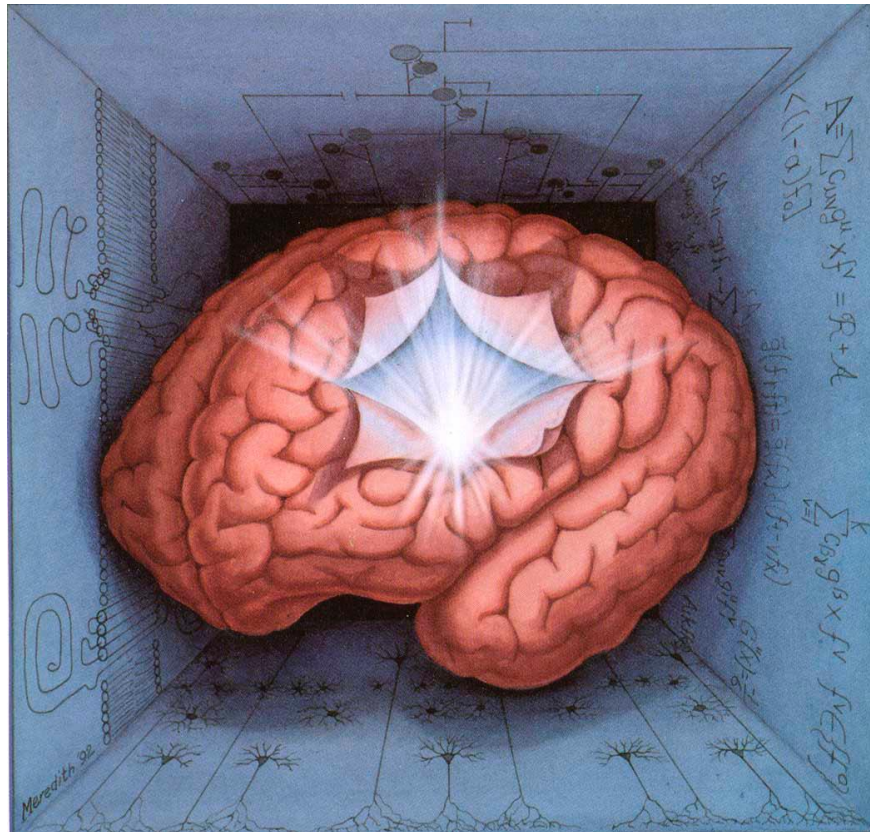


University of Rochester
School of Medicine and Dentistry
**Neuroscience Graduate
Program**



2019-2020
STUDENT HANDBOOK

*This handbook SUPPLEMENTS, but does not replace,
the Official Bulletin for Graduate Studies*

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NEUROSCIENCE GRADUATE PROGRAM (NGP)

1. Program Goal

The primary goal of the Neuroscience Graduate Program (NGP) is to provide state-of-the-art research-intensive training for students seeking to obtain a Ph.D. degree in the study of the nervous system. The program provides trainees with the research and teaching skills necessary to become successful independent neuroscientists employed in academic, government, and corporate settings. Successful completion of the training program culminates in the granting of the Ph.D. degree in either **Neuroscience** or **Neurobiology & Anatomy**.

2. Overview

Students seeking admission into NGP should indicate their interest in neuroscience when completing the online application to graduate studies at the University of Rochester School of Medicine and Dentistry. Detailed information about the application and admission process is available online at: <http://www.urmc.rochester.edu/education/graduate/prospective-students/>. Students entering NGP typically complete the majority of the core curriculum requirements during their first year. Coursework in cellular and systems neuroscience is supplemented by research rotations in NGP faculty laboratories selected by the student. At the end of the first year, and after completing 3-4 laboratory rotations, students select a thesis advisor(s) and laboratory for their dissertation research. At the same time, students chose one of two Ph.D. degree tracks: **Neuroscience** or **Neurobiology & Anatomy**.

This handbook outlines the policies and regulations for NGP. Students admitted into another Ph.D. program at the University of Rochester may petition to transfer into NGP provided the student's thesis advisor is a member of the NGP faculty. General policies and regulations for graduate study at the University of Rochester are contained in the *Official Bulletin for Graduate Studies*, which can be found at <http://www.rochester.edu/GradBulletin/>.

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The *NGP Director* oversees the administration and day-to-day activities of the NGP and is assisted by the *Associate Director* and *Graduate Program Coordinator*. Three committees comprised of faculty and student representatives participate in the administration of the program. The *NGP Admissions Committee* recruits students to the NGP and is made up of faculty representing a broad range of neuroscience disciplines. The *NGP Steering Committee* is made up of faculty with demonstrated interest and expertise in graduate education. The Steering Committee is charged with making decisions on the general policies, qualifying exams, curricula, and faculty membership of the NGP. The *NGP Executive Committee* is comprised of administrative leaders in neuroscience and acts to guide major policy changes and to represent the program at the institutional level.

4. Program-sponsored Activities

NGP students participate fully in program-sponsored functions in addition to their own department/center-sponsored activities and seminars.

- Annual Retreat: The NGP sponsors an all-day retreat for students, postdocs, and faculty from across the University who share an interest in neuroscience. The retreat, planned by students and faculty, is typically held in the fall at an off-campus site.
- Neuroscience Colloquium: The program co-sponsors a number of seminars each year that bring visiting scientists from around the world to the University to present their latest research findings. The Colloquium supplements the numerous department and center-sponsored seminars by aiming to invite speakers that will appeal to a broad cross-section of the Neuroscience community. Speakers are selected by a committee of students and faculty.
- Neuroscience Luncheons: The program sponsors a luncheon for NGP graduate students on the second Wednesday of each month during the academic year. In addition to free food and drink, the monthly lunch provides a forum for students to discuss topics related to graduate education with the NGP directors and other guests.
- NGP Qualifying Exam and Thesis Defense Seminars: All NGP students are expected to attend these special presentations to support their colleagues as they pass through important milestones in their training.
- Poster Sessions: Throughout the year, various departments, centers, and programs sponsor poster sessions to showcase their research and to provide a forum for exchanging ideas. NGP students who have passed their qualifying exams are expected to present their work at these sessions, and all students are expected to attend and actively participate.
- Mandatory Lecture Attendance: All NGP students are expected to attend named lectures Doty, Notter, etc.

5. Curriculum

a. Required Coursework: All NGP students complete a core curriculum during their first year that includes: *Cellular Neuroscience* (NSC 512), *Integrative and Systems Neuroscience* (NSC 531), *Ethics in Research* (IND 501), *Human Brain Anatomy* (NSC 511)¹, *Introduction to Programming* (NSC 410), and 3-4 laboratory rotations of their own choosing. During years 1 and 2, NGP students must also complete 2 Fall semesters of *Current Topics in Cellular Neuroscience* (NSC 592), 2 Spring semesters of *Critical Reading In Integrative and Systems Neuroscience* (NSC 592), *Applied Statistics in the Biomedical Sciences* (BST 467), *Introduction to Computational Neuroscience* (NSC 547 Summer after first year), serve as a teaching assistant for one semester (NSC 581 - usually in year 2 or 3) and register for *NSC Student Seminar* (NSC 503) each semester they are in the program.

