



*Guidelines and Regulations for
Doctoral Study
in the
CNUP Training Program*

2019/20 CNUP Students:

Constanza (Connie) Bassi
Madeline Carr
Aaron Dean
Erin Duricy
Jenna Gale (MSTP)
Jenesis Gayden
Ruby Holland (MSTP)
Antonija Kolobaric
Sydney Lamerand
SuhJin (Alex) Lee
Geyu (Grace) Liu
Eleni Moschonas
Tracey Myers
Amar Ojha
Tiffany (Vinci) Parks
Sadie Riskus
Rebekah (Shelby) Ruiz
Terra Schall
Sam Snyder
Alexander Zinsmaier

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1. OVERALL OBJECTIVES OF THE GRADUATE PROGRAM

The predoctoral training program of the Center for Neuroscience at the University of Pittsburgh (CNUP) has been designed to accomplish the following objectives:

- To develop competence in conducting laboratory research; to plan, execute, report, and defend original research in the field of neuroscience.
- To develop general excellence in neuroscience and specific expertise in one or more areas of neuroscience such as cognitive neuroscience, developmental neurobiology, homeostatic regulatory systems, membrane biophysics, modeling of neural circuits, molecular neurobiology, neuroanatomy, neurochemistry, neuroendocrinology, neuropharmacology, and neurophysiology.
- To develop a general professional excellence in oral and written expression, in the critical analysis of primary scientific articles, and in teaching.
- To develop fundamental skills in scientific reasoning required to define important research questions and to devise innovative strategies as a means for adapting to the continually evolving landscape of neuroscience and neuroscience research.

In formulating the graduate training program, the faculty has been guided by several principles. *First*, the program should aid each student in the development of an individualized training program based on the student's background and interests. *Second*, research experience should form the core of each student's training and as such should not be postponed by a lengthy period of time devoted exclusively to course work. *Third*, students should be able to complete the program in four to six years. *Fourth*, students should be evaluated in terms of those competencies that are important to a research scientist: designing, conducting and evaluating research, both their own and that of others. Thus, the progress that a student makes in the program is considered primarily in terms of the student's performance as an investigator.

2. PURPOSE OF THIS DOCUMENT

"*Guidelines and Regulations for Doctoral Study in the CNUP Graduate Training Program*" is a document written by the CNUP graduate training faculty in consultation with the graduate students. The Guidelines are meant to supplement the ***Regulations Governing Graduate Study at the University of Pittsburgh*** and thereby provide a complete handbook for students that detail the Program's rules, expectations, and recommendations for each aspect of the graduate program. Questions regarding specific issues of the graduate program should be directed to the Co-Directors of the CNUP Graduate Program (see below).

2.1. Changes to the Guidelines

Each graduate student will be given a copy of the *Guidelines* when they enter the program. To ensure that students are given an up-to-date version of the *Guidelines*, a new edition will be dated and printed at the beginning of each fall term. Each summer, the Co-Directors of the CNUP Graduate Program will oversee the editing of the *Guidelines*. Student input will be solicited. Major changes will be circulated among the faculty and students for comment. It is expected that this annual revising of the *Guidelines* will not result in any substantive change in the graduate program. Rather, this process is expected to update or clarify aspects of the previous edition. Major substantive alterations in the *Guidelines* (e.g., a change in the format of the

Comprehensive Exam) would require additional discussion by the faculty and students before being implemented.

During their progression through the Program, each student should refer to the *Guidelines* that were current when they entered the Program.

3. ADVISORS

To aid the student in satisfying the objectives outlined in this document, the faculty has created separate mechanisms for providing academic and research advice. Upon entering the Program, each student selects a research mentor to supervise his or her first laboratory rotation. Advice on academic issues and other issues relating to graduate education will be handled formally by the Co-Directors of the Graduate Program who will also serve as general advisors to the student during their first year. Students are also encouraged to establish an informal research advisory committee consisting of their research mentor and two other members of the CNUP training faculty.

3.1. Co-Directors of the Graduate Program

The Co-Directors of the CNUP Graduate Program (currently, Drs. Brian M. Davis and Anne-Marie M. Oswald) have the primary responsibility for ensuring that the graduate program is running effectively. Students who have questions related to required coursework, curriculum development, or completion of Program milestones should consult with either of the Co-Directors on these matters. The Co-Directors are responsible for approving student registration, approving the composition of student evaluation committees (i.e., Reprint Exam, Second Year Research Evaluation, Comprehensive Exam, and Dissertation committees), and may at their discretion approve minor modifications in Program academic requirements for students on an individual basis. When conflicts arise between a graduate student and the CNUP program or the student's mentor, the Graduate Program Co-Directors will serve as advocates for the student to insure that the student is treated fairly, within the CNUP guidelines.

The Co-Directors of the CNUP Graduate Program are also responsible for the annual evaluation of each student (See Yearly Evaluations – Section 7) and they therefore serve as Co-Chairs of the CNUP Student Evaluations Committee. This committee consists of six members of the training faculty in addition to the Co-Directors of the Graduate Program. The major function of this committee is to facilitate the students' progress through the Program by providing them with thorough yearly evaluations and advice regarding their development. This committee also serves as an advisory committee for the Co-Directors of the Graduate Program.

The Co-Directors of the CNUP Graduate Program are assisted by the CNUP administrative staff. These staff (Patti Argenzio and Natalee Bright) are responsible for maintaining student folders, notifying students of upcoming deadlines, scheduling exams and committee meetings, and monitoring the status of students.

3.2. Research Advisor

At all times during their graduate training, students will be engaged in laboratory research. While a student is working within a faculty member's laboratory, that faculty member will serve as the student's research advisor. Research advisors are limited to CNUP training faculty members. Students seeking

specialized training may work with graduate faculty members outside the CNUP only during the second and third rotation periods, provided they receive prior approval from a CNUP Co-Director.

Students and their research advisors should discuss the nature of their interactions so that each has a full understanding of what they should, and should not, expect from one another. The students should understand that different faculty members have different styles of interacting with students. New students are encouraged to consult with the Co-Directors of the CNUP Graduate Program and with senior students to obtain additional perspectives concerning the mentoring styles of different faculty members.

3.2.1 Workload and Vacation

CNUP graduate students are financially supported for full-time and year-round work, whether that support derives from institutional funds, faculty research grants, training grants, or individual student fellowships. Upon selecting a thesis laboratory, students and mentors should discuss mutual expectations for daily and weekly student research time spent in the laboratory and time spent in other research-related tasks. Every project will have different requirements, and student progress will be intimately related to time and effort expended. Regarding vacation time and occasional days off, students are eligible for all faculty and staff university holidays. In addition, students are encouraged to take a somewhat longer vacation break (typically two weeks per year) after discussion with and approval by their laboratory research mentor.

3.2.2 Financial Support

The first year of financial support for Ph.D. students (i.e., before students commit to a particular laboratory for their dissertation research) will be provided by the CNUP. This support will include a stipend, institutional fees (tuition) and individual medical insurance. While our program is committed to ensuring that all students receive full stipend support throughout their graduate career, it is the student's responsibility to select a CNUP-approved dissertation mentor who agrees to support the student's continued graduate training. Students may also be eligible for support in later years through training grants and other institutional programs. In addition, students are encouraged to apply for individual predoctoral fellowships (see 5.7 Grant Writing Course).

4. GRADUATE PROGRAM

The following sections outline the academic courses, the research experiences, and the oral and written examinations (herein referred to as "milestones") that the student must successfully complete prior to being awarded the doctoral degree. A calendar listing the deadlines associated with these milestones is included at the end of this document. These requirements are described in terms of the academic and research accomplishments expected during each year of the student's progress through the Program. Anticipated deviations from the outlined sequence and time schedule must be approved in advance by the Co-Directors of the Graduate Program.

