Graduate Interdisciplinary Program

Neuroscience

Student Handbook

(August 2017)

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1. Preface

Welcome to the Graduate Interdisciplinary Program (GIDP) in Neuroscience at the University of Arizona. This handbook explains the organization of the program and provides a guide towards obtaining a Ph.D. degree in Neuroscience. The handbook outlines the rules and regulations of the graduate program. The student is responsible for knowing these policies.

Most of the basic rules are policies of the Graduate College of the University of Arizona and must be followed by all programs offering graduate degrees. More specialized requirements were established by the Program to ensure the quality of your training. As questions arise, good sources of information are the Graduate Program Coordinator, Graduate Student Academic Services (GSAS), members of the Graduate Student Advisory and Progress Committee (*GSAPC*) and your dissertation research advisor (Major Advisor).

Integrity and ethical behavior are expected of every student in all academic work. Students enrolled in the Program are subject to the Code of Academic Integrity. This principle stands for honesty in all class work, and ethical conduct in all labs and clinical assignments.

The most important component of your Ph.D. training will be the experience of designing, performing and evaluating research. Courses will provide a valuable opportunity to discuss the fundamentals of neuroscience with established investigators and to learn how to approach and evaluate the scientific literature. A critical goal of the faculty will be to teach you how to take responsibility for your own education. As a graduate student, you must determine what you need to know, figure out how to learn it, and pursue the information aggressively - be it in the classroom, library, or laboratory.

2. Overview of Ph.D. Program in Neuroscience

The purpose of the University of Arizona's GIDP in Neuroscience is to provide formal doctoral education in contemporary Neuroscience.

In keeping with the diverse nature of current approaches included within the realm of Neuroscience, the GIDP in Neuroscience at the University of Arizona transcends traditional departmental boundaries. Students in the program complete a series of core and elective Neuroscience courses, research rotations and other requirements, to ultimately pursue their Ph.D. dissertation research in the laboratory of a GIDP faculty member.

Work leading to the Ph.D. in Neuroscience ordinarily requires four to six years. Students must complete a total of 72 semester units of coursework from the General Catalog in the major and minor subject areas in order to complete the degree.

- ***Major*** 36 units of coursework, combining units from the core and elective curriculum (see below: typical curriculum).
- ***Minor:*** At least 9 units are required for the minor (Biochemistry, Molecular & Cellular Biology, Pharmacology, Psychology, Cellular and Molecular Medicine, Genetics, Physiological Sciences, Speech, Language, & Hearing Sciences, or other related area).
- ***Dissertation Units:*** At least 18 units of dissertation credit are required after successful completion of the comprehensive examinations. Other units come from independent study and research credit.
- ***Research Rotations:*** Students are required to complete two research rotations during their first year in the Program.
- ***Teaching Requirement:*** Students are required to teach for one semester in a course that complements their interests.

- ***Seminars:*** Through enrollment in Neuroscience (NRSC) 695F/G students are required to attend seminars and journal clubs.

Typical Time Line (see below for details):

Year 1: *Core Coursework & Research Rotations*
Year 2: *Coursework, Comprehensive Examination & Dissertation Research.* Students finish their coursework (mostly elective), complete a Comprehensive Examination, and begin their dissertation research under the direction of the Major Advisor.
Years 3-5: *Dissertation Research*, *Dissertation, and Oral Defense Examination.*

3. Critical Steps to Your Degree

Each of these steps must be taken at the appropriate time in your academic career. Please check out the 'Deadlines' you need to be aware of to keep your graduation on schedule.

Each step requires completion and electronic submission of an appropriate form to the Graduate College through GradPath, which you may access through UAccess Student by clicking on the drop-down menu under the Academics section and selecting GradPath Forms.

GradPath is the Graduate College's degree audit process that tracks and monitors student progress. Students are able to fill in and submit forms online through UAccess Student.

The first form you need to submit is to verify compliance with the Responsible Conduct of Research regulations. Before you begin conducting research, be sure you've fulfilled all your responsibilities with regard to the Responsible Conduct of Research, especially with regard to human subjects.

Doctoral Degree Forms

1. Responsible Conduct of Research Form
2. Evaluation of Transfer Credit (If applicable)
3. Doctoral Plan of Study
4. Comprehensive Exam Committee Appointment Form
5. Announcement of Doctoral Comprehensive Examination
6. Results of the Oral Comprehensive Examination for Doctoral Candidacy (submitted by committee chair)
7. Verification of Prospectus/Proposal Approval (submitted by Graduate Coordinator)
8. Doctoral Dissertation Committee Appointment Form
9. Announcement of Final Defense
10. Results of Final Defense (submitted by committee chair)
11. The Thesis Submission Process

4. Administration of the Program

The GIDP in Neuroscience at the University of Arizona is administered by an Executive Committee (EC) fostering common interests, activities and communication among all neuroscientists at the University of Arizona.

The EC reports to the Dean of the Graduate College. It includes at least seven members of the Neuroscience GIDP faculty, including the chairperson, the PI of the training grant, and one GIDP student. The chairperson of the Neuroscience GIDP also chairs the EC (see bylaws of the program for details). The EC is assisted by the Graduate Program Coordinator.

The EC includes one student member who is appointed by the EC for a one-year term. The student member must pursue a major in Neuroscience and is nominated by a simple majority vote of the Neuroscience GIDP students. The student member will be asked to leave the meeting when individual students are being discussed.

The EC coordinates two main standing subcommittees: the Graduate Student Admissions and Recruitment Committee (GSARC) and the Graduate Student Advisory and Progress Committee (GSAPC). The chairperson of each subcommittee is a member of the EC.

The EC:

- develops, implements and supervises the curriculum of the GIDP in Neuroscience as well as policies and procedures for the operation of the program;
- evaluates nominations and applications for membership to the GIDP in Neuroscience and reviews faculty appointments regularly;
- appoints Program faculty to serve on the standing committees of the GIDP in Neuroscience;
- acts on recommendations from the Graduate Student Recruitment and Admissions Committee regarding applications from prospective students;
- acts on recommendations of the Graduate Student Advisory & Progress Committee regarding academic counsel to new students and on evaluations of students in the early phases of the Program until each has a Dissertation Advisor and an individual Advisory Committee;
- plans for future developments in the area of neuroscience at the UA;
- prepares and submits an annual report of Program activities and accomplishments for the Dean of the Graduate College;
- serves as an advisory board for Training Grants
- ensures that regular reviews of the Program, consistent with requirements of the Board of Regents and the training grant, are carried out;
- facilitates interaction and communication within the GIDP and Affiliated Faculty as well as interested parties in the University (such as the deans and the heads of related academic units);
- seeks funding in support of the Program.

The Chairperson of the GIDP in Neuroscience:

- administers the GIDP in Neuroscience, with the assistance of the Graduate Program Coordinator;
- convenes and chairs meetings of the EC and the GIDP;
- acts on behalf of the EC to implement the Program (e.g. to sign requests to schedule examinations, to approve recommendations for appointments to examination committees, etc.);
- serves as representative of the GIDP in Neuroscience to the University Administration, granting agencies, prospective students, etc.

Current Administration:

Chair:

- Konrad Zinsmaier, Professor, Department of Neuroscience and Department of Molecular & Cellular Biology

Executive Committee:

- Alan Nighorn, Professor, Department of Neuroscience
- Katalin Gothard, Professor, Department of Physiology

- Andy Fuglevand, Professor, Department of Physiology
- Daniela Zarnescu, Professor, Department of Molecular & Cellular Biology
- Ralph Fregosi, Professor, Department of Physiology
- Student Representative, GIDP in Neuroscience

Graduate Student Advisory & Progress Committee (GSAPC).
- Andrew Fuglevand, Professor, Department of Physiology (Chair)
- Erika Eggers, Assistant Professor, Department of Physiology
  *the chair is a non-elected member of the EC.

*Program Coordinator***:**
- Kirsten Cloutier Grabo

5. Faculty of the GIDP in Neuroscience

The GIDP in Neuroscience recognizes a distinction between *"Neuroscience GIDP Faculty"* and *"Affiliated Faculty"***.** The Neuroscience GIDP faculty represents the UA faculty who run the GIDP, mentor its students, and can serve as major advisor for a GIDP student. Affiliated Faculty constitutes a broad-based community of neuroscientists who promote the general interests of neuroscience at the UA.

The *Neuroscience GIDP Faculty* is comprised of tenured or tenure-eligible faculty of the UA who are admitted to membership after fulfilling the following criteria (see bylaws for a complete list of criteria):
- being recommended (and suitable) to serve as advisor to a graduate student conducting dissertation research in neuroscience;
- being active in research in neuroscience (as assessed by current record of research support, publication of recent, refereed papers based upon that research, recent service as a Ph.D. thesis/dissertation advisor, etc.); one whose neuroscientific research constitutes a major component of her/his overall research program; and one who actively participates in the Program and other CN activities.

Member of the *Neuroscience GIDP Faculty*:
- can serve as major advisor for a Neuroscience GIDP student.
- can serve on Neuroscience graduate student advisory committees.
- can host Neuroscience GIDP students for lab rotations.
- can vote on GIDP curriculum and policies.
- can serve on Executive Committee.
- can nominate and host seminar speakers.

Affiliated Faculty are scientists who fulfill the following criteria (see bylaws for a complete list of criteria):
- being interested and knowledgeable in neuroscience but not necessarily actively involved in current research in the field; and
- contributing significantly to the goals of the Program by teaching courses, organizing seminars, serving on committees, etc.
- can serve on Neuroscience graduate student advisory committees (but **not** as major advisor).
- can host Neuroscience GIDP students for lab rotations (students should confer with the Neuroscience Graduate Advisor in advance regarding the specifics of the research project to be carried out during the rotation).
- can nominate and host seminar speakers.

The *Graduate Program Coordinator* works closely with the students, faculty, EC and standing committees to ensure timely fulfillment of UA and Program policies and flow of information, as well as to assist faculty and students as needs arise.

6. Coursework and Program Requirements

Graduate students are responsible for knowing the graduate requirements of both the Graduate College and the GIDP in Neuroscience (see below).

Trainees who enroll in the GIDP in Neuroscience work towards a doctoral degree with a "major" in Neuroscience and a "minor" from another graduate program, depending upon the area of research focus. According to the rules of the Graduate College at the UA, all pre-doctoral students must complete both a major and a minor.

Courses in the Major Field. A minimum of 36 units of graduate work must be taken in the major field (exclusive of dissertation research). Of the 36 units, at least half must be course work taken for letter grades. Six required courses normally account for >21 units (For details see: NRSC Course Guide, Table 1):

- NRSC 588, Principles of Cellular and Molecular Neurobiology
- NRSC 560, Systems Neuroscience
- two semesters of NRSC 700 - Research Rotations in the laboratories of at least two members of the Neuroscience GIDP
- PCHL 595B Science Writing Strategies, Skills & Ethics, or SLHS 649, Survival Skills and Ethics, or IMB 521 Scientific Grantsmanship
- one semester of Statistics (NRSC Course Guide, Table 2)
- NRSC 695F, Neuroscience Colloquium (see also below)

Additional course work in Neuroscience (NRSC Course Guide, Table 3) is selected in consultation with Program's student advisors. Choices from Table 3 should total 3-6 units as needed to reach a total of 36 units (not including dissertation research and independent study). Additional courses of interest to individual students can be accepted after confirmation with the student's Advisory Committee (GSAPC) or the Major Advisor.

In addition to the 36 units of course work in the major field, the student will complete at least 9 units in a minor field (see below), and at least 18 units of Dissertation Research (NRSC 920). In total, the Graduate College requires at least 63 units of graduate work.

Neuroscience Colloquium. Throughout the period of pre-doctoral study, each student is required to actively participate in the Neuroscience Colloquium (NRSC 695F/G) and attend regularly other public seminars and colloquia that are sponsored by the Neuroscience GIDP.

The Neuroscience Colloquium includes a number of diverse events including Data Blitz presentations, Research Lectures by external speakers, Student Seminars (lectures by advanced graduate students), and Journal Clubs. The presentations will be publicly announced to the Neuroscience community.

All first- and second-year students, as well as students who have not yet passed the comprehensive exams, are required to enroll in NRSC 695F and actively lead at least one journal club discussion each semester.

All third-year and advanced students (who have passed the Comp. Exam) are required to enroll in NRSC 695G each semester. Advanced (3rd year and beyond) students must present their research progress at least once each year at a Student Seminar (NRSC 695G) or the Neuroscience Retreat.

***Teaching*.** Because teaching is an important element in academic careers in Neuroscience, supervised experience in university-level teaching is considered essential. Each student is therefore required to serve as a Teaching Assistant for at least one semester during the first 2 years.

Research Rotations*.** In preparation for the selection of rotation laboratories and a potential dissertation research advisor (Major Advisor), the student should become familiar with the research interests of the Neuroscience GIDP faculty. This is accomplished in two steps: ***(a) Soon after arrival, first-year students should explore the research of the Neuroscience GIDP faculty, available on each faculty member's website (http://www.neuroscience.arizona.edu/faculty-directory); ***(b***) Each student should meet individually with several members of the faculty of the Program during the first weeks in residence in order to discuss research activities and opportunities.