At the end of the first year, students formally declare whether they will follow the *Neuroscience* (NSC) or *Neurobiology & Anatomy* (NBA) track. The two tracks accommodate distinct training objectives:

- **Neuroscience track** – maximum flexibility to tailor advanced coursework to fit individual education and research objectives
- **NBA track** – comprehensive exposure to human physiology and anatomy or medical neuroscience through participation in the medical school curriculum

b. Electives: In addition to the coursework listed above, **students must complete a minimum of 10 elective credits of coursework**². For most students, a maximum of 4 elective credits will come from either *Foundations in Modern Biology (modules 2, 3 and 4)* (IND 431), *Foundations in Modern Biology II (module 1)* (IND 432), *Biochemistry* (IND 408), *Molecular Biology and Genetics* (IND 410), or *Foundations in Cellular and Molecular Biology* (ANA 511). The remaining 6 (or more) elective credits are earned in upper level graduate courses and are chosen in consultation with the NGP Director and/or the student's thesis advisor.

Sample Curriculum

1st Year—All students

<u>Fall Semester</u>		<u>Credit Hours</u> ³
NSC 592	Current Topics in Cellular Neuroscience	1
NSC 503	NSC Student Seminar	1
IND 501	Ethics & Professional Integrity in Research	0
NSC 512	Cellular Neuroscience	5
NSC 590	Lab Rotations	variable credits
IND 431	Foundations in Modern Biology (Modules 2,3,4)	3
	Elective (<i>optional</i>)	variable credits
<u>Spring Semester</u>		
NSC 592	Critical Reading in Integrative and Systems NSC	1
NSC 503	NSC Student Seminar	1
NSC 511	Human Brain Anatomy	1

¹ NSC 511 is not a requirement for M.D./Ph.D. students

² M.D./Ph.D. students can use 10 credit hours of medical school coursework to fulfill the electives requirement.

³ Students register for a total of 16 credit hours/semester.

NSC 531	Integrative & Systems NSC	6
NSC 410	Introduction to Programming	1
<u>IND 432</u>	<u>Foundations in Modern Biology (Module 1)</u>	<u>1</u>
NSC 590	Lab Rotations	variable credits
	Elective	variable credits

Summer Semester

⁴ NSC 547	Introduction to Computational Neuroscience	3
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2nd year—Neuroscience track

Fall Semester

		<u>Credit Hours</u>
NSC 592	Current Topics in Cellular Neuroscience	1
NSC 503	NSC Student Seminar	1
NSC 595	PhD Research	variable credits
	Elective	variable credits

Spring Semester

NSC 592	Critical Reading in Integrative and Systems NSC	1
NSC 503	NSC Student Seminar	1
⁵ BST 467	Appl. Stats in Biomed. Sci.	4
⁶ NSC 581	Teaching Tutorial	3
NSC 595	PhD Research	variable credits
	Elective	variable credits

2nd year—NBA track

Fall Semester

⁷ ANA 526	Human Structure & Function	16
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Or

NSC 592	Current Topics in Cellular Neuroscience	1
NSC 503	NSC Student Seminar	1
ANA 525	Mind, Brain and Behavior	8
ANA 595	PhD Research	6

Spring Semester

NSC 592	Critical Reading in Integrative and Systems NSC	1
NSC 503	NSC Student Seminar	1
⁵ NSC 581	Teaching Tutorial	3
⁴ BST 467	Appl. Stats in Biomed. Sci.	4
ANA 595	PhD Research	variable credits
	Elective	variable credits

Irrespective of track, students should strive to complete all coursework by the end of the fifth semester of study.

⁴ The 3 credits from NSC 547 contribute to the 16 credits allowed in the Fall semester of Year 2.

⁵ BST 467 may be replaced with either *Intro to Biostatistics* (BST 463) or *Data Analysis I* (BCS 510) offered in the fall semester.

⁶ Students may elect to fulfill the TA requirement (NSC 581) in the fall or spring of year 2 or 3.

⁷ Students taking ANA 526 cannot register for any other courses that semester.

⁸Partial list of graduate level electives taken by current students and recent graduates

ANA 405	Hearing & Balance: Structure, Function & Disease
ANA 411	Cellular and Molecular Bio Found
ANA 513	Neuroinflammation
ANA 518	Intro to Neuroengineering
ANA/NSC 591	PhD Readings (<i>Instructions on creating this course: Appendix B pages 26 & 27</i>)
BCS 502	Cognition
BCS 511	Behavioral Methods in Cognitive Science
BCS 512	Computational Methods in Cognitive Science
BCS 513	Intro to fMRI: Imaging, Computational Analysis & Neural Representations
BCS 521	Auditory Reception
BCS 532	Probabilistic theories of cognitive processing
BST 465	Design of Clinical Trials
GEN 507	Advanced Genetics
GEN 508	Genomics and Systems Biology
IND 420	Mastering Scientific Information
IND 447	Signal Transduction
MBI 403	Drug Discovery
MBI 456	General Virology
MBI 473	Immunology
MBI 492	Special Topics
MBI 515	Advanced Immunology
NSC 525	Biology of Neurological Disease
NSC 547	Topics in Computational Neuroscience
PHP 404	Principles of Pharmacology
PTH 507	Cancer Biology
PTH 509	Pathways of Human Disease
PTH 571	Molecular Basis of Disease
TOX 521	Toxicology I
TOX 522	Toxicology II

c. Medical Scientist Training Program – M.D./Ph.D.

- M.D./Ph.D. students are allowed to waive the required Neuroscience Graduate Program electives.
- NSC 511 is not required for M.D./Ph.D. students. Email the course instructor for approval to waive this requirement.
- M.D./Ph.D. students are exempt from the TA requirement but may do so if interested.
- M.D./Ph.D. students need to complete only one rotation report – instructions on page 8-10 of the handbook.

d. Advising committees: During the first year each student is assigned a first year advising committee comprised of two NGP faculty members and a senior NGP student. The goal of the first year advisory committee is to provide critical feedback to students early in their careers, before they choose a thesis lab. Since students may not have formed individual relationships with faculty and senior students at this point, the first year advisory committee provides an opportunity to forge such relationships and get mentorship at a critical time when students may have less access to meaningful input. Mentors provide advice on areas that include (but are not limited to): expectations in graduate school, balancing classes and lab work, study habits, choosing a rotation and eventually a thesis lab, reading the scientific

⁸ Not all courses are offered each year and each semester.

literature, scientific writing, qualifying exams, interacting with faculty and students, networking and future career options. The first year advising committee also provides feedback on rotation reports (see below) and oral presentations in student seminar. By the start of the second year, this committee is replaced by the Part I Exam Committee and eventually by the Thesis Committee. Timing and guidelines for convening these committees are described later in the handbook.

e. Lab rotations: The primary purpose of the lab rotation is to provide students with an insider's view, through active participation in a research project, of the research interests, laboratory environment, and mentoring style of faculty they are considering as potential thesis advisors. Laboratory rotations also provide an opportunity to learn new techniques and to gain an appreciation for different scientific approaches to a problem. The experience should broaden one's research skills and, therefore, students may want to avoid multiple rotations in labs utilizing essentially the same approaches and techniques. On the other hand, coordinating the rotations to employ different techniques aimed at investigations into one particular area of neuroscience research can also be beneficial.

