Guide to Life Science Careers

The Guide to Life Science Careers helps you to explore and choose what career is best for you. Starting with an assessment of who you are and how you work best, this guide takes you on a journey that extends from a survey of possible careers through the steps necessary to get there. Interviews with professionals about how they chose their career paths are included so you can learn how others became successful and understand the positive and negative aspects of various career choices. Strategies for networking, overcoming shyness, and building your résumé are also discussed to help you lay the groundwork for success and present the best you to potential employers. This guide is a must read for anyone embarking on a career in the life sciences.

About the Author

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Unit 1: Know Yourself

So you love life sciences, and know that you want your career to involve science in some way. Now what?

If you are asking yourself that question, you're in good shape, because it means that you're starting to think early about laying the groundwork for your post-collegiate life. The fact is that ensuring you have a successful and rewarding career requires a lot of conscious planning; in most cases, great careers don't just fall into your lap.
Some of you will be lucky enough to have mentors who are helping you plan for your career, perhaps a favorite faculty member or a family friend. But many of you probably feel like you're largely on your own, and that may make you nervous. The good news is you are not on your own; there are resources all around you that can help you transition to a successful career. There are many activities that you can easily do right away — taking a personality test, for instance, or going on informational interviews at local institutions. Others involve a bit more planning and effort (e.g., going to a science conference), but are immensely rewarding and useful.

I've been guiding scientists-in-training into successful careers at the Hutchinson Cancer Center for nearly ten years now, and while each student is different, I have observed a few basic principles that can help most students plan a rewarding life-path. The first is: Know yourself. If there's one lesson I could leave you with, it would be this one. Having a fulfilling career isn't about prestige, salary, or work hours. It's about doing work that matches the things that you value and enjoy; it's about doing work that is a good fit with your personality. We all have unique personalities; something that excites one person can bore another. Don't listen to conventional wisdom about what you should or shouldn't do as a scientist. Instead, know yourself, and then listen to yourself. In the first unit of this course, I outline a few simple but important steps you can take to learn more about your personality.

The second principle is: Be informed. Even if you know yourself well, you still need to know quite a lot about various professions in order to choose the one best suited to you. Oftentimes, the impression we have about careers when we are students can differ quite a lot from what those careers actually involve. Something that seems glamorous might turn out to involve a lot of repetitive work; something that seems boring might involve subtle and extraordinary kinds of creativity. Don't be content with conventional impressions about what careers involve — dig in and explore. In the second unit of this course, I outline a dozen possible careers you should consider if you love the life sciences. You'll find out about possibilities of advancement, pay scales, job security, work-life balance, typical work days, and many other characteristics that I hope will help you develop a detailed mental picture of science careers. There are also interviews with people currently in each of those professions; they share many helpful insights and practical advice. Reading through these resources will give you a good start in making informed career decisions.

The third principle is: Test your choices. Once you have learned about a range of careers, you may be starting to have a good sense of the career you're most interested in. Or, you may have several careers you're equally attracted to. In either case, the best way to make your final choice is to get some real, concrete experience of what is involved in science careers. You can do this through informational interviews with practitioners in the field, through internships, or through many other approaches. In the third unit, I outline how to do these things, and what to keep in mind while you are doing them.

The fourth and final principle I want to pass on to you is: Start early. Knowing exactly what career you want is half the battle; but there's still the other half, which is positioning yourself to be a good candidate for a successful career in your chosen field. This could involve networking, professional or academic training, skills development, travel, applications, or many other things,
depending on which career you're interested in. The earlier you start laying the groundwork for your career through these activities, the better the chance that you will be successful in your quest. So start now! In the fourth unit in this course, I outline a few simple strategies you can use.

No single course can give you everything you need to have a fulfilling life-path. Careers are as varied, personal, and unpredictable as lives. And I've focused a lot of my advice on the work context of the United States, because most of my own professional experience has been based here. But I do feel that the four principles I've outlined here apply in general to students in many countries planning their life-path, and I believe that if you follow them you'll be better prepared to tackle the challenges of post-college life. So I hope you find this course useful, and I wish you the best of luck in your life.

