EASTERN ILLINOIS UNIVERSITY

Student Learning Outcomes (SLOs) Report for Accredited Programs

(*updated 9/19/23*)

Program Type: **Accredited Program**

Program Name: Chemistry (BA and BS programs)

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Submission Date:

Review Cycle:

- Even Year
- Odd Year

Review Round and Instructions

- **Round A** (Associate Dean review)**:** Submit this cover sheet and a copy of the annual (or periodic) report most recently submitted to the accrediting agency; your accreditation report should address assessment.

- **Round B** (Associate Dean + VPAA review): Submit this cover sheet and the following:
  - evidence of ongoing accreditation (document confirming accreditation status, which could be a letter from the accrediting agency)
  - annual (or periodic) accreditation report submitted to agency
  - this SLO report, which provides a summary of the program's collection and evaluation of its annual assessment data*
  - an optional cover memo (not to exceed one page), which briefly describes any information or highlights the department believes would be important to demonstrate academic excellence and program quality

If your program completed a significant review (accreditation application and/or the full 8-year IBHE report) in the last calendar year, then you may, with permission from the VPAA or designee, substitute either of these major reports for your typical Student Learning Outcomes report, in "Round B." **To be approved, these documents must substantively discuss assessment, outcomes, and data, and have been prepared and submitted within the same calendar year.*

All SLO reports are archived here: https://www.eiu.edu/assess/majorassessment.php
DUE: **October 15th** to your Associate Dean or designee

Each academic program is expected to prepare a Summary of the Assessment Data by Student Learning Outcome. This summary may take the form of a chart or other means of presentation that describes the annual data collected, when it is collected, in which course(s), through which assignment or activity, and by whom. This summary should clearly indicate what the program seeks to discover in its students' learning. The summary should correspond to the record-keeping documents maintained by the academic program.

Program Name: Chemistry BA and BS

(Note although 4 students matriculated in this time frame, the data for only 3 of these were used, as the 4th one attended EIU from FA07-SP12, then went into the workforce, and finally in SU24 transferred in remaining credits to graduate. As his experiences with our chemistry courses were not in the same timeframe as the rest of the cohort, his data was excluded.)

PART 1. OVERVIEW OF STUDENT LEARNING OUTCOMES AND MEASURES

Student Learning Outcome (SLO)	What **measures and instruments** are you using? This could be an oral or written exam, a regularly assigned paper, a portfolio—administered early and later in coursework.	How are you using this info to improve student learning? What are you hoping to learn from your data? Include **target score(s) and results**, and specify whether these were met, not met, or partially met for each instrument.	Does your SLO correspond to an **undergraduate learning goal (ULG)**: writing, speaking, quantitative reasoning, critical thinking, responsible citizenship?
1. Students understand the fundamental principles and applications in all subdisciplines of chemistry.	(a) Grades in foundation courses (2310, 2440, 2730, 3300/3450, 3910) and in in-depth courses (2840, 3460, 3780, 3920, 4900) as applicable. Will be collected at end of each semester. (b) Scores on ETS Major Field test, administered to graduating seniors in SP semesters. Fall graduates will be tested in the SP prior to degree completion. (c) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (d) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(a) Target: 75% of students obtaining an A or B grade on first attempt. Data: CHM 2310 – 100% (3/3); 2440 – 67% (2/3); 2730 – 100% (3/3); 3450 – 100% (3/3); 3910 – 100% (2/2) (b) Target: For all students, scores of ≥ 50th percentile. For BA students, ≥ 35th percentile on the remaining 3 subdisciplines. For BS students, $\underline{\geq}$ 50th percentile on remaining 3 subdisciplines. Data: scores not returned yet. (c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: BA-Avg = 2.50 (one respondent = 4, one = 1). BS= Avg=4.67. (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	Yes: quantitative reasoning, critical thinking,

