

Neuroscience PhD Program Qualifying Exam Description, Rules, and Student Guide October 2021

Purpose

The qualifying exam (QE) is a combination of a written research proposal, oral defense of the proposal, and oral exam of general knowledge before a faculty committee. The purpose is to assess the student's knowledge of his or her field and intellectual readiness to undertake thesis research. This includes general background knowledge in neuroscience, critical reasoning, clarity of thinking, and verbal and written presentation skills.

The QE is specifically designed to ensure that (1) within their immediate thesis area, students have in depth knowledge of the literature, can design effective experiments and interpret the results, can propose research in a written grant format, can reason scientifically at a high level, and can defend their ideas orally; (2) within closely related research areas that are complementary to their thesis area, students have a strong knowledge of concepts, methods, and findings from the literature; and (3) within the overall field of Neuroscience, students have a basic graduate-level understanding of important concepts. The QE is **not** meant to be an evaluation of preliminary data for the thesis proposal.

The QE format should enable students to prepare for the exam effectively and in a reasonable time frame. Most of the exam focuses on research areas within and related to the thesis area. Knowledge breadth across neuroscience will be examined by a set of questions that explore important topics that all Neuroscience students should know.

QE Format

The exam has three parts: Thesis Proposal, Related Research Areas, and Foundational Questions in Neuroscience. One-third of oral examination time should be dedicated to each component.

Part 1: Thesis Proposal

The student will develop a thesis proposal in the form of an NIH-style grant application. It will contain the following sections: Title, Abstract, Specific Aims, Background & Significance, Innovation, Experimental Plan, and References. The proposal should be 10 pages long (excluding References), double spaced, 12-point font, with figures intermixed.

The overall research questions and approach for the Thesis Proposal should be planned in consultation with the thesis adviser. Students are encouraged to consult with knowledgeable faculty for general information, literature suggestions, and advice. However, the specifics of project design and analysis, literature review, interpretation, and writing must be solely the work of the student.

The Thesis Proposal is sent to the committee before the exam and defended orally during the exam.

Part 2. Related Research Areas

The student will identify, in consultation with committee members prior to the exam, two research areas that are distinct from, but related and complementary to, the dissertation research topic. These areas will be examined orally. During preparation for the exam, faculty may suggest a few papers to help the student begin reading in these areas. It is the student's responsibility to read

intensively in these areas and to be prepared to demonstrate substantial knowledge of concepts and methods.

The choice and breadth of each area will be determined by discussions between the student and committee members. As a general guideline, consider the Society for Neuroscience list of “Themes and Topics”, at <https://preview.sfn.org/sfn/annual-meeting/neuroscience-2018/abstracts/call-for-abstracts/themes-and-topics>. Themes are denoted by a capital letter (e.g., “A: Development”, “H: Cognition”). Topics are indicated by a number (e.g., “D.07: Vision”) and subtopics by a lower-case letter (e.g., “H.02.n. Working memory”). The scope of each Related Research Area is meant to be similar to a subtopic within this scheme. Choose areas that complement or synergize with your thesis research topic.

Part 3. Foundational Questions in Neuroscience

To test broad knowledge in Neuroscience, students will be asked general knowledge questions from a published list of Foundational Questions in Neuroscience. This list is the same for all students and is available upon entry to the program. Questions may be updated slightly from year to year in the September prior to the qualifying exam. Many of these questions are covered during normal coursework, and others can be addressed by reading textbooks and/or review articles. Questions are designed to test basic common knowledge of neuroscience facts and principles and do not require analysis of the primary literature. This portion of the QE is listed on the form that students submit to the Graduate Division as a fourth topic of “General Neuroscience”.

During examination of the Foundational Questions in Neuroscience, committee members will choose questions that explore the student’s breadth of knowledge. *Faculty are free to ask follow-up questions to clarify the student’s knowledge, or to assess knowledge gaps, in answering these questions. However, questions on wholly new topics not on the Foundational Questions list are discouraged, as students have not had an opportunity to prepare for them.*

The oral exam is scheduled for three hours. Parts 1 and 2 are typically intermixed as topics related to the thesis project are explored. Part 3 should constitute a clearly separate period of the QE, either at the start or the end of the exam. It is the QE chair’s responsibility to make sure the exam is fair and weights these three components equally. The QE committee is expected to ask questions that determine the limits of the student’s knowledge and his or her readiness to independently undertake thesis research.

[QE Committee composition – revised Graduate Division policy as of September 2019](#)

The committee should have four members and cannot include the thesis adviser. The Chair must be a faculty member in the UC Berkeley Academic Senate (not Adjunct) and a member of the Neuroscience PhD Program. Otherwise, there are no restrictions regarding the number of committee members that are HWNI or non-HWNI faculty. Each committee has one member who is designated to be the Academic Senate Representative, and this person must be in the Academic Senate. In addition, at least one member must be in the dissertation research area, and at least one member must be from a different area of Neuroscience (Cell/Molecular, Systems, Computational, Cognitive). In rare cases, one committee member can be from a University other than Berkeley, but this requires special paperwork.

