

Student Learning Outcomes (SLOs) Report for Accredited Programs

(updated 9/19/23)

Program Type: **Accredited Program**

Program Name: BS Biochemistry

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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: BS Biochemistry

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) Final grades in foundation courses (CHM 2310, 2440, 2730, 3450, 3910) as well as in-depth courses (2840, 3460, 3780, 3920 or 4900, 4860) b) Scores on ETS Major Field Test c) Students rate their agreement with statement on exit survey (given last semester attending) d) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)	a) Foundation: Target = 75% or higher achieving an A or B on first attempt. Result = Foundation: 2310 = 75% (6/8); 2440 = 86% (6/7); one transferred in); 2730 = 63% (5/8); 3450 = 100% (8/8); 3910 = 88% (7/8). In-Depth: 2840 = 75% (6/8); 3460 = 63% (5/8); 3780 = 75% (6/8); 3920 = 0% (0/2) and 4900 = 100% (7/7); 4860 = 75% (6/8). b) Target = scores \geq 50 th percentile each area. Result = This data not available. The tests are given in-person in the late Spring, so for SP 2020 this was not possible due to COVID. Tests were administered Spring 2021, but results have not	

		<p>been returned yet (backlog at ETS)? Data should be available for 4-yr review.</p> <p>c) Target = Average response of ≥ 3 on 5pt scale. Result = 4.00 (n=3).</p> <p>d) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)</p>	
2. Students are able to execute experiments in chemistry and biochemistry.	<p>a) Final grades in laboratory courses (CHM 2445, 2730, 2845, 3455, 3780, 3915)</p> <p>b) Final grades in research course (CHM 4400)</p> <p>c) Students rate their agreement with statement on exit survey (given last semester attending)</p> <p>d) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)</p>	<p>a) Target = 75% or higher achieving an A or B on first attempt. Result = 2445 = 86% (6/7); one transferred in); 2730 = 63% (5/8); 2845 = 88% (7/8); 3455 = 88% (7/8); 3780 = 75% (6/8); 3915 = 75% (6/8).</p> <p>b) Target = 75% or higher achieving an A or B on first attempt. Result = 4400 = 100% (6/6).</p> <p>c) Target = Average response of ≥ 3 on 5pt scale. Result = 4.00 (n=3).</p> <p>d) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)</p>	
3. Students are able to critically analyze data.	<p>a) Rubric scores from instructors on 1 report in CHM 2845, 3455, 3780 and 3915.</p> <p>b) Performance on critical thinking component of Major Field Test (cohort score only)</p> <p>c) Students rate their agreement with statement on exit survey (given last semester attending)</p>	<p>a) Target = 75% or higher with a score of ≥ 2.5 on 4pt scale. Result = 3455: 100% (1/1); 3915: 100% (2/2); no data for CHM 2845 and 3780 or remaining students in 3455 and 3915 since took class before assessment plan item included</p> <p>b) Target = Mean percentile \geq national mean. Result = This data not available. The tests are given in-person in the late Spring, so for SP 2020 this was not possible due to COVID. Tests were administered Spring 2021, but results have not</p>	

	<p>d) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)</p>	<p>been returned yet (backlog at ETS)? Data should be available for 4-yr review.</p> <p>c) Target = Average response of ≥ 3 on 5pt scale. Result = 4.00 (n=3).</p> <p>d) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)</p>	
<p>4. Students are able to utilize computer applications.</p>	<p>a) Rubric scores from instructors on 1 experiment in following areas (courses): spreadsheet / graphing (CHM 2730 & 3915); word processing (CHM 2845, 3780 and 3915); structure drawing (CHM 2845); computational / molecular modeling (CHM 1315, 2845, 3455 and 3915)</p> <p>b) Faculty score on visual presentation item on seminar (CHM 3001 and 4001) evaluation.</p> <p>c) Students rate their agreement with statement on exit survey (given last semester attending)</p> <p>d) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)</p>	<p>a) Target = 75% or higher with a score of ≥ 2.5 on 4pt scale. Result = Spreadsheet/graphing: 3915: 100% (2/2); Word Processing: 3915: 100% (2/2); Comput/Modeling: 3455: 100% (1/1); 3915: 100% (2/2); no data for 2730, 2845 and 3780 or remaining students in 3455 and 3915 since took class before assessment plan item included</p> <p>b) Target = Average response of ≥ 2 on 3 point scale. Result = 2.53 (n=10); both 3001 and 4001 every individual ≥ 2</p> <p>c) Target = Average response of ≥ 3 on 5pt scale. Result = 4.00 (n=3).</p> <p>d) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)</p>	

