

# NEUR 490x: Directed Research

## General Information, Application Instructions, and Application

For most of you, engaging in laboratory research will be a very new and important learning experience in your development as an independent thinker. A major goal for enrollment in the NEUR 490x course is to learn how to describe and communicate your plan for a research project to a broad audience. This skill will be helpful to your education in general, and will certainly assist you in writing your Personal Statement for graduate/professional school applications. We want you to derive maximum benefit from your NEUR 490x research endeavors. Writing a strong Proposal at the beginning and providing a clear Research Report at the end is an essential part of this exercise.

As you may know, many of our life science undergraduates are involved in research. Most, however, do not receive course credit for every semester of involvement. Because research is a long-term, multi-semester commitment for most students, they take a NEUR 490x course as the capstone or culmination of their research experience.

The advantage of doing a 4-unit NEUR 490x course is that it may count as an upper division elective in your major (please check with your advisor on this). The advantage of working on your research project on an informal basis for a while before signing up for the NEUR 490x is that then, the NEUR 490x can be the culmination of a substantial body of work - more than could be accomplished in a single semester. Longer-term involvement will allow you to become more sophisticated in your techniques, accomplish more (all research progresses slowly), and will give your mentor more opportunity to get to know you (and thus be a better advocate in letters of recommendation, etc.). **Please do not apply if your science and/or cumulative GPA is below 3.0 or if you are Sophomore standing or below (completed less than 64 units).**

### Finding a Faculty Sponsor

The vast majority of research-active scientists at USC are strong supporters of undergraduate involvement in research, and are committed to providing opportunities. A NEUR 490x sponsor must be a regular USC faculty member conducting neuroscience-specific research. If your sponsor has not previously directed a NEUR 490x course, we would need his/her curriculum vitae. While many students work with Dornsife faculty in the departments of BISC, PSYC, HBIO, CHEM, and MATH some students work with out-of-department NEUR 490x sponsors in the schools of medicine, pharmacy, gerontology, and engineering.

To find a faculty sponsor, our advice is to try several tactics simultaneously. Review the web pages of the faculty members in BISC and PSYC, as well as relevant departments in the Keck School of Medicine, the School of Pharmacy, the School of Engineering, etc. Once you've made a list of potential sponsors, send each prospect a brief email. Tell them that you're interested in their research and in working with them. You could say that, even if they don't have space, you would appreciate meeting to get their advice. This will give them the opportunity to check you out as a prospective student-researcher. In the email and any subsequent meeting, be sure to put your best foot forward. They will want to know your overall GPA, which most faculty members view as a useful index of students' academic ability as well as ability to manage time. Be willing to commit to a period of learning before actually beginning to work in the lab. This learning could include taking a relevant class, reading of advanced textbooks and original research literature, attending lab meetings and journal clubs, etc.

At the same time, ask fellow students who may be doing research for their advice and possibly for introductions to their sponsors. Most of the more accomplished life science and pre-health students will be doing research, so they won't be hard to find. You can also check out the Provost's undergraduate research web page: <http://undergrad.usc.edu/research/>. Explore some of

the links on this webpage for names of faculty who are more deeply involved in sponsoring undergraduate researchers.

## **Guidelines for Writing the Research Proposal**

A question that students sometimes have is whether they must devise their own research project. The answer is almost always no. Your faculty sponsor will either assign you a project or give you a choice of a few well-defined and closely related projects. After all, your role and that of everyone else working in the laboratory, will be to advance the specific aims of the grants that fund the research.

The proposed research project must be neuroscience focused, which is up to the Neuroscience Program Director to decide.

