MS in Molecular Biotechnology 2021-22 Learning Outcome Assessment Report

Learning Outcome 1 – Mastery of Field

Methods

We assessed students' mastery of their field using a survey distributed to the thesis committee within 10 days of the thesis defense. Questions on the survey addressing this learning outcome included "Mastery of Field" and "Mastery of Current Literature in Field", with students scored on a range of 1 (unsatisfactory) to 4 (outstanding).

Because our current data set for MS Biotech students for Learning Outcome #1 is very small, with information for only a single student from 2019 and 2020, we combined the last five years' of data for a total of five students. Scores were averaged across respondents for each of the two questions for each student; the number of students meeting or exceeding the minimum criteria (3.0) are reported here.

Results

Four of the five MS-Biotech students completing their program in 2017-2022 obtained a minimum mean score of 3.0 from their committee members on the "Mastery of Field" question (80%), but only two obtained a minimum of 3.0 on the "Mastery of Current Literature" question (40%). The average score across the five students was 3.07 for "Mastery of Field" and 2.87 for "Mastery of Current Literature". The proportion of students (40%) meeting the minimum standard falls below our stated goal of 75% for "Mastery of Current Literature", but exceeds our stated goal of 75% for "Mastery of Field" (80%).

2020-21 MS-Biotech Program Learning Outcome Assessment - Mastery of Field						
Student	1	2	3	4	5	Mean
Mastery of Field	2.33	3.00	4.00	3.00	3.00	3.07
Mastery of Current Literature	1.67	2.67	4.00	3.00	3.00	2.87
		Total number of students			5	
		Students scoring ≥ 3.0 on Q1			4	
		Percent of students, Q1			80%	
		Students scoring ≥ 3.0 on Q2			2	
		Percent of students, Q2			40%	

Learning Outcome 2 – Mastery of Research Design and Methods

Methods

We assessed students' mastery of research design and methods using a survey distributed to the thesis committee within 10 days of the thesis defense. Questions on the survey addressing this learning outcome included "Mastery of Research Design" and "Mastery of

Research Design and Execution", with students scored on a range of 1 (unsatisfactory) to 4 (outstanding).

Because our current data set for MS Biotech students for Learning Outcome #2 is very small, with information for only a single student from 2019 and 2020, we combined the last five years' of data for a total of five students. Scores were averaged across respondents for each of the two questions for each student; the number of students meeting or exceeding the minimum criteria (3.0) are reported here.

Results

Between 2017 and 2022, four of the five (80%) MS-Biotech students completing their program in Biological Sciences obtained a mean score of at least 3.0 from their committee members on the "Mastery of Research Design" and the "Mastery of Research Design and Execution" questions. The average score across the five students was 2.83 for "Mastery of Research Design" and 2.80 for "Mastery of Research Design and Execution", largely because of one very poor student. The proportion of students (80%) meeting the minimum standard for each question falls below our stated goal of 85%.

2020-21 MS-Biotech Program Learning Outcome Assessment - Mastery of Research Design and Methods

Student	1	2	3	4	5	Mean
Mastery of Research Design	1.67	3.00	3.50	3.00	3.00	2.83
Mastery of Research Design and Execution	2.00	3.00	3.00	3.00	3.00	2.80

Total number of students	5
Students scoring $\geq$ 3.0 on Q1	4
Percent of students, Q1	80%
Students scoring $\geq$ 3.0 on Q2	4
Percent of students, Q2	80%

Learning Outcome 3 – Mastery of Communication

Methods

We assessed students' mastery of research design and methods using a survey distributed to the thesis committee within 10 days of the thesis defense. Questions on the survey addressing this learning outcome included "Mastery of Communication" and "Mastery of Written Communication", with students scored on a range of 1 (unsatisfactory) to 4 (outstanding). We also distributed an exit survey will be given to each student to report the number of national or regional conferences they attended, the number of posters or oral presentations given, and the number of publications they had submitted or accepted in peer-reviewed journals at the time of their defense.

Because our current data set for MS Biotech students for Learning Outcome #3 is very small, with information for only a single student from 2019 and 2020, we combined the last five years' of data for a total of five students. Scores were averaged across respondents for each of the

two questions for each student; the number of students meeting or exceeding the minimum criteria (3.0) are reported here. The percent of students meeting the minimum criteria for meetings attended, presentations given, and publications submitted or accepted in peer-reviewed journals will be reported.