NGP students must complete at least 3 rotations by the end of the summer after their first year.⁹ The Senior Associate Dean for Graduate Education has established a standard set of start and end dates for lab rotations as follows:

<u>Rotation Proposal Due:</u>	<u>Rotation Begins:</u>	<u>Rotation Ends:</u>	<u>Evaluations Due:</u>
June 18	July 1	August 31	September 15
September 15	October 1	December 15	December 20
December 18	January 1	March 15	April 1
March 1	March 16	May 31	June 15

At the conclusion of each rotation, a **Lab Rotation Evaluation** is completed by the student and rotation mentor. Rotation Evaluation forms are available from the NGP Coordinator or online at:

<https://www.urmc.rochester.edu/education/graduate/home/forms.aspx>

Incoming students are encouraged to arrive early and begin their first rotation on July 1 before starting classes in the fall.

All incoming students attend a Chemical Hygiene, Bloodborne Pathogens, and Occupational Safety Seminar on Orientation Day. When selecting a lab rotation, students must check with the mentor to find out whether they will be working with radioisotopes, certain regulated chemicals or biologicals, and/or animals or human subjects. In such cases, students will be required to complete additional training.

Rotation reports: NGP first year students are required to complete two written rotation reports (MSTP students will only be required to complete a Fall rotation report). The goal of guided rotation reports is to provide students with the opportunity to practice their scientific

⁹ M.D./Ph.D. students complete two lab rotations generally during their 1st and 2nd summers in medical school.

writing skills early. These skills include the ability to formulate project goals, provide rationale as well as an overview of the field. Many students come in with limited scientific writing experience and struggle to develop these skills in graduate school. A critical aspect of the rotation reports is to provide students with consistent feedback throughout the first year to ensure that their skills improve and that they are provided with the support they require, depending on their level of competency.

It is important that both students and faculty realize that rotation experiences vary widely. Some students will design and complete a full experiment and be ready to present their findings in the form of a scientific paper. Others will take part in a team approach and experience different techniques without formally carrying out an experiment. Those students may write a rotation report that focuses on the bigger questions addressed by their rotation lab or the techniques that they have explored to address these questions. DATA ARE NOT REQUIRED, but may be presented if available. The most important result of the rotation write-up is that students learn to communicate scientific concepts clearly and identify important aspects of a new scientific field.

To ensure that reports are completed in a timely manner, rotation reports will only be required for Fall and Winter rotations. Completion of the reports will be required to obtain a passing grade in NGP Student Seminar (NSC 503). Students not doing rotations in either of those rotation periods can complete a report on a rotation completed earlier.

Report format:

1. The main point of the report is to demonstrate an understanding of the scientific field explored during the rotation and to provide a description of the rotation experience. DATA ARE NOT REQUIRED, although students who have obtained data during their rotations are welcome to include them in their report.
2. The report must include a Title followed by at least four sections:
 - a. Purpose: a brief paragraph succinctly describing the point of the rotation project or rotation experience
 - b. Introduction: an overview of the field and where the rotation project fits into the big picture view
 - c. Materials and Methods: description of the techniques used with their limitations. This section may include the design of experiments if this approach was part of the rotation whether or not the experiments yielded data
 - d. Discussion section describing any results or expected results if none were obtained and how they would inform the field and lead to future research directions.

A results section may be included if appropriate.

3. A proposal will be required at the beginning of the rotation period. If the report describes a rotation that was completed prior to the timing of the report then the proposal can be replaced with the purpose section.
4. The report is to be submitted as a Word document approximately **3-6 pages** (one-sided) of text, double spaced, Arial font, 11 point, one-inch margins on all four sides of

the page. Figures, Tables and References are NOT included in this page limit. Pages must be numbered.

5. Complete references are to be provided at the end of the report. There is no limit to the number of references; however, the student is expected to have read all the references cited. References should be cited in the text as “First author et al., 2005”, rather than numbered.

6. Additional pages can be used, as needed for Figures, brief Figure Legends and Tables for data obtained during the rotation.

Timelines:

Students are expected to turn in sections of the report on Mondays throughout the semester to their advisory committee and to rewrite those sections based on the feedback obtained. Hence, timely submission of both the report sections and feedback from the faculty is critical. Faculty may ask for additional rewriting if necessary. Although not required, students are encouraged to seek feedback from the rotation advisor before or along with submission to the first year advisory committee.

Sample timeline (will vary depending on semester/academic year):

Rotation start:	Proposal due to committee
+ 1 week	Feedback on proposal due back to student
+ 1 week	Rewrite due to committee
+ 1 week	Background due to committee
+ 1 week	Feedback on background due back to student
+ 1 week	Rewrite due to committee
Rotation ends	Final draft due to committee
+ 1 week	Feedback on final draft due back to student
+ 1 week	Rewrite of final draft due

f. Journal club: Participation in a Journal Club is required each semester a student is enrolled. During years one and two, students must register for NSC 592. This course, which focuses on both historic and recent findings in the neuroscience literature, provides experience with reading scientific papers, experimental design, data analysis, and critical thinking. The readings are often coordinated with materials being taught in the core Cellular and Systems Neuroscience courses. In years three and beyond, students are free to participate in a journal club related to their research area. If a journal club in a student’s area of interest does not exist, students are encouraged to form one.

g. Student seminar: Students are required to register for NSC 503 *NSC Student Seminar* every semester they are in the program with the exception of the final semester in which they defend their thesis. However, students will need to continue attending the seminar in their dissertation semester until the PhD thesis defense is scheduled. This course provides a forum where students deliver, at least once per year, an oral presentation related to their research. Both students and faculty evaluate the talks and provide the presenter with feedback on various aspects of their presentation. Students must attend a minimum of 80% of the presentations each semester to receive a passing grade. Attendance includes NGP colloquia and named lectures such as the Notter and Doty. First year students must also satisfactorily complete a rotation report each semester (MSTP students complete one report in the Fall semester only). Students who miss seminar due to attending a scientific conference will be

excused. Unexcused absences can be made up by written assignment after consultation with the course director.

