

## Program Assessment Plan

**Program:** MS in Chemical Biology  
**Department:** Chemistry  
**College/School:** College of Arts & Sciences  
**Date:** August 2021  
**Primary Assessment Contact:** Marvin Meyers

**Note:** Each cell in the table below will expand as needed to accommodate your responses.

| # | Program Learning Outcomes   | Assessment Mapping   | Assessment Methods   | Use of Assessment Data   |
|---|---|--|--|--|
|   | <p>What do the program faculty expect all students to know, or be able to do, as a result of completing this program?</p> <ul style="list-style-type: none"> <li><i>Note: These should be measurable, and manageable in number (typically 4-6 are sufficient).</i></li> </ul> | <p>From what specific courses (or other educational/professional experiences) will artifacts of student learning be analyzed to demonstrate achievement of the outcome? Include courses taught at the Madrid campus and/or online as applicable.</p> | <p>What specific artifacts of student learning will be analyzed? How, and by whom, will they be analyzed?</p> <ul style="list-style-type: none"> <li><i>Note: the majority should provide direct, rather than indirect, evidence of achievement.</i></li> </ul> <p>Please note if a rubric is used and, if so, include it as an appendix to this plan.</p>   | <p>How and when will analyzed data be used by faculty to make changes in pedagogy, curriculum design, and/or assessment work?</p> <p>How and when will the program evaluate the impact of assessment-informed changes <i>made in previous years</i>?</p> |
| 1 | Assess relevant literature in chemical biology  | CHEM-5630 (Chemical Biology)<br>CHEM-5470 (Med Chem)<br>Master's Thesis  | <p>Course-specific rubrics will be used to collect student learning data from student literature papers written for CHEB-5630, CHEM-5470, and the Master's Thesis. The rubric will be completed by the course instructors as they grade the papers and by the mentor as they assess the Master's Thesis.</p> <p>The data will be analyzed by the Chemical Biology Program Coordinator and a small team of faculty.</p> | Assessment data will be collected on a 3-year rotating basis. A summary of the results will be shared with the faculty annually and adjustments to the curriculum and/or assessment process will be made as needed.                                      |
| 2 | Apply the major practices, theories, or research methodologies in chemical biology  | Master's Thesis<br>MS Oral Examination   | Rubrics are used to collect student learning data from the Master's thesis and oral examination. The rubric will be  | Assessment data will be collected on a 3-year rotating basis. A summary of the results will be shared with the   |

|   |   |   |   |  |
|---|---|---|---|--|
|   |   |   | <p>completed by the research mentor and examination committee.</p> <p>The data will be analyzed by the Chemical Biology Program Coordinator and a small team of faculty.</p>  | <p>faculty annually and adjustments to the curriculum and/or assessment process will be made as needed.</p>  |
| 3 | Apply chemistry knowledge to address questions in biology           | CHEM-5630 (Chemical Biology)<br>CHEM-5470 (Med Chem)                                | <p>The final exam in CHEB-5630 (cumulative) and average of exam scores in CHEM-5470 will be used to gauge student mastery of this learning outcome.</p> <p>The data will be analyzed by the Chemical Biology Program Coordinator and a small team of faculty.</p>   | <p>Assessment data will be collected on a 3-year rotating basis. A summary of the results will be shared with the faculty annually and adjustments to the curriculum and/or assessment process will be made as needed.</p> |
| 4 | Articulate arguments or explanations in both oral and written forms | Master's Thesis<br>MS Oral Examination  | <p>Rubrics are used to collect student learning data from the Master's thesis and oral examination. The rubric will be completed by the research mentor and examination committee.</p> <p>The data will be analyzed by the Chemical Biology Program Coordinator and a small team of faculty.</p>  | <p>Assessment data will be collected on a 3-year rotating basis. A summary of the results will be shared with the faculty annually and adjustments to the curriculum and/or assessment process will be made as needed.</p> |
| 5 | Evidence scholarly and professional integrity in chemical biology   | CHEB-5110 (Intro to Chem Biol Research 1)<br>Master's Thesis<br>MS Oral Examination | <p>Select exam questions in CHEB-5110 will be used to gauge student mastery of this learning outcome.</p> <p>A rubric will be developed and used to collect student learning data from the Master's thesis and oral examination. The rubric will be completed by the research mentor and examination committee.</p> <p>The data will be analyzed by the Chemical Biology Program Coordinator and a small team of faculty.</p> | <p>Assessment data will be collected on a 3-year rotating basis. A summary of the results will be shared with the faculty annually and adjustments to the curriculum and/or assessment process will be made as needed.</p> |