Each student must take at least two research rotations during the first year in the Program. The required course "Methods in Neuroscience," NRSC 700, provides a formal mechanism for these rotations. The purpose of research rotations is

- to provide "hands-on" experience for at least two areas of interest
- to become familiar with specific research approaches and techniques
- to become acquainted with the laboratory work and research group of one or two prospective dissertation advisors.

Faculty members hosting a rotating student will expect a serious and conscientious effort by the student. Successful rotations may but are not required to lead to the completion of a specific project and/or publication.

Ordinarily, lab rotations last between 8 and 16 weeks, spending 10-20 hours/week in the lab. The duration of a rotation and the expectations of both the student and the faculty member must be discussed in advance. The rotation focus or duration in a given laboratory can be altered at any time through mutual consent of the student and faculty member. All changes must be communicated in writing to the Graduate Program Coordinator. Students typically receive credit for their research rotations (NRSC 700).

How to get credit for research rotations? To receive credit for NRSC 700, the student must submit a brief outline of the rotation ***in advance*** and a final report ***upon completion*** of the rotation to GSAPC through the Graduate Program Coordinator. In addition, the advisor needs to submit an evaluation of the student's performance during the lab rotation.

- The ***rotation outline*** (pdf form) should describe the anticipated time course of the rotation and the work to be performed. .It must be signed by both the student and the respective faculty member.
- The ***student's final report*** (pdf form) should briefly describe the work accomplished during the rotation and comment on the lab environment, the mentorship of the PI and whether the rotation advanced the student's academic knowledge and experimental skills. The form must be submitted by the last day of finals to receive grade for rotation. A grade will not be issued until the report is turned in.

- The ***advisor's final report*** (pdf form) should briefly describe the student's performance during the rotation. The advisor must submit the report by email to the program coordinator, Kirsten Grabo (kirstencg@arizona.edu).

Minor in Another Field. At least 9 units of classes are required, as determined by the guidelines of the respective minor program. Students can pursue a minor in an established program, or may choose a minor in Neuroscience which offers a flexible curriculum tailored to the student's interests. Examples of some minor programs are Cellular and Molecular Medicine, Biochemistry, Cognitive Science, Entomology, Genetics, Molecular & Cellular Biology, Medical Pharmacology, Physiological Sciences, Psychology, Speech, Language, & Hearing Sciences, and others. The minor should be selected in consultation with GSAPC and the Major Advisor (if already selected).

Minor in Neuroscience*.* The Neuroscience Program encourages students from other disciplines to minor in Neuroscience. Nine credits in Neuroscience are required. This must include credits from either NRSC 560 or NRSC 588. The remainder of the units may be selected from Table 3 in the *Neuroscience Coursework Guidelines*.

Students planning to minor in Neuroscience must have at least one member of the Neuroscience GIDP on their Comprehensive Exam Committee, and must submit the appropriate form to the EC (through the Graduate Program Coordinator) for approval and signature. Successful completion of 9 units of approved coursework in Neuroscience constitutes passage of the written comprehensive examination in the minor area.

Rate and Quality of Work*.* Students should make every effort to complete all requirements for the Ph.D. degree within 4-5 years. Students should take at least 6 (12 for first year students) units of graduate course work in each fall and spring semester in order to remain in good standing in the Program. In case of a long-term illness or other serious issues, a student is advised to take a leave of absence to remain in good standing.

A checklist of requirements is maintained by the Graduate Program Coordinator and reviewed annually for each student by the GSAPC and by the EC. If a student falls one full semester behind the timeline laid out in the checklist, he or she will meet with the GSAPC, which will make recommendations to help resolve any problems. If a student falls one year behind the recommended timeline, he or she may be referred to the Graduate College for conversion to non-degree status in the absence of extenuating circumstances. Students will be notified by June 1st of each year of their satisfactory or unsatisfactory progress.

A grade of **I** (incomplete) may be awarded only at the end of a term, when all but a minor portion of the course work has been satisfactorily completed. Instructors are encouraged to use the Report of Incomplete Grade form as a contract with the student as to what course work must be completed by the student for the **I** grade to be removed and replaced with a grade.

Students in the Program must achieve a grade of B or better in each core course. If a student receives a lower grade, she/he must repeat the course at its next offering; failure to achieve a grade of B or better in the second taking of a course will result in dismissal from the Program and conversion to non-degree status.

Students in the program are expected to maintain an overall grade-point average of at least 3.0 (B) and to have no more than a total of 2 grades of C; failure to achieve such a record can result in dismissal from the Program and conversion to non-degree status at any time. Students in

non-degree status are ineligible for continuing financial support, depending on the source of the funding.

In unusual circumstances, a student may apply for and be granted up to a one-year leave of absence. In the event of unexcused interruption of graduate work for one semester (not including summers), the student must apply to be readmitted to both the Graduate College and the Program.

Any graduate student who believes that he or she has valid grounds for a grievance should prepare a written statement of the grievance setting forth the specific allegations with reasonable particularity and submit it to the Graduate Student Advisory & Progress Committee (GSAPC) or to the Program Chair. A meeting will be scheduled within one academic calendar week for discussion of the grievance and to work towards a resolution.

The Graduate College offers additional resources for students such as professional development, childcare assistance, and health and wellness resources as well as other helpful information through the GSAS Office.

7. Enrollment & Vacation Policies

Doctoral Continuous Enrollment Policy. Unless excused by an official "*Leave of Absence*" (which may not exceed one year throughout the student's degree program), all graduate students are subject to the Continuous Enrollment Policy of the Graduate College in order to remain in the program. If the student fails to obtain a "*Leave of Absence*" or maintain continuous enrollment, he or she will be required to apply for re-admission. Tuition or registration waivers cannot be applied retroactively.

Vacation Policy. As trainees that anticipate a research career, graduate students should take advantage of semester breaks and the summer to work in the laboratory or library.

Graduate students are research trainees but can also be University employees, so interpretation of holidays can be complicated. First year students should consult with the GSAPC for guidelines on how much vacation is considered appropriate. Once students are in the laboratory of a Major Advisor, they should negotiate when and how long they take vacations during semester breaks.

Students are required to notify the both their Major Advisor and the Graduate Program Coordinator when they make vacation plans. Attendance at scientific meetings or specialized courses is not considered vacation.

8. Student Supervision & Evaluation

Graduate Student Advisory & Progress Committee (GSAPC). A subcommittee of the EC, the Graduate Student Advisory & Progress Committee (GSAPC), advises and supervises each student in preparation of her/his program of study until the student has passed the Comprehensive Exam and selected a Major Advisor. Thereafter, advising and supervision are provided by the student's Dissertation (Major) Advisor and the student's Dissertation Committee.

GSAPC will make every effort to tailor the student's course work to her/his individual needs. Depending upon the student's interests, the Committee may also assign the student to an interim faculty advisor selected from the GIDP Faculty.

Major Advisor. By mid-May of the first year, the student is expected to choose a Major Advisor (Dissertation Advisor) from among the Neuroscience GIDP Faculty. Having obtained the concurrence of the faculty member, the students must communicate this decision in writing to the GSAPC. The Committee consults with the student and the proposed advisor and then presents the proposal to the EC. The selection of a dissertation advisor may be delayed, in unusual circumstances, with permission from the EC. Having chosen a major advisor, students will begin a research project. Credit for this research may be obtained by enrolling in NRSC 900.

The Major Advisor's responsibilities include:

- to advise and supervise a student's dissertation research
- to advise a Plan of Study
- to advise a student on the selection of a Comprehensive Exam Committee, and subsequently a Dissertation Committee

Comprehensive Exam and Dissertation Committees. By the end of the first year in the program, a student selects a Comprehensive Exam Committee, which will conduct the comprehensive examination. After the comprehensive exam, the Exam Committee may then be re-structured to serve as the Dissertation Committee (for details, see sections below on each committee).

Supervision and Evaluation during year 1 and 2**.** GSAPC advises students in the preparation of their program of study. The committee also ensures that remedial course work is completed, that the Comprehensive Examination is completed in a timely manner, and that the student advances in a timely manner towards his/her dissertation work.

Each student undergoes an annual evaluation by GSAPC at the end of the spring semester until the Comprehensive Exam has been successfully completed and a Dissertation Advisor has been selected. These evaluations include a review of the student's course and research performance. If adequate, the GSAPC will seek input from the student's rotation advisor(s).

The result of the evaluation by GSAPC will be reported to the EC. If the student fails to make satisfactory progress, the EC will recommend guidelines for improvement or dismissal from the Program. Failure to achieve the required record can result in conversion to non-degree status and dismissal from the Program.

A Master's (M.S.) degree in Neuroscience is awarded only in rare instances in which a student who has passed the first-year evaluation is unable to continue in the Program for a justifiable reason. In such instances the EC determines whether or not a M.S. degree is merited. To qualify for the M.S. degree, the student must either successfully complete the written and oral comprehensive exams, or complete a written thesis that is defended to a committee. In addition, all the requirements of the Graduate College must be fulfilled. The Program generally accepts only students seeking the Ph.D. degree.

Supervision and Evaluation during year 3 and above. The Major Advisor and the Dissertation Committee will together monitor student progress after a student has passed the Comprehensive Exam. A student must form a Dissertation Committee and arrange a first meeting within 6 months after the exam and annually thereafter.

Initially, the Dissertation Committee will evaluate the merit of the student's dissertation-research proposal and provide advisory input.

In subsequent meetings, the Dissertation Committee will monitor the progress of the student and provide critical advice during at least one annual meeting. The committee discusses the student's progress with the Dissertation Advisor (in the absence of the student) and with the student (in the absence of the Dissertation Advisor).

A brief report of each meeting is submitted to the EC and Director of the GIDP through the program coordinator by the chairperson of the Dissertation Committee. The student's comments concerning the Dissertation Advisor may be submitted to the Program Director in confidence.

Every effort will be made by the ***GSAPC*** and the EC to help the student meet these requirements. Failure to complete the requirements for the qualifying exam at the end of the fourth semester, however, may be cause for dismissal from the Program.

9. Comprehensive Examination

The Comprehensive Examination is the major requirement that a student must pass before being admitted to formal candidacy for the Ph.D. degree.

A student must meet the following requirements to qualify for the Comprehensive Examination:

- the student has selected a Dissertation Advisor and finalized a Comprehensive Examination Committee;
- the student has satisfactorily completed the required course work (see section 6) for the major and minor (will be verified by the Comprehensive Examination Committee).

The Comprehensive Examination is considered a single examination, although it consists of written and oral parts that are both designed to meet two main objectives:

- To evaluate the proficiency of the student's general neuroscience knowledge
- To evaluate the ability of the student to:
    - independently evaluate and critique a body of neuroscience literature,
    - integrate the acquired information into broad conceptual schemes,
    - develop testable hypotheses,
    - devise experimental approaches and thereby evaluate hypotheses,
    - demonstrate the communication skills required to present and defend scientific ideas in oral and written formats.

The Comprehensive Examination ***must be taken in the student's fourth or fifth semester*** in the Program. The EC may grant an extension only for compelling reasons upon written petition by the student and recommendations from the student's Major Advisor (if selected) and GSAPC.

Comprehensive Exam Committee. By the end of the first year in the program, the student selects a Comprehensive Exam Committee, which will conduct the exam. After the exam, the Committee may then be re-structured to serve as Dissertation Committee (for details, see section Dissertation Committee, section 9).

The Exam Committee should consist of at least 4 members, including at least 3 members of the GIDP Faculty (one of whom can be the Major Advisor) and one faculty member from the student's minor field. Note that since GIDP faculty may also be associated with the minor program, more than 3 members of the committee may belong to the GIDP.

One of the GIDP faculty members ***other*** than the Major Advisor will serve as chairperson, and will preside over all examinations and deliberations of the committee. The Exam Committee has the flexibility to make the best decision for a given student.

Scheduling. For scheduling requirements of the Graduate College, students are advised to consult the Graduate Program Coordinator and the Graduate College publication "Oral Comprehensive Examination".

To formally schedule a doctoral oral comprehensive exam, students must use GradPath using the link within the UAccess Student Center to submit the necessary forms. This process can take several business days and needs to be done well in advance of the examination.

- Students must have submitted earlier the "Responsible Conduct of Research" confirmation form and have an approved "Plan of Study."
- To schedule the oral comprehensive exam, students must submit the "Comprehensive Exam Committee Appointment Form" prior to submitting the "Announcement of Doctoral Comprehensive Exam".

Guidelines for the Comprehensive Examination.

Overview. The Comprehensive Exam consists of 2 parts, a written and an oral exam.

- For the written exam, students prepare a research grant proposal that follows the guidelines of a NIH Kirschstein predoctoral fellowship (see "written exam" for guidelines).
- The oral exam consists of an in-depth examination of the topic addressed in the research proposal and a broad examination that can cover any aspect of neuroscience and/or the chosen minor field of study (see "oral exam" for guidelines).

The topic of the research proposal can be any problem of neuroscience, and may be part, or the focus of the student's planned dissertation research. The emphasis of the research proposal should not be a review of the literature but a creative experimental dissection of the selected problem. The proposal must be "hypothesis-driven". That is, it should aim explicitly to address a working hypothesis regarding an unresolved issue in neuroscience.

The Comprehensive Examination will evaluate the written proposal, its oral defense, and fundamental knowledge in all basic areas of neuroscience. All three parts must be mastered independently. The broadly covered areas should include aspects of molecular/cellular, developmental, systems, behavioral, computational neuroscience or medical neuroscience.