h. Teaching assistantship: NGP students are required to serve as a TA for at least one semester.¹⁰ This experience typically includes responsibility for a weekly conference, discussion group, or laboratory in the undergraduate courses *Basic Neurobiology* (NSC 201, Fall semester) or *Lab in Neurobiology* (NSC 203, Spring semester), or the medical school courses *Mind, Brain and Behavior* or *Human Structure and Function*. Students fulfill the TA requirement by registering for 3 credits of *Teaching Tutorial*, either NSC 581 (for teaching in NSC 201/203 or an equivalent graduate or undergraduate course), ANA 581 (for teaching in HSF), or ANA 583 (for teaching in MBB). The TA requirement is usually fulfilled in the spring of the 2nd year or fall of the 3rd year. Note that **PRIOR APPROVAL** from the course director is required before registering.

i. Selection of Ph.D. Track: By July 1 following the first year of study, students declare which Ph.D. degree they will pursue, *Neuroscience* or *Neurobiology & Anatomy*. It is strongly recommended that students seek advice from the NGP Director or Associate Director and their research advisor prior to making the choice of Ph.D. track, keeping in mind the eligibility of faculty in each track, course requirements, teaching requirements, etc. A form available from the NGP Coordinator is to be completed and returned indicating the student's choice. At that time, the NGP Coordinator will schedule a brief meeting between the student, his/her thesis advisor and the NGP Director to go over student and mentor guidelines and remaining degree requirements.

6. Additional Degree Requirements

a. Part I exam: The Part I or *Preliminary* Exam serves two purposes. First, it is a tool for helping students prepare for the qualifying exam (Part II). Second, it is a mechanism for determining whether a student is qualified to pursue further studies toward completion of a Ph.D. dissertation. This determination involves an evaluation of a student's potential for independent thought, his or her approach to investigating a significant scientific problem in a sound manner, and his or her general knowledge of neuroscience. *The examination is not an evaluation of the student's proposed research problem or their supporting preliminary data.* For this reason, scheduling the Part I exam is independent of the degree to which the student's laboratory research has progressed. **Students should take the Part I exam during the spring semester of the 2nd year. The exam must be started before April 1st and be completed by June 1st of the summer between years 2 and 3.**

Committee: The examining committee consists of the student's advisor plus 2 tenured or tenure-track NGP faculty with expertise in the student's general area of research (co-advisors can fulfill this role). Students submit the names of the proposed faculty to the NGP Director for approval. The NGP Director will assign a chair from the committee members. Please communicate with the NGP Director once you have formed the committee and before you start the reading period of the exam.

¹⁰ M.D./Ph.D. students are exempt from the TA requirement but may do so if interested.

Exam format: The student in consultation with his or her advisor selects a minimum of 50 papers relevant to the student's scientific area of interest to be read by the student over a period of not more than 2 months. At this time, the student meets with the committee, which will either approve the reading list or suggest further refinements to the scope of the exam. At the end of the reading period, the student formulates and submits in writing 5 broad hypothesis-driven research questions to their committee based upon the readings. The exam begins when the Committee returns a subset of these questions along with one or more of its own to the student. The student then has 1 week (7 calendar days) to compose written answers to these questions. As a guideline, a thorough answer to each question typically requires 2-4 single spaced pages.

Sample timeline for the Part I (Preliminary) exam:

- | | |
|-------------|--|
| February 1 | The student submits the names of proposed committee members to the NGP Director and begins formulating the reading list. |
| February 10 | Initial meeting with Committee to go over the reading list. Approval of the reading list marks the start of the exam reading period. |
| April 10 | The student submits his or her written questions to the Committee and a copy to the NGP Director. |
| April 15 | After consulting with the committee, the Committee chair provides the student with the final set of exam questions. |
| April 22 | The student submits his or her written answers to exam questions. |

Grading: At the conclusion of the examination, and no later than 2 weeks after receiving the student's answers, the Examination Committee will assign a grade of 'Pass' (with ranking Excellent, Average or Marginal), 'Retake', or 'Fail' along with written feedback on the student's performance. In some cases, a passing grade may be conditional upon a satisfactory revision of one or more answers. A grade of 'Retake' starts the process over and provides the student with one additional chance at passing the Part I exam. Failing the exam, which requires a unanimous decision by the Examination Committee, is grounds for dismissal from the program.

b. Part II exam – Thesis Proposal/Qualifying Exam: After passing the Part I Exam, the student is expected to formulate a thesis proposal with the guidance of his/her Thesis Advisor. The written proposal should include the specific aims and overall significance of the proposed research, sufficient background for others to understand the research plan, key preliminary data that support the aims, and a description of the experimental design that will be used to accomplish the stated aims. **The thesis proposal must be written and the Qualifying Examination taken BEFORE October 1st of the fifth semester of graduate study (i.e., fall semester in year 3).** Successful completion of the Thesis Proposal/Qualifying Exam advances the student to candidacy for the Ph.D. degree.

Examining committee: The University Council on Graduate Studies has designated rules for the Committee. The student's committee must consist of 4 tenured or tenure-track faculty of assistant professor or higher rank and is subject to approval from the NGP Director.

Neuroscience track: 3 of the 4 members are chosen by the student in consultation with their thesis advisor. Of these, 2 **MUST** be from the NGP faculty list and 1 **MUST** be from **outside** of the primary department of the advisor and co-advisor. A holder of a secondary appointment in the advisor's and co-advisor's departments may serve as the external committee member, provided that his or her primary appointment is in another department. Please notice that faculty members of NGP can serve as external committee members for NGP students as long as the above mentioned stipulations are met. The chair may be external or internal to NGP and the advisors' primary departments. Note that the thesis advisor (and co-advisor if applicable) is **NOT** a member of the Examining Committee for students in the Neuroscience track, although he or she is expected to attend the closed session as a silent observer. The final fourth member of the Committee will be appointed by the NGP Director from the NGP core faculty and will be a member of the examining committee for the purpose of the thesis proposal only.

NBA track: 2 of the 4 committee members **MUST** have their primary appointment in the Department of Neuroscience. 1 of the 4 members **MUST** be from outside the Department of Neuroscience's primary faculty (secondary appointments in Neuroscience are acceptable as long as the primary appointment is in another department). The 4th member of the committee is the thesis advisor (who must have a primary or secondary appointment in the Department of Neuroscience). A co-advisor would serve as a 5th member of the committee. For NBA track students, the Chair can be within the Neuroscience Department.

An expert from outside the University of Rochester may be invited to join the Committee as the external member with *prior written approval* from the NGP Director and Associate Dean for Graduate Studies.

Written proposal: The thesis proposal is to be written in the form of a National Institutes of Health *Kirschstein National Research Service Award* pre-doctoral fellowship. Detailed instructions can be obtained by following the [SF424 \(R&R\)](http://grants.nih.gov/training/nrsa.htm) link on the NRSA webpage: <http://grants.nih.gov/training/nrsa.htm>.

