

Johns Hopkins Undergraduate Honors Thesis

Objectives

- Provide practical experience developing a research hypothesis, designing a study to test a hypothesis, and executing the study.
- Increase the amount of direct student engagement with a research project.
- Provide hands-on practical research experience using cutting-edge technology to enhance the technical capabilities of students.
- Increase the written and oral science communication skills of students.

Introduction

The Neuroscience Undergraduate Honors Thesis program is designed for students wishing to distinguish themselves via the writing and defense of a Thesis. Students wishing to gain more hands-on experience in the construction of a research hypothesis, experimental design, and scientific communication should consider the Thesis. In particular, students thinking about pursuing a career in research may find the preparation of an Undergraduate Honors Thesis will provide valuable insight into the research endeavor.

Undergraduate Honors Thesis Requirements

Students successfully completing the Neuroscience Undergraduate Honors Thesis will earn the Honorific Distinction in Research which will appear on transcripts. To successfully complete the Neuroscience Undergraduate Honors Thesis program, students will need to:

- Design and conduct an experiment in Neuroscience under the direction of mentor
- Submit an application, a recommendation letter from the primary mentor, and a research proposal describing your planned project to the Undergraduate Honors Thesis Director (Dr. Robert Ross) via email at rross32@jhu.edu during the Spring semester the year before your planned graduation date
- Enroll in 9 credits of Independent Research
- Write an Undergraduate Honors Thesis
- Defend the Thesis orally to a committee comprised of members from the Johns Hopkins University Neuroscience community by mid-April of your graduation year.
- Present your research at the DREAMS conference Fall or Spring of your final undergraduate year
- Attend a weekly Honors Thesis Seminar during Spring semester of your graduation year focused on assisting with Thesis writing (Neuroscience Honors Thesis Seminar AS.080.599)
- Maintain minimum 3.5 GPA in all required courses for the Neuroscience major

The Undergraduate Honors Thesis

A Thesis involves an in-depth foray into some unknown aspect of study leading to construction of a hypothesis whose answer would advance our understanding of the topic. In practice, a Thesis involves a dive into the research literature followed by construction of a testable hypothesis and then hypothesis testing and reporting. The hypothesis should be constructed with input from the Neuroscience Undergraduate Honors Thesis mentor(s). Once a hypothesis is constructed, the next step is constructing an experiment to adequately test the hypothesis followed by preparation of a written Thesis to explain the logic behind the experiment, the experiment, and link the results of the experiment to the broader scientific literature. The Neuroscience Undergraduate Honors Thesis will likely be somewhere in the 30-50 page range (including references, Figures, and Tables). The maximum number of pages should be 60 pages as the goal is to effectively communicate the logic, rationale, and benefits of your experiment and not write an in-depth review article. If accepted to the program, you will be provided a Thesis Preparation Guide with more detailed information about the construction of a Thesis.

The Undergraduate Honors Thesis Defense

The Undergraduate Honors Thesis Defense will simulate the experience of defending a Master's Degree Thesis or Ph.D. dissertation by having students present their work orally to a committee of Neuroscience community members. The presentation should be 20 minutes long and will be given to the committee and invited guests followed by 5 minutes of questions from the guests. The guests will then be asked to leave the room and the committee will question the candidate for 15-20 minutes. The Thesis Committee will then evaluate the written Thesis and the oral defense in determining whether the candidate passes the program and earns the Distinction in Research honorific.

The Thesis Defense must be scheduled to occur by the end of April with a successful defense in order for the Distinction in Research honorific to appear in the Commencement Program.

Grading

Students will register for the Neuroscience Honors Thesis Seminar AS.080.599 1-credit class and receive an S/U grade based on the Thesis Committee's evaluation of the written Thesis and the oral defense. If the student earns an S grade, then the designation Distinction in Research will be given and appear on the student's transcript pending completion of the other programmatic requirements (GPA and 9 credits of research).

The Neuroscience Undergraduate Honors Thesis Program is separate from receiving Honors in Neuroscience. If a student successfully completes the Honors in Neuroscience requirements, they will receive both the Neuroscience Honors designation as well as the Distinction in Research designation for successfully completing the Undergraduate Honors Thesis.

The Honors Thesis Committee

The Undergraduate Honors Thesis Committee should be composed of 3 people from the Johns Hopkins University Neuroscience community. A member of the neuroscience community includes any faculty member that engages in Neuroscience research or teaches neuroscience

classes from any department as well as post-docs working in Neuroscience research labs. One committee member will be the candidate's primary mentor, which can be the PI of the laboratory or a post-doc directly supervising the undergraduate student. The other two Committee members can be from any department at Johns Hopkins University where Neuroscience research is being done with the stipulation that at least 1 Committee member be from outside the primary mentor's laboratory. The members of your Honors Thesis Committee as well as the Director of the Neuroscience Honors Thesis program should be given a **completed** copy of the Thesis at least 2 weeks prior to the scheduled Thesis defense date (mid-April). As such, students should plan to have their first draft of their Thesis completely written by mid-March of the Spring semester.

