

Graduate Program Requirements in Behavioral Neuroscience (Revised July 5, 2012)

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Introduction:

Behavioral Neuroscientists want to explain behavior in terms of the activities of the brain. Students interested in this field thus need to understand how to connect behavior to brain anatomy, physiology, and its cellular-molecular underpinnings. The Behavioral Neuroscience program is designed to provide students with the conceptual and empirical methods needed to be successful in this field. Thus, each student is expected to achieve general competence in neurosciences as well as in-depth proficiency in those areas relevant to his or her special interests.

Students in Behavioral Neuroscience are expected to conduct research and participate in courses on a continuous basis. Research should be initiated early in the first year so that a detailed progress report on the work can be made at the end of the second year. The general requirements of the PhD program include:

- a) A series of core courses (detailed in section 3) and an individualized course plan designed by the student's committee
- b) A second-year progress paper and defense (which can also count as a master's level comprehensive exam, should the student wish to do this. If the student does choose to do the master's, then they must first complete 30 hours of coursework and apply for master's candidacy with the Graduate School. Please see section 8 for more information).
- c) A PhD level comprehensive exam taken by the end of the 4th year of enrollment and after the majority of the coursework is completed
- d) The doctoral dissertation and dissertation defense.

Each of these requirements is discussed below under separate headings. In addition, the area requires one year of teaching experience (see #7, below). A typical schedule for completion of these requirements is presented at the end of this document (see Appendix

A). It should be noted that any deviation from the formal requirements must be requested in writing to the student's advisory committee. This petition will only be honored subject to the *written approval of the committee chair and the Program Director*. Failure to achieve the prescribed requirements can be grounds for dismissal from the graduate program (see section #9.).

1. The Student's Committee:

The direction of a student's training will primarily be the responsibility of the thesis supervisor. However, the Program Director, in consultation with the primary advisor, will arrange a committee initially composed of the primary advisor and two other faculty members (usually from BN, but could be from other areas in the Department or other Departments, with prior approval from the Program Director) to assist in the development of the student and to monitor her/his progress.

The committee will help the student select courses, consult with the student on research, serve on thesis committees, and so forth. Ideally the committee will meet with the student once each semester. The composition of the committee can change to mirror the changing research interests of the student.

Prior to the comprehensive examination and dissertation defense (see 5 and 6) a committee composed of at least 5 faculty (who have current graduate faculty appointments, see

[http://www.colorado.edu/GraduateSchool/policies/docs/Graduate Faculty Membership.doc](http://www.colorado.edu/GraduateSchool/policies/docs/Graduate_Faculty_Membership.doc)

and

[http://www.colorado.edu/GraduateSchool/academics/docs/doctoral_graduation checklist.doc](http://www.colorado.edu/GraduateSchool/academics/docs/doctoral_graduation_checklist.doc)) will be appointed to assist the student with the preparation of the

plan of study and to guide and examine the doctoral dissertation. At least three members will have primary appointments in the BN program. The other two members must come from outside of the BN program. One external member must be from the graduate faculty outside the Psychology Department and one must be from another program in the Department of Psychology and Neuroscience.

It is the responsibility of the student's primary advisor to submit to the Program Director a potential list of faculty who are willing to serve on this committee. The Program Director will submit this list to the Department's Associate Chair for Graduate Education for approval. Additional members from outside or inside of the Department can be appointed by petitioning the Program Director. Normally the members of this committee will also be the Final examination committee.

2. Annual Evaluation:

At the end of each academic year the program faculty will meet to evaluate the progress of each student. As part of this evaluation, the Program Director will provide the student with a *Summary of Accomplishments* form to be filled out by the student and returned to the Program Director and committee members. In addition, the faculty will consider the input from the primary advisor, committee members, other faculty and information about TA performance to determine if the student is making adequate progress. The Program Director will provide the student with a letter summarizing the results of this evaluation.

3. Course Requirements:

The core curriculum for the students in the Behavioral Neuroscience PhD Program is in register with that of the Interdepartmental Neuroscience PhD Program. All students are required to take the Core Curriculum:

- a. Core Courses (total credits: 14-17):
 - i. Introduction to Neuroscience 1 (NRSC 5100). This course can either be taken as a 2 credit or 5 credit course, depending on the student's previous neuroscience course experience at the advanced level. A majority of students should plan on taking the 5 credit version, which includes a laboratory section.
 - ii. Introduction to Neuroscience 2 (NRSC 5110 - 3 credit hours)
 - iii. Advances in Neuroscience (NRSC 6100). Students must take 3 semesters of this 2 credit course, for a total of 6 credits.
 - iv. Statistics (PSYC 5741 or equivalent - 3 credits). Student must take at least one semester of statistics. Must be passed with at least a C in order to count as credit. The mentor will decide which statistics course the student shall take, based on the student's anticipated research direction.
 - v. The core course requirements must be met by the end of the second year, unless the courses are not offered during this period.
- b. Elective Courses (total credits: 16-19):
 - i. A list of elective courses can be found here:
<http://www.colorado.edu/neuroscienceprogram/phdrequirements.html>
 - ii. The elective courses can be completed at any time during the tenure of a student's course of study.
- c. Total credit hours required for the program: 60
 - i. Course Credits (total hours: 30)
 1. Core Courses – students must take 14 – 17 credit hours of core courses, depending on which version of NRSC 5100 they enroll in.
 2. Elective Courses – students must take 13 – 16 hours of electives. This can include 4 – 6 hours of Master's Thesis hours or 4 – 6 hours of Independent Study (see section 8).
 - ii. Dissertation hours (PSYC 8991): students must take **at least** 30 dissertation hours in preparation for their dissertation defense.
 1. A student may not register for more than 10 dissertation credit hours in any one semester, including summer.
 2. Prior to the semester in which the student completes the Ph.D. level comprehensive exams, a student is not allowed to have accumulated more than 10 dissertation hours. However, if the student has enrolled in more than 10 dissertation hours prior to completing the comprehensive exams, they may petition the Dean of the Graduate School to have those hours included in their final total.

3. Not more than 10 dissertation hours of credit taken the semester in which the comprehensive exam is passed may be included in the 30 credit hours required for the degree.
 4. After the student completes the Ph.D. level comprehensive exam, they must be enrolled in at least 5 dissertation hours for every semester until they successfully defend the dissertation. Students can enroll in as many as 10 dissertation hours per semester (including Summer) after they have completed their comprehensive exam.
- d. Resident Requirements. At least 24 semester hours of courses at the 5000 level or above are required (the Graduate School allows 6 of these hours to be 3000-4000 level courses); at least 20 of the required hours must be in graduate courses taken at the University of Colorado at Boulder.
4. Second Year Progress Paper:
By the end of the second year (August for most students joining the program at the beginning of the academic year), all students must submit a progress paper to their committee, detailing one of their laboratory research project completed to date. This paper should be at least 20 pages (doubled spaced) and formatted for submission to one of the leading neuroscience journals. If students have not completed a research project by this time, they should report what has been completed and discuss implications of probable outcomes. This paper will serve as the basis of a focused oral examination (or a Master's level comprehensive exam, should the student choose to get the Master's degree). This will be a closed (to the public) examination conducted by the student's committee. Other faculty members of the program, however, are welcome to attend and participate. It is the responsibility of the Program Director to schedule the examination.
The student must file a petition to extend the deadline for this requirement. This petition will be submitted to the Program Director and outline the reasons for the extension. The Program Director will then meet with the student's committee to determine if the student should be given an extension and to stipulate the length of the extension.
5. Comprehensive/Preliminary Examination:
Before admission to candidacy for the PhD degree, the student must pass an individually tailored comprehensive examination in the field of concentration and related areas. The student and committee will determine the nature of the qualifying exam. It can take the form of a review paper organized to evaluate a particular hypothesis, or a grant proposal (both options are described further in Appendices B and C). To advance to candidacy the examination committee must judge the student's written document as satisfactory, and the student must pass an oral defense of the paper and the student's broader knowledge of the field. The oral examination will be closed to the public but open to other faculty members of the Behavioral Neuroscience program. It will be scheduled by the Program Director no sooner than two weeks after receiving and distributing the written document to the

committee.

Before attempting the examination, the student will have:

- a. Completed at least three semesters of residency, and successfully completed the core course requirements with grades of B- or better.
- b. Made formal application for [Admission to Candidacy](#) on forms supplied by the Graduate School at least two weeks before the comprehensive examination is attempted.

The student is expected to complete both components of the Comprehensive Examination no later than the end of August of the fourth year of enrollment. *The student must file a petition to extend the deadline for this requirement.*

This petition will be submitted to the Program Director and outline the reasons for the extension. The Program Director will then meet with the student's committee to determine if the student should be given an extension and to stipulate the extent of the extension. Failure to complete the Comprehensive Examination in a timely manner is grounds for dismissal from the program.

