



RICE NATURAL SCIENCES

Department of Biosciences

Biosciences and Neurosciences Undergraduate Research Information

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For advising and research opportunities, join these mailing lists:

Biosciences Opportunities Canvas site (<https://catalog.rice.edu>)

Neuroscience Opportunities (<https://mailman.rice.edu/mailman/listinfo/neur-opps>)

Environment list (<https://mailman.rice.edu/mailman/listinfo/environment>)

What can you tell me about undergraduate research in Biosciences/Neurosciences?

What is undergraduate research?

Undergraduate research is on-the job training in science, where students participate in moving the frontier of knowledge in their field under the guidance of a faculty mentor. In Biosciences, students typically perform research in a lab group with a professor (a.k.a. principal investigator, PI) as well as a mixture of graduate students and postdoctoral researchers. Undergraduate projects are most often a smaller part of a larger research mission/scientific question pursued by the lab. As students become more intellectually engaged and familiar with their projects and techniques they will often gain greater responsibility and independence.

Am I ready for research?

Being prepared for a research experience is less about having the appropriate course prerequisites or experience and more about your awareness of what a research experience entails. Professors search for students at a variety of experience levels. Some professors are looking only for juniors and seniors with upper-level coursework or previous research experience, whereas others seek freshmen or sophomores with an interest in a multi-year research experience. Regardless of previous experience or coursework, common indicators of undergraduate research success are *curiosity, diligence, responsibility, interpersonal communication skills*, and *resilience to failure*. As research at any level requires dedication, you will want to make sure that you have time and space in your schedule (physical and mental) to take on a research project. Do you have time in your schedule for 9+ hours of research per week? Do you have large open blocks of time (3+ hours) to set up and run your experiments? During semesters in which you will be participating in research, we usually recommend that your total credit load, including 3 credits of research, not exceed 15 or 16 hours total.

What do I want out of a lab experience?

First determine your area of interest. Ideally, you will want to find an opportunity in your general area of interest so that you can gain knowledge and skills and begin to explore research and careers in this area. If you want help determining your area of interest, you can meet with your academic advisors for advice and suggestions. In addition to experience, you may wish to receive course credit and/or pay for your research. Although it is less common for labs to offer pay during the school year than in the summer, some pay work-study students so you are encouraged to mention if you are eligible for work-study money. Note that receiving pay for your Biosciences research does not preclude you from receiving credit as well.

Where do I start? How can I get connected?

Enroll in the Biosciences Opportunities Canvas site (<http://catalog.rice.edu/>) or join the Neuroscience Opportunities listserv (<https://mailman.rice.edu/mailman/listinfo/neur-opps>) to receive research postings and advising information. Look at the various research summaries of the faculty on the web (see “Surfing” below). Look for a lab that is interesting to you. Talk to juniors and seniors about their lab experiences. Which labs do they recommend? Discuss your research interests and goals with advisors in the Biosciences Department and ask which research group might be a good match (advisor contact information can be found at: <https://biosciences.rice.edu/undergraduate-programs/undergraduate-advising>). If you are serious about joining a particular research group, perhaps visit the lab, ask to meet the undergrads already working there, and inquire as to the best method of approaching that particular professor.

How do I find labs on the web?

You can learn about the research in a particular department at Rice or elsewhere by selecting a department or graduate program, then selecting the “Faculty” or “People” tab and finally clicking through the various faculty names and research statements. To find research faculty in the Texas Medical Center, start with

“GSBS UT” or “GSBS BCM” to identify clusters of faculty affiliated with area graduate programs. Surf the web using terms such as: “[topic/organism/disease] research Houston”. Read the research summaries of scientists to learn more about the field. Many community environmental research organizations, zoos and museums are also open to Rice interns, so don’t be afraid to contact people in those institutions as well.

How do I contact a PI (Principal Investigator, head of a lab)?

Do your homework. Most positions are not advertised, but are filled from among the students who contact the PI. Read about the PI’s work and, if possible, talk with people working in the lab to get a feel for the personality and expectations of the PI. Write a brief personal email to the PI. Do not send a mass email to multiple faculty members or your email will be considered spam and ignored!! Your brief introductory email conveys an important first impression and can influence how easy it will be for you to find a lab home. All PIs of research labs will have either a PhD or an MD degree and should be addressed as “Dr.” or “Prof.” and not “Ms., Mrs., or Mr.” In your email, tell the PI *who you are* (name, year at Rice, academic/research interests), *why you are contacting them* (you are interested in their research on X), *what you want from them* (would they be willing to talk to you about potential undergraduate research positions in their labs). You also may want to mention if are looking for a multi-semester experience and if you are interested in graduate school after Rice. Both are usually a plus for PIs. Your letter should be short, to the point, and convey genuine scientific interest (don’t say “I need research for my major/medical school”). If you are applying to an on-campus lab and are eligible for work-study, you can mention this asset.

