

Program-Level Assessment: Annual Report

Program Name (no acronyms): BA Chemistry	Department: Chemistry
Degree or Certificate Level: Undergraduate	College/School: SSE
Date (Month/Year): September 2022	Assessment Contact: Brent Znosko
In what year was the data upon which this report is based collected? 2018-present	
In what year was the program's assessment plan most recently reviewed/updated? 2022	
Is this program accredited by an external program/disciplinary/specialized accrediting organization? No	

1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle? (Please list the full, complete learning outcome statements and not just numbers, e.g., Outcomes 1 and 2.)

Year 2 assessment focuses on lab courses. The following program student learning outcomes were assessed in this annual assessment cycle (Year 2):

Outcome #2 – Demonstrate proficiency of basic (general, organic, and analytical) laboratory techniques and conduct laboratory experiments safely.

Outcome #3 – Collect, interpret, and analyze quantitative data.

Outcome #4 – Communicate scientific results effectively.

2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please describe and identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

Outcome #2 – Students' scores on a safety exam in General Chemistry Lab 1 and 2 were collected. The total score on General Chemistry Lab 2 Boiling Point Elevation were collected. Students' scores on a safety exam in Organic Lab 1 and 2 were collected. The scores on the technique points section on Lab 7: E1/E2 Elimination in Organic Lab 2 were collected. The semester scores in Analytical 1 Lab were collected.

Outcome #3 - Students' semester scores in Analytical 1 Lab were collected.

Outcome #4 - Students' scores on an end of semester presentation in Organic 1 Lab were collected.

All the relevant courses are typically offered in-person. Data was not collected if the artifact was supposed to be completed during remote learning. Data from Madrid was not collected. Only general chemistry and organic chemistry are offered in Madrid, and these courses very rarely include majors.

3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and **include them in/with this report document** (do not just refer to the assessment plan).

Raw scores were tabulated by the instructors of the courses and sent to the undergraduate program coordinator. Percentage scores were evaluated using the following criteria: >89% = exceeds, 80-89% = meets, 70-79% = approaching, and <70% does not meet.

4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

Outcome #2 – Students' scores on a safety exam in General Chemistry Lab 1 (67% exceeds, 20% meets, 7% approaching, 6% does not meet, n=30) and 2 (65% exceeds, 30% meets, 5% approaching, 0% does not meet, n=20) were collected. The total score on General Chemistry Lab 2 Boiling Point Elevation were collected (33% exceeds, 46% meets, 13% approaching, 8% does not meet, n=24). Students' scores on a safety exam in Organic Lab 1 (92% exceeds, 0% meets, 0% approaching, 8% does not meet, n=12) and 2 (91% exceeds, 9% meets, 0% approaching, 0% does not meet, n=11) were collected. The scores on the technique points section on Lab 7: E1/E2 Elimination in Organic Lab 2 were collected (60% exceeds, 30% meets, 0% approaching, 10% does not meet, n=10). The semester scores in Analytical 1 Lab were collected (64% exceeds, 36% meets, 0% approaching, 0% does not meet, n=11).

Outcome #3 - Students' semester scores in Analytical 1 Lab were collected (70% exceeds, 30% meets, 0% approaching, 0% does not meet, n=11).

Outcome #4 - Students' scores on an end of semester presentation in Organic 1 Lab were collected (43% exceeds, 14% meets, 0% approaching, 43% does not meet, n=7).

5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

We have learned the following:

1. The University's policy of submitting this assessment report based on individual program may not be best suited for chemistry. The faculty decided that assessment based on the aggregated results from all programs is a better method of assessment. Most courses are enrolled by students from different programs, so changes to a course affects students in different programs. Also, separating based on program does not provide a sufficient amount of data to make meaningful conclusions (notice the very small n values above). In the aggregate, our students are meeting or exceeding the outcomes.
2. Overall, students are meeting the learning Outcome #2. On the General Chemistry Lab 1 safety exam, General Chemistry Lab 2 safety exam, General Chemistry Lab 2 Boiling Point Elevation, Organic Lab 1 safety exam, technique points section on Lab 7: E1/E2 Elimination in Organic Lab 2, and the semester scores in Analytical 1 Lab, 87%, 95%, 79%, 92%, 100%, 90%, and 100% of the students have met the outcome.
3. Overall, students are meeting the learning Outcome #3. For the Analytical 1 Lab semester scores, 100% of the students have met the outcome.
4. Overall, students are not doing as well on learning Outcome #4. Only 57% of the students are meeting this outcome (although there is a very small sample size of n=7).

It should be noted that small sample sizes (sometimes as few as seven students) may be skewing the results. More meaningful results will likely require data from several years.

6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

The collection and analysis of the data was completed just prior to finalizing this report. The data and the first draft of this report was shared with the instructors of the courses related to the above outcomes. These instructors had an email discussion and shared ideas. The data will be shared with all faculty in the near future. It is likely that faculty will discuss the results reported here with their colleagues in their respective areas of expertise (general chemistry, organic, inorganic, analytical, physical, and biochem). Additional ideas may result from these discussions.

B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies

- Course content
- Teaching techniques
- Improvements in technology
- Prerequisites
- Course sequence
- New courses
- Deletion of courses
- Changes in frequency or scheduling of course offerings

Changes to the Assessment Plan

- Student learning outcomes
- Artifacts of student learning
- Evaluation process
- Evaluation tools (e.g., rubrics)
- Data collection methods
- Frequency of data collection

Please describe the actions you are taking as a result of these findings.

The faculty and staff responsible for the course associated with Outcome #4 have evaluated the results from this outcome. While these results look poor, the overall results for all majors/degrees combined demonstrates that most students exceed or meet the expectations. The small sample size here makes a meaningful recommendation for change difficult to make. The responsible parties for the course are still evaluating best steps forward; however, there are two pertinent actions that are being considered. (1) Evaluation of offering a no point penalty draft option. Students wishing to turn in a draft presentation will receive constructive feedback on how to improve their presentation so it can be incorporated into their final submission. (2) An example presentation could be provided to the class which would provide a template for them to utilize. These two modifications could benefit students who traditionally achieve lower scores on this outcome. Final decisions on modifications to the course will be made after the submission of this report.

If no changes are being made, please explain why.

Due to the high percentage of students who are meeting the outcomes, it is likely that no changes will be made with Outcomes #2 and #3.

7. Closing the Loop: Review of Previous Assessment Findings and Changes

A. What is at least one change your program has implemented in recent years as a result of assessment data?

We recently decided to change the assessment method for our analytical courses. For this program, we are no longer collecting data on technique-specific questions from the ACS analytical exam. The faculty felt that collecting the semester score in analytical 1 lab was sufficient to demonstrate proficiency of basic lab techniques. Also, we are no longer collecting data on quantitative questions from the ACS analytical exam. Instead, we are collecting students' semester scores in CHEM 2200.

B. How has this change/have these changes been assessed?

These changes are reflected in our current assessment plan. We are no longer collecting data on technique-specific or quantitative questions from the ACS analytical exam. We have always collected the semester score in analytical 1 lab, so that will continue. We have begun collecting students' semester scores in CHEM 2200. That data is being assessed with all of our other program outcomes.

C. What were the findings of the assessment?

While the n is still small (n=11), so far, 100% of the students are meeting this program objective.

D. How do you plan to (continue to) use this information moving forward?

These changes will be reflected in our annual data collection process and our 3-year annual assessment cycle.

IMPORTANT: Please submit any assessment tools (e.g., rubrics) with this report as separate attachments or copied and pasted into this Word document. Please do not just refer to the assessment plan; the report should serve as a stand-alone document.