What is Research?

Research is taking what you have learned (and mostly things you have yet to learn) and apply them to problems that have yet to be solved. You get to do real, novel science and learn while doing so. Also research is NOT mind-blowningly difficult/impossible and you will not be just thrown into it without guidance, you will be guided and learn what you need as you work. Being in Berkeley we have some of the best labs surrounding us, we just need to find our way into them.

Why do Research?

Research will provide you with a better understanding of what being a scientist is truly like. You will learn about different fields and start developing an idea of what field of study you are interested in, or maybe you'll realize that research isn't for you. Summarized to a few short words:

- Experience.
- Development
- Grad School
- Fun :D

Research, though intimidating at times, is extremely important to one's development as a scientist and very very (did I mention very?) useful when applying to grad school. Of course grades are important, but research will set you apart and show grad schools that you have what it takes to conduct research for them. In addition to this, research acts a means by which to develop a close personal relationship with a professor or professional from whom you can ask for a letter of recommendation, another key aspect of grad school applications. It is much easier for professors to write about a student doing novel research with them than one who simply did well in their class. Also you learn a LOT out of necessity, will be pushed to broaden your horizons, and maybe even get a publication or conference trip out of it! Lastly, remember that even though it might be stressful, research should be fun so try to work on things that interest you.

How to get Research

It's as simple as asking. Don't be intimidated by professors/researchers, and don't feel as if you are not qualified or don't have the skills to do research. When you start doing research you will be guided and given resources that you'll need to be successful and accomplish whatever task you are assigned, so don't be deterred. The most important thing to remember in looking for research is persistence, professors/scientists are very busy and oftentimes get hundreds of emails a day, if they don't respond to your email, it can't hurt to try again, the worst they can say is no.

Some outlets through which you can actually start your quest for attaining research are as follows:

- **URAP** (Undergraduate Research Apprenticeship Program)
  ⇒ This is a more formal means of looking for research. You will see a list of open positions and will have to fill out an application. More information can be found here **http://research.berkeley.edu/urap/**

- **Grad Students**
  ⇒ Grad students are more accessible than professors/PIs and are more sympathetic to the plight of the undergraduate, having recently been one themselves. You can ask your GSIs or just any grad student in a lab you may have looked up if they have any space for an undergraduate. Oftentimes grad students will take on undergrads to help them with their work and can get you a seat in a research group.

- **Professors (Office Hours/Emails/Professor talks etc..)**
  ⇒ Don't underestimate the willingness of professors to consider an undergrad for research just from asking them at office hours or after a student-faculty lunch. Most times if they say no it is because they don't have space, but again it can't hurt.

- **Lawrence Berkeley National Lab (LBNL)**
  ⇒ Some professors work at LBNL, but there is a largely untapped wealth of staff scientists who work at LBNL and would be happy to have an undergrad working for them. You can browse through various facilities and groups on the LBNL website (**http://www.lbl.gov/**) and contact the PI (Principal Investigator) of the group.

Important Skills

These skills are very useful for different aspects of research, but by no means necessary to actually get research. You may end up having to learn these skills, which will all be included in future modules, but for now here is a list with examples:

- **Programming/Data Analysis** ⇒ Python, MATLAB, IDL, LabVIEW...

- **LaTeX** (text editing)

- **Image Processing** ⇒ ImageJ, Python...

- **CAD** (Computer-Aided Drafting) ⇒ Autodesk Inventor, AutoCAD, KLayout(Lithography)...

- **Creating Plots/Figures** ⇒ POV-Ray, Excel, Adobe Illustrator...

- **Circuitry and Electronics** ⇒ CadSoft Eagle, Physics 111A...

- **Simulation Software** ⇒ Comsol Multiphysics...

- **Scientific Reading/Writing**

Resources

Some added resources to help you learn more about what research is or how to get research are as follows:

- Research Workshop (SESB: **http://sesb.berkeley.edu/**)

- Society of Physics Students (SPS: **http://sps.berkeley.edu/**)

- Faculty Advisers

- Peers!

Contact

If you have any questions about what you heard today or about Research Workshop in general contact today's instructors at the emails below, or chat us on Facebook:

- MacCallum Robertson (**maccallumr@berkeley.edu**)

Next week's Research Workshop topic: