WSU M.S. in Molecular Biotechnology
2019-2020 Assessment Plan

Mission Statement

The MS Biotechnology program's mission is to prepare students for careers as research assistants in private, governmental, or academic molecular biology laboratories or to prepare them for a transition to PhD. The two-year, full-time program is a melding of courses in theory and practical molecular biology laboratories. Following this formal preparation, students transition to active laboratory research experience in laboratories within and outside our department. Students are also trained in science-related oral and written communication skills.

M.S. in Biotechnology Program Outcomes

Students successfully completing the WSU M.S. in Biotechnology should be able to:

1. Attain a strong understanding of the structure and functional aspects of prokaryotic and eukaryotic systems and processes that are utilized in RNA, DNA, and protein biotechnologies;
2. Show proficiency proficient in general experimental design for experiments in molecular and cellular biology laboratories;
3. Demonstrate proficiency in the execution and trouble-shooting of experimental programs;
4. Gain the skills to the skills to seek out, understand, and implement new techniques as they are developed;
5. Present research work in written and oral forms as is common and appropriate for their fields of research.

2019-2020 Assessment Learning Outcomes

The learning outcomes for the M.S. in Biotechnology are currently being revised. For the 2019-20 assessment, the following learning outcomes will be utilized:

1. Students will demonstrate mastery of their biological field evidenced by broad understanding and connectivity of the broader field and by bringing new knowledge and insights;
2. Students will demonstrate mastery of research design and methods;
3. Students will demonstrate mastery of communication evidenced by giving professional and compelling presentations;
4. Students will demonstrate mastery of their own research evidenced by an ability to answer questions skillfully, showing deep insight of their work, and projection of future directions in the field.

Assessment 1 – Mastery of Field

Learning Outcome
Students will demonstrate mastery of their biological field evidenced by broad understanding and connectivity of the broader field and by bringing new knowledge and insights.

Data Sources
Following defense of the thesis, each member of the thesis committee will score the student's mastery of the field using an established rubric (see next page).

Data Gathering and Timeline
Committee surveys will be distributed and completed within 10 days of the thesis defense. Each student completing a thesis defense will be evaluated individually using the scores of their committee members and the percent of students meeting the minimum criteria reported.

Data Evaluation
Two questions on the survey will cover this learning outcome; "Mastery of Field" and "Mastery of Current Literature in Field." Survey responses will be scored as follows: Outstanding = 4, Very Good = 3, Acceptable = 2, Unsatisfactory = 1. Scores will be added across the respondents and reported as a mean value for each student. The percent of students meeting the minimum criteria will be reported.

Criteria for Acceptable Performance
75% of students completing their thesis will score a minimum of 3.0 for the Mastery of Field and Mastery of Current Literature in Field questions on the thesis committee survey.

Assessment 2 – Mastery of Research Design and Methods

Learning Outcome
Students will demonstrate mastery of research design and methods.

Data Sources
Following defense of the thesis, each member of the thesis committee will score the student's mastery of the field using an established rubric.

Data Gathering and Timeline
Committee surveys will be distributed and completed within 10 days of the thesis defense. Each student completing a thesis defense will be evaluated individually using the scores of their committee members and the percent of students meeting the minimum criteria reported.

Data Evaluation
Two questions on the survey will cover this objective; "Mastery of Research Design" and "Mastery of Research Design and Execution." Survey responses will be scored as follows: Outstanding = 4, Very Good = 3, Acceptable = 2, Unsatisfactory = 1. Scores will be added across the respondents and reported as a mean value for each student. The percent of students meeting the minimum criteria will be reported.

Criteria for Acceptable Performance
85% of students completing their thesis will score a minimum of 3.0 for the Mastery of Research Design and Mastery of Research Design and Execution questions on the thesis committee survey.