<p>5. Students can properly use chemical information and database sources.</p>	<p>a) Rubric scores from instructors on following topics (courses): SciFinder / journal databases (CHM 2845, 3450, 3500); Protein Data Base (CHM 3450, 3500)</p> <p>b) Faculty score on sources item on seminar (CHM 3001 and 4001) evaluation.</p> <p>c) Students rate their agreement with statement on exit survey (given last semester attending)</p> <p>d) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)</p>	<p>a) Target = 75% or higher achieving an A or B on first attempt. Result = SciFinder/database 3450: 100% (1/1); 3500: 100% (1/1); PDB: 3450: 100% (1/1); 3500: n/a (assignment not done this semester). Note that some of the students took these courses before the new assessment items were added.</p> <p>b) Target = Average response of ≥ 2 on 3 point scale. Result = 2.44 (n=10); both 3001 and 4001 9 out of 10 had ≥ 2</p> <p>c) Target = Average response of ≥ 3 on 5pt scale. Result = 4.67 (n=3).</p> <p>d) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)</p>	
<p>6. Students will generate and contribute to the process of expanding new knowledge and data in the field.</p>	<p>a) Participation in CHM 4400 Undergraduate Research.</p> <p>b) Participation in summer research experiences.</p> <p>c) Authors on published abstracts for presentations or posters at external meetings</p> <p>d) Students rate their agreement with statement on exit survey (given last semester attending)</p> <p>e) Alumni rate their agreement with statement on exit</p>	<p>a) Target = At least 70% of majors completing 1 semester; at least 50% of majors completing more than 1 semester. Result = 75% (6/8) did research, with all taking at least 2 semesters and 50% of these doing more than 2 semesters.</p> <p>b) Target = At least 15% of majors involved in a summer experience. Result = 25% (2/8; both did summer research at EIU)</p> <p>c) Target = At least 50% of students listed on at least 1 abstract. Result = 13% (1/8).</p>	

	survey (given 3 and 8 yrs post-graduation)	d) Target = Average response of ≥ 3 on 5pt scale. Result = 4.00 (n=3). e) Target = Average response of ≥ 3 on 5pt scale. Result = 2.00 (n=2)	
7. Students will communicate effectively in speaking and writing.	<p>a) (Speaking) Faculty score on organization, delivery, and visual aid items on seminar (CHM 3001 and 4001) evaluation</p> <p>b) (Writing) Faculty score on abstract item on seminar (CHM 3001 and 4001) evaluation</p> <p>c) (Writing) Rubric scores from instructors on 1 experiment in courses: 2845, 3455, 3780, and 3915</p> <p>d) (Speaking) Published results from speech rubrics in CMN1310G and EIU4XXX.</p> <p>e) (Writing) Faculty rubric scores submitted on EWPs.</p> <p>f) Students rate their agreement with statement on exit survey (given last semester attending)</p> <p>g) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation)</p>	<p>a) Target = Average response of ≥ 2 on 3pt scale. Result = Organization: Average = 2.61; Delivery: Average = 2.47; Visual aid: Average = 2.58 (n=10 all 3); for all but Delivery 3001 and 4001 every individual ≥ 2; Delivery 9 out of 10 had ≥ 2</p> <p>b) Target = Average response of ≥ 2 on 3pt scale. Result = 2.58 (n=10); both 3001 and 4001 every individual ≥ 2</p> <p>c) Target = 75% of students obtain score of ≥ 2.5 on 4pt scale. Result = 3455: 100% (1/1); 3915: 100% (2/2); no data for CHM 2845 and 3780 or remaining students in 3455 and 3915 since took class before assessment plan item included</p> <p>d) Target = Average of > 3.2 in CMN1310G and ≥ 3.6 in EIU4XXX. Result = Both AY 100%, with AY20: 3.75; AY 21: 3.59</p> <p>e) Target = Average of > 3.3. Result = Speaking: 3.67 (n=6); Writing: Result = 4.17 (n=6).</p> <p>f) Target = Average response of ≥ 3 on 5pt scale. Result = Speaking: Average = 4.00 (n=3); Writing: Average = 4.33 (n=3)</p> <p>g) Target = Average response of ≥ 3 on 5pt scale. Result = Speaking:</p>	

		Average = 1.50 (n=2); Writing: Average = 1.50 (n=2)	
8. Students will be aware of practiced in working safely	<ul style="list-style-type: none"> a) Completion of CHM 3500 Intro to Chemical Research b) Students rate their agreement with statement on exit survey (given last semester attending) c) Alumni rate their agreement with statement on exit survey (given 3 and 8 yrs post-graduation) 	<ul style="list-style-type: none"> a) Target = 100% of students complete. Result = 3500 = 100% b) Target = average response of ≥ 3 on 5pt scale. Result = 4.50 (n=2; 1 student did not respond to this item). c) Target = average response of ≥ 3 on 5pt scale. Result = 1.0 (n=2) 	

Note that for a number of the course-specific instructor rubric items (i.e, item 3a), a complete data set was not available, as some these items were developed/implemented after the students had taken the course, or before the assessment forms had been changed to include individual student names (to make it possible to split data out by degree (CHM vs BIOCHM)).