4.1. Overview of Requirements

The Ph.D. program in Neuroscience has a 23-credit course requirement covering fundamental material. This requirement is fulfilled by core courses in cellular and molecular biology, systems neuroscience, and by 9 credits of elective courses (<http://www.cnup.pitt.edu/graduate-course-list>).

Core Courses:

- **Cellular and Molecular Neurobiology 1 and 2** (Fall Semester, Year 1)
- **Systems Neurobiology** (Spring Semester, Year 1)

Elective Courses:

- **9 Credits Elective Courses**, consult the CNUP website <http://www.cnup.pitt.edu/graduate-course-list> for pre-approved electives. See <https://www.registrar.pitt.edu/courseclass.html> for the University's Schedule of Classes.

Additional Requirements:

- **Pro-Seminar** (Fall Semester, Year 1)
- completion of a course in **Professional Ethics** (1 Credit)
- completion of an *advanced graduate level* course in **Statistics** (which may require completion of two graduate-level courses, the first being a less advanced introductory course)
- completion of a course in **Grant Writing** (3 Credits)
- attending **CNUP Journal Club** every Fall and Spring term through advancement to candidacy (i.e., until approval of the dissertation proposal).
- attending **Research Seminars** on a regular basis each year (requires documentation)
- obtaining **Research Experience** in at least two separate laboratories
- serving as a **Teaching Assistant** for at least one term (or course)
- MSTP and PhD students registered in the School of Medicine must obtain 40 hours of **Dissertation Credit** after advancement to candidacy and prior to the date of their graduation.

Graduate students must receive a grade of at least a B to pass a course and must maintain a cumulative grade point average (QPA) of at least 3.0.

Students are expected to attend all sessions scheduled for each of the required CNUP courses (e.g. Cell and Molecular Neuroscience 1 and 2, Systems Neurobiology, Proseminar, Ethics and Professional Development, Statistics, Grant Writing). Consideration will be given to students attending scientific conferences or illness. Course Directors will be notified prior to missing a scheduled class whenever possible.

Students are required to pass four milestones en route to the doctoral degree: the Preliminary (Reprint) Exam, the Comprehensive Exam, approval of their Dissertation (Thesis) Proposal, and successful defense of their dissertation/thesis.

Students should refer to the *Regulations Governing Graduate Study at the University of Pittsburgh* for additional details concerning University requirements.

4.2. Yearly Sequence of Requirements and Expectations

4.2.1. Entering Students: Entering students should schedule an introductory meeting with one of the Co-Directors of the Graduate Program in order to discuss issues related to being a graduate student. The purpose of this meeting is to answer questions that the student may have and to assist the student in getting settled in the program. Prior to the beginning of the student's first term, the student, with the aid of the Co-Directors, outlines a plan of study for the first two years.

4.2.2. First Year: The major objectives of the first year are to select a laboratory for dissertation research, complete the core course curriculum, and obtain sufficient experience through courses and research to pass the preliminary or "Reprint" Exam.

It is required that students participate in the following activities during the Fall and Spring terms of their first year: (a) laboratory research, typically consisting of semester-long laboratory rotations in at least two different laboratories (see section 5.1 on Research Rotations), (b) two courses of the core curriculum in neuroscience (Cellular and Molecular Neurobiology 1 and 2, and Systems Neurobiology), (c) Pro-Seminar, (d) journal club, (e) research seminar and (f) ethics. During the first year, students typically register for 3-6 research credits of Directed Study (MSNBIO 2690 or NROSCI 2902) per term.

Following the spring term of the first year of study, each student takes the Preliminary (Reprint) Exam (see Section 9.1).

During the summer term following the first year, students are expected to focus on research. In addition, students may choose to take a graduate-level statistics course during the summer to fulfill the first part of their statistics requirement (see Section 5.4).

By the end of the first year, students should have selected a dissertation advisor. This must be done by the end of August of the first year unless students receive special permission from the Co-Directors of the graduate program, in writing, to extend this for an additional rotation period.

4.2.3. Second Year: The major objective of the second year is to begin work towards a dissertation project.

During the Fall and Spring terms students will generally participate in (a) research (registered for 6-9 credits, MSNBIO 2690 or NROSCI 2990), (b) elective coursework, (c) statistics, (d) journal club, and (e) research seminar. A list of current elective course offerings can be obtained from one of the CNUP administrative offices.

It is expected that most students will complete the Program's teaching requirement during their second year (see Section 6), as well as their statistics requirement (see Section X).

The Second Year Research Evaluation (at the end of the second year) includes an oral and written research presentation by each student to a committee assembled for this purpose (see section 9.2).

Establish Comprehensive Exam Committee by August 1st (see section 9.3.1).

4.2.4. Third Year: The Comprehensive Exam (see section 9.3) must be completed by February 28 of the third year. In addition, the dissertation committee must be approved and hold its initial meeting within 6 months after the student passes the Comprehensive Exam.

In this and subsequent years, graduate students are expected to be involved in research, to participate in a journal club and research seminars, and to take additional courses as necessary.

4.2.5. Subsequent Years: The major objective of the remainder of a student's graduate program is to have their doctoral dissertation proposal approved, and to complete the doctoral dissertation (see Section 9.4). Students continue to attend Research Seminar for each Fall and Spring term they are enrolled in the Program. Participation in the CNUP sponsored journal club becomes optional, though encouraged, once a student is admitted to candidacy. Please check with a CNUP Administrator regarding PhD credit requirements for the school you are enrolled in.

4.3. MD/PhD Students

MD/PhD students are expected to follow an accelerated schedule designed to aid the student in completing the PhD within 3 years. The requirements for MD/PhD students are similar to those of PhD students, except for the following: 1) MD/PhD students are **not** required to take the two core neuroscience courses (Cellular and Molecular Neurobiology 1 and 2 and Systems Neurobiology); 2) MD/PhD students must complete a minimum of 6, rather than 9, hours of elective coursework; 3) MD/PhD students will satisfy their grant writing and ethics course requirements through their medical school curriculum; and 4) teaching (TA service) is optional for MD/PhD students.

Research requirements for MD/PhD students are the same as those for PhD students. MD/PhD students complete their first laboratory rotation during the summer prior to beginning medical school, and their second laboratory rotation during the summer between the first and second year of medical school. MD/PhD students must select their dissertation advisor before entering the CNUP graduate program.

5. COMPONENTS OF THE PLAN OF STUDY

In developing a plan of study, students are expected to strike a balance between breadth in neuroscience and depth in their area of specialization. Students are encouraged to be innovative in designing their graduate training experience. Thus, courses are defined as any accredited interaction between a student and one or more faculty members. This includes formal lecture courses (usually but not always at the graduate level), seminars, or tutorials at the University of Pittsburgh, CMU, or at other universities, research institutes, or special study programs. Credit for coursework outside of the University of Pittsburgh is subject to the approval of the program Co-Directors.

5.1. Research Rotations

Each student is required to spend at least one term conducting research in a laboratory other than the laboratory in which they do their dissertation research. This will typically be done as research rotations during the first year. The first year is divided into two research rotation periods with additional rotation periods during the summer before or the summer after. Rotations officially begin on the first day of classes and end on the last day of classes each term (see the University calendar for specific dates). Students are required to begin their first research rotation no later than the first day of the Fall Term, but can begin earlier in the summer by mutual agreement with the research mentor. The first rotation must be with a member of the CNUP Graduate Training Faculty. This research rotation is set up by arrangement between the student and the specific training faculty member, who serves as the student's research mentor during that rotation period. In addition, the student is encouraged to establish a research committee consisting of the research mentor and two other members of the training faculty. The student will need to fill out a "Research Rotation Form" listing the research mentor and submit the form to a CNUP administrative office within one week of beginning the research rotation.