Finding a research lab for the Thesis

You should use the guidance at the following link to find a lab:

<https://krieger.jhu.edu/neuroscience/research/finding-a-lab/> . If you are planning on trying to complete a Neuroscience Undergraduate Honors Thesis, we strongly suggest finding a lab to join at least 2 years (4 semesters) before your planned graduation date as you will need time to learn about the lab, plan an experiment, conduct the experiment, and then write your Thesis.

DREAMS Poster Presentation

Presentation of Neuroscience Undergraduate Honors Thesis findings at the Day of Research in Engineering, Arts, Medicine and Sciences (DREAMS) is required. If you have not presented your research and plan to present in either of the upcoming DREAMS, please provide proof of registration to Hope Fisher.

Please submit an abstract if the deadline date is prior to the presenting date. When submitting the abstract, it **MUST** be in a Word document with the title of the research and **your name and the name of your PI**. Do not include the abstract in the body of an email.

Research presented at Fall or Spring DREAMS will be judged by Neuroscience and/or Behavioral Biology faculty [based on select criteria](#).

If a student's presentation does not meet the criteria or a judge is unable to contact the student, that student will become ineligible for Honors and Distinction in Research. Therefore, the presentation should be treated like a final exam.

Honors Thesis Seminar (1 credit)

Attendance of a weekly 2-hour class to discuss issues relating to the Neuroscience Undergraduate Honors Thesis is required to complete the program. The Neuroscience Honors Thesis Seminar class (AS.080.599) will meet for 2 hours weekly in the Spring semester to assist with the Thesis Program requirements. Specifically, students will learn and practice how to write a Thesis via lectures, workshop activities, and peer review. The Honors Thesis Seminar

class will also provide Neuroscience Honors Thesis students tips on putting together poster presentations and their Thesis defense talk.

Independent Research (9 credits)

Nine (9) independent research credits in Neuroscience must be completed in order to earn Distinction in Research. There are two differences to be aware of in how the required research paper at the end of each semester a student is required to write for independent study is handled.

1) Students that submit a proposal (see below) to the Undergraduate Honors Thesis program and are currently enrolled in independent neuroscience research can use the Honors Thesis proposal as their final research paper for their independent study. Students can only use their Honors Thesis proposal as their final research paper for their independent study the semester they submit the proposal. Only students that submit a proposal to the Honors Thesis program can use a research proposal as their final research paper for their independent study and this can only be done once in the Spring semester in the year the student applies to the Honors Thesis program.

2) At the end of Fall semester of senior year, students in the Honors Thesis program should submit a draft of their introduction and methods section of their Thesis instead of the regular research report. We encourage students to use their proposals to the program as the basis for developing their methods section and introduction. The rough draft of the introduction and methods section will help in launching the work done in the Honors Thesis Seminar class.

Undergraduate Honors Thesis Proposal

Students interested in completing an Undergraduate Honors Thesis should prepare a proposal describing the planned experiment using the Summer PURA Research proposal guidelines. The proposal must be submitted by March 1st the year prior to the planned graduation date (typically March of Junior year). The proposal should be submitted to the Director of the Undergraduate Thesis Program (Dr. Robert Ross, rross32@jhu.edu) via email. There may be limited funds available via the Neuroscience Program Summer Research Award (see Funding) to support students working on their Thesis research in the summer prior to their final year at Johns Hopkins University. All students applying to the Neuroscience Undergraduate Honors Thesis Program will be considered for a departmental award with the exception of students that have received PURA funding from the University. Students are strongly encouraged to submit their Thesis Proposal to PURA first and then to the Honors Thesis Program. A letter of recommendation from the PI of the laboratory is required. Please provide your PI with the Undergraduate Thesis Mentor Recommendation Letter form for them to fill out. Proposals will be reviewed by a committee of Neuroscience faculty members and students will be notified of their acceptance to the program and any funding determinations by the end of March.

If an undergraduate student has already published a 1st author paper (or has submitted a manuscript for review) by the time they would apply to the Undergraduate Honors Thesis Program, the student can submit the published article as their proposal to the program. Additionally, the requirement to write a thesis will be satisfied by the published article. However, students with a 1st author publication would still need to do an oral defense of their paper before their thesis committee to complete the written thesis and oral defense portion of the program. This exemption only applies to undergraduate students that are listed as 1st author on a paper and does not include papers where the student was an author other than 1st.

Funding

Discuss with your Thesis mentor how funding your research experiment will work. Funding may also be obtained through many different mechanism from the University (<https://research.jhu.edu/rdt/funding-opportunities/undergraduate/>). Additionally, the Undergraduate Neuroscience Department may have a limited amount of Summer Research Awards available. The Summer Research Award from the department is meant to provide students the ability to conduct Summer Research to facilitate writing their Neuroscience Undergraduate Honors Thesis. As such, only students that are committing to writing an Undergraduate Honors Thesis are eligible for Summer Research Funds from the Department. We encourage you to apply for summer research funding through the University first (for example, the Summer PURA program applications are typically due in February with funding decisions in mid-March). As the format of the Undergraduate Honors Thesis proposal is the same as the Summer PURA award, it is acceptable (and encouraged) to apply to Summer PURA and then use the same proposal for your Undergraduate Honors Thesis proposal.