2. Students are able to execute experiments in chemistry.	(a) Grades in laboratory courses of 2445, 2730, 2845, 3455, 3780, 3915, and 4915, as applicable. Will be collected at end of each semester. (b) Grade in research course CHM 4400, as applicable. (c) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (d) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(a) Target: 75% of students obtaining an A or B grade on first attempt. Data (BA): 2445 – 100% (3/3); 2730 – 100% (3/3); 2845 - 100% (3/3); 3780 – 100% (2/2); 3915 and 4915 – no BA students took this. Data (BS): 2445-80% (4/5); 2730- 71% (5/7); 2845-71% (5/7); 3780-75% (6/8); 3915-50% (4/8); 4915-88% (7/8) (b) Target: 75% of students obtaining an A or B grade on first attempt. Data (BA): 100% of majors did at least 2 semesters of research, and 100% rec'd A/B. Data (BS): 88% of majors did at least 1 semester of research; 100% received A or B (c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 4.00 (2 respondents) Data (BS): Avg = 3.67 (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	Yes: quantitative reasoning, critical thinking,
3. Students are able to critically analyze data.	a) Rubric scores from instructors on 1 selected student report in CHM 2845, 3455, 3780, 3915, and 4915 as applicable. Scores will be provided by end of semester course taken. (b) Critical thinking component of Major Field Test	(a) Target: 75% of students obtaining score of ≥ 2.5 (on 4pt scale). Data: 2845 – 67% (4/6); 3455 - 100% (1/1); 3780 - 83% (5/6); only 1 student took 3455, 3915-100% (9/9); 4915-89% (8/9) (b) Target: Mean percentile correct ≥ national mean. Data: scores not returned yet.	Yes: quantitative reasoning, critical thinking,

	(c) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (d) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 2.50 (2 respondents) Data (BS): Avg = 4.67 (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	
4. Students are able to utilize computer applications.	(a) Rubric scores from instructors on 1 selected experiment as specified in following items: (1) use of spreadsheet / graphing / plotting programs in CHM 2730 and 3915; (2) use of word processing software in CHM 2845, 3780, and 3915; (3) use of structure drawing software in CHM 2845; (4) computational chemistry packages in CHM 1315, 2845, 3915. Scores will be provided by end of semester course taken. (b) Seminar evaluation items on use of structure drawing software and presentation software in CHM 3001 and 4001. Scores will be provided by end of semester course taken. (c) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses.	(a) Target: 75% of students obtaining score of ≥ 2.5 (on 4pt scale). Data: (1) 2730 – 100 % (1/1); 3915-89% (8/9) (2) 2845 – 83% (5/6); 3780 – 67% (4/6); (3) 2845- 67% (2/3) (4) 1315* – 100% (5/5); 2845 –33% (1/3) (b) Target: Average response of ≥ 2 on seminar evaluation, where 1 = needs improvement and 3 = excellent. Data: 3001 - 100% (11/11); 4001-100% (9/9) (c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 4.00 (2 respondents) Data (BS): Avg = 4.33 (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	No

	(d) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.		
5. Students can properly use chemical information and database sources.	(a) Rubric scores from instructors on 1 exercise as specified in following items: (1) SciFinder and journal databases, including PubChem, in CHM 2845, 3450, 3500, and 4915; (2) use of Protein Database and NIST database in CHM 3450 and 3500. Scores will be provided by end of semester course taken. (b) Seminar evaluation items on sources used in CHM 3001 and 4001. Scores will be provided by end of semester course taken. (c) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (d) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(a) Target: 75% of students obtaining score of ≥ 2.5 (on 4pt scale). Data: (1) 2845 – na; 3450 – 100% (8/8); 3500 – 100%; 4915 – 100% (9/9). (2) 3450 – 88% (7/8); 3500 - na (b) Target: Average response of ≥ 2 on seminar evaluation, where 1 = needs improvement and 3 = excellent. Data: 3001 - 82% (9/11); 4001 – 100% (9/9). (c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 4.00 (2 respondents) Data (BS): Avg = 4.67 (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	No
6. Students will generate and contribute to the process of expanding new knowledge and data in	(a) Participation in CHM 4400 Undergraduate Research. Will be collected at end of each semester.	(a) Target: For BS chem, management and BA students at least 50% of majors complete 1 semester of 4400 Data (BA): 100% of majors did at least 2 semesters of research	Yes: quantitative reasoning, critical thinking,

