COLLEGE OF CHEMISTRY COURSE GUIDE (../INDEX.HTML)

RESEARCH AT BERKELEY

One of the major advantages of being a student in the College of Chemistry is the abundance and caliber of the research opportunities available. About half of the students in the College of Chemistry participate in research, whether that is within the college, the university, or neighboring institutions (like UCSF, Lawrence Berkeley National Laboratory (LBNL), Joint Energy Institute (JBEI), and various institutions/start ups in the Bay Area). Undergraduate research allows for students to develop critical scientific skills while allowing them to explore topics of interest not typically taught in the classroom. The following is a brief overview on why undergraduates should do research, ways in which students can get a research position while at Berkeley, and what can generally be expected from a research experience.

WHY DO RESEARCH?

As noted before, an undergraduate research experience can be extremely beneficial as it allows students to develop scientific skills that are not typically cultivated in the classroom. Lectures, especially those at the undergraduate level, typically are aimed at building a strong scientific foundation, and as such, much of the information, theories, questions, etc. taught in these courses are considered settled in the scientific community. Many of the questions asked in these courses have some definite (or at least, largely-agreed-upon) answer, and typically will also have some definite way (even if it is not obvious) to get about that answer. But the careers that chemists, chemical biologists, and

chemical engineers typically pursue requires people to confront and solve problems that are not definite or settled. The goal of research is specifically aimed towards solving unsettled questions within a scientific discipline. Therefore, students who participate in undergraduate research will be specifically developing the scientific skills more successful and more qualified candidates in whatever field they choose to go on.

Research also allows students to develop and pursue interesting scientific topics that are not typically covered in class. Again, because lectures are primarily aimed and developing a foundation for students, they are generally broad and all-encompassing in nature. Those who find some interesting topic briefly covered in a class (or sometimes topics that are not typically covered in a class) would be able to learn more about that topic through undergraduate research. In short, undergraduate research provides some practical benefits in the skills obtained as well as intellectual fulfillment.

HOW DO YOU GET A RESEARCH POSITION WHILE AT BERKELEY?

The following is a brief survey of the many ways students become involved in research while at Berkeley. This section is mainly dedicated to finding a research position during the academic year or on campus. For tips on how to obtain research positions at other universities during the summer, please visit the Applying for Summer Internships and Research page (summerapps.html).

METHOD 1: APPLICATIONS

Some research groups at UC Berkeley will advertise openings in their lab online. Some groups may post paid openings on Handshake (https://www.joinhandshake.com/) or on the Work-Study (https://financialaid.berkeley.edu/find-work-study-jobs) database. Typically, students in these positions start as a lab technician, primarily focused on daily tasks required to maintain the upkeep in a lab space. However, some positions offer the opportunity for students to then become a research assistant or undergraduate researcher, where they assist with a research project or develop their own research project, respectively.

UC Berkeley also has an Undergraduate Research Apprentice Program (URAP) (http://urap.berkeley.edu/). In this program, open positions are advertised at the beginning of each semester, and students apply to specific positions some time in the

first couple weeks of school. If accepted, the student will typically start as a research assistant for research units.

These methods are typically very effective for finding positions in the university (in departments not in the College of Chemistry) and around campus. Some labs within the College of Chemistry will also participate in these formal application processes, but the majority of labs within the CoC often utilize more informal ways or more personalized ways to find undergraduates interested in research.

Many of the research groups within the College of Chemistry or at LBNL that do prefer a more formal way to find undergraduates will publicize potential openings through the CoC undergraduate mailing list via an undergraduate advisor. Therefore, if you are interested in finding a position, it is beneficial to be subscribed to the mailing list.

METHOD 2: CLASSES, UNDERGRADUATES (WORD-OF-MOUTH)

Arguably, the majority of undergraduates within the College of Chemistry find research opportunities through older undergraduates, graduate student instructors (GSIs) in their courses, or by asking a professor that is teaching their course. This represents a more informal way of obtaining a research position.