1.1 Personality Assessment
Choosing your career is choosing your life, so you need to take many factors into consideration. Is family important to you? How about money? Do you want a clear separation between work and home life? Are you okay with working hard and sacrificing for years to achieve your career goals?

The first key to making a successful career choice is to know yourself and what makes you happy. Is it important to work closely with other people, or are you happiest working alone? Are you a detail-oriented person, or do you like to focus on the big picture? Are you comfortable taking the lead, or do you prefer a less visible role in your work? Do you like to see immediately how your work makes a difference, or is it okay to wait awhile, even years, to see the ultimate results of your work?

Additional Resources

1. Myers-Briggs Type Indicator

There are a number of tools available that can help you assess yourself — your strengths, your weaknesses, and what motivates you in your work and life. The most popular tool is called the Myers-Briggs Personality Assessment. This test will indicate whether you are an introvert or an extravert, how you assimilate information in your environment, whether you are detail-oriented or big-picture oriented, and many other preferences that make up who you are. Most career centers have this assessment available, but you can also find a list online of where you can take the assessment. While the Myers-Briggs test will not tell you a definite career path to follow, it is a first step in making a choice that will help you be the happiest in your career.

Some people find personality tests to be touchy-feely but I cannot emphasize enough how important it can be in setting yourself up for long-term happiness. The consequences of making a choice that turns out to be a poor fit with your personality can affect all aspects of your life. I know a person who was accepted into a prestigious graduate program in molecular biology, but once she started graduate school it didn't feel like the best fit for her. She nevertheless continued with the program because she didn't know what else to do with her life. After several years, she ended up depressed and confused about what to do. After seeking help, she is now pursuing another career in winemaking that uses her best skills. She's lucky that she was able to listen to her inner voice and reassess her career choices while she was still relatively young.

The more carefully you ask yourself now who you are and what you value in life, the better the
chance that you'll make a career choice that will be satisfying and fulfilling, so please start your career planning by taking the Myers-Briggs assessment!

1.2 Choosing Careers

If you have already done a Myers-Briggs personality assessment as part of your career planning, you probably realize that there's a lot of information in there to digest. Hopefully you have received an overview of your preferences for how you like to operate, where your challenges lie, and maybe even a list of careers that are the best fit for your Myers-Briggs type. If you didn't receive a list of careers, you can find such lists by searching on the Internet for "Myers-Briggs and career choice." Take a good look at these lists. Does anything look familiar? Are there any surprises? Pay close attention, because you have just been given a road map to how you best operate and what type of work makes you the happiest. Take some time to reflect on this information and consider your options before choosing careers. Maybe there's a career on the list that you've never considered or have outright rejected. Ask yourself why that is and give it a second look.

As part of the assessment, you should also receive a list of areas that you may need to improve upon. I suggest that you take a very close look at this list, because these are the characteristics that can trip you up in your career. We all have areas that we need to work on; I don't know one successful person who hasn't had to work to overcome deficits. If you don't start working to improve them now, they can come back to haunt you later. I know a woman who didn't pay attention to detail and neglected to document the work she had done. She did fine in her career for over a decade, but eventually received a promotion to a position in which she had to submit regular reports on her progress. She was incapable of doing this because it just wasn't in her nature to be organized and she didn't recognize that this was an area of improvement for her. She was eventually let go from her job. It's far better to know what your weaknesses are now, and start working to improve them, than to face the consequences later in life.

1.3 Overcoming Shyness

Something you will notice throughout this course is that many of the strategies I'm recommending require proactive outreach to people you may not know well. This can be daunting, particularly for someone who is shy. There is nothing wrong with being shy! But if you want to have a successful career, you will need to learn how to compensate for your shyness and develop strategies for outreach. This is just as true for people who want to run labs as for people who want to be teachers: No matter what you do, your ability to connect with the people around you, and to actively reach out and cultivate professional opportunities is essential. If you consider yourself shy, then it may be a good idea to start developing techniques for overcoming shyness in professional situations. We'll discuss a few strategies here.

