

## Guidelines for NSCI 490 & 491

Below is an introduction and guidelines to the NSCI 490/491 course sequence. Students should check the Canvas course site for the most up-to-date information.

### Course Overview:

The main purpose of this course is to enable you to obtain hands-on experience with basic research as part of your education at Yale. The course entails two semesters of experimental work (the minimum time expectation is 10-12 hours per week in the lab) aimed at generating data from experimental strategies designed to test an interesting research question. Work for this course must be performed in-person or (when possible) remotely. Only NSCI seniors may take this course, and only to fulfill the Senior Requirement for the NSCI B.S. degree

### Safety Requirements:

Note that you will need to fulfill various safety and associated requirements to begin research, depending on your field of study. You will not be able to start your experiments until these requirements are fulfilled. You must be included in your lab's safety plan submitted to EHS; confirm with your PI that you are included. For further information, call EHS at 5-3550.

If your proposed research involves animal use your professor **must** have an approval for this protocol from IACUC. Your professor must send a new form to IACUC to include you in the protocol once your project has been approved. Finally, if you have not already done so, you need to complete an IACUC course before research can begin.

If your proposed research involves human subjects your professor **must** have an approval for this protocol from HIC or HSC. Your professor must send a new form to the relevant IRB to add you to the protocol once your project has been approved. Finally, if you have not already done so, you need to complete a human research ethics course before research can begin.

### Course Requirements:

#### 1. Student and Research Mentor Contracts:

Both the student and the research mentor are required to sign the research contract. These should be uploaded to the Assignments section of Canvas.

The contract is typically due the second Friday of the Fall term.

## 2. Course Proposal:

A 1-2 page double-spaced summary of your empirical research project written in collaboration with your research mentor. This should include a 0.5–1 page overview/background of the project (documented with a short bibliography) and a section describing the general objectives, hypothesis to be tested, and most importantly, the specific aims of your project. For guidance, ask your research mentor for an example Specific Aims section of a grant.

Empirical research can include: obtaining and analyzing new data, performing new analyses on public or private data, or creating quantitative models to explain data. ***If you are considering a project that does not fall into one of the categories above, please discuss this with your research mentor and the course coordinators prior to committing to the laboratory or project (there may be suitable alternative projects in the same lab).***

This assignment is typically due the second Friday of the Fall term.

## 3. Time Commitment

We are particularly concerned that each student fulfills the minimum 10-12 hours per week research commitment in the lab or remotely; part of the mentor's contract is to verify that level of participation by mid-semester. ***If for any reason you are unable to fulfill your commitment to the course and laboratory, you will be asked to withdraw from the course; this may impede your ability to graduate this year.*** Note, if you are a senior planning on attending multiple interviews for medical school in the Fall, you are expected to make up for lost time.

## 4. Fall Grant Proposal:

A 10-page (double spaced) document must be uploaded to Canvas under Assignments with the following sections patterned after the format of an NIH or NSF Grant:

- Specific Aims
- Background
- Significance
- Aims
- Approach
- References
- Figures and Legends can be embedded

This assignment is typically due on the last day of class during the Fall term.

## 5. Spring Poster Symposium:

The Poster Symposium is a mandatory session that will be held in the Spring. The purpose of the symposium is to share information and more specifically to highlight undergraduate research at Yale. The symposium will be open to anyone wishing to attend, so please encourage friends, colleagues and other students to come. Your research mentor is strongly urged to attend.

**Each student must prepare a poster.** Posters can be as large as 3' X 5' but may be smaller. We will have poster boards and easels available to put your poster on. Posters should be printed professionally, if possible. Students should check with their mentor to see if they can cover printing costs. Alternatively, a student may use a color printer and assemble individual sheets onto the poster board.

Posters should have a title, and the authors (including you and your research mentor) should be listed as well, usually in large letters at the top. Indicate which research course you are in (NSCI 490). The poster should include three sections: Introduction, Results, and Conclusions. The Introduction explains the purpose of your project; the Results section contains figures and/or tables showing your data, with legends or commentary; the Conclusion summarizes what you learned. Feel free also to include what you would do next were you to continue working on the project.

If you continue in research, the first presentation you are likely to give at a scientific meeting is a poster, so this will be good practice. The fewer words and the LARGER THEY ARE WRITTEN make it easier for people to notice and examine your poster. If a poster contains a great deal of text in small font, the audience may not read it. The same applies to data. Tables with large numbers of entries may be ignored. Simple figures with a concise conclusion for each are optimal. You should begin to organize your poster well in advance and you should allow at least one day for planning it and at least one day for producing the various parts of it. Bring it to the session ready to assemble. Please keep in mind that content should take precedence over form. It is much more important that your poster be clear, informative, and thoughtful than that it look highly professional.

Aesthetic appeal is of course nice, but the science is paramount. Finally, ***discuss your presentation with your research mentor and other members of your lab well before the session*** and if you have any further questions/concerns bring the preliminary poster to show the course coordinators.

The poster symposium is typically held on the first Monday of reading period in the Spring.

## 6. Spring Research Article:

A 6,000-7,000 words in total, double-spaced paper in the form of a typical Research Article is due in the Spring. It needs to be uploaded to the Assignment section in Canvas.

Well in advance of this deadline, you should meet with your research mentor to plan a general outline for your paper and engage them in continued discussions throughout the writing process. You should conform to any other specifics that your mentor might expect in your write-up. The research mentor should grade the final version of the report and return it to us with comments electronically along with a recommendation for an overall course grade. Your research mentor will be contacted directly with grading information near the end of the term.

The article should follow the formatting guidelines of a journal in the field of neuroscience with longer articles, such as: *Neuron*, *Journal of Neuroscience*, *PLOS Biology*, or *Cerebral Cortex*. Please consult each journal website for exact requirements.

This assignment is typically due on the last day of class in the Spring term.

## 7. Grading:

The final grade will take into account the research mentor's recommendation on the level and quality of effort in the laboratory and the quality of the final research report, combined with the course coordinators' evaluation of the Poster Symposium. The mentor will be asked to recommend an interim grade of satisfactory (S) or unsatisfactory (U) at the end of the Fall term based on laboratory effort and the grant proposal. Students receiving an unsatisfactory grade will be asked to meet with the coordinators and the mentor to identify problems and outline strategies for improvement. In the Spring term, students will receive a letter grade that will be applied retroactively to the Fall term.