- c. The examination can be evaluated at 3 levels as determined by the committee:
 - i. *Passed at the Doctor of Philosophy Level:* The student has passed the examination at a high level by meeting all expectations for either the grant proposal or the review paper. This is the expected outcome for most students.
 - ii. *Failure at the Doctor of Philosophy Level, Option to Revise the paper/proposal:* The student does not pass at a high level, but is given an opportunity to revise the paper. If the paper is sufficient in many respects, but has a few notable deficiencies that are relatively straightforward to address, then the option to revise will be considered. If however, the paper is deficient in many ways and/or severely so, then revision will not be an option.
 - iii. *Failure at the Doctor of Philosophy Level:* The student does not pass, and will not be advanced to candidacy for the doctoral degree.

6. Doctorate of Philosophy Dissertation:

- a. Advisory Committee: The student should obtain the signatures of members of the advisory committee (thereby indicating their willingness to serve) on a [Doctoral Examination Report](#) form; one copy to be given to the chair of the advisory committee, one to the Director of Graduate Studies in Psychology and Neuroscience, and one to be placed on file in the program office. Any change in the advisory Committee is to be similarly reported. It is the student's responsibility to keep the advisory committee informed of the progress in his or her research and training, and of any significant change in the direction or status of his or her program. The Graduate School must also be advised of any changes in degree program after the Application for Candidacy is filed.
- b. Final Examination. This is the traditional thesis defense. It will be open to the public. The *Program Director* will be responsible for scheduling the public

examination.

The Final Examination will not be scheduled until the Program Director has received copies of the complete properly formatted thesis to distribute to the committee and to make available to the public. The Program Director will contact the members of the thesis committee to schedule the final examination. The examination will be scheduled *no sooner than two weeks after the Program Director has received copies of the thesis and distributed them to the committee.*

As noted, the final examination will be open to the public. The examination will have three components:

- i. The student will give a 45-minutes formal presentation of the thesis.
 - ii. A period with questions from anyone in the audience
 - iii. A closed questioning period with the student's formal committee.
- c. Student's Responsibility. The requirements of the Behavioral Neuroscience program are consistent with those of the Graduate School. It is the student's responsibility to see that these requirements (including total credit hours, advanced registration for examination, etc.) are met. It is important to pay careful attention to the rules governing the various examinations, thesis preparation, resident requirements, etc., as they are set forth in the Graduate School Rules that can be found at <http://www.colorado.edu/GraduateSchool/policies/downloads/GSRules2001.pdf>

7. Additional Requirements:

The following are requirements that must be met prior to admission to candidacy for the Ph.D. degree:

- a. Individualized Coursework. Course requirements, beyond core course requirements, will be designed individually for each graduate student based on their background and anticipated research/specialty areas. The student's committee will help to formulate this plan.
- b. Teaching Experience. All students are required to gain teaching experience by serving as teaching assistants for two semesters.
- c. BN Journal Club: Beginning in the second year, all graduate students are required to give a BN Journal Club presentation of their research progress. Failure to comply with this requirement can be grounds for dismissal or withholding of financial support.

8. Optional Master of Arts Degree:

The Master's degree is a way station en route to the Ph.D., and is now optional to Behavioral Neuroscience students. The main purpose of pursuing a Master's degree is if a student decides to complete their studies at this level and not continue on to complete a Ph.D. No students are admitted to our program with the expectation that they will complete only a Master's degree. The degree requirements include 30 hours of graduate work and a 2nd year Progress Paper (see #2), as agreed upon by the student's committee. At least 24 semester hours of the graduate coursework must be 5000 level or above, and 4 to 6 hours must be PSYC 6951 (Master's Thesis

Hours or Independent Study Hours). The Progress (second year) Paper substitutes for the traditional Master's Thesis and must be defended before the student's committee before the end of the third year. The Program Director will be responsible for scheduling the examination. This cannot happen until the Program Director has received the complete and properly formatted thesis. The Program Director will contact the members of the thesis committee to schedule the examination. The examination will be scheduled *no sooner than two weeks after the Program Director has received copies of the thesis and distributed them to the committee.*

