Q: Will questions on techniques, results, and background be included?

A: Yes, questions on the exam may cover all these topics.

Q: I heard some faculty say they would give us a predicted result for one of our proposed experiments and ask us for our interpretation. Is this true? How are we supposed to study specific details?

A: You are expected to have a good understanding of the questions being addressed in your proposal, the experimental approaches used to address the questions, the conclusions drawn from the experiments, and their significance to the field. Questions may be asked that require you to interpret detailed data. We are not trying to test if you can memorize details but rather that you have gained a good grasp of the important concepts in a range of study topics.

Q: Will there be questions on material that is not covered in our Neuroscience courses?

A: It is your obligation to clarify your understanding of areas covered in your proposal. While you should use this as an opportunity to familiarize yourself with new subjects, it is also important that you don’t focus on trying to memorize, but rather take some time to think about what they mean. You should consider the big picture. What is interesting about these areas? Where is the field headed next? What would be the significance of the findings to biomedicine? If you approach it in this way, you will understand the topic better and you will be ready to answer.

Q: Is there any standard for the answers of qualifying exam?

A: You are scholars studying for an advanced degree. Your job is to convince the committee that you understand the topic being discussed. The exam is intended to demonstrate that you can educate yourself about recent advances in science. Understanding is not the same as simply memorizing. If you understand the topic you will be able to explain your answer with a clear rationale.

Q: Why do I have to take this qualifying exam?

A: Ultimately, the program is tasked to certify that you achieved a doctorate degree in Neuroscience. This exam allows the faculty to determine whether you have the motivation and intellectual ability to be considered as a potential candidate for this academic degree.

Q: Why have the faculty chosen to test students with a research proposal rather than a test of objective, knowledge-based questions?

A: Once you are awarded a Ph.D. degree, tests don't stop. They only continue to get more competitive. These tests come in the form of doing high quality research, submitting original papers to refereed journals, applying for fellowships and research grants, applying for a
permanent position in industry, research and/or teaching, and undergoing professional scrutiny by a university tenure or promotions committee. Your success in these endeavors requires many other skills besides knowing a textbook from cover to cover. This exam provides a taste of practical scientific life and will help you to prepare for competition in the real world.

Q: Why must our research proposal include an original hypothesis?

A: Scientific work progresses in many different ways. Much science simply involves the collection of new information. Scientific breakthroughs will come by analysis of such information and the formulation of new hypotheses. It is essential for graduate students to learn how to do hypothesis-driven research. Thus, in this exam it is not appropriate to simply propose to perform neural recordings in a certain brain structure or to describe a mouse model of Alzheimer’s disease. In this exam, you should study existing scientific data and synthesize it to propose an original mechanism for some well-defined phenomenon. This is a unique opportunity. Often, someone new to the field is able to see things in a fresh way. Your hypothesis may actually be the key to solving an important problem. Do not simply try to demonstrate something trivial. Ask a unique question and try to devise a realistic path that will yield the answer.

Q: What constitutes a good hypothesis?

A: The dictionary says that a hypothesis is merely a proposition to explain certain facts. A good hypothesis provides a rational explanation for a curious phenomenon of nature or a fundamental aspect of living systems. The key feature of a good hypothesis is that it makes definite mechanistic predictions that can be tested. It answers the simple question: How does it work? Some examples of great, Nobel Prize winning hypotheses are:

- Genetic Information is encoded by DNA (Crick, Watson & Wilkins, 1962)
- RNA can act as a catalyst (Altman & Cech, 1989)
- Viruses that cause cancer can do so with genes pilfered from normal cells (Bishop & Varmus, 1989)
- GTP-binding proteins couple hormone receptors to cAMP production (Gilman & Rodbell, 1994)
- Endothelial cells release a gas that can relax blood vessels (Furchgott, Ignarro, & Murad, 1998)

Q: What is a controlled experiment?

A: The interpretation of every experiment is subject to the influence of confounding variables. A good experiment must be designed to isolate only the variable that is to be tested. For example, if you propose to test whether the introduction of a certain gene into a cell by viral transfection affects a particular cellular process, how do you know whether the virus itself modifies this process independently of the candidate gene? Clearly, one must include a control virus lacking the tested gene in this experiment. The elegance of experiments critically depends upon the identification and inclusion of the most appropriate controls that rule out artifacts and misinterpretation of the results.
Q: How do I cope with the stress and extreme nervousness I feel in having to take this exam?

A: The best way to avoid nervousness is to put forth your best effort in designing a brilliant research proposal. Research your ideas thoroughly and master the basic knowledge related to your topic. Organize practice sessions with fellow students (especially those who have previously passed the exam) and ask them to critique your presentation. By the day of the exam, you will be able to articulate your ideas, and have confidence in your ability to defend them in front of the faculty.

Q: What happens if I fail this exam?

A: A very large majority of students are eventually able to pass this exam. Sometimes the committee is dissatisfied with a performance and will not issue a passing grade. If the committee believes that the student is capable of improvement with hard work, the student may be offered a conditional pass. Rarely, a student may fail the exam even after a second attempt. This is a serious decision by the faculty that the student does not have the capability to perform research at the doctoral level. If this happens, the important thing to remember is there are many other excellent options for your career. Failing the qualifying exam may actually be a relief to some students, because it signals that an alternative to an academic research career is an advisable option. Students who do not pass the exam may write a masters thesis and be awarded a Masters degree. They are qualified for many exciting opportunities that make use of their scientific background and training. Some may choose to pursue additional education in business or health-related fields. Many faculty members are able and willing to advise students on these options. The prospect of failing such an important exam may seem devastating, but all of us must eventually learn to cope with failure.

Q: What happens if I pass this exam?

A: It is a time to celebrate your accomplishments with your friends, relatives and colleagues. You have demonstrated potential ability in your chosen field and have been selected to perform original thesis research that will be completed over the next few years.