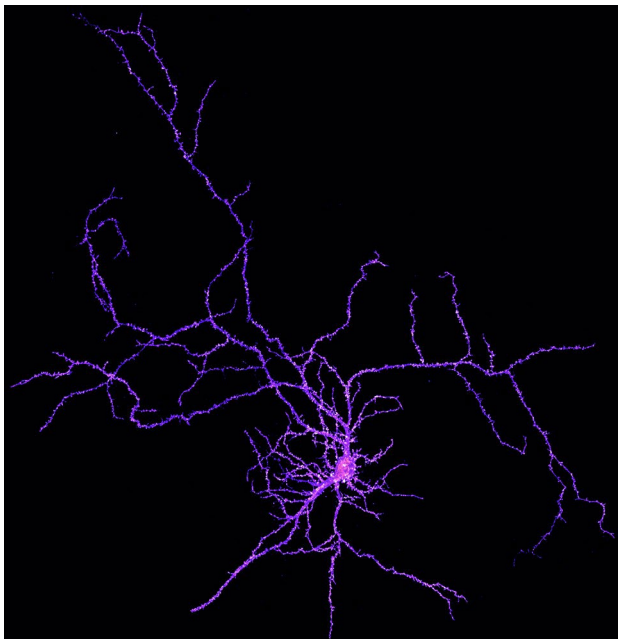
UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE

GRADUATE PROGRAM IN LIFE SCIENCES



Program in Neuroscience

PhD Student Handbook

September 2025

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Appendices

Appendix 1 –Program Forms and Documents

Purpose of This Document

These guidelines are intended to supplement the regulations already given by the University of Maryland School of Graduate Studies and the Graduate Program in Life Sciences. We encourage you to study these regulations, which are described in the most recent graduate catalog and on their websites http://www.graduate.umaryland.edu and https://lifesciences.umaryland.edu/.

Additional Program-specific regulations, guidelines and expectations are described in this document, which is designed to answer most questions you may have regarding our Program and the course of study. If you have any further questions after reviewing these guidelines, please reach out to the Academic Services Specialist or Program Director.

If any links are broken, please let the Academic Services Specialist know so they can direct you to the correct form or information.

I. Welcome

Welcome to PIN - the Program in Neuroscience at the University of Maryland, Baltimore!

PIN is a doctoral degree granting program. For more than two decades, our prestigious program's major mission has been to prepare its graduate students with the training necessary to excel as neuroscientists in academic, industrial, and governmental settings. PIN has over 70 graduate students working with approximately 100 faculty members in the Schools of Medicine, Dentistry, and Nursing.

PIN resides within a hub of neuroscience excellence on campus. Doctoral students have access to UM-MIND-sponsored monthly seminars from internationally recognized neuroscientists, the Neuroscience Journal Club, and many departmentally sponsored neuroscience seminars. We offer regular networking opportunities culminating in the Annual PIN Retreat held in a beautiful off-campus setting.

PIN offers a broad perspective into the field while tailoring mentoring to each trainee's individual interests and talents. Research is increasingly interdisciplinary and interactive. PIN mentoring is, in turn, highly engaged and interactive, with a keen eye on developing students for next-generation neuroscience. We are truly excited – and proud - that you chose to join PIN! We look forward to your success in deepening our understanding of the brain.

II. Faculty

We have approximately 100 faculty members in the Program in Neuroscience. Our faculty members are affiliated with 20 departments, 9 research centers, 5 research institutes, and 3 schools:

Advanced Oral Sciences and Therapeutics (School of Dentistry)
Anesthesiology
Biochemistry and Molecular Biology
Diagnostic Radiology and Nuclear Medicine
Epidemiology and Public Health
Microbiology and Immunology
Neural and Pain Sciences (School of Dentistry)
Neurobiology
Neurology
Neurosurgery
Obstetrics, Gynecology, and Reproductive Sciences
Ophthalmology and Visual Sciences
Organizational Systems and Adult Health (School of Nursing)
Otorhinolaryngology – Head and Neck Surgery
Pain and Translational Symptom Science (School of Nursing)
Pediatrics
Pharmacology and Physiology
Physical Therapy and Rehabilitation Science
Psychiatry
Surgery

Center for Advanced Imaging Research
Center for Biomedical Engineering and Technology
Center for Biomolecular Therapeutics
Center for Innovative Biomedical Resources
Center for Shock, Trauma and Anesthesiology Research
Center for Stem Cell Biology and Regenerative Medicine
Center for Vascular and Inflammatory Diseases
Center to Advance Chronic Pain Research
University of Maryland Marlene and Stewart Greenebaum Comprehensive Cancer Center

Institute for Genome Sciences
Institute of Human Virology
Kahlert Institute for Addiction Medicine
Maryland Psychiatric Research Center
University of Maryland – Medicine Institute for Neuroscience Discovery (UM-MIND)

These departments and schools contribute to the Program in Neuroscience by offering courses and sponsoring seminars in neuroscience and neuroscience-related areas as well as providing the space and intellectual atmosphere for students to carry out their research. The range of research interests within the faculty allows students to select from a broad array of research topics.

More information about our faculty and the research they conduct can be found at http://lifesciences.umaryland.edu/neuroscience/Research-Focus-Groups/.

III. Overview of Training for PhD Students

Year 1 – Fall

- Meet with their Advisory Committee to discuss courses and rotations.
  - *Pre-Candidacy Advisory Committee Meeting Form*
- Complete Mechanisms in Biomedical Sciences (also known as the Core Course) (GPLS 601) with a grade of B or better.
- Complete Current Topics in Neuroscience (GPLS 691) with a grade of B- or better.
- Attend Professors' Rounds, Neuroscience Journal Club, GPILS First-Year Experience, and UM-MIND seminars.