If you know in advance whom you're going to be talking with, you might do an Internet search on the person's name and see if you can find any commonalities. Maybe you'll find out that you're both runners, or both have kids, or both play soccer. If you find a commonality, you have discovered a topic of conversation. Small talk can help you both feel more at ease.

If you're talking with someone you don't know and feel anxiety about it, you might want to start by saying something candid like, "I never know what to say at these types of events." You never
know — the person you are talking with might also be shy. Even if that is not the case, most people appreciate honesty and will work to make you feel comfortable once they know that you are uncomfortable.

Then find simple topics of conversation. Topics can include local sports teams, something you read in the newspaper that morning, the latest cool journal article that you just read, or the latest scientific seminar that you attended. Remember that you have to give something to get something; the more forthcoming you are with your own impressions or thoughts, the more inclined other people will be to share theirs with you, and that's the start of a relationship. Don't chew a person's ear off, of course! But do offer something of yourself; people will usually respond.

Remember that successful people are often very happy to share their experience and help students with career choices, especially if they are asked politely and it doesn't take too much of their time. After all, they recall how many senior people helped them when they were just getting their start. Asking politely means acknowledging that the person is busy and asking for at most an hour of their time at their convenience.

Not surprisingly, there will be times when you will experience rejection. Some people will not have time for you; some may even be rude. Remember: Every successful person has suffered through rejections and failures. In fact, the most successful people ask what lessons can be learned from their failures and incorporate these learning moments into becoming better at what they do. They don't let rejections and failures hold too much power over them and they don't take it too personally. If they can't get what they want through one avenue, they figure out what other avenues might be available to them. This persistence is an important life skill; you really can't afford not to risk rejection. The people around you at conferences and other events have useful information that may eventually lead to an internship or a job. The chance of those doors opening is 0% if you don't venture outside your comfort zone.

The final point I'll leave you with is that reaching out and networking gets easier every time you do it. The first few times you may have your heart in your throat. But do it ten more times and it will start to feel like second nature. So get over that initial hump as early as possible — walk up to someone at a conference, wait for a pause in the conversation, smile, and say, "Hi, I'm Jane Smith," and take it from there.

Unit 2: Understanding Your Career Options

Once you have learned more about your own personality, the next step is to learn more about the various careers that are open to you, and choose the one that you believe will be the best match.

I've known many scientists-in-training who felt that the only appropriate career for scientists is research. Research is certainly a fascinating career, and it is at the heart of what science is about. But it is far from the only rewarding profession that people who are interested in science can pursue. There are dozens of exciting job roles you can choose from: academic researcher, journal editor, high school teacher, industry researcher, fundraiser, journalist, technician, doctor, and more. In this unit we'll explore many of these careers in detail, looking at what typical work days are like, what kind of training is required, what career advancement possibilities there are, what compensation is like, and what kinds of personalities are the best fit.
2.1 Academic Research

Academic research can be intense, stimulating, and rewarding. But it is important to know that a research career involves many activities besides research. Scientists spend their time writing applications for funding to do research, as well as writing scientific papers to report the findings of their research. In addition, they spend time presenting their research in oral or poster form to other scientists at group meetings, institutional meetings, and scientific conferences; they also spend time teaching students about their field of study. A scientist's life is often full of tasks that need to be done and most scientists work very hard, but they also love what they do.

Fields of Study

- Clinical Scientist: David Fredricks
- Epidemiologist: Gloria Coronado
- Geneticist: Katie Peichel
- Clinical Research: Dana Panteleef
- Research Technician: Nanna Hansen

If you're interested in a general sense in academic research, the first thing to figure out is which field of research is best for you.

