

Information about BISC-290/490x Directed Research

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 BISC-290/490x 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 BISC-290/490x research endeavors. Writing a strong proposal at the beginning and providing a clear and succinct summary report at the end is an essential part of this exercise.

BISC-290 and BISC-490x

Engagement in research is a great experience for most students. 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.

BISC-290 is designed to be a for-credit introduction to research. Most students who get involved in research don't take a BISC-290 course, however. They simply begin their research involvement on a volunteer basis. Because research is a long-term, multi-semester commitment for most students, they take a BISC-490x course as the capstone or culmination of their research experience.

The advantage of doing a 4-unit BISC-490x course is that it may count as an upper division elective in your major (please check with your advisor on this), whereas BISC-290 doesn't satisfy any particular requirement. The advantage of working on your research project on an informal basis for a while before signing up for the BISC-490x is that then, the BISC-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.**

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. For most of us, our first step on the path that led to our current academic positions was engagement in research when we were undergraduates. A BISC-290x/490x sponsor must be a regular USC faculty member, but not necessarily in the BISC department. If your sponsor is not in BISC and has not previously directed a BISC-290/490x course, we would need his/her curriculum vitae. Most of our out-of-department BISC-290/490x sponsors are in the schools of medicine, pharmacy, or gerontology.

To find a faculty sponsor, our advice is to try several things simultaneously. Review the web pages of the faculty members in BISC, as well as relevant departments in the Keck School of Medicine, the School of Pharmacy, etc. Once you've made a (long) short 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 a graceful way 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 some 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 there for names of faculty members 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 "biological," which is up to the faculty reviewer to decide. More information, and links to application forms, can be found at: <http://dornsife.usc.edu/bisc/research/>. Also, this page has a link to a video interview which addresses frequently asked questions about undergraduate research: <http://urcusc.wordpress.com/>.

1. The writing must be clear and grammatical, and devoid of typos and mis-spellings. (Research shows that a single typo in a resume can sink a job application.) 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 BISC-290x/490x research project. Your faculty sponsor will usually be the Principal Investigator, or P.I., that is, the faculty member responsible for the overall research in the laboratory. It is OK 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 BISC-290/490x application.

6. The deadline to submit your application is 12:00 pm on the Friday of the first week of classes in the semester in which you wish to enroll. Late applications will not be accepted. A decision from the department will be made by the add/drop deadline.

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 BISC-290/490x 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 BISC-290/490x 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. Also, you need to write a final report, usually in the format of a scientific paper, and submit that to the department office.

Final Report for BISC-290/490x Directed Research Projects

The main reason for this request for documentation of the BISC-290/490x 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.

Your final research report is due to your faculty sponsor and the department by the **last day of classes** in the semester in which you enroll for BISC-290/490x. Final grades will be assigned 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 BISC-290/490x research project.

Students are expected to upload their final research report on their BISC-290/490x research projects. The upload link is on the BISC website <https://dornsife.usc.edu/bisc/undergraduate/forms-applications/>. BISC archives the reports but does not share the final reports. Your faculty sponsor is expected to review the report prior to submission to the department.