**Program (Major, Minor, Core):** MS  
**Department:** Biology  
**College/School:** A&S  
**Person(s) Responsible for Implementing the Plan:** Susan Spencer (Graduate Program Director), members of the Department of Biology Graduate Affairs Committee: Judy Ogilvie, Brian Downes, Yuqi Wang, Fenglian Xu, Dan Warren  
**Date Submitted:** November 15, 2015

<table>
<thead>
<tr>
<th>Program Learning Outcomes</th>
<th>Curriculum Mapping</th>
<th>Assessment Methods</th>
<th>Use of Assessment Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you expect all students who complete the program to know, or be able to do?</td>
<td>Where is the outcome learned/assessed (courses, internships, student teaching, clinical, etc.)?</td>
<td>How do students demonstrate their performance of the program learning outcomes? How does the program measure student performance? Distinguish your direct measures from indirect measures.</td>
<td>How does the program use assessment results to recognize success and &quot;close the loop&quot; to inform additional program improvement? How/when is this data shared, and with whom?</td>
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</tbody>
</table>
1) Students will have broad knowledge of biological principles and detailed knowledge of the biological field of their research. A student will 1) be able to read, interpret, and critique primary research articles, 2) understand the methods and tools used in his/her concentration and 3) be able to understand how his/her experiments advance scientific understanding in his/her field.

The student completes a coursework sequence tailored to his/her research project and guided by his/her faculty mentor and advisory committee. All upper level and graduate courses are designed to increase student knowledge of biological principles, expose students to relevant methods and tools, and provide practice formulating hypotheses and proposing experiments to test them.

Students are required to take two semesters of EES or CMR Seminar (BIOL5820/5840), which is designed to give students practice reading, interpreting and presenting primary literature papers. Elective graduate courses also include work to improve students’ ability to read and interpret primary literature.

Upon completion of studies, the student undergoes an oral examination to defend the thesis.

Courses are graded by faculty based on a rubric. A passing grade indicates adequate knowledge of the material.

Final oral examination: the student demonstrates understanding of his/her research area and experiments by answering questions posed by faculty members on the thesis committee. After the examination, committee members discuss the student’s performance and assess if the student demonstrated knowledge that would be expected for a student at a comparable level.

Coursework offerings are evaluated every 3 years by the Program Director in consultation with faculty active in the Biology program, the Graduate Affairs Committee, and the Curriculum Committee for the Department of Biology.

Outcomes of oral examinations at the end of a student’s studies (positive results leading to a degree) are shared with the Graduate Affairs Committee.
2) Students will demonstrate the ability to apply principles of their concentration and techniques in a laboratory and/or field setting – including experimental, theoretical, and computational methods. This includes students being able to: 1) design experiments to investigate a scientific hypothesis with help from the thesis advisor, 2) carry out experiments safely, using proper equipment and techniques, and 3) conduct data analysis.

All students are required by the university to attend laboratory safety training annually.
Students meet at least once each year with their thesis committee, which evaluates their performance.
Students enroll in courses relevant to their research to learn common laboratory or field techniques.
Students enroll in six hours of Thesis Research during their program; students regularly with their thesis advisor review research progress, discuss experimental design and data, and prepare manuscripts for publication
At the end of their program, students present their research findings to the public at an oral defense.

The student’s thesis committee provides feedback after each meeting on the student’s research progress. At each meeting, the student’s committee provides a rating of “exceptional”, “adequate”, or “inadequate” for research progress on the progress report worksheet. Progress reports are reviewed by the Graduate Program Director and are incorporated into the student’s annual review.

Peer scientists in the relevant research areas review submitted manuscripts and assess if they are acceptable for publication in scientific journals.

The thesis committee evaluates the research and votes to pass or not pass the student.

Thesis committee meetings provide feedback to the student on research productivity, the proposed future direction of the research project, and the research completion goals for the MS.

Annual reviews of all students in the department are provided by the graduate program director.
Students not meeting program expectations are asked to meet more frequently with their Dissertation Committees for guidance. Students who have “unacceptable” ratings at two consecutive meetings may be dismissed from the program.

Outcomes of oral examinations at the end of a student’s studies (positive results leading to a degree) are shared with the Graduate Affairs Committee.
3) Students will demonstrate the ability to communicate the principles of their field and their research findings to scientific audiences.

In their 2nd year of studies, students give an oral presentation on their proposed research to their Oral exam committee.

Students enroll in BIOL5800, Research Colloquium, for two semesters and BIOL 5860, Scientific Communication Practicum, for one semester.

All students enroll in two semesters of EES or CMR Seminar (BIOL5820/5840) where they practice presenting research papers.

Many students act as teaching assistants during their degree period and attend orientations for teaching assistants provided by the department.

All students enroll in Departmental Seminar each semester they are in the PhD program, providing exposure to professional scientists presenting their research.

At the end of their studies, students give an oral presentation to present their research.

Students typically present posters or talks on their research at SLU’s annual Graduate Research Symposium; they may also present their work at a scientific conference.

Scientific Communication Practicum provides feedback from the instructor on written forms of communication and is graded. At Research Colloquium the student’s presentation is videotaped and feedback is provided by the course instructor.

CMR and EES seminar require students to present primary scientific papers to their classmates; presentations are graded by the course instructor.

Students acting as teaching assistants are evaluated by students in their classes and by the faculty member responsible for the course.

Presentations given at symposia and scientific conferences are public, but feedback will generally be provided by the research mentor.

Feedback on oral presentations given as part of course requirements are used by course instructors to modify classes.

Oral presentations at thesis committee meetings are evaluated by research mentors and committee members. Verbal feedback is provided to the student during closed meetings following the presentations.

Feedback on oral presentations given as part of course requirements are provided by the course instructor.
1. It is **not recommended** to try and assess (in depth) all of the program learning outcomes every semester. It is best practice to plan out when each outcome will be assessed and focus on 1 or 2 each semester/academic year. Describe the responsibilities, timeline, and the process for implementing this assessment plan.

One set of outcomes (1, 2, or 3) will be evaluated each year, so that each outcome will be evaluated once every three years. The Graduate Affairs Committee of the Department of Biology will use annual reviews, written exam data, teaching evaluations and coursework evaluations to review student progress. Reviews will be conducted each fall.

2. **Please explain how these assessment efforts are coordinated with Madrid (courses and/or program)?**

   The Madrid campus does not have any science graduate programs.

3. **The program assessment plan should be developed and approved by all faculty in the department. In addition, the program assessment plan should be developed to include student input and external sources (e.g., national standards, advisory boards, employers, alumni, etc.). Describe the process through which your academic unit created this assessment plan. Include the following:**

   The assessment plan was produced by the Graduate Affairs committee of the Department of Biology in consultation with the department’s Chair and Associate Chair, and with comparisons to assessment programs for SLU’s Integrated and Applied Science Program and Department of Chemistry. This assessment plan represents a first draft, and still needs to be approved by the Biology Department faculty before it is implemented; it will be presented to the faculty of our department at our December, 2015 meeting.