The fundamental task of research is asking questions. There are many areas of research in the life sciences, and they generally fall into three categories based on the types of questions that are asked and the tools that are used to answer the questions:

- Basic Research
- Clinical Research
- Population-Based Research

Basic Research

Basic researchers ask questions about how fundamental life processes work. Examples of questions include the following:

- What are the mechanisms that determine how and when cells divide?
- How do DNA mutations associated with a disease occur?
- How and why do cells age?
- How and why does one type of cell work differently from another type of cell?

Basic researchers usually work in laboratories with other scientists, usually with one faculty member leading a group of postdoctoral fellows, graduate students, and lab technicians who do most of the lab work. The hours can be very long and the work can be challenging, especially for graduate students and postdoctoral fellows. Basic researchers often ask their questions using model organisms, including yeast, worms, flies, fish, and mice.

Clinical Research

More Interviews

- Scientific Recruiter: Scott Canavera
- Staff Scientist: Tom Paulson
- Shared Resources: Julie Randolph-Habecker
Clinical researchers ask questions about how disease occurs and how it can be cured in humans. Examples of questions include the following:

- How can we manipulate the body's immune system to improve treatment of a disease?
- How can we create a drug to improve disease survival?
- What are the long-term impacts of treatment on quality of life?

Clinical researchers work in laboratories that are very similar to basic researchers, but they often work with human tissue samples to ask their questions. Many clinical researchers find it rewarding to work on a question that may have an impact that they will eventually see come to fruition. At the same time, when you're working with human tissue, you usually have a limited amount of it so the risks of making a mistake that will lose your sample could be high. Clinical researchers will often collaborate with biostatisticians to best design and analyze their studies in order to yield the maximum amount of relevant information.

Population-Based Research

Population-based research is done by epidemiologists who ask questions to determine how diet, genetics, and lifestyle may influence the risk of disease. They ask these questions in one of two ways:

1. by following a group of people over time and correlating exposure to who gets a disease;
2. by asking a group of people with a disease about their lifestyle and diet choices and comparing the data to a randomly chosen group without the disease in order to look for differences between the two groups.

The types of questions they ask include the following:

- How can we best prevent teenagers from starting to smoke?
- Do some genetic variants place a person at greater risk for cancer?
- Do vitamins help prevent cancer?
- Does exposure to certain chemicals increase the risk of getting a particular disease?

Epidemiologists also collaborate with biostatisticians in order to design and analyze studies so they can get the most information from them. Rather than work in a lab, epidemiologists often need no more than a desk and computer. However, the interdisciplinary field of molecular epidemiology is changing this, and many epidemiologists ask questions about how a particular gene can influence disease risk, rather than, or in addition to, a lifestyle exposure.

Roles in Research

The second thing you will need to consider is what kind of role you'd like to have in research. The opportunities include faculty member, research scientist, shared resources specialist, and technician or support person. There are also numerous administrative positions that support scientific research and make sure that institutions run well.

Faculty Member

Faculty members usually have Ph.D.'s or M.D.'s and have gone through graduate school or medical school followed by several years of being a postdoctoral fellow or medical resident. A faculty member is the leader of their own lab or work group and determines the direction of the
research in their group. Most faculty members spend a good deal of their time writing grant proposals and manuscripts, reading research papers, reviewing colleagues' manuscripts and grant proposals, thinking and talking with others about their research to gain new ideas, and mentoring the people in their group.

Faculty positions are usually very competitive to get and are often a result of hard work over many years. However, most faculty members love what they do and wouldn't trade it for anything.

Research Scientist
Ph.D.-level research scientists usually work under the supervision of a faculty member and have fewer responsibilities, but may work equally hard as the faculty member. A research scientist will often spend time actually performing the research, as well as helping to write manuscripts and grant proposals. These positions are not as competitive as faculty positions, but they are often seen as an ideal position for scientists who love benchwork and don't want to spend most of their time in administrative or leadership activities.

Shared Resource Specialist
Shared resource specialists can have a bachelor's, master's, or doctorate. They work in a lab with equipment that is shared by scientists throughout the institution, often for a fee. They assist the scientists with designing experiments, running the experiments on the equipment, and analyzing the results. Most shared resource specialists like to help people and their role is part scientific specialist and part customer service. The skills needed for these positions are usually very specific, so while the applicant pool of qualified scientists may be limited, the positions can still be quite competitive.

Technician and Other Support Staff
Technicians usually have bachelor's or master's degrees. They spend most of their time doing research under the supervision of a faculty member or research scientist. Most of the time, they are doing experiments that have been designed by others and have less say in the overall direction of the research. They are often included in research publications, but this is not the case in every lab. These positions are somewhat competitive, with the main factor being the greater number of applicants for the limited number of spots. Those with skill sets that are the best fit for the job have the advantage in the application process. Many technicians love the hands-on nature of the lab work that they do and see their position as a permanent spot. Others view their jobs as a temporary stop for a few years while they are deciding what the next step is in their career. Some technicians receive promotions to become lab managers and ensure that the lab runs well, placing orders for equipment and reagents, managing budgets and lab tasks, and supervising technicians. Others may go on to graduate school, medical school, business school, or law school.

Administrative Positions
A substantial amount of administrative work is required to ensure that research runs smoothly. Administrative activities include recruitment of good scientists, coordination of research studies across multiple sites on a national or an international basis, assistance with manuscript and grant preparation, payroll management, and public communication. In many academic settings, administrative positions can outnumber scientific positions. Many of the people in these positions started out by majoring in biology as undergraduates and then moved into administrative roles.
For example, Scott majored in the life sciences as an undergraduate, then earned an M.Sc. in Immunology and an M.B.A. He works well with people and is a quick judge of character, which makes him an excellent scientific recruiter. His background in the life sciences serves him well to understand the scientific language involved in recruiting for scientific positions.

2.2 K-12 Science Education

K–12 science education can be an incredibly rewarding career, especially for those who love to learn. The best teachers are excited by learning new information that they can then teach to their students. Their enthusiasm for sharing what they know can be infectious, and their classrooms a joy to observe.

Science teaching has changed radically in the past ten to fifteen years. Rather than giving hour-long lectures, with limited knowledge retention by the students, many teachers now have a more interactive approach to teaching, including:

- Limiting lectures to ten to fifteen minute chunks, interspersed with interactive discussions
- The use of clicker technology, whereby the class can be instantly polled to assess understanding of a subject
- Group and project-based learning
- Hands-on learning

K–12 teachers in the public school system must have a teaching certificate, which usually requires a master's degree in education. A teaching certificate is not required to teach in private schools.

Public versus Private School

Interviews

- **Science Teacher: David Peterson**
- **Science Teacher: Katie Morrison**

Choosing between public and private schools is ultimately a very personal decision — both have pluses and minuses.

Advantages of Public School Teaching

Teaching at a public school is a relatively secure job as there will always be a need for teachers. Because teachers are part of a union, the salary ranges and annual increases are usually predictable, which eliminates a lot of uncertainty. There can also be a good degree of mobility between grades and schools within a school district, so public school teachers have many options.

Disadvantages of Public School Teaching

Public school teachers can have less autonomy and flexibility to choose what and how they teach because of increasing efforts to measure success using standardized testing. This can result in teachers feeling a need to teach to the test in an effort to improve test scores. In addition, many public school teachers report that they do not have time to interact much with their colleagues, so peer-learning can be limited during the school year.

Advantages of Private School Teaching

Because private school teachers do not need a teaching certificate, they can start teaching sooner and without the expense of obtaining one. Many of the best private schools have internship
programs, through which potential private school teachers can learn about teaching at a private school over the course of a year. Most private schools do not participate in standardized testing, so there is less pressure to teach based on the test and more autonomy and flexibility in content. In addition, many of the best private schools encourage and provide time for the teachers to interact, learn from each other, and strategize, for example, about how to help a student who is struggling in his learning.