How many labs should I contact?

Getting into a lab is partly timing and luck, so don’t be discouraged if your initial attempts don’t pan out. Contact one or two at a time but be aware that you will probably need to contact multiple labs over the course of your search before you find a position. If you know someone in a lab where you want to work, ask that person to put in a good word for you. If you are not successful after several attempts, you may wish to ask for feedback on your contact letter from the undergraduate research coordinators.

What is expected of me in a lab?

Your mentors will expect that you will be intellectually engaged, diligent and responsible. Specific expectations vary so you will want to meet with your mentors to clarify expectations. Undergraduate research is a form of apprenticeship. Your research mentors will likely expect you to keep regular hours, especially at the beginning. You should expect to work closely with your mentors until you are able complete procedures on your own, and even then it is good to communicate regularly with them. In many labs, you will not be working directly with the PI, but with a graduate student or postdoctoral fellow who has volunteered to train you. This person probably is not doing this extra work out of pure altruism and likely hopes that your research will contribute to their research question. Thus, you should be cognizant and respectful of their time.

What should I expect throughout my research experience?

You should expect that your questions and intellectual curiosity will be welcomed and encouraged. As you observe, read, ask questions, and practice techniques, you should expect that you will gain knowledge of your area of research and that you will have the opportunity to develop a number of research methods and practice scientific communication skills. These skills will assist you in a career in research but many, such as analytical and communication skills, are transferable to any career.

Surfing for labs: search strings for seeking opportunities on the web



http://25.media.tumblr.com/5c834a3a6ec8f41ace0bb886dfc17424/tumblr_mjtbwtkryl1r9eisao1_500.jpg

<http://www.coydavidson.com/wp-content/uploads/2010/07/tmc-aerial.jpg>

At Rice University

Google a department or program: e.g. *biosciences rice, SSPB rice, chemistry rice, bioengineering rice*

go to menu and select: *people* to see full faculty list w/o descriptions

select: *faculty* and make sure that you are looking at tenure-track/research faculty

click: each faculty member (photo or name) to read their bio

read: faculty bios and pull a few recent research articles

At UT Health (McGovern Medical School, School of Dentistry, MD Anderson Cancer Center)

Google: *GSBS UTHealth*

hover over: *PhD Programs in the upper bar*

click: the program (on the left) that interests you

click: *faculty, faculty directory, or people*

click: individual faculty names to see more research details

read: faculty bios and pull a few recent research articles

At Baylor College of Medicine including Texas Children's

Google: *GSBS BCM*

click: *programs* (in bar near top) and scroll down to see names of graduate programs

click: name of graduate program of interest

click: *faculty* (on the left)

click: individual faculty names to see link to their full profile

read: faculty bios and pull a few recent research articles

Be warned that these surfing instructions change regularly as departments change their site navigation. Hang loose and just keep surfing until you find the faculty pages! In general, searching any topic + research + "Houston" will get you to researchers in that field who are based in Houston. If you are searching at an institution in another city, try going to that institution's graduate program website and start your search there. Going to any graduate program or department page and clicking "people" or "faculty" will get you to faculty listings.

Can I get course credit for my research/internship?

There are multiple Rice courses through which you can receive course credit for your research or internship. To find the best match, first start in your home department so that you may receive credit toward your major (if possible). Biosciences offers the research courses, BIOS 310/401/402, NEUR 310/401/402 and the internship course, BIOS 299. Students who will be receiving financial compensation for their research are still eligible to enroll in any of the Biosciences research or internship courses. Students participating in formal summer REU programs (e.g. Baylor SMART Program) may not register for BIOS 310 credit, as the requirements of the course will distract from the enrichment activities of the summer program. If you don't know if your program qualifies as a formal summer program, contact derethp@rice.edu. Students requiring course credit for an experience outside of Houston or one that does not fall within the requirements of a departmental research course, should consider one of the experiential education/internship/practicum courses at Rice (e.g. BIOS 299, UNIV 295, ENGI 330, KINE 375, HEAL 379, ECON 299). *All Biosciences research/internship courses require that the students have identified a hosting lab or employer/sponsor and secured a position prior to registering.*

BIOS 310: Independent Research in BioSciences

Credits: 1-4 (min 3 credits required if research is off-campus)

Semesters offered: F, S, Su

Prerequisites: BIOC 112, FWIS 115, NSCI 120, BIOS 211, BIOS 212, BIOS 213 or qualifying previous research experience. Research must be performed in the research groups of Houston area faculty.