The proposal is to be written in 11 point or larger font size using Arial, Helvetica, Palatino, or Georgia typeface. It should be written on standard single-spaced pages with 1/2-inch or larger margins on all sides. A smaller font size may be used for figures, graphs, diagrams, charts, tables, figure legends and footnotes, but it must be in black type, readily legible and follow the typeface requirement. Use English and avoid jargon. **The proposal is to be a maximum of 7 pages including any figures and tables, but not including the title page, abstract, and reference list.** If the proposal exceeds 7 pages, it will be returned to the student for revision and will be reconsidered only when it meets the page requirements.

The proposal must be written in the following format:

- (1) **Title Page:** Include a title for the proposal, date and time of the exam, student's name, advisor's name, and the names of committee members.

- (2) **Abstract:** State the proposal's broad long-term objectives and specific aims, and describe concisely the experimental design and methods for achieving these goals. The abstract should be a succinct description of the proposed research, even when separated from the proposal. This section is **not** included in the 7-page proposal limit.
- (3) **Specific Aims:** State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology. Proposals should generally have two or three separate Specific Aims. *Specific Aims are limited to one page.*
- (4) **Research Strategy:** Organize the Research Strategy in the specified order using the instructions provided below. *Research Strategy is limited to 6 pages.*

(a) Significance

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

(b) Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project, including how the data will be collected, analyzed, and interpreted.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high-risk aspects of the proposed work.
- Where appropriate, point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised.
- If applicable, include any courses that you plan to take to support the research training experience.

Include key preliminary studies as part of the Research Strategy, incorporating these within the *Significance* and *Approach* sections described above. Discuss the pertinence of the preliminary data to the proposal. If applicable, relevant *published* results produced by the student may be included as an appendix to the thesis proposal.

- (5) **References cited:** Use the *Journal of Neuroscience* format. There is no page limit for this section and this section is not included in the 7-page proposal limit.

The student may consult with others (e.g., his or her advisor, other faculty members, postdoctoral fellows, other students) in preparing the written proposal. It is recognized that there will be some (even substantial) input by the student's advisor, since the thesis generally reflects research activities in the advisor's laboratory. **However, the actual written proposal is to be the intellectual output of the student, and plagiarism from publications or grant applications written by the advisor or others is not permitted.** When the student has completed the written proposal, *the advisor must review it* before the oral examination is scheduled. While the advisor may suggest modifications in the written proposal, all revisions are to be done by the student.

Requirements: The Thesis Proposal/Qualifying Exam must be taken **BEFORE October 1st of the fall semester in the third year of graduate study.**¹¹ Any student who has not completed the Qualifying Examination by this date will be placed on academic probation, with this recommendation relayed to the Senior Associate Dean for Graduate Education. The student would then have until the end of the fall semester of their third year, in accordance with the School of Medicine and Dentistry's registration deadlines and blackout periods, to take their Qualifying Exam. *If the exam is not completed by the last permissible day in the fall semester of the third year, the NGP Director will recommend to the Dean that the student be dismissed from the program.*

Additionally, 30 hours of graduate credit is required for the Master degree which is awarded for successful completion of the Thesis Proposal/Qualifying Exam. No more than 6 credits of NSC 595/ANA 595 and/or reading courses may be used towards the 30 hour requirement. IND 501, NSC 592 and NSC 503/ANA 522 can contribute towards the 30 credits.

Qualifying Exam Schedule:

- ***At least 4 weeks (20 business days) prior to exam date:*** Submit in writing to the NGP Coordinator (i) the date and time agreed upon by your Committee for the public presentation and closed exam, (ii) the names of all Committee members, noting the advisor, and (iii) the title page and abstract from the written proposal. The NGP Coordinator will schedule rooms for the seminar and exam and prepare necessary paperwork ([MS Program of Study](#) and [Qualifying Exam Appointment](#) forms), and seminar announcements.
- ***At least 4 weeks (15 business days) prior to exam date:*** The Coordinator will submit paperwork to the Senior Associate Dean for Graduate Education, who will then appoint one of the existing Committee members to chair the proceedings.
- ***At least 2 weeks (10 business days) prior to the exam date:*** The written paper **MUST** be circulated to the Committee and the NGP Coordinator.

Oral presentation: The student will publicly present the proposal to the Qualifying Exam Committee and Neuroscience Community in an open seminar. The presentation should last approximately 45 minutes, with a question and answer period to follow.

¹¹ Students with extenuating circumstances may petition the NGP Steering Committee for an extension in writing. Such petitions must be accompanied by a supporting letter from the advisor and be received by October 1st.

Examination procedure and grading: The Examination will generally begin immediately after the student's oral presentation with an initial closed meeting of the Examination Committee to review the student's academic record, research performance, and written proposal. Please note, no notes or aids are allowed in the closed door exam and slides from the public talk can only be used if allowed by the examining committee. The Committee will also decide on the general areas of questioning for the oral examination. In rare instances, the Committee may decide (based on the student's background or the quality of the written proposal) that the student is not ready to sit for the examination. In such cases, the Committee will inform the student in writing of the steps necessary to correct any deficiencies.

The Chair of the Examination Committee will moderate the examination and assure that each participant has adequate time to ask questions. The Chair is also expected to ask questions. While the focus of questioning is usually related to the student's thesis proposal, questions aimed at assessing the student's general knowledge in Neuroscience are also possible and should be anticipated. Immediately following the oral examination, the Committee will meet in closed session to evaluate the student's overall performance (considering the oral examination, written proposal, academic record, and laboratory performance). The committee will then vote on the following options: (1) the student passed; (2) the student failed; or (3) the student may pass contingent upon meeting some further requirement set by the Examination Committee (e.g., the student may be required to rewrite the proposal and obtain committee approval of the revised proposal, to successfully repeat the oral examination, and/or to take further course work to remedy some deficiency in her or his background). *A three-fourths majority of the committee is required for passing the exam.* All votes will be recorded.

The student and advisor will be verbally informed of the committee's decision at the conclusion of the closed session. The Chair of the Examination Committee will notify the Senior Associate Dean for Graduate Education in writing that the student has passed, failed, or received a contingent pass of the Qualifying Examination. If the student has passed, the student will earn a Master's degree and the Associate Dean will advance the student to the status of Candidate for the Ph.D. degree.

If the student receives a pass contingent on meeting some further requirement, the Chair of the Examination Committee will inform the student of this in writing. A copy of the letter will be placed in the student's program file and a copy will be sent to the Senior Associate Dean for Graduate Education. The student will have 14 calendar days to satisfy the requirement. When the requirement has been satisfied, the student must send written documentation of this to the NGP Director and to the Associate Dean for Graduate Education.