By the last day of each of the first two laboratory rotation periods, the student must submit a rotation report to his/her research advisor and to a CNUP office (see description of the Rotation Report below, section 5.1.1). The research mentor will submit an evaluation of the student's performance during the rotation. Rotations are graded satisfactory/unsatisfactory. Unsatisfactory rotations will not count toward the required two and will result in the student being placed on probation.

At the end of the student's first rotation, the student will typically move to a second laboratory to complete a second research rotation. At the end of the second research rotation, the student may elect to remain in the same laboratory, return to the initial laboratory, or move to a third laboratory for an additional research rotation. Rotation reports are required only for the first two rotation periods; if a student chooses to do a third

rotation, a report is not required. It is expected that the rotations selected by each student will reflect a goal directed effort to identify a suitable laboratory for doctoral dissertation research. It is also important to understand that some mentors may not be able to accommodate rotation requests. Students are therefore encouraged to take a proactive approach in planning rotations and to approach potential mentors well in advance of the desired rotation period.

Students are expected to complete a minimum of two laboratory rotations prior to declaring a thesis laboratory. Under certain circumstances, and with prior approval from the graduate program co-directors, other arrangements may be made.

5.1.1. Rotation Report: The main goal of the rotation report is to produce a scholarly account of the research activities undertaken by the student during that rotation period. In general, the report should include 5-8 pages of double-spaced text and any useful figures. It should utilize the standard format of scientific journals (i.e., Introduction, Methods, Results, Discussion). Even if experiments were not completed as planned or data were not obtained, the report should include discussion of how the rotation experience contributed to the student's pursuit of educational and technical training objectives. Copies of the report must be given to the research mentor and to a CNUP administrative office. Rotation mentors are expected to provide the Program Co-Directors with a written evaluation of the student's research work, and also to comment on the student's written rotation report. **Rotation reports are due on the final day of the rotation period.**

5.2. Core Curriculum in Neuroscience

The core curriculum consists of two courses designed to be taken during the first year. The first core course, Cellular & Molecular Neurobiology 1 and 2 (MSNBIO/NROSCI 2100/2101), deals with issues of cellular and molecular biology and is offered during the Fall term. The second core course is Systems Neurobiology (MSNBIO or NROSCI 2102). It focuses on the functional anatomy of the mammalian brain and is offered during the Spring term.

5.3. Electives and Tutorials

Students must also take elective courses in order to further their expertise in neuroscience. A listing of courses identified by the CNUP Curriculum and Education Programs Committee that satisfy the elective requirement is available from the Graduate Administrators. Students may also establish tutorials in specialized areas for which formal courses are not available. In such cases, a student (or group of students) identifies a faculty member willing to serve as a tutor and develops a syllabus, including a mechanism by which competency in the area will be assessed. The syllabus must be approved in advance by one of the Graduate Program Co-Directors, with potential additional input from the CNUP Curriculum Committee as deemed necessary. The subject matter of these tutorials usually will be "academic" in nature; i.e., with a focus on the reading of primary and secondary literature. It also may involve learning new laboratory techniques. Journal clubs cannot be used to satisfy the elective requirement.

5.4. Statistics

Students are expected to obtain a background in statistical and quantitative analysis of data that is appropriate to their area of research and sufficient to enable critical evaluation of scientific literature. At a minimum, students are required to obtain training comparable to the material covered in "Introduction to Biostatistics for Biomedical Scientists (BIOST 2014)" or "Introduction to Statistical Methods II (BIOSTAT 2042). Note, BIOSTAT 2014 is only offered in the Summer Term. BIOSTAT 2042 is offered in the Spring but has a prerequisite of "Introduction to Statistical Methods I (BIOSTAT 2041) which is offered in the Fall.

We encourage all students to take an additional higher-level statistics course for elective credit, but this is not required.

5.5. Pro-Seminar

Pro-Seminar is a required one-term course taken during the Fall term of the first year of graduate study. The goal of this course is to provide first year students with an overview of research being conducted in the laboratories of CNUP training faculty. The course meets informally once per week over dinner and provides an excellent opportunity for students to learn about the diversity of research programs in the CNUP, as well as to meet the faculty and hear about their personal career journeys.

5.6. Grant Writing

All students are required to complete a grant-writing course during their second year in the program. The grant writing course gives students an opportunity to develop their scientific writing skills and, more importantly, to develop their ability to design a hypothesis-based research project. The Grant Writing course is one of several experiences (others including the comprehensive exam and the dissertation proposal) that are designed to help the student develop the writing skills necessary for success as an independent scientist. It is expected that this requirement will be fulfilled by taking MSNBIO 2624 Grant Writing, a 3 credit course which will be offered in the Spring term. This course will expose students to the processes of grant writing and grant reviewing. Students will review grants previously submitted and will generate written and oral reviews of those grants. They will also write a 6 page NRSA predoctoral-style proposal based on a novel research project of their own design. These proposals will be reviewed and critiqued by other students and faculty in the course. For MSTP students, the grant writing course requirement is fulfilled by a similar course offered through the MSTP program.

5.7. Journal Club

Each student is required to attend a weekly journal club sponsored by the program (MSNBIO 2650 or NROSCI 2007) each Fall and Spring term through their admission to candidacy (see section 9.4.3, honors/satisfactory/unsatisfactory). Participation thereafter is encouraged but not required. The goal of this experience is to provide students with a multidisciplinary perspective on the critical analysis of the neuroscience literature. Each term, students will be divided into groups of 10-14, and each group will be assigned a faculty supervisor and a weekly meeting time. If a student has a conflict with their assigned time, they should contact a Graduate Administrator to get reassigned before the term begins. Each student is required to present a paper in journal club at least once each term, and it is expected that the more senior students will make their presentations earlier in the term whereas the more junior students will make their presentations later in the term. At the initial meeting each term, each student will sign up for a week that they will be responsible for selecting and presenting the journal article. The presenting student also has the option of having their research mentor or another "expert" faculty member attend their journal club presentation in order to provide particular expertise for the paper. Both students and faculty supervisors will critique presentations. Presentations that are not considered acceptable by the faculty supervisors must be repeated. In addition to presenting a paper once during the term, each student is required to read the selected paper each week and be prepared to discuss it. Weekly attendance and active participation in journal club is required. More than one unexcused absence will result in the student failing this course and will require the student to enroll in this course for an additional semester after they advance to candidacy.

5.8. Seminar Series

Each student is required to attend research seminars on a regular basis. Each Fall and Spring term that the student is enrolled in the graduate program, they must register for Seminar Series (MSNBIO 2660 or NROSCI 2106, pass/fail). This “course” requires that the student attend at least 10 relevant research seminars during the term. Students must send an e-mail message summarizing their attendance record to the seminar coordinator of the course for which they registered, typically once at the end of each term. Acceptable seminars are at least 45 min long and involve a formal presentation of data in one of the departmental seminar series. Journal clubs, dissertation defenses, or informal presentations of data in laboratory meetings or student-sponsored meetings (e.g., “Brain Bag”) cannot be used to satisfy this requirement. Seminars presented at meetings off campus also do not count towards satisfying the requirement. This includes the annual CNUP and CNBC retreats, Society for Neuroscience meeting, off-campus workshops, etc.

5.9. Ethics and Professional Development

All students are required to complete a formal training program on research ethics during the Spring term of their first year in the program. It is expected that this requirement will be fulfilled by taking a 2-credit course in Scientific Ethics (MSNBIO/NROSCI 2010). This requirement is waived for MSTP students who have already taken the MSTP ethic courses.