### Additional Questions

1. On what schedule/cycle will faculty assess each of the above-noted program learning outcomes? (*It is not recommended to try to assess every outcome every year.*)

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)

2. Describe how, and the extent to which, program faculty contributed to the development of this plan.

The plan was originally approved when the Chemical Biology Masters program was developed. Substantial changes will be approved by the faculty (no substantial changes have been made to date).

3. On what schedule/cycle will faculty review and, if needed, modify this assessment plan?

Every 3 years.

***IMPORTANT: Please remember to submit any assessment rubrics (as noted above) along with this report.***

## CHEM-5470 Research Paper Rubric

Name \_\_\_\_\_

| Standards                   | 5 - 4<br>Exemplary  | 3 - 2<br>Satisfactory  | 1 - 0<br>Weak  | Score   | Weight | Total<br>Score |
|-----------------------------|---|--|--|---|--------|----------------|
| Introduction                | Provides background research into the topic and summarizes important findings from the review of the literature; describes problem to be solved; explains the significance of the problem to an audience of non-specialists | Provides background research into the topic and describes the problem to be solved   | Provides background research into the topic but does not describe the problem to be solved; insufficient or nonexistent explanation of details to non-specialists  |   | x 3    |                |
| Discussion                  | Integration of Knowledge  | Discusses at least four topics covered during the course. Demonstrates full understanding and application of concepts learned in course. Chemical detail of structures and discussion is accurate. | Discusses three topics covered during the course. Demonstrates satisfactory understanding and application of concepts learned in course. Chemical detail of structures and discussion are mostly accurate. | The paper does not demonstrate that the author has fully understood and applied concepts learned in the course. |        | x 4            |
|                             | Depth   | Paper presents a complete story of the discovery of the selected drug, including medical need, biological target or assay, medicinal chemistry optimization, and development.                      | Paper presents a partial story of the discovery of the selected drug.  | Incomplete coverage of discovery.   |        | x 4            |
|                             | Cohesiveness  | Addresses the topic with clarity; organizes and synthesizes information; and draws conclusions   | Addresses the topic; lacks substantive conclusions; sometimes digresses from topic of focus  | Presents little to no clarity in formulating conclusions and/or organization                                    |        | x 4            |
| Summary                     | Presents a summary of the topic with clear recommendations and/or implications for future research  | Presents a summary of the topic  | Missing or does not summarize the topic  |   | x 3    |                |
| Mechanics and documentation | Is free or almost free of errors of grammar, spelling, and writing mechanics; appropriately documents sources (ACS style)   | Has errors but they don't represent a major distraction; documents sources   | Has errors that obscure meaning of content or add confusion; neglects important sources or documents few to no resources   |   | x 2    |                |
| Comments                    |   |  |  | Grand Score<br>(max 100)  |        |                |

CHEM 5630: Introduction to Chemical Biology and Biotechnology  
Oral Presentation Scoring Sheet

Presenter: \_\_\_ Discussion leader: \_\_\_\_\_

Content

- Presentation is organized
- Material is covered with adequate depth
- Subject is appropriate and relevant
- Uses examples to clarify and add interest
- Demonstrates use of multiple sources

Notes:

\_\_\_ Score out of 25. (25 = excellent, 20 = very good, 15 = good, 10 = fair, 5 = poor)

Delivery

- Audible
- Understandable
- Prepared
- Attitude, confidence, and enthusiasm
- Effective use of time

Notes:

\_\_\_ Score out of 10. (10 = excellent, 8 = very good, 6 = good, 4 = fair, 2 = poor)

Questions

Notes:

\_\_\_ Score out of 5. (5 = excellent, 4 = very good, 3 = good, 2 = fair, 1 = poor)

\_\_\_ **Deductions (late assignment, etc.)**

\_\_\_ **Total score out of 40**

**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: