SO YOU WANT TO BE A PH.D. STUDENT IN THE GOLDBERG LAB? GREAT! READ ON…

Getting an advanced degree can be a highly rewarding experience. Conducting a Ph.D.-worthy project develops character and leads to both personal and professional growth. There are many different mentoring styles, and there is no such thing as a "one size fits all" mentoring philosophy. The only sure bet is that you will have an important relationship with your main advisor. So, here is the "top 10 list" of my mentoring philosophy.

1) You are in charge of your own success.

My job is to foster a supportive and inclusive lab environment and to guide you through your Ph.D. education, but your success will depend far more on you than it will on me. I expect graduate students to work exceptionally hard to become successful. There will be setbacks and frustrations, but it is the responsibility of the student to persevere and overcome adversity. It is also your responsibility to work with your program administrators to make sure you are staying on track with your program's timeline (course credits, qualifying exam deadlines, etc.).

2) Publications and funding are the coins of the realm.

Almost all careers that require a Ph.D. are competitive. How do you set yourself apart? The first answer is: publish in peer-reviewed journals. If you do not have at least three first-author publications in reputable journals by the end of your Ph.D., you will find it difficult to be competitive. If you want to be really competitive, aim for five. Is it easy to get 3-5 first-authored publications? No! That's why it is critical to work passionately and intensely through your entire graduate career.

The second answer is: get grants and fellowships. During your Ph.D. you should submit numerous grant and fellowship applications. This is, in fact, an essential part of a Ph.D.-level education. Science is a competition among ideas. The best ideas, explained clearly and concisely, get funded. Chances are you've come into grad school supported by a grant or fellowship for 2 or more years. That's great; everyone needs help at the beginning. However, once that grant or fellowship is over, you will still need to be supported. My job is to help you find funding, not to give it to you outright. In the process, you will learn to become a competitive grant proposal-writer. Oh, and teaching. Teaching is an essential part of a complete Ph.D. training experience. That's why my students typically support themselves for a year or so by teaching – even if they are lucky enough to have grants and fellowships that would support them anyway.

3) Intelligence matters, but passion matters more.

No matter if you can handle the intellectual challenge of earning a Ph.D., you will eventually come to a point where you are frustrated, dispirited, or

exhausted (or all three!). What will get you through? It's not your intellectual capabilities – it's your passion for your topic. If your Ph.D. topic is not something you care about deeply, you will likely have a difficult time.

4) Writing well and communicating clearly are essential.

Writing well is the same thing as communicating well, which are both the same thing as thinking well. If you do not write well, you will have a very difficult time succeeding in graduate school or afterwards. This is why, during graduate school, you will hone your expertise in communicating as a scientist. You will learn how to synthesize research findings, develop your own thoughts, and communicate your research orally and in writing. This is especially true in my laboratory, where we deal with diverse topics that sometimes require nuanced written presentations. Knowing how to write clearly and compellingly is therefore extremely important for success in my laboratory.

Statistics and computational tools are also essential for success in science, because they are also ways of presenting and communicating information. Although you do not need to have a statistics degree to succeed in my lab, you will need to be genuinely excited to learn advanced statistical methods, including languages like Python and R. If you have not done so already, I encourage you to take an introductory course in Data Carpentry, Software Carpentry, Biocomputing, or equivalent, and to follow that up with "boot camp" style statistical and computing workshops.

5) You should strive to finish your Ph.D. in four years.

The average student at UW-Madison obtains a Ph.D. in approximately five years. Elsewhere in the world, the average is three years. The first year or so of graduate school is designed to expand the scope of your knowledge while building your basic research skills. The following years focus on conducting a narrow research project and developing in-depth knowledge in a highly specialized topic. By the time you graduate with your Ph.D., you should be the undisputed world expert in your chosen topic. However, unless you are going to continue the same research project for the rest of your life (bad idea), you will reach a point of diminishing returns as you near the completion of your degree. You should therefore become the world expert in your narrow topic but also an expert in your broader field of study and conversant in the state of science in general.

6) Take the classes you need, but not more.

Classes in graduate school are important, but not as important as research. Research is your first, second, and third responsibility in graduate school. Students should be selective and apply themselves diligently to those courses that genuinely spark their interest and help fill key knowledge gaps. However, most graduate student learning occurs in the lab and in informal settings, not the classroom. It is your research productivity, not your transcript, that will make you successful after grad school.

7) It is important to be a good citizen.

Our lab does not exist in a vacuum. Graduate students should go out of their way to participate in activities within their program, support their classmates when they give seminars, and be involved in campus life at all levels. Graduate students should attend relevant seminar series on campus and should be active participants, asking questions and meeting speakers. They should also actively get to know students in other graduate programs, including socially (e.g. most programs have excellent "happy hours" and other events). Most successful graduate students form lasting collaborations and friendships with other students outside their own programs. Broad participation in campus activities is also important for diversity, equity and inclusion, which are at the heart of the Goldberg Lab philosophy. And hey, getting to know people is fun!

8) Graduate students should be well-rounded.

Burn-out is all too common among graduate students. It's important to have outside interests. So, use your free time wisely to "decompress" and pursue your other interests. However, the life of a successful graduate student is inherently demanding, such that success in graduate school is typically incompatible with extremely time-consuming outside interests (e.g., participating in professional sports or holding a second job).

Students often ask me about "work-life balance." It's a great thing to strive for, but it's often misinterpreted. "Work-life balance" does not mean that every hour of every day will be a nice, even balance between work and other activities. Rather, "work-life balance" is a time-averaged goal. There are times for work, and there are times for other things. Over time, work and non-work balance themselves out. Grad school is very heavily on the "work" side of that spectrum. That is because the work you do in grad school will, in large part, determine your future career trajectory. So, invest in work now so you can step back and smell the roses later!

9) A graduate student is an independent scientist-in-training.

Early on, my students often "get their feet wet" with ongoing lab projects or projects that have already been planned, using standard lab protocols. However, to be successful, you must move beyond the standard practices of the lab, methodologically and intellectually. A "ready-made" project that is handed to you is not sufficient for a Ph.D. degree.

Soon after deciding on a Ph.D. topic, you should know more about your project than I do. You should have a better grasp of the literature, including the history of discovery in your field. For example, you should know who did what, when, where, and why, and who trained those people. You are standing on the shoulders of giants, so learn all about those giants.

Graduate students are the engines who propel science forward, and this requires independence both in thought and action. Don't be seduced by bright, shiny new technologies. Ideas are more important than methods.

10) The laboratory is not just another place to work.

A laboratory is unlike any other workplace. It is a fertile ground for growing ideas and innovations from inception to fruition. That's why it's so important to be a good citizen. Check your ego at the door and be humble at all times. No matter what your prior training, everyone in the lab knows more than you do about something. We are a group of individuals united by a passion for health, conservation, and making the planet a better place for all. That means we share our results with one another and have open discussion about our successes and failures. It means we collaborate with others who want to work with us. We do not "own" our research, but rather we do research so that we may impart new knowledge to society and leave the world in a better place than we found it. We must always remember that we are privileged to do the work we do, and that we have a commensurate duty to society to pay it back and pay it forward.