

## Program-Level Assessment: Annual Report

Program Name (no acronyms): Chemical Biology

Department: Chemistry

Degree or Certificate Level: MS

College/School: College of Arts & Sciences

Date (Month/Year): August 2022

Assessment Contact: Chris Arnatt

In what year was the data upon which this report is based collected? 2021-2022

In what year was the program's assessment plan most recently reviewed/updated? New program approved in 2018

### 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.)

SLU graduates with a MS degree in Chemical Biology will be able to:

Outcome 1: Assess relevant literature in chemical biology

**Outcome 2: Apply the major practices, theories, or research methodologies in chemical biology.**

Outcome 3: Apply chemistry principles to biology.

**Outcome 4: Articulate arguments or explanations in both oral and written forms.**

Outcome 5: Evidence scholarly and professional integrity in chemical biology.

Learning outcomes highlighted in **BOLD font** were assessed in this annual cycle.

This is the third year for the program. In Year 1, learning outcomes 1 (course-based assessment only) and 3 were evaluated. However, due to the fact that only 1 student has defended their Thesis since the program started and the inability to fully evaluate Year 1 outcomes due to impacts by COVID-19 and the biannual offering of CHEB-5630, Outcomes 1 and 3 were re-evaluated in Year 2. **In Year 3, outcomes 2 and 4 were evaluated.** In Year 4, outcomes 1 (thesis-based assessment only) and 5 will be evaluated.

### 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

1. MS Oral Exam rubric: Average of first two criteria rounded to nearest whole number: A grading rubric was used to evaluate this outcome based on student presentations. See attached rubric
2. MS Thesis rubric: "Presentation of Advanced Research": A grading rubric was used to evaluate this outcome based on student thesis. See attached rubric

#### Outcome 4

1. MS Oral Exam rubric: Last criteria score ("Communicate..."): A grading rubric was used to evaluate this outcome based on student presentations. See attached rubric

2. MS Thesis rubric: Overall Avg Score: A grading rubric was used to evaluate this outcome based on student thesis. See attached rubric

Madrid does not have a graduate program in Chemical Biology.  
No courses in this assessment were offered online or off-campus

### 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).

Data was collected by mentors and is summarized on the attached spreadsheet. The rubrics used for source data are attached as well.

Data was analyzed by the Chemical Biology Program Coordinator and reported to department faculty for feedback.

### 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

1. MS Oral Exam rubric: Average of first two criteria rounded to nearest whole number: 3 of 3 students exceeded expectations.
2. MS Thesis rubric: "Presentation of Advanced Research": 3 of 3 students met or exceeded expectations.

#### Outcome 4

1. MS Oral Exam rubric: Last criteria score ("Communicate..."): 3 of 3 students met expectations.
2. MS Thesis rubric: Overall Avg Score: 3 of 3 students met or exceeded expectations.

It should be noted that this is the third year of the program and the number of MS students is small, which may skew the results.

### 5. Findings: Interpretations & Conclusions

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

Based on our analysis, our MS students are meeting or exceeding expectations, although we were limited in our assessment this year due to small sample size.

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 affect 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.

### 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 results of the assessment were shared with the full faculty via email. 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.

The res  
2021.

- 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.

This is our first year assessing these outcomes using these metrics. No changes are being made with respect to these two outcomes.

If no changes are being made, please explain why.

There are no major concerns given the sample size and all of our students are meeting or exceeding expectations.

## 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?

B. No specific changes to the program have been made as this is only the third year of the program.

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

n/a

D. What were the findings of the assessment?

n/a

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

All data will be collected annually so that we can assess larger sample sizes (3 years' worth of data) in the coming years when the outcome(s) are scheduled for review.

**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.**

**SLU Chemical Biology – Final Defense Rubric for MS students**

	<b>1 (Poor)</b>	<b>2 (Fair)</b>	<b>3 (Good)</b>	<b>4 (Excellent)</b>	<b>Score</b>
Demonstrate advanced level knowledge in both (i) synthesis and materials chemistry and (ii) analytical and physical chemistry methods, with a higher level of knowledge expected in the student's area of focus	<i>Student lacks basic knowledge in chemistry and biology topics.</i>	<i>Student displays knowledge, but is weak in several key concepts.</i>	<i>Student displays knowledge, with minor weaknesses.</i>	<i>Student displays great knowledge chemistry and biology topics.</i>	
Acquire the basic tools, including chemical practices and theories, needed to conduct advanced chemical research. Students will become proficient in their specialized area of chemistry and complete an advanced research project.	<i>Student has make limited progress on an advanced research project.</i>	<i>Some progress has been made on an advanced research project.</i>	<i>Sufficient progress has been made on an advanced research project.</i>	<i>Significant progress has been made on an advanced research project.</i>	
Communicate scientific findings from literature and original findings from the student's own advanced research.	<i>Student unable to clearly communicate chemical and biological topics.</i>	<i>Student can sometimes communicate chemical topics effectively.</i>	<i>Student can effectively communicate chemical topics.</i>	<i>Student can communicate chemical and biological topics effectively and compellingly.</i>	

Comments:

**Please return to the Chemical Biology Program Coordinator**

SLU Chemical Biology – MS Thesis

	<b>1 (Poor)</b>	<b>2 (Fair)</b>	<b>3 (Good)</b>	<b>4 (Excellent)</b>	<b>Score</b>
Thesis Format	<i>The organization of the thesis is confusing and/or the length is not appropriate. The references may not be appropriately formatted.</i>	<i>The organization of the thesis is, in places, confusing and/or the length is not appropriate. References may not be appropriately formatted. More emphasis should be placed on several of the sections.</i>	<i>The thesis is well-organized and is of appropriate length. References are appropriately formatted. More emphasis should be placed on a few of the sections.</i>	<i>The thesis is well-organized and is of appropriate length. Chapters are balanced appropriately. References are appropriately formatted.</i>	
Background Knowledge	<i>Demonstrates limited knowledge of chemical and biological principles and the current literature.</i>	<i>Demonstrates adequate knowledge of chemical and biological principles and an awareness of the current literature, but does not identify unanswered questions in the field.</i>	<i>Demonstrates sufficient knowledge of the current literature and chemical and biological principles. Correctly identifies and understands the importance of unanswered questions in the field.</i>	<i>Demonstrates the ability to apply fundamental concepts to advanced topics in chemistry/biology and in-depth knowledge of the current literature. Correctly identifies and illustrates the importance of unanswered questions in the field and presents his/her work within the context of these questions.</i>	
Presentation of Advanced Research	<i>The aims/objectives and/or the rationale for the project are not adequately described. The experimental approach is neither clearly defined nor logical. Results and discussion are limited.</i>	<i>Aims/objectives are described, however, the rationale for the aims/objectives is unclear. The experimental approach is clearly defined and logical, however the results and discussion lack clarity.</i>	<i>Aims/objectives are described. A rationale for the aims/objectives is included. The experimental approach is clearly defined and logical. Results are presented and interpreted, but additional discussion should be provided.</i>	<i>The aims/objectives are clearly described and provide a logical framework to address a problem. A compelling rationale for the aims/objectives is included. The experimental approach is clearly defined and logical. Results and discussion are complete.</i>	
Written Communication	<i>Fails to clearly communicate results and conclusions.</i>	<i>Adequately communicates results and conclusions, however supporting information and explanations are missing.</i>	<i>Successfully communicates results and conclusions, supporting information and explanations are provided.</i>	<i>Results and conclusions are not only successfully summarized and supported, but are also analyzed in the context of the field.</i>	

Comments:

**Course Performance - MS Students**  
**Academic Year 2021-2022**  
**Program Year 3**

**Assessment Cycle: Year 3**

Year 1: Learning outcomes 1 (course-based) and 3

Year 2: Learning outcomes 2 and 4

Year 3: Learning outcomes 5 and 1 (thesis-based)

Outcome 1: Assess relevant literature in chemical biology							
Data Source	>90% - Exceeds Expectations (Rubric 4 = Excellent)	70 - 89% - Meets Expectations (Rubric 3 = Good)	65 - 69% - Approaching Expectations (Rubric 2 = Fair)	<65% - Not meeting expectations (Rubric 1 = Poor)	Total	Assessment	Notes
CHEB 5630 rubric for literature presentation							Points earned for "Content" and "Questions" were summed and converted to % of possible points from rubrics for each student
CHEM 5470 rubric for research paper and presentation							% of points earned for course rubric for research paper and presentation
MS Thesis rubric: "Background Knowledge"							

Outcome 2: Apply the major practices, theories, or research methodologies in chemical biology.							
Data Source	>90% - Exceeds Expectations (Rubric 4 = Excellent)	70 - 89% - Meets Expectations (Rubric 3 = Good)	65 - 69% - Approaching Expectations (Rubric 2 = Fair)	<65% - Not meeting expectations (Rubric 1 = Poor)	Total	Assessment	Notes
MS Oral Exam rubric: Average of first two criteria rounded to nearest whole number	3				3	100 % meet expectations	
MS Thesis rubric: "Presentation of Advanced Research"	2	1			3	100 % meet expectations	

Outcome 3: Apply chemistry principles to biology.							
Data Source	>90% - Exceeds Expectations	70 - 89% - Meets Expectations	65 - 69% - Approaching Expectations	<65% - Not meeting expectations	Total	Assessment	Notes
CHEB 5630 final cumulative exam score							Course is only offered every even year in the fall so all 5 students in the program took the course Fall 2020. Final exam is cumulative
CHEM 5470 exam average							Combined data from Spring 2020 and Spring 2021. Average of all exams in the course (there is no cumulative exam)

Outcome 4: Articulate arguments or explanations in both oral and written forms.							
Data Source	>90% - Exceeds Expectations (Rubric 4 = Excellent)	70 - 89% - Meets Expectations (Rubric 3 = Good)	65 - 69% - Approaching Expectations (Rubric 2 = Fair)	<65% - Not meeting expectations (Rubric 1 = Poor)	Total	Assessment	Notes
MS Oral Exam rubric: Last criteria score ("Communicate...")		3			3	100 % meet expectations	
MS Thesis rubric: Overall Avg Score	2	1			3	100 % meet expectations	

Outcome 5: Evidence scholarly and professional integrity in chemical biology.							
Data Source	>90% - Exceeds Expectations	70 - 89% - Meets Expectations	65 - 69% - Approaching Expectations	<65% - Not meeting expectations	Total	Assessment	Notes
CHEB 5110 ethics module							