1. The writing must be clear and grammatical, and devoid of typos and misspellings. In addition, you need to clearly explain the text of your proposal so that it is understandable to a broad audience. A reader outside the field of research of your project must be able to easily understand the:
  - a. background and rationale for your study (i.e., why your study is interesting and important);
  - b. specific goals of your study, the methods you will use, and the dependent measures that you will collect;
  - c. possible results you will obtain and what these results might mean;
  - d. guiding hypotheses, and how your experiments will allow you to test those hypotheses. If yours is an exploratory study without a definite hypothesis, then simply communicate that fact;
  - e. breadth of your involvement in the overall project. If you will have a limited role in a larger effort, indicate what part of the project is yours. We require that you be as broadly involved in the project and laboratory culture as possible. Proposals that are limited to routine analysis of data gathered by others are unlikely to be approved.
2. It is important to write the proposal in your own words. Excessive use of verbiage from your sponsor's papers or grant applications is easy to detect and will not be acceptable.
3. Almost certainly you will be working with a graduate student or post-doc during your research. It is fine to have a graduate student or post-doc in the lab work with you on a first draft of your proposal before submitting it to your faculty sponsor who will oversee your NEUR 490x research project. Your faculty sponsor will usually be the Principal Investigator, or P.I. (the faculty member responsible for the overall research in the laboratory). It is commonplace to be persistent in order to get the help you need writing your proposal to ensure that you have a detailed enough understanding of your project to clearly communicate your research plan in writing.
4. Before submitting the final text of your proposal in your application, it is your responsibility to make sure that your faculty sponsor reads the proposal and provides feedback before s/he signs the form. You need to let your faculty sponsor know well in advance (at least one month) that you have a deadline for submitting your form. Making a plan with your faculty sponsor will save you a lot of stress in the long run.
5. It is a virtual certainty that you will have to go through at least 1-2 drafts of your proposal with your faculty sponsor, and it is not uncommon to go through 3 or more drafts. Therefore, you should plan to email the first draft of your proposal to your advisor(s) at least one week prior to the deadline for submission of your NEUR 490x application.
6. **The deadline to submit your application to your academic advisor is 5:00 p.m. on the Friday of the first week of classes in the semester in which you wish to enroll. Late**

applications will not be accepted. Please allow up to 2 weeks for a decision from the department.

## **Engaging in Research**

Performing research in a faculty member's lab involves serious commitments, on the student's part to work diligently, honestly and with responsibility, and on the professor's part to provide appropriate guidance, help, and mentorship. So, it's important that the student and faculty member meet and establish their professional relationship before they mutually agree to begin. Some degree of persistence and legwork on the part of the student is viewed by many faculty members as an important first step in demonstrating a potential for commitment.

A major requirement for approval to enroll in NEUR 490x is at least a science and cumulative GPA of 3.0 or higher. Please do not apply if your GPA is below 3.0. Instead, focus on improving your grades before applying. The main rationale is that students' highest priority should be to learn and attain the highest possible grades in regular classes in order to proceed promptly toward successful completion of degree requirements and graduation. Given that research is very time-consuming, there are potential negative effects on grades in regular classes when conducting research at the same time.

There is no set schedule for the research - that will be a matter of mutual agreement between you and your sponsor. An important guideline is that you should spend 3-4 hours per week on the research (in and out of lab), per unit of credit. In other words, a 4-unit NEUR 490x class will require a 12-16 hour commitment per week, on average. Of course, you should keep a record of your research, typically some sort of lab notebook and associated computer files. The exact nature of these records depends on the research. Your sponsor will inform you about the standards for record keeping in the field.

## **Final Research Report for NEUR 490x: Directed Research Projects**

The main reason for this request for documentation of the NEUR 490x research projects is to set up the expectation that you are not to merely act as a technician in performing a research protocol, but are expected to gain a deeper understanding of the research and how your contribution fits into the broader picture.

Students are expected to file an electronic copy of their final research report on their NEUR 490x research projects. These reports will be archived with the Neuroscience Program and the guidelines for the report's format are detailed below. Your faculty sponsor is expected to review the report prior to submission to the department.

**Final research reports are due to the Program Director: Prof. David McKemy at [mckemy@usc.edu](mailto:mckemy@usc.edu) (along with a cc: to your faculty sponsor) by the last day of instruction in the semester in which you are enrolled for NEUR 490x.**

*Final grades will be **assigned by the Faculty sponsor** pending receipt of the documentation and confirmation from your faculty sponsor that your research and report meet the standards required for satisfactory completion of a NEUR 490x research project.*

## **Organization of the Research Report**

Scientific research reports, irrespective of the different Neuroscience disciplines, should follow the method of scientific reasoning including a clearly defined problem, a hypothesis, experiments to test the hypothesis, experiments performed, and conclusions from the results. Thus, the final report should include the following:

## **Title and Title Page**

The title should accurately reflect the research project described in the report. It should be as short as possible and include the essential key words.

The author's name (e.g. John C. Smith) should follow the title on a separate line, followed by the author's affiliation (e.g., Department of Biological Sciences, University of Southern California), the date, and origin of the report (e.g., In partial fulfillment of a Individual NEUR 490x Research Project under the supervision of Professor John Doe, Term and Year).

All of the above information could appear on a single cover page. Acknowledgements and a table of contents can be added as preface pages if desired.

## **Abstract**

The abstract should briefly describe the topic, the scope, results and the conclusions. It should accurately reflect the content of the report and be no more than 200 words.

## **Introduction**

The introduction should be presented as a clear statement of the problem or project and why you are pursuing it. This section should describe the background information on the problem, what has been previously done (cite the literature), and the project's objectives.