	(b) Participation in summer research experiences, including internships or CoOPs. Will be collected at end of each semester. (c) Published abstracts for presentations or posters at external meetings. Will be collected at end of each semester. (d) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (e) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	Data (BS): 88% of majors did at least 1 semester of research, with 75% doing more than 1 semester. Avg length = 3 semesters (b) Target: At least 15% of majors involved in a summer experience. Data (BA): 50% did summer research at EIU, paid off external grant. Data (BS): 11% did research external (Argonne); 11% did internship at UK chemical company; 25% did summer research at EIU, 1 paid off external grant. (c) Target: At least 50% of students listed on at least 1 abstract. Data: 66% (8/12) presented at external meeting (5 national, 7 at regional). 11% author on a manuscript (1/9). (d) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 3.00 (2 respondents) Data (BS): Avg = 3.67 (e) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	responsible citizenship
7. Students will communicate effectively in speaking and writing.	(a) For speaking, 3 items on the back page of CHM 3001, 4001 seminar evaluations (b) For writing, seminar evaluation item on abstract for CHM 3001 and 4001. (c) For writing, rubric scores from instructors on 1 report from CHM	(a) Target: Average response of ≥ 2 on seminar evaluation, where 1 = needs improvement and 3 = excellent. Data: 3001 - 82% (9/11); 4001 – 100% (9/9). (b) Target: Average response of ≥ 2 on seminar evaluation, where 1 = needs improvement and 3 = excellent. Data: 3001 - 73% (8/11); 4001 – 89% (8/9).	Yes: writing, speaking

	2845, 3780, 3915, and 4915, as appropriate. (d) For speaking, published results from speech rubrics in CMN1310G and EIUXXX. (e) For writing, rubric scores submitted by CHM faculty instructors. (f) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (g) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(c) Target: 75% of students obtaining score of ≥ 2.5 (on 4pt scale). Data: 2845 - 100% (6/6); 3780 – 83% (5/6); 3915 – 67% (6/9); 4915 – 89% (8/9). (d) Target: Averages of ≥ 3.2 in CMN1310G and ≥ 3.6 in EIUXXX. Data*: CMN1310G avg = 3.50 (n=2); EIUXXX = 3.69 (n=3). (e) This is a repeat of item (c) just above (f) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Speaking avg = 4.00; Writing avg = 4.50 (2 respondents each) Data (BS): Speaking avg = 4.33; Writing avg = 4.33 (g) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	
8. Students will be aware of and practiced in working safely.	a) Completion of CHM 3500. (b) Reflective items on exit surveys to graduating seniors, to be completed by the end of their last semester of courses. (c) Reflective items on alumni surveys sent to students who graduated 3- and 8-yrs prior. Surveys will be sent in late SP or over SU.	(a) Target: 100% of majors complete. Data: 100% of majors completed. (b) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data (BA): Avg = 3.00 (2 respondents) Data (BS): Avg = 4.67 (c) Target: Average response of ≥ 3 on 5pt scale, where 1 = strongly disagree and 5 = strongly agree. Data: Very low response rate	Yes: responsible citizenship

* This data not for individuals in the cohort, but for all majors in the DEPT, as is not either meaningfully available [4a(4) – incoming freshmen do not necessarily declare properly their specialization at this point, as well as this item added after these students would have taken the course and hence not available] or no parsed out this way (7d)

PART 2. IMPROVEMENTS AND CHANGES BASED ON ASSESSMENT

A. Provide a short summary (1-2 paragraphs) or bulleted list of any **curricular actions** (revisions or additions) that were approved over the past two years as a result of reflecting on the student learning outcomes data. Are there any additional future changes, revisions, or interventions proposed or still pending?

