

Degree/Certificate: BA, BAE, and BS

Major/Option: Chemistry, all options

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Part I – Program SLO Assessment Report for 2013-14

Part I – for the 2013-14 academic year: Because Deans have been asked to create College-Level Summary Reports annually, the template has been slightly modified for a) clarity for Chairs and Directors, and b) a closer fit with what the Deans and Associate Deans are being asked to report.

1. **Student Learning Outcome:** The student performance or learning objective as published either in the catalog or elsewhere in your department literature.

Students will demonstrate a knowledge of major concepts in the areas of inorganic, organic, analytical, and physical chemistry.

2. **Overall evaluation of progress on outcome:** Indicate whether or not the SLO has been met, and if met, to what level.

_____ SLO is met after changes resulting from ongoing assessments, referencing assessment results from the previous year to highlight revisions;

_____ SLO is met, but with changes forthcoming;

___x___ SLO met without change required

3. **Strategies and methods:** Description of assessment method and choices, why they were used and how they were implemented.

Two questions each from the Final Exams of organic chemistry and physical chemistry were used to measure student knowledge. The questions were chosen to reflect characteristic knowledge for their respective areas of chemistry. The success rates reported reflect the average number of points earned on the questions, taking into account the usual partial credit on such questions.

In organic chemistry, the first question involved predicting the reaction products for a selection of reactions involving aromatic compounds. The second question covered the topic of sugar chemistry. Averaging the results from these two questions, students managed 78.2% correct responses.

In physical chemistry, the first question involved writing a correct quantum mechanical Hamiltonian operator for a simple molecule and explaining the Born-Oppenheimer Approximation. The second question asked for a sketch of a quantum mechanical electronic energy surface for a diatomic

molecule, together with its allowed vibrational levels, all labelled using proper spectroscopic notation. The combined success rate for these two questions was 79.4%.

4. **Observations gathered from data:** Include findings and analyses based on the strategies and methods identified in item #3.

- a. Findings:

Given the complexity of the questions used to measure gained knowledge, success rates of nearly 80% seem very successful. It is also satisfying, although perhaps gratuitous, that the success rates in two disparate sub-fields such as physical chemistry and organic chemistry appear to be so similar.

- b. Analysis of findings:

The questions involved in this measurement clearly demonstrate a gain in knowledge on the students' part; they are not the sort of questions that most non-chemistry-majors would even *understand*, let alone be able to answer correctly. Based on this, it seems clear that the chemistry major programs are succeeding in providing students with substantial knowledge as described in this SLO.

5. **What program changes will be made based on the assessment results?**

- a) Describe plans to improve student learning based on assessment findings (e.g., course content, course sequencing, curriculum revision, learning environment or student advising).

No improvements are suggested by these findings.

- b) Provide a broad timeline of how and when identified changes will be addressed in the upcoming year.

N/A, as no program changes are intended.

6. Description of revisions to the assessment process the results suggest are needed and an evaluation of the assessment plan/process itself.

Too many items are included in this particular SLO; it is tedious – and not particularly meaningful – to attempt to simultaneously measure knowledge gained in all of the areas listed. For this year, we chose to measure only organic chemistry and physical chemistry. It might make more sense to rewrite the SLO to address the various sub-disciplines separately.

NEW: PART II – CLOSING THE LOOP

FOLLOW-UP FROM THE 2012-13 PROGRAM ASSESSMENT REPORT

In response to the university's accrediting body, the [Northwest Commission on Colleges and Universities](#), this section has been added. This should be viewed as a follow up to the previous year's findings. In other words, begin with findings from 2012-13, and then describe actions taken during 2013-14 to improve student learning along, provide a brief summary of findings, and describe possible next steps.

Working definition for closing the loop: *Using assessment results to improve student learning as well as pedagogical practices. This is an essential step in the continuous cycle of assessing student learning. It is the collaborative process through which programs use evidence of student learning to gauge the efficacy of collective educational practices, and to identify and implement strategies for improving student learning.* Adapted 8.21.13 from <http://www.hamline.edu/learning-outcomes/closing-loop.html>.

1. Student Learning Outcome(s) assessed for 2012-13

Students will demonstrate effective oral and written communication skills and critical thinking skills as related to the field of chemistry.

2. Strategies implemented during 2013-14 to improve student learning, based on findings of the 2012-13 assessment activities.

No changes to curriculum have been made, since the results were already satisfactory. Inclusion of an oral report component in CHEM 432 will be reconsidered this Winter quarter when the course is offered again.

3. Summary of results (may include comparative data or narrative; description of changes made to curriculum, pedagogy, mode of delivery, etc.): Describe the effect of the changes towards improving student learning and/or the learning environment.

N/A

4. What further changes to curriculum, pedagogy, mode of delivery, etc. are projected based on closing-the-loop data, findings and analysis?

None.