## **Methods**

The methods should clearly describe the procedures that were used in the project with as much detail as possible. A good way to think about it is as a guide that another researcher could use to repeat your experiments. It should follow your laboratory notebook, describing procedures, techniques, instrumentation, and analysis procedures.

## **Results**

The results are the main component of the report, describing the data obtained, observations, and summary of the specific project findings. Tabulation of data, equations, charts and figures are helpful in clearly presenting the data obtained.

## **Discussion**

The discussion is where you can now fully describe the analysis and interpretation of the results. What do the results mean? How do they relate to your initial objectives for the project? Do the results support your hypothesis? Directions for future work and what additional directions this work might go in the future are also appropriate.

## **References or Literature Cited**

Literature references should be collated at the end of the report and cited in one of the formats described in standard journals.

## Application Instructions

Please read the instructions below carefully.

1. **Please do not apply if your science and/or cumulative GPA is below 3.0.**
2. NEUR 490x applications are due electronically as one single PDF document to your academic advisor on the Friday of the first week of classes in the semester in which you wish to enroll. Late applications will not be accepted. Please allow up to 2 weeks for a decision.
3. Your research proposal should be approximately 2 double-spaced pages (no more than 3 pages) written in your own words.
  - a. We expect that your description of the background, rationale, and significance of your study will not require more than about 20% of the total length of your proposal.
  - b. You may include one extra page with one figure (with a figure legend; not included in page limit).
4. You do not need to include references (or a reference list).
5. Please include a copy of the title page from a single journal article that is highly relevant to your proposal.
6. Please make sure that your application is complete with all supporting materials, signed and dated by your faculty sponsor. Please enter on the form your official USC email address, whether or not this is your preferred email address.
7. **DO NOT** include grades earned in transfer course work when calculating your science GPA.
8. **DO** indicate transfer courses by entering "TR" in the space where the letter grade would be entered.
9. Please include your most up-to-date STARS Report. All grades reported on the application will be checked against your STARS Report. Applications with grades that are misreported or contain other incorrect information may be denied.
10. You will receive an email from your academic advisor when processing of your application has been completed. If approved, you will be given d-clearance and can register for NEUR 490x.
11. Upon the conclusion of the semester in which you registered for NEUR 490x, submit your FINAL written research report to your faculty sponsor and the neuroscience program director by the **last day of instruction.** You will not receive a grade for NEUR 490x until the department has received a copy of your research report for that semester, as well as an email from your faculty sponsor indicating that your research and report meet the standards required for satisfactory completion of a NEUR 490x research project and a letter grade.

# NEUR 490x Directed Research Application

## OFFICE USE

Semester (circle)	Year	Units*
Fall		
Spring		
Summer		

\* 2 or 4 units per semester

CV on File   
 Approved  Denied

X

\_\_\_\_\_  
 Director of NEUR Research Date

## Contact Information

### Student

Name: \_\_\_\_\_  
 USC ID#: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_  
 Major: \_\_\_\_\_

### Faculty Sponsor

Name: \_\_\_\_\_  
 Department: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_

## Academic Progress

### Class Standing:

Junior   
 Senior

### GPA:

Major   
 Cumulative

### NEUR Core Grade

BISC 220L	
CHEM 105aL	
PSYC 100	
MATH 125	
STATS	
BISC 421	
BISC 408/407	
PSYC 440	

### U.D. Electives Grade

_____	
_____	
_____	
_____	

### Other Sciences Grade

_____	
_____	
_____	
_____	

## Please attach the following to this application:

- **Research Proposal:** Please see the above instructions for further information regarding your research proposal.
- **Title page of one research journal article** that you have read to help in the design and execution of your proposed project.
- **STARS Report** (most up-to-date)
- **Faculty sponsor's curriculum vitae if not on this list:** <http://ngp.usc.edu/faculty/>

## Research Agreement

I have read the requirements for NEUR-490x and have discussed them with my Faculty Sponsor. I am aware that I must conduct the research project appropriately and must submit to my Faculty Sponsor and academic advisor a final project by the end of the semester. The information entered on this form is accurate to the best of my knowledge.

X

\_\_\_\_\_  
 Student Date

I agree to sponsor this student's NEUR-490x course, to supervise the research with care, and to provide a beneficial learning experience. I will ensure that the student files a research report by the end of the semester and I will provide a grade to the program by the end of the semester. **I have personally reviewed and support this student's research proposal.\***

X

\_\_\_\_\_  
 Faculty Date

**Email completed applications to your academic advisor by Friday of the first week of the semester in which you wish to enroll.**

**\*An email from the faculty may serve as a signature.**