***Initial Preparation*.** The student must convene an initial meeting with the committee to select:

- a specific topic for the research proposal
- a date for submission of the research proposal (written examination): 8 weeks after initial meeting
- a potential date for the oral examination: no later than 14 weeks after the initial meeting

Prior to the first meeting, the student submits a pre-proposal to the committee (one page). The pre-proposal should outline a rationale for the topic/problem to be studied and 2-3 questions (or Aims) that will be addressed later in the proposal.

It is recommended that the proposed topic be part of, or covers the student's planned dissertation research. It is expected that students will later use the successful "exam proposal" as a template for an NIH pre-doctoral fellowship application.

The questions raised in the pre-proposal must demonstrate that the student is well positioned to develop and address a working hypothesis regarding an unresolved issue in Neuroscience. The

pre-proposal should reflect an informed analysis of the problem and the relevant literature, and should be supported by key citations.

At the first committee meeting, the committee must evaluate whether the topic and the outlined questions of the proposal are appropriate to design a hypothesis-driven research proposal. The committee chair is charged with ensuring that such an evaluation has been carried out and that appropriate dates for the written and oral exam (see time line) have been selected.

It is recognized that sometimes it may be unavoidable that parts of a specific aim of a student's proposal are similar to that of an active or submitted grant application by the advisor. The committee is asked to discuss to what degree such a "thematic" overlap is tolerable. If in question, the advisor may provide copies of the respective grant application to the committee.

The written proposal must be entirely the work of the student. It is not permitted to cut & paste or "slightly" modify any part of an existing research proposal (being current or in draft form). If a partial thematic overlap exists, it is expected that there is also significant divergence.

Before and during the preparation of the proposal, the student may have general discussions on background information, or the strengths and weaknesses of experimental approaches and techniques with members of the Exam Committee, the Dissertation Advisor, or other colleagues. It is not appropriate to ask anybody for review of any parts of the written proposal, even in draft form.

***Timeline*.**

- Initial committee meeting and identification of a specific topic for the research proposal (ideally during the fourth, the latest by the end of the fourth semester)
- Deadline for submission of research proposal (time of written exam): 8 weeks after initial committee meeting.
- Announcement of written exam evaluation: no later than 1 week after submission of the proposal.
- Oral examination: 9-14 weeks after the initial committee meeting (1-6 weeks after submission of the proposal).

Written Exam (research proposal). After selection of the specific research topic, the student will have 8 weeks to write a grant application based on the selected problem. The student will need to evaluate the literature in the selected area, formulate significant and relevant hypotheses, and devise experimental strategies to test hypotheses. The written exam (research proposal) must be electronically submitted to the chair of the committee within 8 weeks after the initial meeting (preferably as a pdf file).

The emphasis of the research proposal cannot be a mere review of the literature. The proposal should explicitly address a hypothesis regarding an unresolved issue in neuroscience. There is an expectation of substantial depth of knowledge in the research area *per se*. It will not be sufficient to defend only particulars of proposed experiments. The students are expected to have a broad view of experimental approaches, a good understanding of expected outcomes and potential pitfalls.

A key element of the proposal defense will be to explain and defend the importance of the questions to be addressed, and to place these questions in a broader context of the field. Thus, in both the significance section of the written proposal and in the subsequent oral defense, the

student should be able to marshal knowledge from the relevant literature and from broader areas of neuroscience.

The research proposal of the written exam should follow the format of an NIH Predoctoral NRSA grant application (PHS 416; note that these guidelines are subject to change). The proposal should realistically cover 3 years of research.

Students are encouraged to look at actual grant applications submitted by other students to get a sense of the structure and contents of successful applications. However, students are not allowed to receive assistance with written drafts of their exam or guidance in the construction of the proposal.

Format and Organization of the written exam. The specific guidelines for the written proposal are those used for the "Research Training Plan" section of the standard NRSA grant application as described in PHS 416 (see, https://grants.nih.gov/grants/how-to-apply-application-guide/forms-d/fellowship-forms-d.pdf).

The research plan (page limit 7) includes two main sections, a "Specific Aims" and a "Research Strategy" section. In addition, full citations of all referenced literature must be included. **NOTE** that the bibliography does not count as part of the 7-page limit.

The research plan must include:

- a specific hypothesis,
- a list of the specific aims and objectives that will be used to examine the hypothesis,
- a description of the methods/approaches/techniques to be used in each aim,
- a discussion of possible problems and how they will be managed, and
- alternative approaches that might be tried if the initial approaches do not work.

Specific Aims (page limit 1)
State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will have on the research field(s) involved.

List succinctly the specific aims (2-3) and main objective of the research proposed (e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology).

Research Strategy (page limit 6)
Organize the Research Strategy into sections in the specified order: Significance, Innovation, Approach.

1. Significance

- Explain the importance of the problem or critical barrier to progress that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

2. Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development (no preliminary results), describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work.
- *Preliminary Studies/Results.* A description of preliminary results is encouraged. If included, provide information on preliminary data collected by yourself and/or others in the lab.

References (no page limit)
Full citations of all referenced literature must be included. Any format of in-text citations can be used. In the bibliography, each literature citation must include the names of all authors, the year of publication, the title of the publication, the name of the book or journal, volume number, and page numbers.

Evaluation of written exam. The student's research proposal will be immediately distributed to all committee members for their evaluation, using the following criteria:

- Expectation that pertinent literature in the chosen area of interest is presented in substantial depth and that the addressed problem is presented in relation to a wider context (“big picture”).
- Expectation that the existing knowledge is critically and scholarly evaluated such that specific gaps in our knowledge are identified.
- Expectation that hypothesis-driven approaches are proposed and that the logic connecting the hypothesis, experiment approaches, experimental outcomes, and possible conclusions is clearly developed and presented.

Each committee member will submit a letter grade of A (4), B (3), C (2), D (1), or F (0) to the committee chair to calculate an average score. An average score of 3.0 or higher will be necessary and sufficient for the student to pass the written section of the examination.

Additionally, committee members are asked to provide constructive and useful written feedback to the student regarding major weaknesses of the proposal (either in the submitted file or as a formal review). The chair of the committee will compile these comments and transmit them to the student together with the average grade.

The chair of the committee will notify the student, the other members of the committee, and the chair of the GIDP of the outcome within 1 week of submission of the proposal. The student must have passed the written examination in order to proceed to the oral examination.

At the discretion of the committee, a student who fails the written examination may be permitted to repeat the examination once. It is also at the discretion of the student's committee to decide whether the student will be permitted to revise and resubmit the failed proposal, or whether the student must submit a new proposal on a different research topic. A repeated written examination must be completed within 5 months after the first examination.

A student with an average of 1.0 or lower shall not be allowed to repeat the examination. In this case, the student will be dismissed from the program.

