reports, laboratory notebooks, and oral presentations.**

Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence
• Created/modified/discussed assessment procedures (e.g., SLOs, curriculum matrix, mechanism to collect student work, rubric, survey, etc.)		
• Collected direct evidence (e.g., student work, exam items, etc.) • Scored direct evidence of student learning • Interpreted and made meaning of findings for direct evidence	• Assignment/exam/paper completed as part of regular coursework	• Used rubric or scoring guide

Findings			
N of Artifacts	**Criterion Used**	**Goal Met**	**Eye-opening Result**
30	The University's rubric for Written Communication was used to assess this SLO and students were scored 1 – 4 for each component (1: beginning; 2: developing; 3: proficient; 4: advanced). Both the average score and the percentage of students scoring at proficient or advanced were used to measure success. The target goal to indicate success is an average score of 3.0 or more than 2/3 of students at least at the level of proficient. Use of the University rubric will allow us to eventually see how our students perform relative to other students at the University and in the College.	This SLO had five components that were evaluated – context and purpose for writing, organization, development, clarity and grammar, and disciplinary conventions. The student work was scored with an average of '3' or higher for 3 of the 5 components (organization, clarity and grammar, and disciplinary conventions). The component with the lowest scores, development, is the only one where either the goal of an average score of '3' or higher or 67% being at least proficient (average score: 2.6 and 53% at proficient or higher).	We chose to focus on the written communication aspect of this SLO to align with the University assessment efforts in the same area and used the same rubric to assess formal lab reports. Nearly two-thirds of students were proficient or better for clarity and grammar, and 70% or more were proficient or better at context and purpose for writing and at disciplinary conventions (writing style, figures and tables, etc.). The scores for development and organization were lower; it would be interesting to see if these lower scores were due to the type of artifact used. Because lab reports have strict formats, that may impact the development of ideas. To answer this question, future assessment of this SLO may also draw on senior project theses for comparison.

- **Student Learning Outcome (SLO): :(SLO 5) Students will use chemical literature and computer resources to gather research information.**

Assessment Activities	Evidence Used	Evaluation and Interpretation of Evidence
• Created/modified/discussed assessment procedures (e.g., SLOs, curriculum matrix, mechanism to collect student work, rubric, survey, etc.)		
• Collected direct evidence (e.g., student work, exam items, etc.) • Scored direct evidence of student learning • Interpreted and made meaning of findings for direct evidence	• Assignment/exam/paper completed as part of regular coursework	• Used rubric or scoring guide

Findings			
N of Artifacts	**Criterion Used**	**Goal Met**	**Eye-opening Result**
30	A rubric was designed to assess two components of the SLO and students were scored 1 – 4 for each component (1: beginning; 2: developing; 3: proficient; 4: advanced). Both the average score and the percentage of students scoring at proficient or advanced were used to measure success. The target goal to indicate success is an average score of 3.0 or more than 2/3 of students at least at the level of proficient.	This SLO had two components that were evaluated – identification and use of primary sources, and citation. The program met its goal for proper citation (average score: 3.1 and 80% of students at proficient or higher). The program did not meet its goal for identification and use of primary (average score: 2.5 and 50% of students at proficient or higher).	These results were not as eye-opening as seen for the other two SLOs assessed; students have honed their skills at using the chemistry citation style in their writing and is a major point developed in a lower-division chemical communications course that is further reinforced in upperdivision formal lab reports. This is reflected in 80% of students scoring at proficient or mastery for citations. The lower percentage identifying appropriate sources is not unexpected.

IMPROVING THROUGH ASSESSMENT

Overall, what best describes how the program used the results in 2022-2023? Select all that apply.

- Assessment procedure changes (SLOs, curriculum matrix, rubrics, evidence collected, sampling, communications with faculty, etc.)
- Use is pending (typical reasons: insufficient number of students in population, evidence not evaluated or interpreted yet, faculty discussions are ongoing, etc.)

Ideas to improve student learning can come from different constituents. With whom did the program discuss assessment planning and/or share results during AY 2021-2022? Select all that apply.

- Program/department faculty as whole
- A committee of program/department faculty
- Program/department assessment committee
- College assessment committee
- College Assessment Liaison

The past academic year posed both challenges and opportunities. Please share any assessment discoveries (e.g., insights about assessment procedures, great achievements, etc.) regarding program assessment in 2022-2023 so that others may learn from your experiences.

The assessment group found it quite straightforward to use the University rubric for written communication to assess lab reports. As everyone is busy with many demands on our time, the group appreciated the clarity of using rubrics to score artifacts. We are hoping that being able to use the same rubrics the next time these SLOs are assessed.

Please share how the program triangulates various data sources to determine student success. Consider assessment findings, CPP's GI2025 markers, CSU Dashboard, CPP's Student Success Dashboard on Tableau, course evaluations, etc.

<narrative here>

Does the program offer a certificate or credential (e.g., teaching credential)?

- No

The most current assessment plan and curriculum matrix we have on file for your program may be found here. To ensure we have the most updated assessment plan and curriculum matrix for your program, and for posting on our website, please upload the following documents:

Assessment Plan - Yes

Curriculum Matrix - Yes

If you would like us to review other assessment documents such as your evidence (e.g., assignment, survey, interview questions etc.) or scoring rubric, please upload/provide them. (Select all that apply)

- Rubric