Should a student fail, the Examination Committee **MUST** choose between two options:

1) the student may repeat the qualifying exam. This option and its associated deadlines must be determined in consultation with the advisor, program director and Senior Associate Dean. However, it is recommended that an exam not be scheduled *earlier* than 5 months or *later* than 12 months after the first attempt;

2) the student may be asked to leave the program. Notice that students who fail the Qualifying Examination *may* be given a second and final opportunity to pass their exam. However, under certain circumstances the Committee may decide that a second examination is not warranted. Such cases require a unanimous decision by the Committee. Examples of circumstances that could void a second examination include:

- the initial exam was scheduled after October 1st in the third year
- the student has significant deficiencies in coursework (i.e., one or more “C/E” grades)
- performance on the initial exam was so poor that a re-examination is deemed unlikely to yield a favorable result

If the Examining Committee determines that the student should be dismissed from the graduate program, the recommendation for dismissal would be made via a written report to the Senior Associate Dean for Graduate Education. The Dean would review the student’s record of coursework, research evaluations, and the outcome of the qualifying examination before rendering a decision to dismiss the student. The Dean may ask to meet with the student and advisor and, if necessary, consult with the University Dean for Graduate Studies. If the Senior Associate Dean accepts the recommendation to dismiss, the student would be notified in writing. Information about appealing such decisions can be obtained from the Office of Graduate Education.

c. Key dates in progression towards the Ph.D.

July 1 before 1 st semester	Begin first lab rotation (optional)
October 1 of 1 st semester	Start of first lab rotation
July 1 after 1 st year	Declare Ph.D. track and thesis advisor
Spring of year 2	Take Preliminary (Part I) exam
June 1 after year 2	Deadline for completing the Part I exam
October 1 fall semester 3 rd year	Deadline for the Qualifying (Part II) exam
July 1 of each year	Deadline for submitting annual evaluation form
6 mo – 1 yr before defense	Make plans for postdoctoral employment

7. Grading System & Performance Evaluations

All required courses, with the exception of Laboratory Rotations, Journal Club, Student Seminar, and Teaching Assistantships, are graded on an A/E system. These exceptions are graded on an S/E system.

A/E System

A Excellent
A-
B+
B Good
B-
C Poor

S/E System

S Satisfactory
E Failure
I Incomplete
IE Incomplete and Failure
W Withdrawn
N No Grade Reported

- E Failure
- I Incomplete
- IE Incomplete and Failure
- W Withdrawn
- N No Grade Reported

The minimum passing grades for courses and research carrying credit are C or S. However, upon receiving one C or lower grade in a course, the student will be put on academic probation and will receive notification from the Senior Associate Dean of Graduate Education. If a student receives a second grade of C or lower, the adequacy of the student's academic performance is reviewed by the Dean and the NGP Director. ***It is NGP Policy to dismiss a student upon receiving two grades of C or lower.*** For more information, please refer to the Grades Section of the University's Official Bulletin on Graduate Studies.

Annual evaluations—The NGP Steering Committee reviews the performance of first year graduate students at the end of each semester. Student progress is evaluated based on grades, instructor feedback, rotation evaluations, rotation reports, oral presentations, performance in journal club and participation. Students may be placed on academic probation or a mentoring plan based on these evaluations.

Second year students and beyond also receive a written evaluation of their performance from their advisor and thesis committee. After completing the Qualifying Exam, the student must meet with his or her Thesis Committee at least annually and file a written progress report with the Program Director within one week of the committee meeting, but **no later than June 1**. This report is reviewed by the NGP Director and Steering Committee and the Senior Associate Dean for Graduate Education. **Scheduling thesis committee meetings is the responsibility of the student and should be done in conjunction with the annual student seminar whenever possible.**

Please follow the guidelines below for annual evaluations:

- Entering into your First year: since you are just entering or will be entering the program you do not need to complete this
- Entering into your Second year: since you have just chosen a lab you do not need to complete this
- Entering into your Third year: Please complete the annual evaluation. You do not need to complete the committee report section
- Entering into your Fourth year and above: You need to complete the entire annual evaluation.

Please complete the annual evaluation when you have your qualifying exam and when you have your annual committee meeting to prepare for your PhD defense.

8. Ph.D. Dissertation and Final Exam

After completing the Qualifying Exam, the official Thesis Advisory Committee is formed and the remaining years of study are spent working on developing the research project that will form the Ph.D. dissertation. The Thesis Advisory Committee must consist of a

minimum of 4 tenured/tenure-track faculty assistant professor or higher. One of these is the thesis advisor. While the Thesis Advisory Committee is distinct from and need not overlap with the Qualifying Exam Committee, often two to three of the members come from the student's Qualifying Exam Committee.

For neuroscience students, two of the remaining three members, **MUST** be from the NGP faculty list and one must be from **outside** of the primary department of the advisor and co-advisor. Please notice that NGP faculty members can serve as external committee members for NGP students.

For NBA students, at least two of the four members **MUST** have their primary appointment in the Department of Neuroscience while the external member must be from outside the Department of Neuroscience primary faculty. The thesis advisor (who must have a primary or secondary appointment in the Department of Neuroscience) is the fourth member of the Advisory Thesis Committee.

It is required that prior to the thesis defense, all students will have published or submitted for publication at least one first-author manuscript in a peer-reviewed journal describing their research findings. Review articles or published meeting presentations are NOT sufficient to fulfill this requirement. After the advisor and Thesis Committee approve the completion of the thesis research, the student submits a dissertation of his or her findings. In the form of an open lecture, the student publicly presents his or her thesis research and in a closed exam defends those findings to the Thesis Committee. See the *Guidelines for preparation and registration of the Ph.D. thesis defense* (section 10 in this handbook).

9. General Program Information

a. Stipends/ health fees/ tuition: All matriculated NGP graduate students in good standing receive a stipend to cover living expenses that is paid semi-monthly (on the 15th and last day of each month). Stipends are not guaranteed following the 6th year in the program. Paper checks are sent to the NGP Coordinator and must be picked up in person. If you opt to have your check direct-deposited to your bank, you will not receive a pay stub or deposit notice. Payroll information is found online through the Human Resources Management System: <https://ps.its.rochester.edu/psp/HRPRD/?cmd=login&languageCd=ENG&>. Federal and New York State taxes are withheld from student paychecks. Individual health fee coverage is the basic coverage through the University Health Service. Additional coverage for family members or a spouse is available, but is not provided by the program. Full tuition costs are covered for 32 credit hours per academic year.

b. Policy regarding extra compensation: In the offer of admission to the Ph.D. programs in the School of Medicine and Dentistry, the prospective students are informed that they are to be admitted as full time students and that employment outside the graduate program is not permitted. A stipend is specified with the expectation that this will provide sufficient support for student living costs. In the rare instance in which a student wishes to participate in additional work and policy permits, the student must obtain explicit permission from their advisor, NGP Director, Department chair or Center Director, and the Senior Associate Dean for Graduate Education.

c. Grants & fellowships: Students are encouraged to submit applications for grants and fellowships to support their research. You can register in the GENIUS/SMARTS/SPIN databases at <http://www.rochester.edu/ORPA/funding/index.html> and receive funding opportunities on a daily basis. If you are interested in learning more about grants and fellowships, you may call the Office of Research and Project Administration (ORPA) for an appointment, x54031 (Hylan Building, Rm. 515 on River Campus) or you can visit them on-line at: <http://www.rochester.edu/ORPA/>.

d. Vacation policy: Each student is allowed 10 business days of vacation per year as mandated by NIH, plus University holidays. University holidays include Christmas Day, New Year's Day, Memorial Day, the 4th of July, Labor Day, and 2 days at Thanksgiving. While the scheduling of vacations is left to the discretion of the student, **prior approval from the advisor must be obtained** so as not to conflict with coursework, laboratory experiments and other duties. Before scheduling an extended absence from the University (i.e., more than 10 business days), students must obtain permission from their thesis advisor and the NGP Director.