All students are required to show ethically appropriate behavior in the conduct of research and mastery of safe laboratory practices. These competencies extend to the treatment of laboratory animals, collection of data, publication of data, and use of references to previous literature. Further, all documents submitted to satisfy curriculum or research requirements of the Program should be free of plagiarism and conform to the rules defined in the University of Pittsburgh Honor Code (www.pitt.edu/~graduate/aistudcode1.html). All students must attend mandated training sessions relevant to their research, as dictated by Environmental Health & Safety. All students are also required to familiarize themselves with the NIH "*Guide for the Care and Use of Laboratory Animals*" (1996), the *Handbook for the Use of Animals in Research, Testing, and Teaching at the University of Pittsburgh*, and *Guidelines for Ethical Practices in Research* (University of Pittsburgh, May 1997). All students using animals in their research must attend the appropriate training session(s) conducted by the Division of Laboratory Animal Resources. Publications detailing requirements in each of these areas are available on web sites and can be obtained from the appropriate campus regulatory agencies. In addition, students should familiarize themselves with acceptable publication practices described by the Society for Neuroscience (<http://www.sfn.org/Advocacy/Policy-Positions/Policies-on-the-Use-of-Animals-and-Humans-in-Research>).

5.10. Career Planning

Every student will be assigned a Career Advisor that they need to meet with annually. Additionally, every student will be required to develop an IDP (individual development plan). See this link for more information: <http://www.asgraduate.pitt.edu/node/426>. This IDP will initially be developed as part of the Ethics and Professional Development course during the Spring term of the first year. Thereafter, students are expected to revise this IDP in consultation with their mentor and career advisor.

5.11. Annual CNUP Retreat

The yearly CNUP retreat occurs at the beginning of each Fall term, typically during the second weekend in September. The CNUP retreat is organized and implemented by a select committee comprising CNUP graduate students, post-docs, faculty, and staff. The CNUP retreat includes an outstanding scientific program, entertaining recreational opportunities, and an environment that fosters both social and professional

interactions. There is no charge for graduate students to attend this event. **All CNUP graduate students are required to attend unless they obtain written permission from one of the Co-Directors of the CNUP Graduate Program.** Acceptable reasons for not attending the CNUP retreat include attendance at other scientific meetings, job interviews or other professional activities that cannot be rescheduled. In addition, graduate students are required to present their research in poster format at the retreat poster session at least twice during their time in the graduate program. These can be the same posters used for other scientific meetings occurring within the last 12 months (e.g. posters used for the Society for Neuroscience meeting), or they can be new.

6. TEACHING BY GRADUATE STUDENTS

Teaching is an important component of the graduate training program. It provides experience in classroom instruction as well as an opportunity to obtain a broader perspective on neuroscience content and pedagogy. In general, second-year students serve as graduate teaching assistants (TAs) to members of the training faculty for one term, or one full course. As such they are typically responsible for conducting recitation sections, teaching laboratory exercises, holding office hours to answer questions of class members, and helping to prepare, proctor, and grade exams.

Some students may elect to become more involved in teaching. To facilitate this, certain faculty allow graduate students to give classroom lectures in their undergraduate courses. Students wishing to obtain this enriched teaching experience should contact a Graduate Administrator.

7. EVALUATION OF GRADUATE STUDENTS

7.1. Yearly Progress Reports

By June 15th of each year all students must submit an NIH-style biographical sketch and a progress report summarizing their activities during the past year and their plans for future study. This report will serve as the focal document for the annual student evaluation by the CNUP Student Evaluations Committee, although reports from the student's research advisor, committee chairpersons, course instructors, teaching supervisors, etc. will also be incorporated into the evaluation. Therefore, the progress report should incorporate everything the student wishes the faculty to know at the time of the evaluation. It should be organized as follows:

- a) a statement of prior year's goals and the extent to which they have been achieved,
- b) a list of the courses taken and the grades attained,
- c) a description of research efforts including clearly stated scientific rationales and goals,
- d) a list of Program "milestones" completed,
- e) a list of any awards or honors attained,
- f) a list of manuscripts and abstracts published or submitted,
- g) a list of attendance and presentations at scientific conferences,
- h) a statement of specific objectives for the coming academic year, and
- i) current emergency contact information.

The length of the progress report can vary from 2 to 10 pages (double-spaced). Detailed reports from first- and second-year students are particularly important because the faculty generally know less about them than about more senior students.

These reports should be submitted to the CNUP Graduate Administrators (Patti Argenzio, E1448 Biomedical Science Tower or Natalee Bright, A210 Langley Hall) before June 15th.

7.2. Annual Student Evaluations

The progress of each student is discussed by the CNUP Student Evaluations Committee each summer. Results of these evaluations are reported to each student in a letter from the Co-Directors of the Graduate Program, typically before the end of August. This letter may be supplemented by a discussion between the student and a member of the committee to clarify the letter, if necessary, or to discuss additional aspects of the student's progress. Students are also encouraged to discuss this evaluation with their research advisor. In evaluating students, the committee considers performance in laboratory research, course work, teaching, journal club, mastery of the relevant scientific literature, performance on any major examinations that have been taken during the past year, and contributions to the community at large. Copies of the yearly evaluation letter are sent to the student's research advisor and become a part of the student's file.

7.3. Mid-year Evaluation of First-Year Students

The progress of *first-year* students in laboratory research (including their first rotation report) and core coursework is reviewed by the CNUP Student Evaluations Committee in January or early February of their first year. The purpose of this mid-year evaluation is to provide early feedback to new students on their progress thus far, while also identifying any problems that might have arisen so they can be corrected promptly. Students will be given a written summary of the committee's perception of their progress following the committee meeting.

More senior students who have experienced difficulties during the previous year may also be re-evaluated at mid-year. As part of this evaluation, the student will be required to provide the Committee with a written report addressing problems areas.

7.4. Program Probation

Students experiencing difficulties or delays in meeting program requirements (either academic or research-related) may be placed on *Program Probation*. A student who fails one of the "milestone" examinations (see Section 9) is automatically placed on probation until the requirement is successfully completed. A student may also be placed on program probation for continued inadequate performance in the laboratory or failure to complete program milestones in a timely fashion. Students who begin a fourth research rotation before selecting their dissertation laboratory will be placed on automatic program probation. Students who are placed on program probation will be informed regarding what is necessary to be removed from probation, and will remain on probation until they have satisfied those requirements and have been notified of this by the program Co-directors. Note that CNUP "Program Probation" is distinct from "University Probation" (see-Section 7.5) in that it does not preclude financial support from the University.

7.5. University Probation

The University requires that all graduate students maintain a minimum QPA of 3.0 or above in order to take the preliminary ("Reprint") exam, the comprehensive examination, to be admitted to candidacy for the Ph.D. degree, and to graduate. Students whose QPA falls below 3.0 must be put on "University probation" and cannot be awarded financial assistance from the University (e.g., teaching assistantship) until they have re-established a QPA of 3.0 or higher.

7.6. Termination of a Student from the Graduate Program

Students may be terminated from the Graduate Program for failure to pass two required core courses or one of these courses on successive occasions, failure to pass the Reprint Exam, Comprehensive Exam, or to advance an acceptable dissertation proposal, failure to make adequate progress in laboratory research (including unsatisfactory performance in the Second Year Research Evaluation), or for breaches in ethical conduct such as plagiarism. Except for instances involving breaches in legal or ethical behavior, students will not be terminated from the Program without first being notified in writing that they have been placed on probation. This written communication will include a detailed description of the reason(s) for placing the student on probation, and the goals that the student must accomplish in order to regain good standing in the Program. Students will typically have one term to resolve their problems and be removed from probation; failure to do so will lead them to be terminated from the Program.

When a student who is not on probation fails one of the major examinations listed above, the student will be placed on probation and given a second opportunity to pass the examination. The student will receive a written communication from the committee that evaluated their exam performance, detailing the deficiencies and what must be accomplished to remove the deficiencies. The second examination must be taken within three months of the first examination, unless otherwise approved by the Program Co-Directors. Failure to resolve issues of concern on the second examination will result in termination from the Program. When a student who is already on probation fails one of the major examinations, they may or may not be given a second opportunity to pass that examination, at the discretion of the CNUP Student Evaluations Committee.