Disadvantages of Private School Teaching

Most private school teachers do not belong to a union, so there is less clarity in salary ranges and potential annual raises. There is also less job security and it may be harder to move between schools. Because there are usually fewer private schools than public ones in any community, most private school positions are coveted slots that can be more competitive to obtain than public school positions, although the best public school positions can match the competitiveness of private school positions.

2.3 College Teaching

College teaching is quite different from teaching at the K–12 level not only because of the age of the students and the level of knowledge but also because many college appointments involve a significant amount of research alongside the teaching. The kind of experience you can expect as a college-level teacher depends on which kind of institution you choose: community colleges, four-year undergraduate-focused universities, or research universities.

Community Colleges

Teaching at a community college can be an interesting and rewarding experience. The students are often older and more diverse and international, which can make for fruitful discussions both in and out of class. Many of the students are taking classes specifically to build skills toward a career that will help build stability for their families and children. The classes are often smaller than at a large university, which means that the instructor often gets to know his or her students better. The emphasis at the college is on teaching, rather than research, which helps to foster the feeling that the instructor is strongly contributing to the college's overall mission.

Some community colleges rely quite heavily on part-time faculty, who sometimes do not have an office on campus. Others have made a concerted effort to have most of their faculty be full-time, as they recognize the stability that brings to their curriculum.

Four-Year Undergraduate Institutions

Teaching at an undergraduate institution can provide plenty of opportunities to do both teaching and research. Michele (interview), an assistant professor at New Mexico State University, has a Ph.D. in Biology and did postdoctoral work before obtaining her current position. The student population at New Mexico State is predominantly Hispanic and Native American, and Michele is
working towards building the number of minorities who are cancer researchers. The majority of her time is spent teaching microbiology, general biology, and cancer biology to undergraduates. In addition, 15% of her time is devoted to research; she is asking questions about how students best learn about cancer. Her research has been published in some of the best biology education journals and she has won awards for her excellent teaching skills. She feels that, because good teaching is emphasized and valued at her institution, she is therefore valued in her job. Because some undergraduates join her as research interns, she is able to get to know undergraduates quite well, and the feeling that she is mentoring the next generation of biologists is very gratifying.

Undergraduate institutions can be large or small. Smaller institutions will have smaller class sizes, which can lead to having more interaction with the students, which many faculty really enjoy and find fulfilling. Smaller institutions also have a smaller number of faculty members; this can be either good or bad, depending on the kind of culture you prefer. Increasingly, many institutions want their faculty to focus on both teaching and have a significant research program because they want their undergraduates to have opportunities to do research. Most faculty who do both teaching and research do more of their research in the summer, when the teaching loads are much lighter.

Research Universities

Additional Resources

1. [Chronicle of Higher Education](#)
2. [Inside Higher Ed](#)

Even at research universities, many professors teach in addition to doing research. For example, some professors have a full research program and also teach courses to graduate students. They generally love to teach and find that interacting with the students is interesting and stimulating. Nevertheless, they have a lighter teaching load than a professor at a primarily undergraduate institution, which allows them to devote most of their time to their research program.

Undergraduate courses are often larger than at a primarily undergraduate institution, which can lead to a feeling of not having enough personal contact with students. On the other hand, there are always students who stand out and can be mentored to do undergraduate research.

2.4 Technical Writing and Editing

Do you love to write or edit and love biology? There are a number of career options that allow you to combine these two passions.

First, ask yourself whether you love scientific writing or love scientific editing. Some people prefer the creativity that comes with writing, telling a story and figuring out the best way to let it unfold. Others love the puzzle-solving aspects of editing that makes a story or set of stories fit together well. It is important to know which you prefer. A person who loves writing may not be happy in an editorial position, and vice versa.