Year 1 – Winter

- Complete first Laboratory Rotation (GPILS 609).
  - *Laboratory Rotation Proposal Form*
  - *Student Laboratory Rotation Evaluation Form*
  - *Mentor Laboratory Rotation Evaluation Form*

Year 1 – Spring

- Meet with their Advisory Committee and bring their completed Individual Development Plan.
  - *Pre-Candidacy Advisory Committee Meeting Form*
  - *Pre-Candidacy Individual Development Plan*
- Complete Advanced Neuroscience Investigation (GPLS 655) with a grade of B- or better.
- Complete second Laboratory Rotation (GPLS 609).
  - *Laboratory Rotation Proposal Form*
  - *Student Laboratory Rotation Evaluation Form*
  - *Mentor Laboratory Rotation Evaluation Form*
- Attend Neuroscience Journal Club meetings and UM-MIND seminars.

Year 1 – Summer

- Complete third Laboratory Rotation (GPLS 609).
  - *Laboratory Rotation Proposal Form*
  - *Student Laboratory Rotation Evaluation Form*
  - *Mentor Laboratory Rotation Evaluation Form*
- Complete one Rotation Presentation in June.
- Meet with their Advisory Committee to discuss courses, rotations, and choice of mentor.
  - *Pre-Candidacy Advisory Committee Meeting Form*

Year 2 – Fall

- Choose a mentor with funding in whose laboratory they can do their thesis research and notify the Neuroscience Program Director and Academic Services Specialist of their mentor choice.
  - *PIN Mentor Selection Form*
- Complete 1 credit of Neuroscience Journal Club (GPLS 629).
- Complete Proseminar in Experimental Design (GPLS 737) with a grade of B- or better.
- Complete Experimental Design and Quantitative Analysis in Neuroscience (GPLS 632) with a grade of B- or better.
- Students are encouraged to enroll in an elective course recommended by their Advisory Committee.

Year 2 – Winter

- Attend Qualifying Exam information session.

Year 2 – Spring

- Pass Qualifying Exam and apply to the School of Graduate Studies for Admission to Candidacy.
    - *Application to Advance to Candidacy*
- Complete 1 credit of Neuroscience Journal Club (GPLS 629).
- Complete and pass 1 credit of Research Ethics (CIPP 907).
- Students are encouraged to enroll in an elective course recommended by their Advisory Committee.
- Complete their Individual Development Plan with their mentor/Advisory Committee.
    - *Post-Candidacy Individual Development Plan*

Year 3

- Choose a Dissertation Committee.
    - *Dissertation Committee Approval Form*
- Submit an NRSA or a grant to a private foundation.
- Submit their written Thesis Proposal to their mentor and Dissertation Committee. (The student can use the document from NRSA/grant submission.)
- Publicly present their Thesis Proposal as part of the Seminar in Neuroscience course (GPLS 608).
- Submit the Thesis Proposal Form.
    - *Thesis Proposal Form*

Year 4

- Complete 1 credit of Neuroscience Journal Club (GPLS 629).

Years 3-5

- Attend Neuroscience Journal Club meetings and UM-MIND seminars.
- Submit the Nomination of Members for the Final Doctoral Examination Committee Form.
    - *Nomination of Members for Final Doctoral Examination Committee*
- Meet with their Dissertation Committee at least twice a year to discuss progress.
    - *Dissertation Committee Meeting Form*
- Complete their Individual Development Plan once a year with their Dissertation Committee.
    - *Post-Candidacy Individual Development Plan*
- Continue dissertation research.
- Complete at least 12 credits of Doctoral Dissertation Research (GPLS 899).
- Publish at least one first-author (or co-first author) primary research article in a peer-reviewed scientific journal.
- Write their dissertation and consult the School of Graduate Studies' instructions for preparing their dissertation.

Semester of Thesis Defense

- Review PIN and School of Graduate Studies guidelines, requirements, and deadlines for defense and graduation.
    - *PIN Pre-Defense Checklist*
    - *Dissertation Expectations*
    - *School of Graduate Studies Graduation Deadlines*
- Register for Seminar in Neuroscience (GPLS 608).
- Submit Application for Diploma to the School of Graduate Studies through SURFS.
- Submit dissertation to their Dissertation Committee.
- Pass final oral exam by their Dissertation Committee
    - *Committee-Only Defense Form*
- Schedule their public defense.
- Submit Certification of Completion of Doctoral Dissertation to the School of Graduate Studies.
    - *Certification of Completion of Doctoral Dissertation*
- Submit online Announcement of Defense.
    - *Announcement of Defense*
- Publicly present their defense.
- Submit final dissertation to the School of Graduate Studies.

IV. Overview of Graduate Training for MD/PhD Students*

MS1 & 2

- Attend Professors' Rounds (optional)
- Complete Laboratory Rotations

GS 1 – Summer

- Complete an additional Laboratory Rotation (if necessary)
- Choose a mentor with funding in whose laboratory they can do their thesis research and notify the Neuroscience Program Director and Academic Services Specialist of their mentor choice.
    - *PIN Mentor Selection Form*

GS 1 – Fall

- Complete Current Topics in Neuroscience (GPLS 691) with a grade of B- or better.
- Attend Neuroscience Journal Club, GPILS First-Year Experience, and UM-MIND seminars.
- Complete and pass Research Ethics (CIPP 907).
- Complete Proseminar in Experimental Design (GPLS 737) with a grade of B- or better.
- Complete Experimental Design and Quantitative Analysis in Neuroscience (GPLS 632) with a grade of B- or better.