When a student is informed that his/her laboratory research progress has been judged unsatisfactory, the student will be placed on probation and given one term to improve laboratory skills and productivity before being reevaluated. A second determination that laboratory performance is substandard, at this time or during any subsequent evaluation, will result in the student's termination from the program.

In all cases, the termination of a student requires a decision by the CNUP Student Evaluations Committee and acceptance of a recommendation for dismissal by the Directors of the CNUP. Termination decisions cannot be made by an individual faculty member or examination committee. Terminations are final.

7.7. Terminal Masters Degree

If students leave the program (voluntarily or otherwise) after having completed a set of minimum requirements (described below), they may petition the CNUP Graduate Student Evaluations Committee to receive a terminal Masters Degree. Students wishing to receive such a degree must fill out an "Application for Graduation" form as mandated by the University. The requirements for a Masters degree include: passing the two required core neuroscience courses, passing at least one elective course, passing the Preliminary (Reprint) Exam, regularly attending Proseminar and Ethics and Professional Development courses, completing at least two terms of CNUP graduate journal club, completing least two terms of research seminar, and completing at least four terms (including summers) of laboratory work.

Students must also submit and defend a Masters thesis and publicly present their Masters research. The student should assemble a Masters thesis committee consisting of at least three members of the CNUP training faculty, including the students' research advisor. The thesis committee must be approved by the Program Co-Directors. The nature and scope of the thesis must be approved during an initial meeting of the student with the committee. The student should anticipate this meeting by distributing a document that proposes the body of work that will form the basis for the Masters thesis. The thesis should be based on the research that has been the focus of the student's work in the training program, and should represent at least one "publishable unit" that has been or could be submitted to a neuroscience journal. See the University's on-

line Style and Form Manual at: <http://training.cssd.pitt.edu/thesisdissertationtemplates.htm> for the Masters thesis format.

Students wishing to obtain a Masters degree *en route* to the PhD, and working under the direction of a faculty member in the Department of Neuroscience, may apply for the degree through the School of Arts and Sciences. The requirements for the degree are the same as stated above for a terminal Masters degree. Note that the Master's degree is not required before completing the PhD.

8. SPECIAL STATUS

8.1. Leave of Absence

Students may request a leave of absence (LOA) from the Program. Such requests should be made in writing to the Co-directors of the Graduate Program. Requests should include the reason for the request and the duration of the requested leave. The student should describe how the LOA will be used to resolve issues leading up to it. If the student has already chosen their dissertation laboratory, the LOA request should confirm that the faculty mentor agrees to allow the student to return to their laboratory at the end of the specified LOA, and the faculty mentor should co-sign the letter. Leaves of absence are subject to the approval of the Associate Dean for Graduate Studies of the appropriate school (as determined by the affiliation of the student's research mentor). Students considering taking a leave of absence should consult the Regulations Governing Graduate Study at the University of Pittsburgh regarding policies on leaves of absence, as well as discuss the matter with one of the Graduate Program Co-directors.

9. EXAMINATIONS

Note: Specific forms are required in association with some of the milestone exams. The relevant forms, and their filing procedures, should be obtained from the appropriate CNUP Graduate Office.

9.1. First Year Preliminary Exam (Reprint Exam)

During the first year students are expected to obtain experience in the critical evaluation of original research reports. This training is provided by a program of supervised reading with their rotation research mentors. **Students are strongly encouraged to seek their research mentors' counsel in preparing for this exam.** It is required that the preliminary or "Reprint" Exam will be taken by May 31 of the first year. By May 1, the student must submit the completed Reprint Examination Form identifying the proposed committee members and the date on which the exam is scheduled. Students wishing to postpone this exam past May 31 of the first year must receive **prior approval** from the Co-Directors of the Graduate Program.

The Preliminary Exam primarily serves to set a standard of competency in the critical evaluation of research articles and in oral expression, a standard that students are expected to attain early in their graduate career. In addition, it helps the faculty to identify areas of weakness in these critical skills.

To begin the process, the student writes a brief description of the general area in which he/she would like to be examined and selects a Reprint Exam committee comprising three CNUP graduate training faculty members. A fourth member of the committee from outside the CNUP training faculty may be added for a particular area of expertise. Typically the student's current or previous research rotation mentor serves as the chairperson of this committee. The composition of the committee must be approved by the Program Co-Directors. Two weeks before the exam students will propose 3 papers for their exam. The committee will

consider the student's suggestions, but the final selection is at the committee's discretion and may be a paper that was not proposed by the student.

At the examination, the student presents background material and discusses the paper's major points, analyzing the rigor of the prior research as defined by NIH (<https://nexus.od.nih.gov/all/2016/01/28/scientific-premise-in-nih-grant-applications/>), the methodology chosen, the validity of the evidence obtained, and the conclusions drawn from the analysis. **In addition, the student must address the following points:**

- 1) What is the stated or implied **hypothesis** that is being tested in the paper? If there is no apparent hypothesis why did the authors think that this series of experiments would advance the field?
- 2) If present, was the hypothesis tested conclusively? If not, what could the authors have done to test their hypothesis?
- 3) Did the experiments meet the standards of "Rigor and Reproducibility" as described by NIH (point III at: <https://grants.nih.gov/reproducibility/faqs.htm#4830>). In particular, address the appropriateness of the statistics used, whether the number of samples was justified, whether the analysis was unbiased, and whether sex as a variable was assessed.

Thirty minutes are provided for this presentation. The student then is questioned on the presentation and other relevant issues. At the conclusion of the presentation, the committee selects one of two options: pass or fail. If the student fails, then the exam may be taken a second time provided that the student was not already on probation. If the student is already on probation, then failure may, at the discretion of the CNUP Student Evaluations Committee, result in termination of the student from the program. If a student fails this exam, the mentor or chair of the committee must submit a written report to both the student and the CNUP detailing the shortcomings of the student's performance. Failing the Reprint Exam, or any other program milestone, results in the student being placed on probation. A failed Reprint Examination must be retaken within three months unless otherwise approved by the Program Co-Directors; the exam will follow the same procedure and format as the first exam but with a new article selected by the exam committee. It is expected that the exam committee will remain the same, though students may petition the CNUP Student Evaluations Committee to request that one member of the committee be changed.

9.2. Second Year Research Evaluation

A formal evaluation of research progress is conducted at the end of the second year. **As part of their Annual Progress Report at the end of the second year (submitted by June 15), the student submits to the Program Coordinators a written description of their research activities during the first two years** and selects a Second Year Research Committee, consisting of the research mentor who serves as committee chair, and two additional CNUP graduate training faculty members. The composition of the committee must be approved by the Program Co-Directors. An important objective of the Second Year research report is to describe how the student's research efforts have contributed to the important goal of defining a doctoral dissertation laboratory. This research report should be approximately 8-10 double-spaced pages of text, plus figures and tables describing the results of experiments. The student also provides this written report to their Second Year Research Committee for review. The meeting in which the committee evaluates the student's progress must occur before July 31 and the date of the scheduled meeting must be included in the progress report. It is the student's responsibility to circulate his/her research progress report to the committee a minimum of a week prior to the meeting.

At the Second Year Research Evaluation meeting, the student presents a 20-30 minute oral overview of their research, during or following which the student is asked questions pertaining to the research project. The student is expected to be knowledgeable in the area in which he/she is working and to be able to defend specific aspects of their research project.