Writing

Interviews

1. [Scientific Writing: Lewis Chang](#)
2. [Scientific Editing: Catherine Goodman](#)
If you love telling stories, you might be interested in a career in science journalism, freelance science writing, or even fundraising for research. Each of these professions involves translating research into a story that the audience can understand. The audience might be, for example, a reader of a technology trade magazine, an interested lay person, or a foundation that your institution is soliciting for funding. A science journalist or fundraising position affiliated with a company or institution will be more secure than a freelance position. I know an excellent freelance writer who did very well in the technology boom of the 1990s, but who has struggled since then to find consistent work. On the other hand, she loves the freedom that she has in her work.

The changes in journalism over the past several years as a result of the Internet is affecting science writing as well. Some jobs, particularly those for the science pages of newspapers, have disappeared; on the other hand, there have been new jobs created through the rise of websites devoted exclusively to reporting research and business developments, such as Xconomy.com. It will be interesting to see how this plays out over the next several years.

With an ever-increasing need for more funds to do research, writing proposals to foundations or grant writing for federal funds tends to be a very stable and rewarding profession. Telling a story about a scientist's research in a way that captures the attention of a foundation can also be a creative endeavor.

Editing and Technical Writing

Do you enjoy reading what someone else has written and figuring out how to say it better? Editors often love to make writing more clear and concise, or make suggestions for how to make a story stronger or more interesting. If editing is your passion, there are several careers that can match your interests. An increasing number of research groups and departments are employing scientific editors to help them be more successful, because good editing of scientific manuscripts and grants can help a scientist get the manuscript accepted for publication, or increase the chances of successfully obtaining funds.

Some professions combine both writing and editing. Editors at scientific journals or technical magazines, for example, frequently edit submissions and write their own reviews, analyses, and features.

2.5 Biotechnology Industry

Working in the biotechnology industry can be a very rewarding career. I know a woman who was on the team that developed Enbrel, a ground-breaking treatment for several autoimmune arthritic diseases. She found it to be enormously gratifying to know that her work has made a significant difference in the quality of life for tens of thousands of people. People afflicted by these diseases...
have thanked her personally for improving their lives. I can't think of a much better feeling than that.

How Industry Differs from Academia

Industry usually offers better salaries than academia, and in large companies there is often more support staff to help the scientists' work run more smoothly and efficiently. There are usually much greater resources and funding available if the company decides to head in a direction that they think will yield good results.

Biotech research is often interdisciplinary, and many scientists in industry find themselves part of a team that includes chemists, molecular biologists, statisticians, engineers, and clinicians. For this reason, many biotech companies highly value the ability of scientists to be flexible, communicate well, and work well with others. The environment can often be fast-paced, intellectually stimulating, and exciting.

There is often a misconception that those who work in industry cannot publish their work. Industry scientists can often publish after the appropriate measures are taken to ensure the protection of intellectual property. Some companies encourage their scientists to publish, while for others it is not a priority. Another misconception is that a scientist who works in industry has sold out for a bigger paycheck. While industry does pay better than academia, those who work in industry do not feel that they have sold out at all, and are excited to be working with highly collaborative teams toward a common goal of reducing and eliminating human suffering and prolonging life.

Industry can, however, be a more volatile environment than academia in terms of job security. In academia, you'll usually have at least a few months notice of the termination of your position, but in industry you might have less notice if the company is headed in a different direction and your skills are no longer needed. I know a person working in industry who came into work one day to discover that her entire project had been scrapped, and most of the team had been disbanded. However, only a few people were laid off, and most, including my friend, were reassigned to different work groups to start on new projects. It was a hard transition, as she had to deal with the loss of her project and her co-workers. She has remained with the company for several years and really enjoys her work, but now has an awareness that the company will act swiftly if a project doesn't seem productive. The fast-paced environment can be more stressful. But most scientists working in biotech industries feel that they are making a difference and love what they do.
In industry, there are large companies and small companies. Large companies tend to have more funds available, are often more stable, and hire people with a wide range of skills. Small companies are often looking for very specific skill sets to complement their small teams. Both large and small companies expect their scientists to work hard to achieve their goals, but many people who work in small companies require extra flexibility to do a variety of tasks as they may not have expertise in every area. Salary levels can also vary between large and small companies.