GS 1 – Winter

- Attend Qualifying Examination Information Session.

GS 1 – Spring

- Complete Advanced Neuroscience Investigation (GPLS 655) with a grade of B- or better.
- Attend Neuroscience Journal Club meetings and UM-MIND seminars.

Year 1 – Summer

- Pass Qualifying Exam and apply to the School of Graduate Studies for Admission to Candidacy.
    - *Application to Advance to Candidacy*
- Complete one Rotation Presentation in June.

Year 2 – Fall

- Complete 1 credit of Neuroscience Journal Club (GPLS 629).

Year 2 – Spring

- Complete 1 credit of Neuroscience Journal Club (GPLS 629).

Year 3

- Choose a Dissertation Committee.
    - *Dissertation Committee Approval Form*
- Submit an NRSA or a grant to a private foundation.
- Submit their written Thesis Proposal to their mentor and Dissertation Committee. (The student can use the document from NRSA/grant submission.)
- Publicly present their Thesis Proposal as part of the Seminar in Neuroscience course (GPLS 608).
- Submit the Thesis Proposal Form.
    - *Thesis Proposal Form*

Year 4

- Complete 1 credit of Neuroscience Journal Club (GPLS 629).

Years 2-4

- Attend Neuroscience Journal Club meetings and UM-MIND seminars.
- Submit the Nomination of Members for the Final Doctoral Examination Committee Form.
    - *Nomination of Members for Final Doctoral Examination Committee*
- Meet with their Dissertation Committee at least twice a year to discuss progress.
    - *Dissertation Committee Meeting Form*
- Complete their Individual Development Plan once a year with their Dissertation Committee.
    - *Post-Candidacy Individual Development Plan*
- Continue dissertation research.
- Complete at least 12 credits of Doctoral Dissertation Research (GPLS 899).
- Publish at least one first-author (or co-first author) primary research article in a peer-reviewed scientific journal.
- Write their dissertation and consult the School of Graduate Studies' instructions, for preparing their dissertation.

Semester of Thesis Defense

- Review PIN and School of Graduate Studies guidelines, requirements, and deadlines for defense and graduation.
    - *PIN Pre-Defense Checklist*
    - *Dissertation Expectations*
    - *School of Graduate Studies Graduation Deadlines*
- Register for Seminar in Neuroscience (GPLS 608).
- Submit Application for Diploma to the School of Graduate Studies through SURFS.
- Submit dissertation to their Dissertation Committee.
- Pass final oral exam by their Dissertation Committee
    - *Committee-Only Defense Form*
- Schedule their public defense.
- Submit Certification of Completion of Doctoral Dissertation to the School of Graduate Studies.
    - *Certification of Completion of Doctoral Dissertation*
- Submit online Announcement of Defense.
    - *Announcement of Defense*
- Publicly present their defense.
- Submit final dissertation to the School of Graduate Studies.

*Timelines and requirements throughout this document may differ slightly for MD/PhD students. Please consult your MSTP or PIN Program leadership if you have any questions.

V. Program of Study

A. First Two Years

1. Registration and Advising

Upon entering the Program in Neuroscience, each student is assigned a three-person Advisory Committee, at least one of whom is a member of the Program Admissions or Curriculum Committees. The Advisory Committee meets with the student for the first three semesters, prior to when the student joins a lab, to consult and approve course selections, research areas, and laboratory rotations.

Students are responsible for arranging a meeting with their Advisory Committee by the end of each semester (no later than November 1 for the fall semester and April 1 for the spring semester) to review their scholastic performance and to discuss their coursework and laboratory rotations for the coming semester.

The student is responsible for submitting written summaries of the Committee's meetings with the student to the Program Director and the Academic Services Specialist via the Advisory Committee Meeting Form. These reports are evaluated by the Program Director and appended to the student's official file. Registration for courses and for laboratory rotations is contingent on timely submission of these reports.

Additionally, the NIH requires that each student completes an Individual Development Plan (IDP) with their committee annually. The IDP form should be completed by the student prior to the committee meeting, and brough to the meeting for review and signature.

2. Coursework

Program in Neuroscience students receive a broad-based education which is then tailored to the individual student's research interests through a wide variety of electives.

a. Required Courses

- GPLS 601 – Mechanisms in Biomedical Sciences (Year 1 – Fall; 8 credits)
- GPLS 691 – Current Topics in Neuroscience (Year 1 – Fall; 1 credit)
- Professors' Rounds (Year 1 – Fall; Mandatory, not for credit)
- GPILS First-Year Experience (Year 1 – Fall; Mandatory, not for credit)
- GPLS 609 – Laboratory Rotations (Year 1 – Winter through Year 2 – Summer; 1 credit each)
- GPLS 655 – Advanced Neuroscience Investigation (Year 1 – Spring; 8 credits)
- Rotation Presentations (Year 1 – Summer; Mandatory, not for credit)
- GPLS 632 – Experimental Design and Quantitative Analysis in Neuroscience (Year 2 – Fall; 2 credits)
- GPLS 737 – Proseminar in Experimental Design (Year 2 – Fall; 2 credits)
- GPLS 629 – Neuroscience Journal Club (Year 2 – Fall & Spring; 1 credit each, Year 4; 1 credit)
- CIPP 907 – Research Ethics (Year 2 – Spring; 1 credit)
- GPLS 608 – Seminar in Neuroscience (semester of Thesis Proposal; 1 credit)

Students must receive at least a B in Mechanisms in Biomedical Sciences (GPLS 601) in order to continue in the program. All students must attain a grade of B- or better in all other required courses. A student receiving a grade of C or less in a required course must retake that course or equivalent.

Students who fail to maintain a 3.0 average overall are placed on academic probation. Students who have two semesters with a cumulative GPA of less than 3.0 may not take the Qualifying Exam, are subject to dismissal from the School of Graduate Studies and are ineligible to be awarded a master's degree.

Virtually all students satisfy their course requirements within the first year and a half. Occasionally, a student will take a specialized course in later years for educational enrichment, but, after the Qualifying Exam, the bulk of time is spent in laboratory research. Students may take a maximum of 10 credits per fall and spring semester.

b. Course Descriptions

GPLS 601 – Mechanisms in Biomedical Sciences: Also known as the GPILS Core Course, this class is a comprehensive overview of current knowledge in cellular, molecular, and structural biology. This modular course provides the background necessary for subsequent specialized studies in biomedical research as a concentrated program during the fall semester. GPILS Core Course is separated into five sections that are taken as a cohesive course: (1) Molecular Biology, -Omics, Bioinformatics; (2) Genetics, Metagenomics, Microbiome; (3) Molecular Structure, Function, Metabolism; (4) Cellular Organization, Transport, Trafficking; and (5) Cellular Physiology, Signaling, Defense.

GPLS 691 – Current Topics in Neuroscience: This 1-credit course is taught in parallel with the GPILS Core Course. Sessions are focused on current topics and techniques in neuroscience. The techniques addressed will center around current molecular, genetics, circuit, non-neuronal, behavioral, and imaging tools in neuroscience. Translational neuroscience is covered with a focus on neuroimaging and treatment development. Diversity and bias in neuroscience are covered to educate students on these current topics. Additionally, students develop activities (facilitated by directors) in research education and/or outreach efforts targeted at UMB or Baltimore communities. This course will provide students with an overview of modern neuroscience topics, techniques, and major neuroscience initiatives in the twenty-first century, while introducing them to current literature in neuroscience and critical thinking and quantitative literacy through discussion-based classes and consideration of real-world application.

Professors' Rounds: This mandatory, non-credit course meets once weekly during the lunch hour in the fall. Two faculty members seeking rotation students introduce themselves, their laboratory research, and their laboratory environment to students seeking rotation laboratories. The casual discussion-based format facilitates interaction between students and faculty members in order to assist students in identifying mentors of interest.

GPILS First-Year Experience: This mandatory, non-credit course meets periodically during the lunch hour in the fall. Session topics range from rotation and mentoring guidance to career development. The course aims to support students in transitioning from an undergraduate, post-baccalaureate, or masters-level academic environment into a biomedical PhD program.

GPLS 609 – Laboratory Rotations: The primary purpose of laboratory rotations is to aid students in the selection of a suitable mentor and lab in which to conduct their research. Rotations should expose the student to diverse aspects of neuroscience research. Students should consider lab rotations which prepare them to test specific hypotheses and/or predictions, develop critical thinking skills, and expose them to novel techniques. Each trainee is expected to complete three* laboratory rotations before choosing a mentor for thesis research.

Students learn about potential rotations in their first year through the required Professors' Rounds described above. Students should also review the full list of Program in Neuroscience faculty, and are also encouraged to view the faculty organized by research focus.

Because of a time-intensive course load, students are permitted, but not encouraged, to do laboratory rotations during their first fall semester. However, students are strongly encouraged to visit the laboratories of Program faculty during this semester. Rotations typically occur during the (1) winter, (2) early spring, and (3) early summer of Year 1. The student's Advisory Committee is responsible for guiding the student into appropriate rotations. Prior to beginning a rotation, the students must receive approval from the proposed mentor, their Advisory Committee, and the Program Director by filling out the Laboratory Rotation Proposal Form.

The student should meet with the laboratory mentor in advance to determine if there is room for them in the laboratory, funding for them in the event they are chosen as the student's thesis mentor, to identify a likely project and its hypothesis, and to clarify expectations about the student's time commitment and the mentor's flexibility. The Laboratory Rotation Proposal Form assists students in establishing these goals. This form should be turned into the Academic Services Specialist once the signatures have been received. Each rotation typically lasts 8 to 12 weeks; longer rotations must be approved by the Program Director.

To assist with identifying an appropriate laboratory, at the conclusion of the rotation, both rotation students and mentors should complete evaluations of the rotations, via the Student Laboratory Rotation Evaluation Form and the Mentor Laboratory Rotation Evaluation Form to be sent directly to Program leadership.

*Students with extensive, documented research experience prior to joining the Program in Neuroscience may receive partial credit toward the Laboratory Rotations requirements, subject to approval by their Advisory Committee and the Program Director. A student must receive prior approval from their Advisory Committee and the Program Director to begin thesis work with a mentor after completing only two laboratory rotations.

GPLS 655 – Advanced Neuroscience Investigation: An interactive course designed to instill basic tenets of neuroscience while developing the critical thinking, problem solving ability, and experimental design skills required for high performance in the research laboratory setting.

Rotation Presentations: Students are required to do one 8-minute presentation discussing the outcomes of one of their rotation projects. Presentations should include a brief synopsis of the overarching research topic, question, and significance (i.e., background), a statement of the hypothesis or predictions tested, and a discussion of the findings. Students should be prepared to answer questions posed by the audience. To support the development of the student's scientific presentation skills, one senior student and one faculty member will provide feedback following these presentations, based on an evaluation of subject matter and delivery to gauge clarity and effectiveness.