***Oral Exam*.** The oral part of the comprehensive examination should be taken as soon as possible, and ideally no longer than 4 weeks after successful completion of the written examination.

- To formally schedule the comprehensive exam, students must use GradPath to submit:
  - the "Comprehensive Exam Committee Appointment Form"
  - prior to submitting the "Announcement of Doctoral Comprehensive Exam".

The exam must be conducted according to the Graduate College 's "Policies and Procedures for Comprehensive Oral Examinations", with particular attention to the following passage:

- "*The examining committee must attest that the student has demonstrated the professional level of knowledge expected of a junior academic colleague.*"

The oral examination involves:

- **in-depth questions** within the area of specialization (topic of research proposal but also dissertation research, if different)
- **broad questions** across the general field of neuroscience (including molecular/cellular, developmental, systems, behavioral, computational neuroscience and/or diseases of the nervous system).

The oral exam should be organized in 3 sections:

- The student may initially give a 5-10 minute overview of the research proposal using audio-visual materials. A LCD projector and, if needed, a laptop computer will be made available for the exam.
- The first hour of the oral exam may be devoted to the defense of the research proposal and in-depth questions related to the students' area of specialization.
- The remaining time consists of a broad examination covering any aspect of neuroscience and/or the chosen minor field of study. The exam must last a minimum of 2 hours but cannot exceed 3 hours.

Students are advised to have at least one practice oral exam with other graduate students and postdocs about two weeks before the scheduled exam. This can be helpful in identifying strengths and weaknesses since students often need practice to effectively illustrate answers to posed questions on a black board.

Evaluation of oral exam. The student is expected to master both parts of the oral exam and show:
a) solid in-depth knowledge within the area of specialization. There is an expectation of substantial depth of knowledge on the topic of the written proposal (and topic of dissertation, if different). It will not be sufficient to defend only particulars of the proposed experiments. A key element of the defense will be to explain and defend the importance of the addressed questions, and to place these questions in the broader context of the field. It is also expected that the student will, in a scholarly manner, address questions concerning background information relevant to the topic, significance, and design of the proposed experiments.
b) general knowledge of the major and minor subjects of study. The student is expected to demonstrate a solid, general knowledge of fundamental principles in all areas of neuroscience, including molecular, cellular, developmental, systems, behavioral, computational and disease-

orientated neuroscience. A similar solid general knowledge of fundamental principles is expected for the respective minor field of study.

- Failure to meet one of the expectations (a or b) results in failure of the entire oral exam.
- Failure to meet one part cannot be substituted by an excellent performance in the other part.

After no more than 2 hours into the exam, the student will be briefly excused from the room and the committee will discuss the student's performance. At this time, the committee may decide that the student has either passed or failed the exam, or it may decide that the examination should continue with additional questions. If continued, the chair is charged to ensure that the exam time is limited to three hours, by which time the committee must decide on a pass or fail grade. Committee deliberation time is not included in the exam time.

If a student fails the oral examination, the committee may recommend that the student be dismissed from the Program or be re-examined no later than six months from the date of the failed oral examination (provided that the student is not already on probation and has not taken the written exam twice). Failure to pass the oral comprehensive exam within six months of the original date will be grounds for dismissal from the program.

10. Advancement to Candidacy

After successful completion of the comprehensive exam, the student will be promoted from Graduate Assistant to Graduate Associate (effective the next January 1 or July 1).

The student must then submit the ***Doctoral Dissertation Committee Appointment Form*** in GradPath. The application must be submitted through UAccess (student > Academics > Grad Path Forms) before the student may enroll in NRSC 920, Dissertation Research. At least 18 units are required, with no more than 9 being taken in any one semester.

11. Dissertation and Defense

Overview. After passing the Comprehensive Exam (CE), the following sequence of events applies:

- Selection of a Dissertation Committee
- Submission of a Dissertation-Research Proposal to the Dissertation Committee
- First meeting with the Dissertation Committee to approve proposed dissertation research (within 6 months after CE)
- Annual meetings with the Dissertation Committee to discuss progress on dissertation research
- Dissertation
- Dissertation defense

Dissertation Committee. The Dissertation Committee should ideally consist of five members. At minimum, the Dissertation Committee must consist of three members, all of whom must be members of the Neuroscience GIDP Faculty (one of whom being the major advisor). There is no maximum of committee members. Any committee member beyond the third may be associated with the major or minor area of study, or another appropriate field, and may be tenured, tenure-track, or a special approved member. Special members (someone who is not a UA tenured or tenure-track faculty) must be pre-approved by the Dean of the Graduate College. If a committee has only three members, all must approve the dissertation. If a committee has more than three members, there may be one dissenting vote. All dissertation committee members are expected to attend the final defense.

One of the Neuroscience GIDP faculty members on the Dissertation Committee other than the Major Advisor will serve as the chair and will preside over all examinations and other deliberations of the committee. The chair will also provide a summary report of all meetings to the Graduate Program Coordinator.

The responsibilities of the Dissertation Committee include:

- to evaluate the merit of the Dissertation-Research Proposal
- to critically advise the student's dissertation research during annual advisory meetings to ensure steady progress
- to ensure an appropriate relationship between the student and the major advisor
- to accept the Dissertation and conduct the Final Examination (Dissertation Defense).

Before the first meeting, a student is required to submit a brief dissertation-research proposal (see below). The Dissertation Committee will evaluate the proposal's overall merit, and provide advisory input by discussing the strength and weaknesses of the plan. The chairperson of the Dissertation Committee will submit to the EC a written report of the Committee's evaluation of the proposal.

In subsequent meetings, students present their research progress and potential changes of the research plan for discussion and advice during at least one annual meeting with the Dissertation Committee.

The committee discusses the student's progress with the Dissertation Advisor (in the absence of the student) and with the student (in the absence of the Dissertation Advisor). A brief report of each meeting is submitted to the EC and Director of the GIDP by the chairperson of the Dissertation Committee. The student's comments concerning the Dissertation Advisor may be submitted to the Program Director in confidence.

***Doctoral Dissertation Committee Appointment Form*.** The student must declare the composition of the Dissertation Committee and file the online form entitled "*Doctoral Dissertation Committee Appointment Form*" in GradPath no later than three months after successful completion of the Comprehensive Examination for Graduate College Degree Certification.

The online application must be submitted to the Graduate Student Academic Services as soon as requirements are met (approved doctoral Plan of Study on file, satisfied course work, language, and residence requirements, and passed the Comprehensive Examination) but no later than six months before the Final Oral Defense Examination is scheduled.

Dissertation Proposal*.* Having passed the Comprehensive Examination, the student is required to submit a dissertation-research proposal (not to exceed 10 pages) that has been developed in cooperation with the Major Advisor. Typically, students developed already a thesis research plan for the written part of their comprehensive examination, which will fulfill the requirement.