Results

Only 80% of MS-Biotech students completing their program between 2017 and 2022 obtained a mean score of at least 3.0 from their thesis committee members on the "Mastery of Communication" and for the goals portion of the "Mastery of Written Communication" questions. The average score across the five students was 3.13 for "Mastery of Communication" and 3.2 for the goals portion of the "Mastery of Written Communication" questions. Students met our stated goals for these two questions (80%). However, only one student (20%) obtained a satisfactory score for the methodology portion of the "Mastery of Written Communication", which fell well below our stated goal of 80% for this question. Similarly, only two of the five students (40%) received a satisfactory score on the methods portion of the "Mastery of Written Communication" question, which also fell below our stated goal of 80%.

2020-21 MS-Biotech Program Learning Outcome Assessment - Mastery of Communication

Student	1	2	3	4	5	Mean
Mastery of Communication	2.67	3.00	4.00	3.00	3.00	3.13
Mastery of Written Communication: Goals	2.00	4.00	4.00	3.00	3.00	3.20
Mastery of Written Communication: Methods	2.33	2.50	4.00	2.00	2.00	2.57
Mastery of Written Communication: Results	2.33	3.00	3.50	2.00	2.00	2.57

Total number of students	5	
Students scoring $\geq$ 3.0 on Q1	4	
Percent of students, Q1	80%	
Students scoring $\geq$ 3.0 on Q2.1	4	
Precent of students, Q2.1	80%	
Students scoring $\geq$ 3.0 on Q2.2	1	
Percent of students, Q2.2	20%	
Students scoring $\geq$ 3.0 on Q2.3	2	
Percent of students, Q2.3	40%	

Two of the five MS-Biotech students (40%) attended a regional or national meeting during the course of their program (short of our goal), and three of the five (60%) gave at least one presentation (also short of our goal). Only one of the three students (20%) published or submitted a paper at the time of their defense.

2020-21 MS-Biotech Program Learning Outcome Assessment - Mastery of Communication

Student	1	2	3	4	5	Mean
# Meetings Attended	0	1	1	0	0	0.40
# Posters + Talks	4	3	1	0	0	1.60
# Publications Accepted + Submitted	0	0	1	0	0	0.20

Total number of students	5	
Students with a meeting attended	2	
Percent of students, meetings	40%	
Students with a presentation	3	
Precent of students, presentations	60%	
Students with a paper	1	
Percent of students, papers	20%	

Learning Outcome 4 – Mastery of Work

Methods

We assessed students' mastery of their work using a survey distributed to the thesis committee within 10 days of the thesis defense. The question on the survey addressing this learning outcome included "Mastery of Work", with students scored on a range of 1 (unsatisfactory) to 4 (outstanding).

Because our current data set for MS Biotech students for Learning Outcome #4 is very small, with information for only a single student from 2019 and 2020, we combined the last five years' of data for a total of five students. Scores were averaged across respondents for each of the two questions for each student; the number of students meeting or exceeding the minimum criteria (3.0) are reported here.

Results

Three of the five MS-Biotech students (60%) completing their program between 2017 and 2022 obtained a minimum mean score of 3.0 from their committee members on the "Mastery of Work" question; the average score across the five students was 2.9. This proportion of students meeting the minimum standard falls below our stated goal of 70%.

2020-21 MS-Biotech Program Learning Outcome Assessment - Mastery of Work						
Student	1	2	3	4	5	Mean
Mastery of Work	2.33	2.67	3.50	3.00	3.00	2.90
	Total number of students				5	
	Students scoring ≥ 3.0 on Q1				3	
	Percent of students, Q1				60%	

2022-23 Action Plan

Our three action items for the 2022-23 academic year remain unchanged from last year's report:

1. Continued and improved emphasis on student familiarity with the current literature and the major issues in their fields. Emphasis will take place in coursework where possible but also within individual laboratories.
2. Continued emphasis on communication of research by students, particularly oral communication in the form of presentations at meetings. We note a significant number of publications among the MS students, but fewer opportunities to present their research compared to our PhD students.
3. Continued and improved emphasis students' mastery of their work, as evidenced by their ability to openly reason and answer probing questions of their research.

Timeline for Action Plan

A timeline for the implementation of the action plan for the 2022-23 academic year remains similar to last year, as follows:

1. Student familiarity with the current literature and the major issues in their fields will continue to be emphasized in courses and individual laboratories. The department will emphasize the importance of these issues to all PIs having MS students in their labs, with significant improvements expected within 3 years.
2. The department will continue to emphasize the importance of presenting MS students with oral opportunities to present their research in Fall 2022.
3. Student mastery of their work will continue to be emphasized in courses and individual laboratories. The department will continue to emphasize the importance of MS students' abilities to reason and answer questions about their research, with significant improvements expected within 3 years.