GPLS 632 – Experimental Design and Quantitative Analysis in Neuroscience: This course introduces fundamental concepts in biostatistics and how to apply these concepts using the R statistical programming language and GraphPad. This course also focuses on how statistical methods are used in neuroscience research. Instructors provide information on the types of data collected within a specific subset of neuroscience, the relevance of a specific statistical test to its analysis, and how this relates to experimental design. Students engage in hands-on practice to determine and execute appropriate statistical analyses and effective interpretation of the results. Additionally, this course is integrated with the Proseminar in Experimental Design course, affording students the opportunity to consider appropriate statistical analysis and effective results interpretation for an experiment of their own design.

GPLS 737 - Proseminar in Experimental Design: This course is designed to enhance students' critical thinking skills, and their ability develop testable hypotheses and design effective experiments. Skills in both written and oral scientific communication are emphasized. The course format consists of a series of two-hour sessions once per week. Each student does three presentations during the term: a critical analysis of a scientific paper, including identification of hypothesis, predictions, and alternative hypotheses; a proposal based on a previous research experience; and a research project based on a hypothetical data set. For the second and third presentations, students write proposals in the format of NIH predoctoral fellowship applications. Students revise their proposals after receiving oral and written critiques from faculty and students. This course is intended for neuroscience-oriented PhD students in various programs reaching the end of their coursework and preparing for their qualifying exam.

GPLS 629 – Neuroscience Journal Club: Prior to advancing to candidacy, students are required to attend all Neuroscience Journal Club meetings. Presentations on current papers are given by Program students. Students receive credit for GPLS 629 by presenting a paper at the Neuroscience Journal Club. A minimum of three semesters of GPLS 629 for credit (i.e., including presentations) are required by each student. Students give two group presentations during the second year of the program, and an individual presentation during their fourth year, after advancing to candidacy. Suggested papers, emphasizing quantitative analysis, are provided by the course director; alternative paper selections must be approved by the director. The grading system for the Neuroscience Journal Club is Pass/Fail.

CIPP 907 – Research Ethics: The ethical conduct of science is essential. The National Institute of Health requires that "…all trainees, fellows, participants, and scholars receiving support through any NIH training, career development award (individual or institutional), research education grant, and dissertation research grant must receive instruction in responsible conduct of research." In this course, various aspects of research ethics are examined, including data collection and ownership, issues in the use of human and animal subjects, responsibilities of authorship, identifying and handling conflicts of interest, scientific misconduct, the peer review system, collaborative research in academia and industry, mentor/mentee relationships, contemporary ethical issues, and the role of the scientist as a responsible member of society. Each session has a readings list assigned and involves in-depth small-group discussions of relevant cases with faculty. Grading is based on participation in discussion and leadership of at least one group discussion.

GPLS 608 – Seminar in Neuroscience: A minimum of two semesters of GPLS 608 for credit is required of each student. Credit will be awarded when a student presents their thesis proposal and dissertation defense. To receive credit, the student must coordinate their presentation with their mentor, Dissertation Committee, and Program Director.

c. Elective Courses

GPILS, the School of Graduate Studies, the broader UMB campus, and other schools within the University System of Maryland offer a variety of elective courses. If granted permission, and deemed appropriate for the student's academic development, a Graduate Research Assistant may enroll in courses outside of their Program and are eligible for tuition remission for courses within the University System of Maryland.

Not every elective is offered every semester. Please check the School of Graduate Studies' course catalog for electives offered, and class schedule for the semesters in which they will be offered: https://www.umaryland.edu/surfs/.

d. Miscellaneous

Credit for Previous Courses or Research: Students who received a B or better grade in equivalent courses at other schools or programs may request a waiver from the Program Director. MD/PhD students at UMSOM may be credited for laboratory rotations performed at UMB prior to entering the Program in Neuroscience.

Master of Science Degree: The Program in Neuroscience does not have a master's program and does not admit students who wish to obtain an MS degree. Master's degrees are not awarded at an intermediary point in the program. However, if a student leaves the program after the second year for compelling reasons or is asked to leave the program, the Program Director may consider recommending the awarding of a terminal MS degree. This will not be considered unless the student has completed two years of coursework, laboratory rotations (totaling 30 credit hours), and is in good academic standing.

3. Choice of Mentor

The most critical decision a graduate student makes in the first 2 years of study is their selection of a mentor. When choosing a mentor, students should consider the following:

(1) Does the mentor have sufficient funds to support the student for at least 2 years?
(2) Do the student and mentor have compatible styles in terms of work ethic, communication, management, and creative freedom?
(3) Is the laboratory an environment where the student will be able to learn and grow?

Some students choose a laboratory based on the project without considering the mentor that heads the project. Some students choose a laboratory based on the mentor without considering whether the project inspires them as a scientist. The most successful students consider both the project and the mentor before selecting a laboratory to join. Students and mentors must both agree that the laboratory is appropriate for the student. Students will submit the PIN Mentor Selection Form to notify the Program of their selection, and that this has been confirmed with the mentor.

B. Qualifying Examination

Context: Graduate students in the Program in Neuroscience at the University of Maryland, Baltimore are expected to develop a number of skills as they prepare to embark on their thesis research. These include the ability to synthesize and critically evaluate data described in scientific literature, formulate clearly testable hypotheses, design experiments to test these hypotheses, and evaluate results from proposed experiments. These skills will be developed through didactic coursework and participation in journal clubs, seminar series, and laboratory rotations.