The proposal should include the following sections: Specific Aims, Background and Significance, Preliminary Studies, and Research Design and Methods. The proposal should present a carefully prepared, thoughtful, critical, and realistic plan of research actually intended to lead to the completion of the dissertation.

The dissertation proposal should be based on preliminary work carried out by the student or others to evaluate the feasibility of the proposed studies.

The research proposal should be submitted to the student's Dissertation Committee 1-3 weeks before the Committee's first meeting (with a copy to the GIDP program Office). For the first meeting, the student should prepare for an oral presentation of the proposal. The Committee will discuss the merit of the proposal with the student and the Major Advisor, and provide critical advisory input on the research plan. The chairperson of the Dissertation Committee will submit to the EC a written report of the Committee's evaluation of the proposal and its defense.

Dissertation. Preparation of the written dissertation shall follow the regulations of the Graduate College (as set forth in the Student's Manual for the Preparation and Presentation of Theses for Advanced Degrees).

After writing and correcting a draft of the complete dissertation, the candidate must submit the draft to each member of the Dissertation Committee. The exact timing of the submission is at the discretion of the Dissertation Committee. However, it is highly suggested that the final draft of the dissertation is submitted to committee members at least 6 weeks before the exam date. Committee members will provide the candidate with detailed suggestions or requirements for revision before, or on the day of, the final exam.

Final Oral Defense Examination. Upon the completion of the dissertation, the candidate must submit to a Final Oral Defense Examination. Formal oral defense of the dissertation constitutes the final examination (Final Oral Defense Instructions).

The date, time, and location of the final examination must be scheduled with the Graduate College in advance using the ***Announcement of Final Oral Defense*** form in GradPath. This form requires online signatures of all members of the dissertation committee, signifying their assessment that the dissertation is ready to defend and should be submitted ***far enough in advance*** of the examination ensuring that all approvers can grant their approval in time for the form to reach the Graduate College one week prior to the exam. Final Oral Examinations should be scheduled during days when the university is in session and during normal business hours.

The defense comprises two parts:

- a one-hour public colloquium in which the candidate presents her/his research and explains how it contributes to the advancement of understanding of the nervous system, and
- an oral examination by the candidate's Dissertation Committee and other qualified persons acceptable to the committee. There is no minimum time limit for the final examination, but the examination may not exceed three hours.

The Final Examination will be chaired by a member of the Dissertation Committee other than the Major Advisor and must be conducted according to the Graduate College's "Policies and Procedures for Final Oral Examinations for Doctoral Candidates".

If the committee requires revisions of the dissertation, they must be done in a timely manner, not to exceed one year. If the revisions are not completed by the dissertation submission deadline for the term when the student defends, the student will be required to register for the next semester and will graduate in the semester when the revisions are complete and approved.

If revisions are not done by the end of the time to degree period, the student will have to re-take comprehensive examinations to demonstrate currency of knowledge.

The Chair of the Dissertation Committee will report the outcome of the exam in GradPath on behalf of the entire committee (using the link in the GradPath e-mail for the Results form or the Pending Transactions page). If revisions are required by the student, the Chair or Graduate Coordinator must notify (by email) Graduate Student Academic Services when the revisions have been completed.

After successful completion of the final examination, the candidate must upload a final copy of the dissertation to the Graduate College for a format review. The candidate makes any corrections required and provides two signed copies of the final dissertation to the Graduate Degree Certification office. Approval pages, which must accompany these copies, are available on the Graduate College website (www.grad.arizona.edu) and it is recommended that the student take these approval pages to the final examination for signatures.

The candidate provides a final copy of the dissertation to the Graduate Program Coordinator to be bound for the Program's library.

Addendum
Guidelines for Master's Thesis

Since fall 2015, the Graduate College has required that masters students completing a thesis must submit the final, approved thesis for archiving. The online submission of the thesis is the last requirement for the student, once the committee has given its final approval. The submitted thesis must meet the Graduate College's very minimal formatting standards before the thesis is accepted for archiving and the student's degree is awarded.

Formatting guidelines for master's theses (and for dissertations) are available on the Graduate College web site at http://grad.arizona.edu/gsas/dissertations-theses/dissertation-and-thesis-formatting-guides. These formatting guidelines are fairly flexible but there are a few required items, particularly with respect to the first two pages of a thesis: the title page and thesis approval/Statement by Author page.

Students can find samples of those pages at http://grad.arizona.edu/gsas/dissertations-theses/sample-pages. A student with specific formatting questions should contact their degree counselor in our office for assistance.

We would like to request that the thesis advisor remind students completing a thesis (under course number 910) that they are required to submit the thesis for archiving once the committee has granted final approval. The archiving procedure is detailed at http://grad.arizona.edu/gsas/dissertaions-theses/submitting-and-archiving-your-thesis.

Submission of the thesis must be made by the graduation deadline for the term in question. Deadlines are posted at http://grad.arizona.edu/gsas/degree-requirements/important-degree-dates-and-deadlines.

Archived theses and dissertations may be found in the UA Campus Repository (http://arizona.openrepository.com/arizona/handle/10150/129649/) or in the archive maintained by ProQuest/UMI (http://www.proquest.com/products-services/dissertations/Find-a-Dissertation.html).

Addendum

MD/PhD Dual Degree Program

Graduate Interdisciplinary Program in Neuroscience
University of Arizona

The MD/PhD Dual Degree Program in Neuroscience prepares students for academic careers involving research and teaching and clinical service, as well as other careers where biotechnology training is required.

The Association of American Medical Colleges summarizes the objective of an advanced dual degree: "The MD/PhD training organizes the experimental and clinical thinking of the physician-scientist. This synergy enables a physician-scientist to recognize new ways that clinical care or the understanding of disease mechanisms will benefit from research and to mount the appropriate effort. Likewise, the synergy achieved in dual-degree training enables the physician-scientist to see how the results of research discoveries and insights can be converted into clinically significant outcomes."

The goal of the University of Arizona MD and Neuroscience PhD Dual Degree Program is to provide outstanding aspiring physician scientists with biomedical training so that they emerge as leaders in both academic medicine and research. Students accomplish this by spending the first two academic years exclusively in the College of Medicine, followed by 4 years of interdisciplinary doctoral training in neuroscience. Upon successful completion of a PhD thesis, students then return to the College of Medicine and complete their final two years of clinical training.

Candidates are admitted independently to the College of Medicine and the Graduate Interdisciplinary Program in Neuroscience. Although the time to completion of both programs, combined is usually nine years, the Neuroscience PhD/MD Dual Degree Program makes it possible to complete both degree objectives in 8 years. This is accomplished by giving credit for certain units of College of Medicine courses towards the Neuroscience study program.