*It is extremely important that ALL international students inform the NGP Coordinator of their **international travel** (including Canada) at least 10 days in advance, as there are specific documents from the University that are needed in order to ensure successful re-entry into the United States. Travel within the U.S. does not require documentation (but see below).

Travel within Rochester, and beyond: The International Services Office (ISO) recommends that international students always carry a university ID, current I-20 or DS-2019, and passport when traveling in the U.S., even within the Rochester area. These documents, including the I-94 card stapled to your passport when you enter the country, document your valid F-1 or J-1 student status. Since Rochester is so close to the U.S. border with Canada, a team of Border Patrol agents routinely check the immigration status of individuals in the community, especially near the airport, train and bus stations. If you are stopped and questioned about your status, the ISO may be contacted to help. When you arrive, you will receive a card with ISO Contact Information to carry with you. For more information, go to <http://www.iso.rochester.edu/>

International students should refer to the University's *Travel Information and Documentation website* (<http://www.iso.rochester.edu/travel/index.html>) before traveling within the U.S. or abroad.

10. Guidelines for Preparation and Registration of the Ph.D. Thesis Defense

a. Requirements:

- Part II Qualifying exam has been passed no sooner than six months prior to the thesis defense.
- Completion of degree requirements within specific time limits (7 years unless extension granted by Senior Associate Dean for Graduate Education).
- Satisfactory completion of the appropriate number of credit hours for the program (90 credit hours with no grades outstanding excluding current term).

- *Program of Study* must be on file with all requirements met. Note that the *Program of Study* should be filed before student completes the Thesis Proposal exam and will be used as a guideline for completion of his/her degree work. It reflects the minimum courses/credits needed to complete the degree.
- Student must have maintained continuous enrollment since admittance into the Graduate Degree Program.
- Committee must conform to the guidelines set by the Vice Provost for Research and Graduate Affairs Office.¹²

b. Written thesis: A manual entitled "The Preparation of Doctoral Theses" is available from the NGP Coordinator or online at <http://www.rochester.edu/Theses/>. Previous theses are also available in Miner Library for reference. It is the responsibility of the student to see that style, format, margins, paper, binding, etc. are in accordance with University regulations. If you have questions or concerns regarding the thesis preparation, please contact the Office of the University Dean for Graduate Studies, x54279. The thesis should consist of the following:

- Title Page (formatted as the example in the Graduate Thesis Manual)
- Curriculum Vitae
- Acknowledgments (where relevant)
- Abstract
- Table of Contents
- List of Tables (if applicable)
- List of Figures and/or Plates (if applicable)
- Foreword
- Text of the Thesis
- Conclusion
- Bibliography
- Appendices

c. Registration guidelines: The University Dean of Graduate Studies has set deadlines during the academic year by which a thesis must be registered in order to participate in graduation at the next Commencement. Please refer to the School of Medicine and Dentistry Graduate Student Academic Calendar for dates regarding registering the thesis, holding the defense and submitting corrected copies. **These dates must be adhered to; there are no exceptions.** Calendars are available from the NGP Coordinator or you can view it online at:

<http://www.urmc.rochester.edu/education/graduate/current-students/academic-calendar.cfm>.

¹² The Committee consists of four people including the advisor and an outside member. The outside committee member is defined as a tenure-track faculty member who is from **outside** of the primary department of the advisor and co-advisor for Neuroscience track students. For NBA track students the outside committee member has to be outside of the Department of Neuroscience primary faculty. A person from outside the University may serve as the outside member with prior approval from the Senior Associate Dean for Graduate Education and the Vice Provost and University Dean for Graduate Studies. Refer to the University's Official Bulletin for Graduate Studies for more details.

Defenses will not be scheduled after 3:30 P.M.

Overview of Due Dates:

- **At least 6 months prior** to scheduling a defense:
Meet with the Advisory Committee to request approval to begin writing thesis.
- **At least 4 months** to scheduling a defense:
The program director, with input from you and your advisor, will identify **3 individuals** to serve as a Chair for your defense. Please fill out the [Request for PhD Defense Chairperson](#) and submit it to the program director and coordinator along with a title page and abstract.
- **At least 8 weeks prior** to the date of defense:
Notify graduate program coordinator of defense plans. Provide the names of your committee members, title, and abstract of your dissertation. The coordinator will prepare the necessary forms for thesis registration ([Biomedical Science Program of Study](#), [Program Statement on Completion of PhD Requirements](#)) and will start a record in the PhD Defense Processing System in a SharePoint website. The system allows student's personal information, all necessary forms, and the required approvals to be collected electronically at various points through the process prior to defense. Please ask your committee whether they prefer paper or/and electronic version of the thesis.
- **At least 25 full working days prior** to the defense:
Upload your PhD thesis and CV in pdf format to the PhD Defense Processing System, and complete the [Alumni Update Form](#) for your exit interview. Provide your thesis to your Advisor, Committee and Chair in their preferred format. Please note that URMCCopy Center requires 4 business days to print and bind your thesis.
- **At least 20 full working days prior** to the date of defense:
The coordinator approves your record in PhD Defense Processing System, which triggers the emails to the committee members asking for their approval. After committee approval, the NGP Program Director approves your defense. Next the Senior Associate Dean of the School and the University Dean review and approve your thesis online in the PhD Defense Processing System.

Students will receive notification from the University Dean's Office confirming scheduling of the defense and the appointment of the Chair. The Chair of the defense and the committee will receive exam information from the University Dean via email.

NOTE: More information on registering and finalizing the thesis is available at <http://www.urmc.rochester.edu/education/graduate/phd/neurosciences/students/thesis-defense.cfm>

d. After the defense: After the Defense, the Committee Chair notifies the Dean of Graduate Studies of the outcome of the defense. If the outcome is a pass, the student will receive an email with further instructions from the University Graduate Studies.

After the successful completion of both the public and closed exams, the student needs to complete revisions (if necessary) and submit them to faculty for approval. The Dean's Office receives the final approval from the faculty via email. The student uploads the final document to the UR ProQuest site **before the degree period deadline**. It is student's responsibility to be aware of the deadline for the current degree period and submit all required forms and documentation on time. Deadlines are listed on the [academic calendar](#).