Purpose of the Qualifying Exam:

(1) To establish that students have acquired academic tools necessary to:

- formulate a testable hypothesis that addresses a particular problem in neurobiology
- formulate a series of experiments designed to test the hypothesis
- discuss potential outcomes of the proposed experiments particularly those relevant to the acceptance or rejection of the hypothesis
- discuss future directions for their proposed line of investigation

(2) To establish that students have obtained a solid foundation in the principles of neuroscience.

Mechanism: The exam will consist of two parts: written and oral. The written portion will be in the form of a written proposal concerning a set of specific aims based on the students projected thesis research. The oral portion will consist of an examination based on, but not restricted to, the written document, during which students will be given the opportunity to clarify and/or expand upon issues raised in the written portion of the exam. A student on academic probation (i.e. GPA less than 3.0) will not be permitted to sit for the Qualifying Exam unless the GPA is above 3.0 at the end of the fall semester.

Evaluation and Outcomes: This will be a two-stage process. Following completion of the written portion of the exam, it will be evaluated by the examiners. If the written portion is judged satisfactory, the student will proceed to schedule the oral exam for a later date. If the written portion is judged unsatisfactory, the student will have the opportunity to rewrite and resubmit the written exam for re-evaluation.

Students will be evaluated on their performance on both the written and oral components of the exam. Students will advance to candidacy if 3 out of 4 members of the examining committee judge that the overall performance of the student was adequate. If fewer than 3 out of 4 members of the committee feel that the overall performance of the student was adequate, the student will have to retake both the written and oral portions of the exam. Under these circumstances, students will be assigned a committee of 3 faculty members who will work with the student to address deficiencies identified in the exam process. Students will be given 3 months in which to address deficiencies and re-take their exam. Students must pass this second attempt to remain in the program.

Transparency: The dissertation research advisor for the student is allowed to attend the oral qualifying exam but cannot participate in any way. The purpose of this is to allow the mentor to observe the strengths and weaknesses in the student's performance so that appropriate mentorship moving forward for the student may be implemented.

Admission to Candidacy: Students are admitted to candidacy once they have successfully completed all course requirements and passed the Qualifying Examination. Admission to Candidacy indicates that the student is ready to begin their thesis research leading to their dissertation proposal and culminating in their dissertation defense. Students must submit the Application to Advance to Candidacy to their faculty mentor and Program Director for signature, and, subsequently, to the Academic Services Specialist, who will then keep a copy in the student's file and forward the original to the School of Graduate Studies for final review. A copy of the student's transcript delineating all course work taken by the student in fulfillment of degree requirements must accompany each copy of the application for admission to candidacy. Doctoral students are expected to complete their degree requirements in a timely manner. The School of Graduate Studies requires that the thesis defense takes place within four years of admission to candidacy.

C. Thesis Years

1. Timeline

To remain in good standing in the Program, it is expected that:

- by the fall of their second year in graduate school, students will have chosen a lab in which to complete their thesis research.
- by the end of their second year in graduate school, students will have assembled a Dissertation Committee have had their first Committee meeting.
- by the fall of their third year in graduate school, students will have developed a potential thesis project with their mentor and Dissertation Committee.
- by the end of their third year in graduate school, students will have submitted an NRSA-style proposal to either the NIH or another funding institution. This will serve as the written of their Thesis Proposal, to be submitted to their Committee for approval. Once approved, students will schedule their public oral thesis proposal presentation. It is understood that this proposal is not binding and that the goals of the research project may be modified in consultation with the Dissertation Committee and the mentor as data is generated.
- by the end of their 5th year in graduate school, students will have submitted a first-author primary research publication and developed a dissertation document and orally defended it to their Committee and, subsequently, the public.

2. Typical Curriculum

Each post-candidacy semester, students will be enrolled in 3 credits of Doctoral Dissertation Research (GPILS 899). This indicates that the student is actively engaged in their dissertation research. The mentor will award a letter grade to the student each semester based on laboratory performance.

The semester of the dissertation proposal and defense, students will be enrolled in one credit of the Seminar in Neuroscience (GPILS 608). This indicates that their public Thesis Proposal or Defense will occur that semester. The mentor will award a letter grade to the student based on their presentation performance.

3. *Dissertation Committee*

A Dissertation Committee, the formal supervisory body that oversees the progress of the dissertation, is formed after a student has advanced to candidacy. It is formed in consultation with the mentor and student, and acts as a resource for the student and mentor by providing recommendations, advice, and guidance while monitoring the student's progress.

The Dissertation Committee consists of 5 voting members who hold a doctoral degree. Three members must be Program in Neuroscience faculty members, and at least three must be Regular members of the Graduate Faculty at the School of Graduate Studies. One committee member must fulfill the criteria for being an external member. This individual must be from a program, department, or discipline separate from that of the candidate and must hold a doctoral degree. The external member may be from within the university or may be a scholar from another institution. Students are encouraged (but not required) to include a scientist from another institution on their Dissertation Committee.

Once all committee members have agreed to participate, the student must complete the PIN Dissertation Committee Approval Form to the Academic Services Specialist for approval by the Program Director. Once approved, changes in Committee membership must be requested in writing. Following the Thesis Proposal, two committee members are designated as readers, and the finalized committee must be submitted to the School of Graduate Studies via the Nomination of Members for the Final Doctoral Examination Committee form, for approval. When the dissertation is completed to the satisfaction of this committee, the adviser and both readers sign the Certification of Completion for the Doctoral Dissertation form, indicating that the dissertation is ready for defense.