No curricular actions were undertaken based on SLOs.

B. Provide a brief description or bulleted list of **any improvements (or declines)** observed/measured in student learning. Be sure to mention any intervention made that has not yet resulted in student improvement (if applicable).

Improvement in SLO #6 (generating and contributing to expanding knowledge) continues to improve, with not only near high amount of majors involved in research (and for multiple semesters) but also in these students seeing fruition of their results, in presentations and publications. The increase can be attributed in part to the success of our newer Unit A faculty, who are making time and space to mentor larger group sizes and having success in their efforts. Note that for manuscript inclusion, this marker can be a hard goal, given that a typical undergraduate cannot see the whole project to completion and there is a lag between them finishing their research and the manuscript being written / accepted after revisions.

We are also happy to see significant increases in SLO #7 (communicating by speaking and writing) from the CHM 3001 junior seminar to the CHM 4001 senior seminar courses, implying that the students are learning and able to apply communication skills from their 1st seminar into their 2nd. It is also rewarding to see that the students themselves feel positive in these areas, from their exit survey responses. And while SLO #8 (safety) has been stressed throughout since the program inception, it is good to see that with this now being a SLO, that the results are very positive.

Declines appeared in a few specific course-related SLO items (#2 executing experiments, with regard to 3915; #3 critically analyzing data, with regard to 2845, #4 using computer applications, in 2845 and 3780), but some work will need to be undertaken to understand these low points, as other markers in the same categories are high.

Greater attention is needed in being sure the required data is returned, as well as in ensuring that all faculty incorporate items to measure various specific SLOs in their courses (such as utilizing chemical information/database sources in CHM2845 Organic II lab for SLO #5a).

One intervention that is underway is a reformatting of CHM 1310G General Chemistry I, to an atoms approach, which is believed to provide a more cohesive order of topics as well as step the students into the math required (rather than this being loaded in the front end). This was initiated by participation in the DFW initiative, and it is believed that this should help with increased comprehension of basic concepts as well as increased comprehension as the students go beyond this course, as it builds the foundation.

Regarding the BA program, one general comment is simply that there were more students in this cohort than in years previous, making analysis of results more confident. We are beginning to see students who are coming in declared as a BA major, instead of switching to this option (from a BS program) in their junior or senior year. This is encouraging.

C. HISTORY OF DATA REVIEW OVER THE PAST TWO YEARS

Please document annual faculty and committee engagement with the assessment process (such as the review of outcomes data, revisions/updates to assessment plan, and reaffirmation of SLOs).

Date of annual (or periodic) review	Individuals or groups who reviewed the assessment plan	Results of the review (i.e., reference proposed changes from any revised SLOs or from point 2.A. curricular actions)
7/23/24	Edward Treadwell (Chair of committee and Chair of Dept)	
3/4/24	Dept assessment committee	
3/22/23	Dept assessment committee	

Dean Review and Feedback

The Chemistry BA and BS 2-year assessment report is comprehensive and draws from multiple data points to measure 8 program learning goals. Assessment instruments include scores on the ETS Major Field test, reflective items on exit surveys, alumni survey data, grades in foundational courses, and writing, speaking, and research rubrics. Results are shared with the department's assessment committee and used as a basis for further discussion and reflection at the department level. In reviewing assessment data, the department noted increasing student participation in undergraduate research along with the presentation and publication of research results. Also notable is improvement in the areas of speaking and writing as indicated by the results of SLO #7. Exit survey data also indicate student satisfaction with their communication skills. While the results of this latest round of assessment are mostly positive, the report does indicate a few areas that require greater attention, including the ability to critically analyze data and execute experiments. I would urge the department to utilize these and other assessment data to inform any upcoming curricular changes. It should be noted that the department is participating in the university-wide "DFW Initiative" with the goal of improving student comprehension of basic concepts in the CHM 1310G foundational course.

2/7/25

Dean or Designee

Date