It is strongly recommended that a student begin working on their ProQuest form before their defense to familiarize themselves with the site and learn what they have to do to complete the form. The form can be started, continued and/or amended.

To exit the program student will need to complete a two-part web-based survey. The first part of the survey contains a brief set of questions from the University of Rochester. When the first part is completed, the student will be automatically directed to the second part where questions about activities in the program, future plans and honest opinion on the quality of the PhD program will be asked. The responses are completely confidential, but the student number is requested to verify the survey has been completed.

University Graduate Studies monitors the completion of the post-defense requirements and updates the student's record accordingly. Once they have all been met, and the final version of the student's PhD thesis was sent to ProQuest, the site will generate the final completion memo, a copy of which is sent to the graduate coordinator, the student, the dean's staff, International Services Office and University Housing. The Graduate Program Coordinator will prepare forms (Change of Status and 506 Appointment Forms) to terminate graduate student status.

The PhD stipend is to be terminated at the end of the pay period in which the student submits the final copy of the dissertation. SMD policy requires that students turn in the final copy of the dissertation within 30 days of the final oral examination.

In extremely rare circumstances, the student may be unable to turn in the final dissertation within 30 days of the oral examination. In such cases, continuation of the stipend beyond the end of the pay period in which the 30th day falls is at the discretion of the advisor and the Senior Associate Dean for Graduate Education.

APPENDIX A: HELPFUL WEB SITES

Graduate Student Information:

Offices for Graduate Education and Postdoctoral Affairs

<http://www.urmc.rochester.edu/education/graduate/>

URMC Academic calendar

<http://www.urmc.rochester.edu/education/graduate/current-students/academic-calendar.cfm>

Graduate Bulletin

<http://www.rochester.edu/GradBulletin/>

The Preparation of Doctoral Theses: A Manual for Graduate Students

<http://www.rochester.edu/Theses/>

Graduate Student Society

<http://www.urmc.rochester.edu/education/graduate/current-students/graduate-student-society/>

International Services Office

<http://www.iso.rochester.edu/>

Health and Safety:

University Health Services (UHS)

<http://www.rochester.edu/uhs/>

University Counseling Center

<http://www.rochester.edu/ucc/>

University Safety and Security

<http://security.rochester.edu/>

Tuition, Billing and Financial Aid:

Bursar's Office

<http://www.urmc.rochester.edu/education/bursar/>

Financial Aid

<http://www.urmc.rochester.edu/education/financial-aid/>

Program-Related Information

Neuroscience Graduate Program

<http://www.urmc.rochester.edu/education/graduate/phd/neurosciences>

Neuroscience at Rochester

<http://www.sas.rochester.edu/bcs/neuro/index.html>

University Related Sources

University of Rochester

<http://www.rochester.edu/>

University of Rochester Medical Center

<http://www.urmc.rochester.edu/>

University of Rochester Intranet

<https://sites.mc.rochester.edu>

Med Center Calendar for Scientific Seminars

<http://www.urmc.rochester.edu/calendar/>

Health Science Libraries and Technologies

<http://www.urmc.rochester.edu/hslt/>

Information Technology Services

<http://www.rochester.edu/ITS/>

Information about Rochester

City of Rochester Site

<http://www.cityofrochester.gov/>

Democrat & Chronicle (Local Newspaper)

<http://www.rochesterdandc.com/>

YNN News (24 Hour Local News)

<http://rochester.ynn.com/>

APPENDIX B: CREATING A PHD READINGS COURSE

To expand on the range of topics covered in current elective offerings, students are encouraged to develop their own elective course drawing on the expertise of the UR faculty. Reading courses usually depend on primary literature readings and discussions although text and specialty books can also be a good source material for reading courses. Typically, students will approach one or more faculty with expertise in a topic they want to explore to determine if there is time and interest in collaboratively developing a reading course, selecting topics and readings, as well as deciding on course format and grading basis. The majority of reading courses are based on a weekly syllabus that determines the topic covered and the readings required, meet 1-2 hours each week and are graded based on discussion, participation and possibly a term paper. A course description must be submitted to the NGP Director 2 months before the start of the semester. Once approved the course will be advertised to the NGP student community so that other students can participate. Below are examples of recently advertised reading courses.

Requirements for credit hours are the following

"A credit hour is defined as 15 "hours" of instruction. That may be fulfilled with 15- "50 minute" classes. The expectation is that a 3 credit class would meet for example on a three day per week schedule 45 times over the 15 week semester. It is required that students should expect 2 hours of outside work for every one hour of instruction. Therefore a 3 credit class requires 45 instructional hours plus 90 outside study hours for a total of 135 work hours." A more detailed description can be found: <https://www.rochester.edu/provost/assets/PDFs/UR-Credit-Hour-Policies-March2016.pdf>

Example 1

Course Title: Circuits in Sensory Systems

Number of Credit Hours: 2

Class Schedule: One 20 minute prep meeting and one 1.5 hour journal club meeting per week. Meeting day/time TBD

Instructors: Dr. Farran Briggs & Dr. Krishnan Padmanabhan

Method of Grading: In addition to presenting and discussing papers, students will work together to prepare and submit a "Journal Club" article to the Journal of Neuroscience based on one of their readings.

Course Descriptions: This Course aims to provide an overview of circuit structure and function in the domain of sensory systems. Topics will be guided by student interest and will include vision, olfaction, audition, and somatosensation as well as methods and techniques used to study sensory systems. Discussion will be led by students with guidance from faculty and will focus on understanding the necessary background for the reading, the results of the paper, and how the findings fit into the literature. The overall goal will be to gain familiarity with research in sensory systems and circuits, allowing students to understand how their work fits into the current field.

Example 2

Course Title: Plasticity in the Lateral Geniculate Nucleus

Number of Credit Hours: 2

Class Schedule: Wednesday 2:00-4:00 pm

Instructor: Dr. Richard Libby

Method of Grading: Based on oral paper presentations.

Course Description: Provides a broad overview of plasticity in the central visual system. Topics covered include organization and development of central visual target fields, modular mechanisms underlying plasticity in the adult brain, brain changes induced following damage to retinal cells, and the functional relevance of plastic changes induced in disease states and following injury.

Example 3

Course Title: Modern Genetic Techniques in Neuroscience

Number of Credit Hours: 1

Class Schedule: 1 hour per week. Meeting day/time TBD

Instructor: Dr. Douglas Portman

Method of Grading: Grading will be determined based upon the amount of active participation in weekly paper discussions.

Course Description: Over the past few decades, the field of Neuroscience has seen an explosion in the number of novel techniques developed to explore the structure and function of the nervous system. These methods have helped to shape the field into a dynamic, diverse, and highly productive discipline. In order to better understand these techniques, as well as how they have shaped modern Neuroscience research, this reading course will focus on hallmark genetic methods that have become prevalent in the field, including Cre-Lox systems, optogenetics, RNS interference and circuit tracing. In doing so a dominant, current technology will be paired with its historical lineage and context.