- a. The student has 2 options as to how they complete the Master's degree:
 - i. Master's Thesis Option: The student will take 4-6 credits of Master's Thesis Hours and complete the 2nd year progress paper as a thesis. The thesis will be defended in front of the student's committee (comprised of 3 graduate level faculty members) and the public. If passed, the student will then submit the thesis to the Graduate School, following their submission guidelines. (Get submission guidelines from grad school, or at least the link). The Graduate School charges a \$60 fee for publishing the thesis.
 - ii. Independent Study/Master's Level Comprehensive Exam Option: the student can take 4-6 credits of Independent Study Hours (PSYC 6841) (they CANNOT take Master's Thesis Hours with this option) or other classes if needed. The student will then defend their second year paper as a master's level comprehensive exam instead of as a master's thesis. The exam will be defended to the students' committee (3 graduate level faculty members) and will be closed to the public but open to any other Behavioral Neuroscience faculty who wish to attend.
- b. Both options can be evaluated at 3 levels as determined by the committee:
 - i. *Passed at the Doctor of Philosophy Level:* The student has passed at a high level and can continue toward the pursuit of the Ph.D. This is the expected outcome for most students.
 - ii. *Failure at the Doctor of Philosophy Level, Masters Level Pass Only:* The student passes with a Master's degree, but is not allowed to continue toward pursuit of the Ph.D. beyond the third year (i.e., the student may complete the present academic year.)
 - iii. *Failure at Master's Level:* The student is not awarded a Master's degree, and is not allowed to continue toward pursuit of the Ph.D. beyond the third year.

9. Grounds for Dismissal and procedures:

- a. Students failing to meet the specified deadlines for the Core courses, Second year paper, Comprehensive examination, or Doctoral dissertation requirements (adequate progress as set forth by the student's committee), without appropriately petitioned extensions from the program director and/or student/dissertation committee, can be dismissed from the graduate program in Behavioral Neuroscience.

- b. Motion to dismiss a student from the Graduate Program based on failure to progress adequately, as stipulated in the Graduate Program Requirements in Behavioral Neuroscience, will be brought forward during the Annual student's evaluation by the Chair of the student's committee or the Program director. A simple majority (50%) vote of Tenured- and Research-track faculty in Behavioral Neuroscience is required for student dismissal from the program.
- c. Student's dismissal procedures can be requested by the Chair of a student's committee or the Program Director at other times of the year, which will require the scheduling of a special Behavioral Neuroscience faculty meeting convened at the request of the Program Director for faculty evaluation and vote.
- d. The faculty vote outcome will be final; it is the responsibility of the student to follow the Graduate Program requirements, and to avail themselves of extensions in cases of attenuating/unforeseen circumstances (for example, family, medical, military or others). If a student determines the dismissal or termination was unfairly cast, the Graduate School has defined grievance procedures that should be followed:
<http://www.colorado.edu/GraduateSchool/policies/docs/acadgriev.doc>

Appendix A

Typical Calendar for Graduate Training in Behavioral Neuroscience

Year 1		
	Fall	Spring
	Survey and Int. NRSC 5100	Survey and Int. NRSC 5110
	Research	Advances in Neuroscience Seminar (NRSC 6100)
	Selection of Faculty Advisory Committee	Research
		Statistics
Year 2		
	Fall	Spring
	Advances in Neuroscience Seminar (NRSC 6100)	Completion of the 2 nd Year Progress Paper
	Neuroscience Depth Course	Advances in Neuroscience Seminar (NRSC 6100)
	Research (IS or Master's Thesis Hours)	Neuroscience Depth Course
		Research (IS or Master's Thesis Hours)
Year 3		
	Fall	Spring
	Neuroscience Depth Course	Neuroscience Depth Course
	Neuroscience-related Course	Neuroscience-related Course
	Research	Research
		Ph.D. level comprehensive examination
Year 4		
	Fall	Spring
	Neuroscience-related course	Neuroscience related-course
	Research (Doctoral thesis hours)	Research (Doctoral thesis hours)
Year 5		
	Fall	Spring
	Neuroscience-related Course	Neuroscience-related Course
	Research (Doctoral thesis Thesis Hours)	Neuroscience-related Course
		Research (Doctoral Thesis Hours)
		Defense of Dissertation

Appendix B

Approved by BN Faculty July 18, 2011

Behavioral Neuroscience Program Guidelines for a Review Paper Satisfying the Comprehensive Examination Requirement

This document provides general guidelines for writing a review paper to satisfy the comprehensive examination requirement.

Stages of the Proposal

Initiation Stage

The process begins with a discussion between the student and advisor. The purpose of the initial phase is to settle on a topic to review and ensure that it is reasonable to pursue it. The student will then meet with the full committee to gain approval to begin the development and writing of the review.

Pre-submission Phase

During this phase the student is free to discuss ideas and approaches to the review topic with the advisor and other individuals (fellow graduate students, postdoctoral students, and other faculty) who may provide insight into the development of the proposal.

The Penultimate Draft

The written penultimate draft should be the work of the student. When completed the penultimate draft can be turned into the advisor for comments. The advisor can discuss any glaring weaknesses in the review and make suggestions for improvement. However, it is not appropriate for the advisor to rewrite any section of the document. Moreover, the advisor is only permitted to comment once on any section of the document.