The chair of the research committee provides a written evaluation of the student's research progress (i.e., either acceptable or unacceptable) to one of the CNUP Graduate Administrators, Patti Argenzio (argenzio@pitt.edu) or Natalee Bright (nrf26@pitt.edu). If the student's research progress is viewed as unacceptable, he or she will be given one term to improve research progress to an acceptable level. In this instance the student will be provided with a written evaluation identifying the areas of concern and stipulating what must be accomplished to resolve concerns. If a student is already on probation, he or she may be terminated from the Program. Dismissal would be contingent upon a review of the issues by the CNUP Student Evaluations Committee and acceptance of a recommendation for dismissal by the Directors of the CNUP.

9.3. Comprehensive Examination

The Comprehensive Examination is the major requirement that a student must pass before being admitted to candidacy for the doctoral degree. This exam provides the student with an opportunity to master a literature that is relevant to their research interests and ultimately to demonstrate that the needed competency has been achieved. The format of the exam is also designed to provide training in the preparation and defense of grant proposals.

The specific educational goals of the Comprehensive Exam are to test the student's ability 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 topic of the Comprehensive examination is expected to overlap with the student's research interests and general dissertation goals. In addition, it is expected that the proposed plan be original in its conception and scholarly in its execution. This means that the research proposal submitted for the comprehensive examination must be demonstrably different from work that has been previously designed and discussed or written up in any form by either the student or the research mentor.

Students should begin planning for the Comprehensive Exam near the end of the second year. The Exam must be completed no later than February 28 of the student's third year in the graduate program, and students are strongly encouraged to do this earlier, if possible. Any requests for a delay in this schedule must be made in writing to the Co-directors of the Graduate Program; such requests should include a reason for the delay, as well as the time when the student proposes to take the exam. Note that the student must have his/her Comprehensive Exam committee approved by the Co-directors of the Graduate Program no later than August 1 of their second year; by that time students must also have decided upon a tentative Exam date. Failure to do so may result in a delayed re-appointment and an interruption in graduate stipend payments.

9.3.1. Committee: The Comprehensive Exam committee is selected by the student, but must be approved by the Co-Directors of the Graduate Program. This committee must be established by the end of the second year (August 1). The committee consists of at least four members, and must contain at least four members of the CNUP graduate training faculty. The research advisor is generally a member of the committee but cannot serve as its chairperson. Prior to its first meeting the student should select a chairperson, and must notify the appropriate CNUP Grad Program administrator (currently Patti Argenzio or Natalee Bright) with the date of the first scheduled committee meeting and the name of the faculty committee chairperson.

9.3.2. Initial Proposal and Meeting: One week before the first committee meeting, students submit to their committee three research projects in the form of an NIH Specific Aims page (1 page per project) on which

they would like to base their comprehensive exam. The students can use as one project the specific aims developed for either the CNUP or MSTP grant writing course. The other two projects should be unique from ones used for the grant writing courses and should not overlap with grants submitted by their mentor. The proposed Specific Aims should reflect an informed analysis of the relevant literature and should be supported by essential citations. Each of the three overview/Specific Aims sets should include one or two paragraphs of relevant background and rationale, should clearly state the hypotheses to be tested, and should briefly indicate proposed experimental approaches (e.g., a few sentences or bullet points per Aim; the typical Comprehensive Exam will include 2-3 Specific Aims).

At this meeting or a subsequent follow-up meeting (in person or via email), the committee will approve one of the student's original or revised topics and set of Specific Aims. The committee may decide to modify one of those topics or assign a different related topic. The committee will ensure that the approved Specific Aims are significantly different from the specific aims developed for the grant writing course and do not overlap excessively with the student's current research. This difference should be sufficient to demonstrate the student's continued intellectual growth and increased knowledge in their chosen field of study. If a student is unable to gain committee approval of their Specific Aims after 3 rounds during which proposed Aims are reviewed and revised, the student will be considered to have failed the Comprehensive Exam.

9.3.3. Written Exam: After receiving approval of their Specific Aims, students have 5 weeks to write a "grant application" based on these Aims. Thus, students will need to evaluate the literature in the selected area, formulate and/or revise their hypotheses, and devise experimental strategies to test these hypotheses. The written report should follow the basic form of an **NIH RO1** application and should follow the directions contained in the most recent version of the NIH SF424 form (<http://grants.nih.gov/grants/funding/424/#inst>). The proposal should be a realistic program for 3 years of research. It will include all of the following sections of an NIH R01 research grant proposal:

Specific Aims (p I-110 SF 424): This section will include a statement of the hypotheses to be tested and the goal or objectives of the proposal (**1 page**).

Research Strategy (p I-110 & 111 SF 424): The Research Strategy (**12 pages total**) is the main portion of the application. It will contain three sections: **a) Significance, b) Innovation** and **c) Approach**.

The **Significance** section will explain the importance of the proposed work and should outline how it will move the field forward. You can also use this section to outline the potential of your studies for advancing the objectives of NIH (e.g., curing cancer; in most cases this section will be less than 1 page).

The **Innovation** section will describe novel theoretical concepts, approaches or methodologies to be used, or developed, during your project (typically ½ page).

The **Approach** section will comprise the majority of the application. NIH is purposely vague on the exact format for this portion of the application. Different investigators use different formats tailored to their research program. Students are encouraged to look at actual grant applications submitted by their advisor or other committee members to get a sense of what is included in this portion of the application.

What follows is a suggested **Approach** format that can be used or modified to suit your needs:

Divide your **Approach** into separate sections for each of your Specific Aims.

For each Specific Aim it is typical to begin with a **Rationale (or Background)** section that contains a description of the hypothesis to be tested, and background information placing this hypothesis in the context of the field and why these experiments are being performed.

This is usually followed by a **Research Design** section, where the experiments to be conducted are outlined and described. It is sufficient to cite published work for all but the most novel methods or parameters that are specific to your study. Be sure to include an estimate of the number of subjects to be used (animal or human) and the statistical analysis that will be employed.

At the end of each Aim it is customary to include an **Interpretation of Results/Potential Pitfalls** section. This is the section where you discuss potential outcomes and how they will advance your Specific Aims. In this section you must convince the reviewer that these experiments have to be done. You can also use this section to discuss potential problems and how you will deal with them. But if you cannot convince them of the significance, dealing with potential pitfalls is less important. Thus, it is recommended that more

time and space is spent putting your potential results in the context of the field, than considering everything that can go wrong.

In addition, a brief “**Preliminary Results**” component may be included if it would help convince a grant reviewer that your proposed studies are feasible and likely to generate interpretable results. For this purpose, you may briefly describe feasible data, based on relevant literature, that would be important to have in hand as a basis for pursuing the proposed research. Some investigators place all Preliminary Results at the beginning of the Approach section, while others make it a separate section for each Aim. The use of scientific diagrams, data figures, charts, and tables is encouraged. However, they should be of adequate size such that axis labels (6 pt font) and legends (8-10 pt font) are legible.

The final section is the Bibliography and References Cited (SF 424, I-62). This will contain full citations of all referenced literature and will be included at the end of your Research Strategy (no space limit).

While working on the written portion of the Exam, it is appropriate for students to discuss their ideas with their committee members as well as with other faculty and students. However, such interactions should be restricted to seeking technical information or information on the strengths and weaknesses of experimental approaches (i.e., information that could be obtained from the literature and/or online with the proper search terms), and should not include a discussion of the feasibility of specific proposed experiments. Students must obtain committee approval for any significant revisions to their approved Specific Aims, whereas modified hypotheses or experimental approaches do not require such approval. Modifications to the Specific Aims will not extend the 5-week writing period. Students are not allowed to receive assistance with written drafts of their Exam or guidance in the construction of the proposal.

9.3.4. Oral Exam: Approximately one week after the student submits the written Exam (“grant application”) to their committee, there will be an oral examination that must be held at an on-campus location. The oral exam consists of a public presentation of the proposal (lasting ~ 45 minutes) followed by a private oral exam administered by the committee. At the oral examination students will be expected to defend their hypotheses and to address questions concerning all background information relevant to the topic, significance, and design of the experiments they proposed. It is expected that the entire oral exam (presentation and defense) will last 2-3 hours. At least one week before the presentation students are required to provide the title of their presentation and the time and place to one of the CNUP administrative offices for distribution.