Older undergraduates who already have a research position in a lab are likely to know the way in which professors take on undergraduates and can also speak to which graduate students/post docs would be interested in taking on an undergraduate. They can also be a good gauge as to whether a group would be willing to take on undergraduates. Furthermore, when an older undergraduate graduates, labs may be looking for someone to fill their position. Therefore, it can be beneficial to talk to older undergraduates to see if there are any openings in labs. This is most easily achieved by joining a Student Organization (orgs.html) or talking to a Peer Advisor (peeradvising.html). Many student organizations also will hold some kind of research-oriented event to help students find a position.

Talking to Graduate Student Instructors (GSIs) and the professors teaching a course you are enrolled in can also be a good way to find undergraduate research. Graduate students teaching a class may be looking for an undergraduate, and sometimes will know if one of their peers is looking for an undergraduate. Furthermore, they may have a better

understanding about what their group does specifically and can help you better understand what they do. Asking a professor for a research position is probably one of the most direct ways to look for a research position, but it never hurts to try.

METHOD 3: EMAIL

Many professors and graduate students may not be teaching a course that you are currently taking, even if their group's research is interesting to you. Sometimes you may not have any contacts (like an older undergraduate) within a group. If that is the case, emailing them is probably the most effective way of finding out if they have an open position. Some labs never advertise if they have openings but do take on undergraduates nonetheless. The main thing to be aware of in these cases is that professors often get many emails throughout the day, and undergraduates looking for research can be relatively low on their list of priorities. This means that it is common to not hear a response from a professor if you emailed them. However, graduate students typically do not have as many emails, and will be more likely than a professor to talk to an undergraduate that is interested in their group. Therefore, it is typically more preferable to email a graduate student than the professor if you would like a more timely response. Emails can typically be found on a group's website (for a list of groups in the CoC and their websites, use these links (Chemistry + Chemical Biology) (https://chemistry.berkeley.edu/chem-research) (Chemical Engineering) (https://chemistry.berkeley.edu/cbe-research)).

WHAT YOU SHOULD EXPECT WHEN DOING RESEARCH

This is highly dependent on the group you join and the method in which you join the group. Typically, students start off as an undergraduate research assistant, where they are paired with either a graduate student or postdoctoral scholar as a mentor and assist with their research project. This allows the undergraduate to learn specific lab skills (pipetting, distillation columns, coding in a particular program/environment, laser alignment, etc.) while becoming more familiar with the underlying science. Then, once the student is more familiar with the research topic and questions, they can either propose an independent project or brainstorm an independent project with their mentor and/or professor. Typically, this is based on the project that the graduate student/postdoc was working on (making it easy for them to advise the undergraduate), but it can also be a completely new project that is in line with the research interests of the group.

CAN I SWITCH LABS?

In short, yes. There are many reasons why an undergraduate will switch labs, including changing interests, increasing class workload, and different lab environments. Students should treat switching labs like quitting a job. It is best to not ghost the mentor or professor, especially if they plan on asking for a letter of recommendation. You should not be afraid to tell them that your interests have changed, or that you are interested in trying something else. Most, if not all, professors and graduate students understand that the interests/needs of any undergraduate can change over the course of their time at Berkeley, and are supportive of their students, even if they have different interests.

That being said, if you want to be able to get the most out of research in a group (for example, if you want to be able to start your own independent project), it can be preferable to try to spend as much time in a single group as possible. This is not to say that if you are unhappy, you should not switch labs, but to say that you should try to choose the groups that you want to join as carefully as possible.

RESEARCH UNITS AND PAID RESEARCH

Some labs do pay undergraduates during the semester, but most labs do not. Instead, they offer research units during the semester, which can count towards your degree and help boost your GPA. Students can add research units to their courseload by filling out a form for CHEM/CBE H194 (for students with a GPA >3.4) or CHEM/CBE 196 (for all other students). Please note that both courses can be taken for a letter grade, while CHEM/CBE H194 is necessary to qualify for the honors program in the major.

During the summer, students can ask to be paid by the group directly but are more likely to be encouraged to find external funding resources. The following are resources with in the college of chemistry (link (cocfunding.html)), but there are many resources that exist within UC Berkeley. In general, the rule of thumb (although there are exceptions) is that you can get research units or get paid, but not both. It should be noted that students should at least attempt to get some funding during the summer in order to offset living costs at UC Berkeley.