Qualifying projects: Projects must be lab- or field- based biology projects such as those pertaining to ecology, evolutionary biology, biochemistry, structural biology, cell biology, genetics, developmental biology, synthetic biology, and related fields. Bioinformatics-type research projects relating to the above topics may qualify as well.

Application/Registration instructions: Instructions vary by lab location. (1) **Biosciences faculty lab:** Hosting professor will give instructor permission allowing student to register in the professor's own section of BIOS 310. (2) **Non-Biosciences Rice lab:** Students must secure a willing Biosciences faculty sponsor for their out-of-department research. Students will register for their sponsor's section of BIOS 310. Projects must be sufficiently biological. (3) **Off-campus Texas Medical Center labs:** Apply using the application link (see <http://biosugresearch.rice.edu/>) at least 3 weeks prior to the start of classes. Start your off-campus institution's paperwork even earlier (~10 weeks) to ensure that you will be in the system/be issued an ID in time to begin your research.

Coordinating instructor: Dereth Phillips (derethp@rice.edu)

NEUR 310: Independent Research in Neuroscience

Credits: 1-4 (min 3 credits required if research is off-campus)

Semesters offered: F, S, Su

Suggested Prerequisites: CAAM 210 and BIOS 212; these are not required, but skills learned in these courses will help make you more valuable to labs when you apply. Research must be performed in the research groups of Houston area faculty.

Qualifying projects: NEUR 310 projects must be lab-based neuroscience projects. Some computational or theoretical Neuroscience projects may qualify. Consult the coordinating instructor to see if your neuroscience-related project will qualify.

Application/Registration instructions: Apply using the NEUR 310 application link (see <http://biosugresearch.rice.edu/>) at least 3 weeks prior to the start of classes.

Coordinating instructor: Jonathan Flynn (flynn@rice.edu)

For additional information on NEUR 310 and BIOS 310 (<http://biosugresearch.rice.edu/>)

BIOS 299: Experiential Education in BioSciences

Credits: 1 graded S/U

Semesters offered: F, S, Su

Prerequisites: none

Qualifying internships: Any off-campus experience that will contribute to biosciences-related career development (e.g. interning at an environmental non-profit, a biopharma startup, a patent law firm, a D.C. science-policy think tank, performing laboratory research out of state). Preference will be given to BioScience majors and those whose internships require course credit from the home institution.

Application: <https://forms.gle/NGruMJZiYRRNN5CL8>

Coordinating instructor: Dereth Phillips (derethp@rice.edu)

Research Courses that may credit life-science-related research

BIOS 310/401/402—BioSciences

NEUR 310/401/402—Neuroscience

BIOE 400/401—Bioengineering

CHEM 391/491/492/493—Chemistry

CHBE 499—Chemical & Biomolecular Engineering

ESCI 481—Earth Science

HEAL 495—Kinesiology

KINE 495—Kinesiology

UNIV 301—University-wide, zero-credit, for all majors, all types of projects qualify

HONS 470/471 (RUSP)—University-wide companion course for research in all majors

Some internship/practicum courses

BIOS 299—Experiential Education in BioSciences

UNIV 295—Careers Through Internship (CCD)

ENGI 330—Engineering Practicum

KINE 375—Sports Medicine Internship (majors only)

HEAL 379—Internship in Health Sciences (majors only)

Please see your department's course listings to identify the undergraduate research or internship courses in your major.

Contacts for undergraduate research information:

Dereth Phillips, PhD: email: derethp@rice.edu; Expertise: opportunities in biochemistry, cell-biology, genetics, developmental biology; Texas Medical Center opportunities; BIOS 299 and BIOS 310 instructor.

Scott Solomon, PhD: email: scott.solomon@rice.edu; Expertise: opportunities in ecology & evolutionary biology; field study opportunities

Jon Flynn, PhD: email: flynn@rice.edu; Expertise: opportunities in neuroscience; Texas Medical Center opportunities; NEUR 310 instructor