At a research institution such as Case Western Reserve, there are many chances for undergraduates to participate in research and to learn what careers in research entail. However, given the busy schedules of many students, devoting time to finding and participating in research is a tough decision to make without more information about the possible paths a career in research might take. Educational requirements and potential jobs are both important considerations for the aspiring researcher. Because of the variety of disciplines that engage in research and the varied backgrounds of scientists in each field, there is no such thing as a typical lab, but there are several ubiquitous figures found in all labs. These figures include the principal investigator, the lab manager, the graduate student, and the undergraduate student. Although these figures might fill different positions and have different titles, an overview of their responsibilities in one particular lab gives a good representation of the sort of jobs an undergraduate can look forward to in an academic, research-related career.

The Principal Investigator

The principal investigator is the head of any laboratory and usually has a team of researchers under their direction. Most people who fill this position have either a Ph.D. or an M.D., as well as some post-doctoral training. They are in charge of deciding what the lab will research next, writing grants to obtain funding, and giving talks at conferences. The principal investigator also actively participates in the research in their lab and often teaches classes in their area of expertise.

One principal investigator in the genetics department is Assistant Professor Thomas LaFramboise, Ph.D. His lab is a computational genetics lab in which many experiments are run both in the lab and in silico (using computer simulations). This computational specialization reflects Professor LaFramboise’s educational background, which includes a Ph.D. in mathematics and a Master of Arts in Biostatistics. According to Professor LaFramboise, one of the best things about his job as a principal investigator is “getting to do cutting edge research, despite having to write lots of grant proposals to do it.”

The Lab Manager

The lab manager is in charge of many of the details of the day-to-day management of a laboratory. This includes designing experiments to reach particular research goals, ordering supplies for the lab, and helping to oversee other lab personnel. A typical educational
background for a lab manager includes a Bachelor’s Degree or possibly a Masters. According to Meetha Gould, the lab manager in the LaFramboise lab, one of the benefits of being a lab manager is that “you get to be the first one to see your data and to begin drawing inferences from the outcome of your experiment.” Another benefit to doing research is getting to be at the cutting edge of developments in your field. Meetha describes this as being “in a unique position as some of the first researchers looking at the whole genome in a statistical manner.”

One aspect of research that many scientists dislike is the amount of repetitive work involved. However, as Meetha emphasized, this can be a good thing for undergraduate students new to research. As in most careers, “it’s a good idea to get some experience of what is to come, even if it is just volunteering or a part-time job.” As a lab manager, Meetha has some experience helping undergraduate students learn how to do research. In any lab, undergraduate students will probably get most of their hands on experience under the supervision of the lab manager.

**The Graduate Student**

While working toward their Masters or Ph.D., many graduate students take part-time or full-time positions in one or more labs. Graduate students are normally employed in labs that coincide with their major and could potentially become the topic of their thesis paper. The responsibilities of a graduate student are varied and include nearly any task that needs to be done in the lab. Although graduate students do work to advance their principle investigator’s research, this often involves an individual project that builds from that research.

Currently, there are two undergraduate students working in the LaFramboise lab, Yoon Soo Pyon and Gokhan Yavas. Yoon and Gokhan both have their Masters and are pursuing their Ph.D.’s in the Computer Science department. Currently, their main project is to develop a new algorithm that will contribute to future statistical analysis of the human genome. One of the largest benefits they get from doing this work as graduate students is the hands-on experience. As Yoon stated, the best part of working in the lab is that “I get a chance to work with real data and to gain some biological intuition about the solutions to real-world problems.” Although research experience and the ability to contribute to research in a lab are the important parts of finding research for graduate students, Yoon suggests that undergraduates should focus on finding research that they enjoy doing.

**The Undergraduate Student**

Similar to the graduate students, undergraduate students working in research laboratories are assigned tasks dependent only on what they are capable of and what needs to be done. While most undergraduate students participate in research that focuses on the subject in which they are majoring, some students also work in cross-disciplinary labs. The benefits of working in a lab based in another department include finding new applications for your major and learning more about other scientific disciplines.

The LaFramboise lab currently has one undergraduate student, Katie Wilkins, who is double majoring in Computer Science and Biochemistry. Although she has now been working in the LaFramboise lab for almost six months, when Katie started doing research she had no experience in a laboratory other than that from basic biology and chemistry lab courses. While many students worry about the time commitment required, according to Katie “the time commitment is a lot, but due to the relaxed atmosphere in the lab my schedule is flexible enough to be manageable.”

Doing research as an undergraduate is one of the best ways to get hands-on lab experience. This can be very helpful when choosing a major. Students can also benefit from learning new skills applicable in many
different fields. Describing the cross-disciplinary knowledge she has gained by working in a genet-
ics lab, Katie stated that she has “learned how
to use software including Adobe Illustrator, pro-
grammed in R and Java, built a computer, and got-
ten much better at running gels.” Katie found this
research position by e-mailing a professor, at her
advisor’s suggestion. She recommended that un-
dergraduate students interested in doing research,
“simply talk to people in each department about
their research and try to find a research position
that matches your interests.”

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