The Final Proposal

After the advisors comments are obtained the student will incorporate them into the final draft that will then be handed to the committee and a defense will be schedule.

Overall document

The final review document should be of a total length of 25-40 pages (double spaced), excluding the reference section. The page total includes any illustrations, figures, or tables that are added to support the text. All margins should be 1.0 inch, and the font type should be either Verdana 11 point or Arial point 12 point.

Review Format

Abstract 300-400 words

The abstract will provide a crisp summary of the review. It should state

- The goal of the review
- The major contents
- Main Conclusions

Introduction

This section should be 1-3 pages (double spaced) and serve several of the functions described below:

- Briefly introduce the topic;
- Describe why it is important;

- Describe the goal of the paper;
- Describe the plan of attack--what literatures are going to be reviewed and the order (Note: this should provide you with organizational headings of the body of the review);
- In some cases you will want to alert the reader at this stage to what you will conclude from your review.

Note that it is generally wise to complete the introduction after the literature review—for the simple reason that you will then have a full idea of the content of the paper and consequently what needs to be introduced.

The Review

This section should be 20-30 pages (double spaced). It should be organized around the plan of attack described in the introduction. Each section should end with a brief summary and provide a transition to the next section.

Discussion

- This section should be 3-5 pages (doubled spaced);
- Restate the motivation/goal of the paper;
- Summarize the evidence that has been reviewed;
- Provide a crisp summary of the implications of the summary focusing on how this review has clarified our understanding of the issues raised in the introduction.

Concluding Comments 1-2 pages (doubled space)

Often a good review will end with some concluding remarks that go a little beyond the original plan of the paper but are tied to the fundamental question that was addressed.

Appendix C

Approved by BN Faculty July 14, 2011

Behavioral Neuroscience Program Guidelines for a Grant Proposal Satisfying the Comprehensive Examination Requirement

This document provides general guidelines for writing a grant proposal to satisfy the comprehensive examination requirement.

Stages of the Proposal

Initiation Stage

The process begins with a discussion between the student and advisor. The purpose of the initial phase is to settle on a topic and ensure that it is reasonable to pursue it.

The student will then meet with the full committee to gain approval to begin the developing and writing of the proposal.

Presubmission Phase

During this phase the student is free to discuss ideas and approaches to the problem with the advisor and other individuals (fellow graduate students, postdoctoral students, and other faculty) who may provide insight into the development of the proposal.

The Penultimate Draft

The written penultimate draft should be the work of the student. When completed the penultimate draft can be turned into the advisor for comments. The advisor can discuss any glaring weaknesses in the proposal and make suggestion for improvement. However, it is not appropriate for the advisor to rewrite any section of the document. Moreover, the advisor is only permitted to comment once on any section of the document.

The Final Proposal

After the advisors comments are obtained the student will incorporate them into the final draft that will then be turned into to the committee and a defense will be schedule.

Format of the Proposal

Proposal Title: 81-character limit, including spaces

Specific Aims (2-to 3 aims): 1 page

Background (2-4 pages)

Research Strategy: 10 pages (excluding references)

Note that the combined Background+Research strategy sections should not exceed 12 pages.

Biosketch: 4 pages

Font

- Use an Arial, Helvetica, Palatino Linotype or Georgia typeface, a black font color, and a font size of 11 points or larger. A symbol font may be used to insert Greek letters or special characters; the font size requirement still applies.
- Type density, including characters and spaces, must be no more than 15 characters per inch.
- Type may be no more than six lines per inch.
- Use black ink that can be clearly copied.
- Print must be clear and legible.

Paper Size and Page Margins

- Use standard size (8 ½" x 11") sheets of paper.

- Use at least one-half inch margins (top, bottom, left, and right) for all pages, including continuation pages. PI's name should not appear in the margins

Page Formatting

- Because a number of reviewers will be reviewing applications as electronic documents and not paper versions, applicants are strongly encouraged to use only a standard, single-column format for the text. Avoid using a two-column format since it can cause difficulties when reviewing the document electronically.
- The application must be single-sided and single-spaced.
- Consecutively number pages throughout the application. Do not use suffixes (e.g., 5a, 5b).
- Do not include unnumbered pages.

Figures, Graphs, Diagrams, Charts, Tables, Figure Legends, and Footnote

- A smaller type size is acceptable, but it must be in black ink, readily legible, and follow the font typeface requirement.

Grantsmanship

- Use English and avoid jargon.
- If terms are not universally known, spell out the term the first time it is used and note the appropriate abbreviation in parentheses. The abbreviation may be used thereafter.