[Eligibility and Timing](#)

The QE is typically taken in the second semester of the second year of graduate study. Students must have passed, with a grade of B or better, the required foundational courses in three distinct areas of neuroscience: (A) Cellular, Molecular & Developmental Neuroscience; (B) Systems and

Computational Neuroscience; and (C) Cognition, Brain and Behavior. See the Foundational Course Requirements for details. In general, these courses should be completed before the date of the exam. However, in some cases, the Head Graduate Adviser may allow the course requirement to be fulfilled in the same semester as the QE. In this case, advancement to candidacy will still require successful completion of all courses with a minimum of a B grade.

Extensions for the QE must be pre-approved by the Head Graduate Adviser and are not given past the fall semester of the student's third year. Under special circumstances, the QE may be taken prior to the second semester of the student's second year. Approval for taking the exam early is based on prior coursework and research experience and is at the discretion of the Head Graduate Adviser.

Required Deadlines

- * The QE application form listing proposed committee members and Related Research Areas, plus a brief summary of the thesis proposal, must be submitted by **February 1**.
- * The complete thesis proposal must be sent to the committee by **March 1**.
- * If further revisions are made to the thesis proposal, the revised proposal must be sent to the committee at least one week prior to the exam date.
 - * The oral exam must be completed by the end of the second semester of the second year, unless an extension had been pre-approved.

Results of the Exam

All committee members sign the **Qualifying Examination Report Form**. In addition, the Chair of the QE committee must complete the **Qualifying Exam Chair's Report**, which gives feedback on student performance. This report is made available to Program Staff and the student.

The possible outcomes are "Pass", "Partial Fail", or "Fail". In the case of "Fail", the committee must either recommend that the student retake the entire exam for a second and final time, or that re-examination is not recommended, which results in dismissal from the program. "Partial Fail" means that the student only has to retake a defined portion of the exam, as determined by your committee. The committee may also recommend additional course work or other special training. Any re-examination must take place before the end of the next semester.

QE PREPARATION GUIDE FOR STUDENTS

Preparation Step 1

Pick your thesis research topic and write a **brief** summary (typically < 2 pages). The summary should have the following sections: title, description of the problem and your general approach, and 2-3 specific aims, each with a title and brief description. In consultation with your thesis mentor, choose two Related Research Areas.

Select your committee members and ask each of them if they would be willing to serve on your committee. This usually involves a brief meeting in which you describe your proposal. Ask them for input on your Related Research Areas. You should list a few reviews or key primary papers to begin your reading in each area. Your committee may suggest adding or changing one or more of these areas and may suggest additional papers to guide your reading. Your Chair must approve your final list of Related Research Areas.

By February 1, submit to the Neuroscience Program Coordinator your QE application form with your list of committee members and your thesis proposal summary. On the QE application form, list

as “subject areas” of the exam: 1) the title of your research project/proposal, 2-3) each of your Related Research Areas that you have chosen (and your committee members have agreed to), and 4) “General Neuroscience”.

Note: The program may minimally adjust your committee composition, if needed, to ensure appropriate expertise and to spread QE responsibility equitably among faculty.

Preparation Step 2

Write a detailed draft of your thesis proposal.

Meet with each committee member to discuss your proposal, and get feedback. Faculty can give you scientific comments and suggestions but can't be involved in writing or revising, or in practicing for your QE. *The student is encouraged to consult frequently with his/her thesis mentor (and other faculty, if appropriate) in planning the thesis research. However, faculty members are not permitted to participate directly in the detailed design or writing of the proposal, or in any practice for the exam.*

By March 1, complete your proposal and send it to your committee, along with the final list of your Related Research Areas. The Chair has one week to determine whether the proposal is acceptable as a basis for your examination. The purpose of the Chair's review is not to identify or correct specific logical flaws, but to establish whether the proposal is sufficient as a basis for examination. If it is unacceptable, the Chair must inform the student and direct revision of the proposal.

Schedule your QE meeting for a 3-hour time slot. Schedule at least 8 weeks, preferably 12 weeks, ahead of time.

Step 3: The Examination

Provide any revised proposal to the committee at least one week prior to the exam. The examination will last 2.5-3 hours. The Chair will determine the order of examination, but each of the three components should be equally weighted.

You will use the board in your presentation. Bring markers if needed. You cannot use transparencies, slides, or digital presentation media. You can provide 1-2 hardcopy diagrams or figures if the information would be difficult to convey on a board.

You may only bring a ~ 1 page outline to guide your presentation.

Timetable Summary

Prior to February 1 in second year of study:

- Complete your foundational classes.

- Review the Foundational Questions in Neuroscience, and address any missing general knowledge.

- Select your thesis research topic and write a summary of the thesis proposal.

- Choose your Related Research Areas.

- Select your committee members and ask them if they will serve on your QE committee.

- Modify your Related Research Areas based on input from your committee and have your chair approve them.

Submit your QE Application Form including list of committee members, Thesis Proposal Summary, and list of Related Research Areas.

Prior to March 1:

Meet with your committee members, and get feedback on your thesis proposal.

Write the full thesis proposal.

Schedule your QE meeting. (THIS TAKES TIME! – START EARLY)

Send your complete thesis proposal and final list of Related Research Areas to your committee.

By end of Spring semester in second year of study:

Any final revisions in your thesis proposal must be sent to your committee at least one week prior to your QE date.

Read independently in your Related Research Areas.

Complete the oral examination.

Bring the QE Report Form to the Neuroscience Graduate Program Office.