To take full advantage of the Dissertation Committee's expertise, students are required to provide the Committee with a progress report at least every 6 months. The student and mentor can provide this report during meetings with individual Dissertation Committee members; however, students must convene the entire Dissertation Committee at least once a year to present their progress in a seminar format. In addition, the student has the option of meeting with the Dissertation Committee members individually, or as a group in the absence of the mentor, should the need arise.

The student's mentor is responsible for submitting a written summary of each Dissertation Committee Meeting by completing the Dissertation Committee Meeting Form and submitting it to the Program Director. Additionally, the NIH requires that each student completes an Individual Development Plan (IDP) with their committee annually. The IDP form should be completed by the student prior to the committee meeting and brought to the meeting for review and signature. If the student's progress is found inadequate, a request to meet with the student and mentor to discuss the student's progress and suggest remedial actions may be made.

4. *Submission of NRSA/Similar Grant*

Students in the Program of Neuroscience are required to apply for an individual National Research Service Award (NRSA) or another similar award by their third year, ideally before proposing their thesis. The same document prepared for the NRSA (or similar grant) submission can be used as the written Thesis Proposal due to the Dissertation Committee before public proposal. NRSA submission deadlines are April 8, August 8, and December 8. Please check websites of other grant awarding organizations for pertinent deadlines.

5. Dissertation Proposal

As part of the requirements of the doctorate, students present and defend a dissertation proposal. It is strongly recommended that defense of the dissertation proposal take place approximately one year after the student has advanced to candidacy, typically by the end of their third year. However, the proposal defense must take place at least 12 months before the dissertation defense.

The defense of the dissertation proposal consists of four parts:

(1) A research proposal written in the format of an NIH grant submitted to the Dissertation Committee.
(2) An oral defense of the proposal to the Dissertation Committee, which convenes at least two weeks after submission of the proposal. If the committee approves the proposal, a formal, public, dissertation proposal presentation is held.
(3) The public proposal defense seminar, which describes the general hypothesis being tested, the data generated so far, and the proposed experiments remaining to be conducted to bring closure to the project. All members of the student's Dissertation Committee (minimum allowed: all but 1 member) must be present for the public proposal to be valid.

(4) The Thesis Proposal Form is completed by the thesis chair and signed by Committee members following the public proposal.

If the dissertation proposal defense is successful, the student proceeds with the dissertation work. If it is unsuccessful, the proposal must be revised and defended again. If it is not successfully revised and defended, the student is dismissed from the program.

Successful defense of the proposal is a requisite for meeting the Program's academic requirements. All students are encouraged to submit an NRSA or other appropriate grant within a year of passing their qualifying exam but are expected to have submitted one by the end of the spring semester of their third year. If the student has not submitted an appropriate grant, the mentor must provide a written explanation for this delay.

6. Doctoral Dissertation

Students must demonstrate the ability to do independent research by presenting an original dissertation on a topic approved by their Dissertation Committee and the PIN Training Committee in both written and oral formats. During the preparation of the dissertation, all candidates for the doctoral degree must register for a minimum of 12 credit hours of Doctoral Dissertation Research (GPLS 899) at the University of Maryland, Baltimore.

A PhD student must establish and maintain a professional relationship with a member of the Graduate Faculty with the appropriate knowledge and expertise to serve as his or her research adviser. If no appropriate Graduate Faculty member is available or no appropriate Graduate Faculty member agrees to be the student's research adviser, the student cannot continue in the PhD program.

Doctoral students are expected to complete their degree requirements within 5 – 5.5 years from admission into the program. Students must be admitted to candidacy within two years of admission to the doctoral program and submit an approved thesis proposal at least two full sequential semesters or sessions (spring, summer, or fall) before graduating. All degree requirements, including the doctoral dissertation and final doctoral examination, must be completed within four years of admission to candidacy and no more than nine years after admission into the doctoral program. Failure to complete all requirements within the time allotted requires another application for admission to the School of Graduate Studies with the usual requisites as decided by the program Admissions Committee. The School of Graduate Studies grants extensions of time only under the most unusual circumstances.

7. Requirements for PhD and Dissertation Defense

A student's progress in the dissertation-research years is monitored during regular updates (every 6 months) and meetings (at least once each year) with their Dissertation Committee. The Dissertation Committee also serves as the "Final Doctoral Examining Committee."

As part of their role as the Examining Committee, the Dissertation Committee is responsible for deciding when the dissertation is ready for defense. This decision is based on a detailed evaluation of the student's research progress – including all tables, figures, and data analyses – and in a closed-door seminar presented by the student. Students are expected to meet the Program in Neuroscience: Dissertation and Oral Examination Guidelines and Expectations for a successful written and oral dissertation. These standards are to be upheld by the Dissertation Committee. The Dissertation Committee will determine if additional research or training is required or whether the student is ready to defend their dissertation. Students may schedule their formal Public Dissertation *only after receiving written approval* from the Dissertation Committee and the Program Director via the Committee-Only Defense form.

The Dissertation is a scholarly document that consists of an introduction, several chapters presenting research results, and a discussion.

The introduction includes a thorough review of the literature and a general justification for the current research.

Students are required to have submitted at least one first-author or co first-author primary research article to a peer-reviewed journal prior to their Public Defense. Students are strongly encouraged to publish any additional data in peer reviewed journals prior to the final preparation of the dissertation. Published manuscripts can serve as the framework for data chapters when appropriate.

