



## **Program Assessment Report (PAR)**

### **Biomedical Sciences (BMS) Doctoral Degree**

**REPORT PREPARED by: Ladle, David R.**

**ACADEMIC YEAR COVERED BY THIS REPORT: 2021-2022**

### **I. PROGRAM LEARNING OUTCOMES**

Learning Outcome 1) Graduates will be able to apply their knowledge of multiple areas in the biomedical sciences to evaluate and develop solutions to relevant biomedical/biological problems. Learning Outcome 2) Graduates will be able to a) design and implement complex experiments, b) perform critical analyses of complex data, and c) place their research in the context of the current state of scientific knowledge. Learning Outcome 3) Graduates will be able to effectively communicate research results in written form and oral presentations.

### **II. PROCEDURES USED FOR ASSESSMENT**

#### **A. Direct Assessment**

Learning Outcome 1) Graduates will be able to apply their knowledge of multiple areas in the biomedical sciences to evaluate and develop solutions to relevant biomedical/biological problems. Each student takes a candidacy examination (aka prelim exam) at the end of their second year in the program. A committee of 5 faculty members evaluates the student's writing ability and knowledge during the oral portion of the exam on a pass/defer/fail rating scale. The exam includes the student's preparing a written document that reviews the literature and where they propose novel experiments. They also prepare an oral presentation and answer questions from the committee during a meeting that typically lasts two hours. Learning Outcome 2) Graduates will be able to a) design and implement complex experiments, b) perform critical analyses of complex data, and c) place their research in the context of the current state of scientific knowledge. The candidacy exam also assesses student's progress in this learning objective as students are required to design novel experiments and place these experiments in the context of the state of the field. Second, students submit and defend a thesis proposal document (ideally) during their third year. This is similar to the candidacy exam document in that experiments are proposed, but these experiments are meant to be implemented and completed during the thesis project.

This document is not evaluated as pass/fail/defer, but demonstrate their progress in achieving the learning goals in this objective during the proposal process. Learning Outcome 3) Graduates will be able to effectively communicate research results in written and oral presentations. Students demonstrate their skills in this area in at least four settings. First, the proposal document includes preliminary data collected and provides the first opportunity for students to explain in writing and in an oral presentation their results. Second, each BMS student presents an annual seminar to the students and faculty in the program detailing their research progress. Third, students meet regularly (ideally twice per year) to give a research update and discussion with their thesis committee. Finally, the thesis document and defense are the ultimate expression of the student's work and ability to communicate their results.

## **B. Scoring of Student Work**

LO #1 Performance on the candidacy exam is scored by faculty members on the thesis committee as pass/fail/defer. LO#2 At this time, the program does not have rubrics or formal evaluation tools for the thesis proposal, committee meetings, or the final defense. LO#3 Annual BMS student seminars are evaluated by their peers (both students and faculty) via a survey form with questions about clarity of the presentation, rated 1(unacceptable) to 9(exemplary). At this time, the program does not have rubrics or formal evaluation tools for the thesis proposal, committee meetings, or the final defense.

## **C. Indirect Assessment**

All graduating students complete an exit survey form. A key element of the survey is a list of all publications and manuscripts in preparation. Publishing in peer reviewed journals is a significant achievement for a student scientist and indicates their progress in each of the 3 learning objectives. In the future, this exit survey could be modified to capture more directly students' own evaluation of how far they have developed the skills in the learning objectives. Currently, the survey focuses on whether the curriculum (core and advanced courses) and faculty/teaching was of high quality. Students meet annually with the director to discuss research progress and reaching program milestones. This is another opportunity that could be better utilized in the future to get student reflections on their progress in reaching the learning objectives.

## **III. ASSESSMENT RESULTS/INFORMATION:**

1. Pass rate for candidacy exam
2. BMS student seminar assessment form

1. Pass rate for candidacy exam. In 2021/2022, all students who attempted the candidacy exam passed (7/7). This indicates that in the eyes of the student committee faculty members that students in the program are reaching the appropriate level of proficiency in "applying their knowledge of multiple areas in the biomedical sciences to evaluate and develop solutions to relevant biomedical/biological problems" (Learning Outcome #1) and can "design and...place their research in the context of the current state of scientific knowledge" (Learning Outcome #2). 2. BMS seminar assessments. Students who presented research seminars in Fall 2021 were evaluated on a 1(unacceptable) to 9(exemplary) scale for the following presentation metrics. Students make their first presentations in year 3 and we compared scores of these students (5 total) to those of more advanced students (years 5 and 6; 4 students). Presentation skills: Year 3: 7.7 average; Years 5&6: 8.0 average Presentation mechanics: Year 3: 7.5 average; Years 5&6: 7.8 average Research proficiency: Year 3: 7.6 average; Years 5&6: 7.9 average The "presentation skills" section rates elocution and enthusiasm for the topic. "Presentation mechanics" rates the quality of logic in the flow of the presentation, organization of slides, and clarity of data presentation. "Research proficiency" assesses the student's knowledge of the topic, ease with questions, and overall logic of the experimental rationale. Each of these three areas relate to Learning Outcome #3 (Graduates will be able to effectively communicate research results in written and oral presentations). These scores indicate students in the program develop and refine these skills as they progress through the program.

[Analysis]

#### **IV. ACTIONS TO IMPROVE STUDENT LEARNING**

A general BMS faculty meeting was held on 16 November 2022 to review progress during the academic year covered in this assessment (2021-2022). Similar to the faculty meeting the prior year, program assessment was a major focus of the meeting. The proposal to generate rubrics for the candidacy exam made in the 2021 meeting had not been followed up on, so the program curriculum was again tasked with developing these rubrics. A proposal to revise the assessment form for the BMS student seminars was also discussed. The curriculum committee will work on this task as well in the current year.

#### **V. SUPPORTING DOCUMENTS**

Additional documentation, when provided, is stored in the internal Academic Program Assessment of Student Learning SharePoint site.