9.3.5. Evaluation: At the end of the oral exam, the student will be excused from the room and the committee will evaluate the student’s performance on the written and oral portions of the Exam. The student will then be immediately informed of the decision of the committee. The possible outcomes are pass, partial pass, or fail.

Students may receive a partial pass if they were deficient in some but not most of the areas on which they were examined. Significant problems associated with either the written or oral portion of the exam, or both, that are not so severe as to result in a failing score may result in a “partial pass”. If the committee decides on a partial pass, they must define those areas of the performance that were deficient, and provide specific criteria that must be met for the student to pass. For example, the committee might decide that experimental descriptions were poor throughout the written portion of the exam, and thus the student must submit revised descriptions of the proposed experiments. As another example, the committee might decide that some of the student’s oral answers were unacceptable, and thus the student must retake the oral portion of the exam. Whatever the reason for the partial pass, the committee must present the student with a detailed written description of what needs to be done to satisfactorily complete the exam. A copy of this written description must also be submitted by the committee chairperson to one of the CNUP Administrators (i.e., Patti Argenzio or Natalee Bright) so that a copy can be placed into the student’s file. Partial passes must be remedied within 2 weeks of the initial oral exam, or the student will be considered to have failed the exam.

If in the unanimous opinion of the evaluating faculty the student has demonstrated significant and pervasive deficiencies that cannot be rectified by limited improvements to the oral or written aspects of the examination, then the outcome will be “fail”. In cases where the decision of the examining committee is not unanimous, a written report of the committee’s evaluation is referred to the Program Co-Directors for further consideration. Students who fail the Comprehensive Exam (including failure due to an inability to advance an

approved set of Specific Aims, see section 9.3.2) will be allowed to take the exam a second time provided that they are not already on probation. The second exam must be initiated (i.e. new Specific Aims advanced) within 1 month of the initial failure.

The Comprehensive Exam must be passed before a student can apply for admission to candidacy for the Ph.D. Once this examination has been passed, the program notifies the appropriate Dean of Graduate Studies of that fact.

9.4. Doctoral Dissertation

The dissertation is the culmination of graduate study. The dissertation is intended to embody an extended original investigation of a problem of significance in the field of neuroscience. It must add to the general store of knowledge and to understanding in this field. Before the dissertation proposal meeting, the student will give their dissertation committee members a copy of the Specific Aims page generated in their second-year grant writing course and also the Specific Aims page from their Comprehensive Exam, so that the dissertation committee is better prepared to help the student identify a dissertation project that ensures the student's continued intellectual growth and scientific development. The dissertation project may be related to work proposed as part of the Grant Writing course or the Comprehensive Exam. However, the dissertation project must extend substantially beyond those prior projects. It must also serve to demonstrate each of the competencies described at the outset of these guidelines.

9.4.1. Dissertation Committee: After successful completion of the Comprehensive Examination, the student and his/her research advisor propose a doctoral committee for approval by the Co-Directors of the Graduate Program. The committee consists of at least 5 members. All committee members must be members of the Graduate Faculty at either the University of Pittsburgh or Carnegie Mellon University. At least 4 of them (including the research advisor) must be members of the CNUP graduate training faculty. According to University Regulations, the research advisor must be a member of the Dissertation committee; Within the CNUP, however, while the research advisor retains his/her status as an advisor to the student and his or her committee, the research advisor does not chair the committee's meetings. The student should select one of the other committee members from within the CNUP to serve as the chairperson.

For the final thesis defense, an outside examiner who is not a faculty member at the University of Pittsburgh or Carnegie Mellon University is added to the original 5-member committee. The outside examiner should be an expert in the area of the thesis, and should be selected by the student in consultation with the committee. Scheduling senior scientists can often be difficult, so it is best to make the selection as early as possible. The invitation is extended to the outside examiner by the student's mentor. An invitation to give a seminar during the visit should also be extended. Once the outside examiner has accepted the invitation to participate on the committee, the mentor must inform the appropriate Program administrator who will make the travel arrangements and schedule the seminar.

The student's dissertation committee must be approved and hold its initial meeting within six months following successful completion of the comprehensive examination. The initial function of the committee will vary according to the needs of the student. Thus, advancing a mature proposal is not a prerequisite of forming a committee. In cases where the student is still collecting proof-of-principle data essential for documenting the feasibility of proposed experiments, the committee should meet to provide council and critical feedback. Nevertheless, it is the responsibility of the student in consultation with the mentor to respond to the advice of the committee in a timely manner in order to generate an approved dissertation proposal. In cases where the preliminary database is more mature, the committee functions to pass judgment on the feasibility and scope of the proposed experimental plan and to provide the necessary approval to advance the student to candidacy. In either event, the student must meet with an approved committee within six months of completing the comprehensive examination and work diligently with the committee to obtain approval for an experimental plan.

9.4.2. Dissertation Proposal and Overview Meeting: Before the first dissertation meeting the student will provide each committee member with a copy of the Specific Aims pages from the grant writing course and the Comprehensive Exam. A dissertation proposal and an overview meeting are University requirements, but their function is not in any way analogous to an examination. Instead they provide an opportunity for students to organize their thoughts concerning the anticipated dissertation, to obtain advice concerning these thoughts, and ultimately to receive some assurance that the broad outlines of the research are acceptable to the faculty. Thus, the proposal should **not** be prepared and distributed when the research is nearing completion, but rather at a much earlier stage.

Delaying submission of a dissertation proposal for committee approval beyond the end of December of the fourth year requires written permission from the Program Co-Directors. The student must understand that delaying the submission of a dissertation proposal past this date will necessarily extend the program beyond five years. Students may revise their original proposal or submit an entirely new proposal when subsequent events warrant it. However, such revisions must be reviewed and approved by their committee.

The format for the dissertation proposal is comprised of a written and oral portion. The written portion should be in the format of the Specific Aims page of an NIH R01 application (1 page, single spaced, ½ inch margins on all sides). No additional written materials are required. The written portion of the proposal should be sent to the dissertation committee at least one week prior to the oral presentation.

The oral presentation should be in the form of a PowerPoint presentation (or equivalent format). The oral presentation should include the background/rationale for the proposed studies (including preliminary data if warranted), an outline of the experimental design and a plan for interpretation of results (including statistics to be used). Also be sure to address the issues of “rigor and reproducibility” as outlined in NIH guidelines (<https://www.nih.gov/research-training/rigor-reproducibility/principles-guidelines-reporting-preclinical-research>). The oral presentation should be no longer than 60 minutes. Following the oral presentation, the dissertation committee will discuss with the student the proposed research design to determine if the proposed body of work is feasible and whether it represents novel work that will make a significant contribution to the student’s field of research.

If both the written and oral portions of the dissertation proposal are determined to be adequate (by unanimous vote of the dissertation committee), this outcome will be reported to the Associate Dean for Graduate Studies. A brief written summary of this meeting will be prepared by the committee’s chairperson and provided to a CNUP administrative office.

If the committee does not approve the student’s proposal (either the written and/or oral portion), they will identify the deficiencies and provide this critique to the student in writing. This critique will also be sent to the CNUP administrative offices. The student will then be given a fixed amount of time (determined by the committee) to submit and defend a revised proposal. Failure to obtain approval of the committee a second time will be reviewed by both Graduate Program Co-Directors of the CNUP who will determine the best course for proceeding. This could include mediation by the co-Directors with the student and the dissertation committee, placing the student on probation with the option of a third attempt at developing an acceptable proposal or dismissal from the CNUP graduate program.