Department of MS Biotechnology Committee Survey

Learning Outcome	Outstanding	Very Good	Acceptable	Unsatisfactory
Mastery of Field	Demonstrates mastery of relevant literature and critical insights	Shows broad knowledge of relevant literature	Shows limited but adequate knowledge of field	Shows lack of knowledge or misunderstanding
Mastery of Research Design and Methods	Demonstrates mastery of design and methods	Demonstrates technical competency and troubleshooting	Demonstrates adequate technical competency	Demonstrates inadequate design, inappropriate or incorrect methods
Mastery of Communication	Presents a professional and compelling presentation	Presents a professional and polished presentation	Presents a good presentation	Poor presentation, organization and/or communication
Mastery of Work	Answers questions skillfully, shows deep insight, projects future direction of the field	Answers questions well and appreciates next steps	Answers questions adequately. Shows professionalism.	Inability to answer questions with authority or answers incorrectly.
Mastery of Research Design and Execution	Independently designs and troubleshoots problem. Independently identifies appropriate experimental approaches.	Develops designs and works out problems with some initial consultations	Understands and follows designs well. Adequately works out trivial problems and understands and contributes to work-arounds.	Does not demonstrate a solid understanding of design. Execution is impeded by inadequate attention to detail or understanding.
Mastery of Current Literature in Field	Demonstrates broad understanding and connectivity of broader field. Brings new knowledge and insight.	Demonstrates good understanding of field and can identify seminal advances when they occur.	Shows solid understanding of articles in the field when in discussions.	Is unsure of the current background, and does not see the broader connectivity.
Mastery of Written Communication	Clearly states the goal of the research and establishes its contribution to and important, identifiable gap in the field. Presents and explains research design and results in a compelling and clear manner. Discusses results in relation to the current knowledge and highlights its contributions.	Establishes the goals of the work and reviews the relevant literature. Fully presents research design and results so that they can be understood and replicated. Discussion puts the work in the full context of the field.	Adequate introduction with relevant literature review and clear statement of research questions. Adequate account of methods. Clear presentation of results. Adequate explanation of results in context.	Poor statement of purpose of work. Unclear statement of relevance to field. Inadequate presentation of methods and poor presentation of results. Discussion repeats results without relationship to current knowledge in field.

Assessment 3 – Mastery of Communication

Learning Outcome
Students will demonstrate mastery of communication evidenced by giving professional and compelling presentations and manuscripts.

Data Sources
Following defense of the thesis, each member of the thesis committee will score the student's mastery of the field using an established rubric. In addition, an exit survey will be given to each student (see next page) following the defense that summarizes the number of national or regional conferences attended, the number of posters or oral presentations given, and the number of publications submitted or accepted in peer-reviewed journals.

Data Gathering and Timeline
Both committee and student surveys will be distributed and completed within 10 days of the thesis defense. Each student completing a thesis defense will be evaluated individually using the scores of their committee members and the values they report in their exit surveys. The percent of students meeting the minimum criteria will be reported.

Data Evaluation
Two questions on the survey will cover this objective; "Mastery of Communication" and "Mastery of Written Communication." Survey responses will be scored as follows: Outstanding = 4, Very Good = 3, Acceptable = 2, Unsatisfactory = 1. Scores will be added across the respondents and reported as a mean value for each student. The percent of students meeting the minimum criteria will be reported.

The number of publications submitted or accepted in peer-reviewed journals will be gathered for each student using the student exit surveys, and the percent of students meeting the minimum criteria will be reported.

Criteria for Acceptable Performance
80% of students completing their thesis will score a minimum of 3.0 for the Mastery of Communication and Mastery of Written Communication questions on the thesis committee survey. In addition, 80% of MS-Biotechnology students completing their thesis will have attended a minimum of one regional or national meeting and presented a minimum of one poster or oral presentation.

Department of MS Biotechnology Student Exit Survey

1 How many semesters did it take to complete your degree? (include spring/summer semesters.)

2 At the time of your thesis defense, how many peer-reviewed publications have been:

Accepted

Submitted

3 How many national or regional conferences have you attended?

Number of posters presented

Number of oral presentations given

4 Have you had experience mentoring/teaching undergraduates in a:

Classroom/class laboratory setting

Research lab setting

5 Are you continuing onto another education program after graduation?

Higher science degree

Professional degree in science or health

Higher degree not related to current degree

6 Do you intend to work after graduation?

Are you still looking/interviewing

Do you already have a job lined up?

7 Does the job or target job rely on skills that you have acquired in your PhD program?

Assessment 4 – Mastery of Work

Learning Outcome
Students will demonstrate mastery of their own research evidenced by an ability to answer questions skillfully, showing deep insight of their work, and projection of future directions in the field.

Data Sources
Following defense of the thesis, each member of the thesis committee will score the student's mastery of the field using an established rubric.

Data Gathering and Timeline
Committee surveys will be distributed and completed within 10 days of the thesis defense. Each student completing a thesis defense will be evaluated individually using the scores of their committee members and the percent of students meeting the minimum criteria reported.

Data Evaluation
One question on the survey will cover this objective; "Mastery of Work". Survey responses will be scored as follows: Outstanding = 4, Very Good = 3, Acceptable = 2, Unsatisfactory = 1. Scores will be added across the respondents and reported as a mean value for each student. The percent of students meeting the minimum criteria will be reported.

Criteria for Acceptable Performance
70% of students completing their thesis will score a minimum of 3.0 for the Mastery of Work question on the thesis committee survey.