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?

Due to frequent need for students to take 2840 Organic II and CHM 3450 Biochemistry I concurrently, changed the prerequisite for CHM 3450 to read "prior (recommended) or current enrollment in 2840." Additionally removed the CHM 3460 Biochemistry II prerequisite for CHM 4860 Advanced Biochemistry. These are very significant as we only offer 3450 in FA and SU, and 4860 FA only – biochem majors need to take all 3 biochem courses (3450, 3460, and 4860) and these changes help greatly with completion plans. Would also point out that this review started during COVID pandemic period, so especially for the labs overall experience was very different than standard. Also should note that the assessment plan was revised, with new version being implemented in FA22, and that the new plan included a number of specific markers for courses that it was not possible to go back and determine for courses already taken – this explains why the number of results are low in some areas and the next report should provide a clearer assessment on these items. Overall we are eager and excited to see these new results.

- 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).

Overall, the results remain high or were slightly improved from previous versions, and most markers were reached, with some of them being greatly exceeded.

1a. and 1b. Performance in lecture and laboratory courses in major. Marks were not reached for CHM 2730 Quantitative Analysis, 3920 Quantum Chemistry, and 3460 Biochemistry II; the first two are amongst the more math-intensive courses and reflect the overall decrease in performance we are seeing for all students. This may be alleviated a bit with the revision of CHM1310/1410 (as part of the DFW initiative), one part of which shuffles the coverage around to more gradually introduce the math portions. Early success in using math in chemistry should give a firmer foundation for continued success in this area. 3460 is a bit surprising considering this is a biochemistry course, but total student numbers were small and a difference of 1 student would have meant the mark was reached. Would note that the student evaluations (on the exit survey) of their abilities in this remained very high. Compared to the 2021 report, the same overall results are seen, with increases in improvement for 2310 Inorganic Chemistry I and 2730 Quantitative Analysis.

4a. Utilization of computer applications. The few alumni responses received resulted in missing the mark here; it is postulated that this is more to the fact that the field is rapidly moving and embracing more and more computer packages that are quite specialized, and student responses focused on this aspect rather than reflecting on their overall background ability / familiarization. There is significant use of applications throughout the curriculum (Protein Database, Chimera, SciFinder, Excel, PowerPoint, etc) but current resources do not allow us to have every package, especially those without academic rates or with very high academic licenses.

6. Generating/contributing to expansion of knowledge in field. While overall the number of majors doing research remained high (was a slight decrease actually from 2021 report), there was a significant increase in the number of semesters they did research. Note this implies that students were starting research earlier. All of this is encouraging and in part responsible due to the hiring of a 2nd biochemistry faculty who is very research active and a great mentor. There was also a significant decrease in the number of manuscripts and presentations with a student author, but this can be attributed to fact that research progress was greatly slowed during COVID and, especially in this field, publications do not come rapidly / require very significant amount of time and experiments to merit publication in regular peer-reviewed journals as well as the fact that it usually takes a bit of time for new faculty members to get to the point of publication. And conferences / travel to conferences was limited during COVID and slow to return to prior levels.

7. Communication in speaking and writing. The results here remain strong, and it is clear from most all of the data that the program continues to excel in this area. The outmarker is here again the alumni response, which is due to low numbers (n=2) and one of the respondents clearly having negative thoughts all around. Greater effort will be spent to try and obtain more results in this area, but the difficulty here lies in the fact that we are looking for anonymous responses and excessive communication asking to complete the survey either has to go out to all (which annoys those who already did it) or to just those who didn't complete it (which makes them question the anonymity of their response).

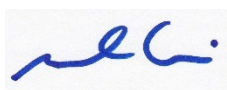
C. HISTORY OF DATA REVIEW OVER THE PAST TWO YEARS

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 Biochemistry BS 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 prior assessment data, the department revised prerequisite requirements for several courses in an attempt to improve student completion rates. On a positive note, the assessment data indicate an increasing number of semesters that student participated in undergraduate research, which points to students becoming involved in research opportunities earlier in their academic careers. The lingering effects of COVID seem to be borne out in a decreasing number of student publications and presentations. The department also plans to work on improving return rates of alumni surveys. 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.



Dean or Designee

2/7/25

Date

VPAA Office Review and Feedback (for "Round B" SLO report only)

B.S. Biochemistry

The Biochemistry B.S. program report indicates significant efforts to address ways to increase completion rates for students, change curricular inefficiencies, and more systematically collect alumni feedback.

VPAA or designee



Dr. Suzie Park

Date

3/28/25