9.4.3. Admission to Candidacy for the Ph.D. Degree: After receiving approval of their dissertation proposal the student files an application for admission to candidacy. This application must be approved by the Co-Directors of the CNUP Graduate Program and the Associate Dean for Graduate Studies of the school in which the student’s mentor is appointed (i.e., FAS when the appointment is in the Department of Neuroscience, SOM when it is not). It is a University requirement that this be done at least eight months prior to the dissertation defense.

9.4.4. Data Meetings: Students should schedule periodic meetings with their committee to discuss the progress of experiments and to review new data. Specifically, students are strongly encouraged to meet with their committee at least twice each year, but, at a minimum, must meet with their committee at least once each year. Students are responsible for obtaining a brief report of each meeting from the committee chair and submitting it to a Graduate Administrator so that it can be added to their file.

9.4.5. Dissertation: The format for the written dissertation is as specified in the Style and Form Manual, which can be obtained from the Office of the Associate Dean for Graduate Studies. In addition to meeting these requirements, the student is encouraged to approximate the guidelines for the journal or journals in which the research results are to be published. The exceptions to this rule are (a) the introduction to the dissertation should include a more thorough review of the literature than usually is the case for a research article, (b) the methods section should include all necessary information concerning the conduct of the research, including procedural information already published, (c) the student may wish to include within the results section (or in an appendix) some data which, because they are confirmatory or incomplete, will not be published, and (d) there must be a general discussion section that is more broad than a discussion section associated with a single manuscript.

Manuscripts (including articles in any state of the publication process, e.g., published, submitted for publication, or completed but not yet submitted) authored or co-authored by the student and based on research conducted for the dissertation study may be included in the dissertation. To logically integrate this work into a dissertation, the student is required to write extensive introduction and discussion sections that give an overview of the objective or objectives of the research and draw general conclusions from the assembled data. If a manuscript is co-authored, the contribution of the student must be clearly delineated in the preface so that the committee can ascertain that the student's own work satisfies the requirements of a dissertation. The Style and Form Manual gives instructions on incorporating manuscripts into the dissertation.

A completed dissertation must be submitted to all committee members **at least two weeks** prior to the defense. The student can expect his/her advisor to read the dissertation prior to its submission, and submission of the dissertation implies that the student's advisor has approved the dissertation as ready for distribution to the committee.

It is important to note that effective 2004, the University mandates that all dissertations must be submitted electronically. Training in the rules guiding electronic submission is available through the University (<http://www.pitt.edu/~graduate/etd/>).

9.4.6. Application for Graduation: Candidates for graduation must file an official application for graduation in the Office of the Associate Dean for Graduate Studies in the first month of the term in which graduation is expected.

9.4.7. Announcement of Thesis Defense: One month before the final examination, the student provides the CNUP administrative office with the title of the dissertation and the time and place for its defense. This information is to be published in the *University Times* and *The Neurotransmitter*, and is sent to all appropriate departments of the University. Note that all CNUP dissertation defenses must be held at an on-campus location since it is assumed that all graduate students, postgraduate fellows, and faculty within the CNUP will attend the defense.

9.4.8. Final Oral Examination: The chairperson of the doctoral committee will oversee the examination. The student begins by making a public presentation of the research project. Approximately 45 minutes are allotted for this presentation. After a brief period for questions and discussion from the public, the candidate, the doctoral committee, and any faculty who wish to attend move to a conference room to complete the oral examination. The research advisor does not participate in this examination and must remain silent throughout the process. When the questioning is complete, the candidate leaves the room while the committee evaluates

the dissertation and its defense. The research advisor (and other faculty members in attendance who are not members of the examining committee) may be asked to leave for a portion of the committee's deliberation. The committee selects one of the following options: pass, revision of the written document and/or additional oral questioning at a later time, or fail. If the committee requires revision of the written document and/or additional oral questioning, these requirements must be completed within a 3-month period. If the student fails the thesis defense, the student may take the exam again within 3 months. Failure to pass the thesis defense on a second occasion may result in the student being terminated from the program. At the conclusion of the defense, the student is provided with a verbal summary of the committee's deliberations. In addition, a report signed by all members of the doctoral committee, including the research advisor, is sent to the Associate Dean for Graduate Studies. When the decision of the committee is not unanimous, the matter is resolved by the Dean.

10. ACADEMIC AND RESEARCH INTEGRITY

10.1. Academic Integrity Policy

Students have the right to be treated by faculty in a fair and conscientious manner in accordance with the ethical standards generally recognized within the academic community (as well as those recognized within the profession). Students have the responsibility to be honest and to conduct themselves in an ethical manner while pursuing academic studies. Should a student be accused of a breach of academic integrity or have questions regarding faculty responsibilities, procedural safeguards including provisions of due process have been designed to protect student rights. These general procedures may be found in Guidelines on Academic Integrity: Student and Faculty Obligations and Hearing Procedures at www.pitt.edu/~provost/ai1.html. Individual schools have their own academic integrity policies and these policies supersede those of the CNUP. Students are encouraged to review these school-specific guidelines.

10.2. Research Integrity Policy

The University of Pittsburgh seeks excellence in the discovery and dissemination of knowledge. Excellence in scholarship requires all members of the University community to adhere strictly to the highest standards of integrity with regard to research, instruction, and evaluation. Research misconduct carries potential for serious harm to the University community, to the research of science, and to society as a whole. The University's Research Integrity Policy is available online at www.bc.pitt.edu/policies/policy/11/11-01-01.html. In the case of a breach in research integrity by faculty or students, the University of Pittsburgh Office of Research Integrity (<http://rcco.pitt.edu/rcco-offices/research-integrity>) should be notified immediately. This office will make the first determination regarding notification of the funding organization supporting the research (intramural and/or extramural), the need for further investigation, and the range of potential sanctions and remedies for each case. Only after a determination by the Office of Research Integrity will the CNUP become involved. In the case of student misconduct, the CNUP Executive Committee will determine if sanctions are warranted and this can include dismissal from the program. All decisions can be appealed to appropriate dean (School of Medicine or Dietrich School of Arts and Sciences) and/or the Vice Provost for Graduate Studies. Students enrolled in the School of Arts and Sciences are also encouraged to contact the University of Pittsburgh Graduate Student Ombudsman (<https://www.asgraduate.pitt.edu/student-life/ombudsperson>).

Calendar of Milestones and Deadlines for Ph.D. Students
 (note that MD/PhD student requirements are somewhat different)

I. First Year

- Select research rotation and initiate research Upon entering program
- Design a Two-Year Program of Study Upon entering program
- Submit Rotation Form First week of Fall term
- Submit first Rotation Report End of Fall term
- Evaluation Committee Reviews student progress Beginning of Spring term
- Submit second Rotation Form First week of Spring term
- Submit second Rotation Report End of Spring term
- Submit Reprint Examination Form May 1st
- Completion of Reprint Examination May 31st
- Submit Progress Report June 15th
- Annual Review by CNUP Evaluation Committee July
- Select Dissertation Mentor & Advisory Committee End of Summer Term

II. Second Year

- Complete Teaching Requirement (flexible) Fall or Spring Term
- Submit Annual Progress Report June 15th
- Second Year Research Evaluation Meeting with Advisory Committee July 31^a
- Establish Comprehensive Exam Committee August 1st
- Annual Review by CNUP Evaluation Committee July

III. Third Year

- Complete Comprehensive Exam February 28^a
- Form Dissertation Committee Spring
- Submit Annual Progress Report June 15th
- Submit Dissertation Proposal August 31st
- File for Admission to Candidacy Upon approval of proposal
- Annual Review by CNUP Evaluation Committee July

IV. Subsequent Years

- Submit Annual Progress Report June 15th of each year
- Annual Review by CNUP Evaluation Committee July
- Data Meetings with Dissertation Committee Two per year
- Application for Graduation Term of graduation
- Announcement of Dissertation Defense A month prior to defense