Dual Degree Requirements

Dual degree applicants must meet the application deadlines and testing requirements to each program independently. Students pursuing the dual degree will spend the first two academic years exclusively in the College of Medicine.

After spending the first two academic years exclusively at medical school, students pursuing the dual degree program will complete their Ph.D. graduate course work and dissertation research before completing their clinical requirements at medical school.

Fees

Students will be charged the fee/tuition of that program in which they are enrolled. For example, COM fees would be charged in years 1 and 2. The Program Coordinator for the student's first program/year will be responsible for letting the bursar's office know the enrollment status of the student.

Doctor of Neuroscience PhD Requirements

Doctoral students must complete a minimum of 63 units of graduate-level coursework. 36 total units must be completed in the major subject area (18 units in the major must be taken as letter-grade and must be courses at the 500-level or greater), 9 units in the minor field and 18 units of dissertation research.

Combined Credit – Units credited to both degrees

Medical course credits will be counted as 1/1 to graduate credits.

Nine units of Medical School curriculum will be accepted by the Graduate College as counting towards the PhD in Neuroscience and 10 credits will be accepted towards the minor.

Students seeking a Ph.D. in Neuroscience degree will successfully complete the following credit requirements with a grade of 3.0 or better GPA. The course work required for the PhD degree is a total of 72 credits.

Requirements

Core Courses

- NRSC 588, Principles of Cellular and Molecular Neurobiology — 4 units
- NRSC 560, Systems Neuroscience — 4 units
- NRSC 701 Communications in Neuroscience (or equivalent) and NRSC 695e Science, Society & Ethics — 2+1 units
  - or PS 595B Science Writing Strategies, Skills & Ethics — 2 units
  - or SLHS 649 – Survival Skills and Ethics, — 3 units
- Statistics (options: EPID 576A/B, PSYC 507A/B/C, RNR 613 — 3-4 units

Elective Courses

Elective courses (see: www.neuroscience.arizona.edu/curriculum) must add up to a minimum of 36 units (not including dissertation research and independent study). At least half of the 36 units must be taken for a letter grade (not pass/fail).

Additional courses of interest that are not listed can be accepted after confirmation with the student's Advisory Committee

Minor Courses (9 units minimum)

MED courses 9 units

Research Rotations

Students are required to complete two research rotations (NRSC 700, Research Rotations, 2-4 units) during their first year in the Program.

Teaching Requirement

Students are required to teach for one semester in a course that complements their interests.

Seminars

Students are required to attend seminars and journal clubs by enrolling in NRSC 695F/G Neuroscience Colloquium (1-2 units).

Research

NRSC 900 (year 1) Research
NRSC 920 (year 2) Dissertation

PhD Courses	**Credits**
Principles of Cellular and Molecular Neurobiology (NRSC 588)	**4**
Systems Neuroscience (NRSC 560)	**4**
Scientific Writing & Ethics (options: NRSC 701 and 695e, or PS 595B, or SLHS 649)	**3**
Statistics (options: EPID 576A/B, PSYC 507A/B/C, RNR 613)	**3-4**
Neuroscience Colloquium NRSC 695F (2 units per semester in year 1-2)	**8**
Neuroscience Colloquium NRSC 695G (1 unit per semester in year 3-5)	**6**
Elective Neuroscience Coursework (to complete 36 units for major)	**x**
Research Rotations NRSC 700 (2-4 unit per semester in year 1)	**8**
Research NRSC 900 (4-8 units in year 2-4)	**24**
MD Courses used for electives in major field (MED 803)	**9**
MD Courses used for minor filed (MED 802, MED 804, MED 805, MED 806A/B, MED 807, MED 808, MED 809)	**10**
Dissertation NRSC 920 (9 credits per semester for 2 semesters)	**18**
TOTAL	**>72**

Sample Plan of Study for Dual Degree MD/PhD Neuroscience

Year One	***First Year Medical School Curriculum*** **MED 802** - Foundations (9 weeks) **MED 803** - Nervous System (9 weeks) **MED 804** - Musculoskeletal System (5 weeks) **MED 805** - Cardiovascular, Pulmonary, Renal Systems (12 weeks) **MED 806A DMH A** - Digestion, Metabolism & Hormones (3 weeks) Courses may be used for graduate credit upon request and approval.
Year Two	***Second Year Medical School Curriculum*** **MED 806B DMH B** - Digestion, Metabolism & Hormones (12 weeks) **MED 807** - Immunity and Infection (9 weeks) **MED 808** - Life Cycle (9 weeks) **MED 809** - Advanced Topics (7 weeks) Complete Step 1 United States Medical Licensing Exam (USMLE) Courses may be used for graduate credit upon request and approval.
Year Three	***First year PhD in Neuroscience Curriculum*** **NRSC 588** – Cellular & Molecular Neurobiology (fall semester) **NRSC 695F** – Neuroscience Colloquium (both semester)

	NRSC 700 – Research rotation (both semesters) **NRSC 560** – Systems Neurobiology (Spring Semester) Science & Ethics Course (either semester) Statistics Course (either semester) Elective & minor courses (both semesters) Comprehensive Exam (end of Spring semester)
Year Four	***Second year PhD in Neuroscience Curriculum*** **NRSC 900** – Research (both semesters) **NRSC 695G** – Neuroscience Colloquium (both semesters)
Year Five	***Third year PhD in Neuroscience Curriculum*** **NRSC 900** – Research (both semesters) **NRSC 695G** – Neuroscience Colloquium (both semestesr)
Year Six	***Fourth year PhD in Neuroscience Curriculum (as needed)*** **NRSC 920** – Dissertation (both semesters) **NRSC 695G** – Neuroscience Colloquium (both semesters) Dissertation and Defense
Year Seven	Clinical Clerkships Transition to Clerkships (1 week) Intersessions (2 weeks) Required Clerkships The seven required clerkships are organized into four blocks: Neurology Clerkship (3 weeks) and Psychiatry Clerkship (6 weeks) plus 3 weeks of elective time or a 3-week Surgery Subspecialty Selective Obstetrics and Gynecology Clerkship (6 weeks) and Surgery Clerkship (6 weeks) Medicine Clerkship (12 weeks, with two, 4-week blocks of inpatient medicine and one, 4-week block of ambulatory medicine) Pediatrics Clerkship (6 weeks) and Family and Community Medicine Clerkship (6 weeks) Complete Step 2 United States Medical Licensing Exam (USMLE)
Year Eight	Continue Clinical Clerkships Sub-internship selective (4 weeks) in a core discipline including internal medicine, general surgery, pediatrics, obstetrics and gynecology, emergency medicine or family medicine.

	Emergency Medicine or Critical Care selective (4 weeks) Surgery Subspecialty Selective (3 weeks) in any subspecialty (if not completed in Year 3) Elective courses (24 weeks) Enter the Residency Match Process Complete Residency Interviews