**Program in Neuroscience: Dissertation and Oral Examination Guidelines and Expectations**

This document is intended to outline the standards to be met by PIN students' written dissertation documents and expectations for the oral exam.

**Dissertation Expectations**

The dissertation document is expected to provide a comprehensive and scholarly account of the student's research in support of their degree and will demonstrate a deep understanding of the field of study. The dissertation document goes to greater depth than a research paper, allowing full exploration of the discussion space around results, a deep review of the literature, demonstration of mastery of methodological approaches, and synthesis of findings with existing knowledge.

A typical dissertation document will include at minimum:

i. **Introduction and detailed literature review.** This chapter should comprise a full review of all relevant literature for the dissertation. This should enable the student to clearly outline the gap in the field that is addressed by the research and sets the stage for later discussion.

ii. **Research chapters.** These will comprise the bulk of the dissertation and may be presented either in '*research paper*' format (see for example Riggs, 2022; accessible online at the UMB Digital Archive), or in a '*traditional*' format in which experiments are presented in thematic chapters that are woven into a cohesive narrative (see for example Dharmasri, 2023). Students who chose to utilize the *research paper* format are encouraged to augment this aspect of the dissertation where relevant with detailed treatment of the research methods utilized, as opposed to the presentation of abbreviated methods more typical of journal articles.

iii. **Discussion and future directions.** This section will include an in-depth discussion of the implications of the research findings for neuroscience, should critically appraise the results and consider alternative interpretations, should discuss the questions raised by the work, should discuss the research findings in the context of relevant extant literature, and should cover future directions for the line of research. The discussion should also identify any weaknesses in the research approaches used and remaining gaps to be addressed.

Examples of high-quality dissertation documents from prior program graduates are available, and mentors and mentees are encouraged to utilize these as touchstones during a process of iterative preparation of the dissertation document. Writing a dissertation is a

sustained task that typically takes months and benefits from continuous feedback, and it is common for mentors and mentees to exchange multiple drafts in the process. As such, students are encouraged to begin writing as soon as possible to avoid a last-minute crunch and to actively seek feedback from their mentor on a regular basis.

**Oral Examination Expectations**

The purpose of the oral examination is to test the student's foundation of knowledge and abilities to defend aspects of the written dissertation and to think critically.

Students are expected to exhibit clear ownership of their work. It is expected that the students will be able to demonstrate a firm grasp of foundational neuroscience principles and will be expected to respond to questions with clarity and rigor. They are expected to be able to clearly articulate the underlying motivations for the study, to exhibit mastery of methodologies employed, to be able to critically appraise their findings, and discuss at length the implications of their research. The ability to critically appraise experimental design choices and interpretations of data, and the ability to design further experiments to test questions raised by the work will also be considered. Examiners will also assess the student's broader knowledge of the field and ability to place their work in context and assess the ability to draw upon and synthesize distinct lines of evidence.

There is no better preparation for the oral exam than thorough practice at fielding questions from as many angles as possible, and as such the program encourages students to arrange mock exams with their laboratory members and mentors during their preparations for the exam. It is also encouraged that the students appraise their dissertation document critically before their exam to anticipate points of contention or curiosity and prepare for as many questions as possible.

**Evaluation criteria and possible outcomes**

Upon receipt of the written dissertation, Readers determine its defensibility and either recommend the document for oral defense or will indicate the need for revisions. This process has similarities to academic peer review and thus the same standards that are expected of all scientific professionals in terms of rigor and clarity are applied to the dissertation document. The program provides detailed expectations for the criteria assessed by reviewers, and this is available to students of the program.

Upon proceeding to oral examination, the possible outcomes are Pass, Major Corrections, Minor Corrections, or Fail. If corrections to the dissertation are required, or that the student is found to be delinquent in a particular area, the committee will have discretion to determine whether written corrections are sufficient or whether the student should retake the oral exam.

# GPILS 1st - Authored Publication Requirement to Proceed to Defense

## *Waiver Process*

GPILS requires all PhD students to have a first-authored (or co-first-authored) publication at the time of graduation.

Occasionally, a student may be ready to defend with a manuscript still *submitted* or *in revision*. In such cases, the mentor and student must submit a waiver request to proceed to the thesis defense. The request should outline the paper's status and the plan to ensure it reaches publication.

In rare circumstances where no manuscript is in process, it is strongly encouraged that the student first submit a preprint of the dissertation results (e.g., **bioRxiv.org**) before requesting a waiver. The waiver must clearly specify the publication plan, timeline, and include assurances from the mentor that the work will be published with the student as first author.

If a waiver is needed, the process is as follows:

1. Student and mentor agree that a waiver request is necessary.
2. Mentor submits the request to the Program Director, with justification and a plan for timely submission of the manuscript.
3. The Program Director forwards the request, along with their recommendation, to the Assistant Dean for Graduate Education and GPILS.
4. GPILS reviews and makes the final determination.