Each chapter should include an introduction and justification for that particular experiment, unique methods, results, and a discussion. A comprehensive discussion should review the findings presented in the chapters, integrate the findings with each other, and place them in the larger context of the existing literature. Questions left unanswered or identified for future exploration should be elucidated.

Methods that are common to many or all experiments can be collated into one chapter entitled General Methods.

References should be made to the primary literature (not reviews or books), should be numbered, and can appear at the end of each chapter or as a single list at the end of the Dissertation.

In accordance with School of Graduate Studies guidelines, the Dissertation Committee must receive the final Doctoral Dissertation at least two weeks before the public dissertation defense. In accordance with School of Graduate Studies guidelines, at least ten working days before the public dissertation defense, students must file a form entitled Certification of Completion for Doctoral Dissertation along with the Announcement of Defense.

The public dissertation defense before the Graduate Faculty is a one-hour seminar open to the public that summarizes the dissertation research. All members of the student's Dissertation Committee must be present in order for the public defense to be valid.

Following the defense, the Examining Committee meets privately for further discussion with the student and to deliberate and vote on whether the student has successfully completed the requirements for a dissertation defense. The normal rules established by the School of Graduate Studies that govern grading of the dissertation defense apply. A successful defense merits the awarding of the PhD.

The candidate may take the final oral defense only twice. A failure on the second attempt means the PhD degree is forfeited.

Students and mentors are encouraged to consult the School of Graduate Studies website, and to review the PIN Pre-Defense Checklist for detailed additional instructions for dissertation preparations and defense.

VI. Other Important Information

A. Program Structure and Leadership

PIN is led by a Director and Associate Director, to rotate every 3-4 years. The Academic Services Specialist also serves as a point of contact and support for the Director and Associate Director, as well as students in the Program. There are various committees within PIN that facilitate various Program functions including Admissions, Curriculum, Qualifying Exam, Retreat, and Student Advocacy. PIN is housed within the broader Graduate Program in Life Sciences, situated in the School of Medicine, and is affiliated with the School of Graduate Studies and the University of Maryland Medicine Institute for Neuroscience Discovery. These entities afford various other resources for the students in PIN.

B. Student Responsibility and Support

It is the responsibility of the student to advance toward the PhD degree in a timely fashion. The student is responsible for reviewing and understanding all information included in this handbook, as acknowledged via the handbook acknowledgement form.

Formal advice and counseling regarding student progression is accessible to the student through their Advisory Committee, their Dissertation Committee, and all PIN and GPILS leadership. Career development support is available through the GPILS Office of Career Development. An additional point of contact for student issues is the Office of Student Enrichment and Strategic Initiatives. It is the responsibility of the student to arrange committee meetings and seek support from leadership, as needed.

C. Student Attendance

Program in Neuroscience students are full-time Graduate Research Assistants. Every student is entitled to a two-week vacation per year, to be arranged with and approved by the chairperson of the student's Advisory or Dissertation Committee.

Students in the Program in Neuroscience are responsible for being familiar with the pertinent rules and regulations stipulated by the University of Maryland School of Graduate Studies and this document.

The Program in Neuroscience mandates a number of activities deemed critical to the professional development of our students, including, but not limited to, participation in journal clubs, seminars, and professional development courses. All students are required to attend the Neuroscience Journal Club pre-candidacy, and the monthly UM-MIND Seminar Series throughout their graduate studies.

Students are expected to attend all activities designated by the Program leadership as mandatory. Students who are unable to attend a particular activity are required to receive prior approval from the PIN Program Director.

Failure to attend three mandatory activities in a given semester will be considered as a failure to meet academic standards and will result in a recommendation to the School of Graduate Studies to place the student on academic probation. Students who do not satisfy the probationary terms dictated by the School of Graduate Studies may be dismissed from the Program.

D. Graduate Student Association (GSA)

Students are encouraged to participate in several programs for incoming and current graduate students offered by the GSA. For more information regarding the GSA and the names of the Program in Neuroscience representatives, please consult the GSA website.

The GSA also offers special services for graduate students, including grants for lab supplies, travel fellowships, and use of laptop computers. If you are interested in becoming an active member or representative of the GSA, please contact the Academic Services Specialist for more information.

E. PIN Student Advocates

The mission of the PIN Student Advocates is to bridge the gap between faculty and students. It is designed to give students a forum to provide feedback on their training and the training of future generations of PIN students that can turn into actionable improvements. All students above their first year are welcome to join in for meetings or to communicate with the PSA leadership as needed. Actionable feedback and curricular/programmatic suggestions are communicated by PSA leadership to the Program Director. That feedback and curricular/programmatic suggestions will be discussed with the PIN Curriculum Committee and among PIN Leadership as appropriate.

Appendix 1
Program Forms and Documents

Entering the Program:

Handbook Acknowledgement Form

Rotations:

Laboratory Rotation Proposal Form

Student Laboratory Rotation Evaluation Form

Mentor Laboratory Rotation Evaluation Form

PIN Mentor Selection Form

Committee Meetings:

Advisory Committee Meeting Form

Dissertation Committee Approval Form

Dissertation Committee Meeting Form

IDP Form (pre-Mentor)

IDP Form (with Mentor)

Milestones:

Application to Advance to Candidacy

Thesis Proposal Form

Nomination of the Members for Final Doctoral Examination Committee

Dissertation Expectations

PIN Pre-Defense Checklist

Committee-Only Defense Form

Certification of Completion of the Doctoral Dissertation

Announcement of Defense