One man I know works in a company of four people. He's not being paid much at this point, but they are working on a very exciting idea with a lot of potential growth in the future, so he's willing to sacrifice for now while the company tries to get itself off the ground. If it does pay off, he will be well positioned for great success in his career. He loves the many hats that he wears in his job and the fast-paced environment.

### 2.6 Science and Public Policy

The world of research is very large and complex; there are many career paths related to research that you may not have thought of. Many of these paths support the research in integral ways and play a key role in determining what research is performed and how we use the findings of research. We will consider a few examples.

**Program Officer**

Scientific research requires funding. The funds come from a variety of sources, including the government, corporations, and private foundations — one of the many intersections of science and public policy. Program officers at all of these organizations manage the allocation of funds, which includes answering questions from grant applicants and managing the grant application review process. Some program officers report that one of the favorite things about their job is that they still have access to the excitement of being on the cutting edge of research, even though they are no longer working at the lab bench.

**Patent Attorney**

Patent attorneys are an essential part of the process of transforming new discoveries into products. Scientific findings are often followed by requests for patent protection to ensure that the scientists are given the proper credit for making a discovery and have the right to profit from that discovery. Patent attorneys ensure that the patent filing process and any agreements made to develop or market the discovery are negotiated well and written accurately from a legal point of view. Patent attorneys often are excited by their work because they become knowledgeable about new discoveries and products.

**Careers in Public Policy**

**Additional Resources**

3. [AAAS Science and Technology Policy Fellowships](#)

4. [American Society for Microbiology Congressional Science Fellowship](#)
Because scientific findings can be complex, it can be difficult to decide the best way for society to use the information to improve our quality of life. Scientists who work at the intersection of research and public policy can help politicians and the general public understand research results in order to formulate thoughtful public policy. Scientists in the public policy field can work for congressional or other government branches to help translate and interpret scientific results. They can also work in non-governmental organizations (NGOs), non-profit think tanks, trade organizations, and institutions such as the National Academies of Science. The work can be incredibly rewarding; imagine seeing your efforts influence policies in your country.

2.7 Medicine

The possibilities for careers in medicine are numerous and could fill an entire website all by themselves. I will touch on only a few career paths here. The accompanying resource box has links to more information so you can dig deeper into the range of possibilities.

Medical Doctor

Medical school is very competitive to get into and, once you're there, an extremely rigorous training process. Medical school entails four years of coursework and experiential training, followed by a one-year internship and, often, a multi-year residency program and even additional sub-specialty training. It can take upwards of seven to eight years of training and passing board certification exams before you are qualified to practice medicine independently. This is not an insignificant amount of time to put into training for your career, so it is wise to carefully consider a medical career before going into it. On the other hand, the career path is well established and it is a secure profession; there will always be a need for doctors. Medical school is expensive; most medical students have to finance medical school through student loans and have significant debt
by the time they graduate. However, they make a good salary and usually do not have too much difficulty paying off this debt.

Medical doctors (M.D.’s) enjoy being at the top of the hierarchy of medical professions. They lead teams of staff to deliver the best care to patients, and those who work in an academic setting also do clinical research. Clinical research seeks to improve treatments and increase the cure or survival rate for diseases. It can be an incredibly rewarding profession; countless lives could be saved through your research. I know one clinician-scientist who has fundamentally changed the whole field of bone marrow transplant by inventing a procedure that makes the process less arduous. This has resulted in an increase in the maximum age at which treatment can occur. Because most cancers that require a bone marrow transplant occur in older people, transplants are now available to the majority of people who are fighting this disease. Imagine looking back on your career and knowing that your work has directly resulted in saving the lives of thousands of people. That's pretty amazing to consider.

Physician Assistant
Physician assistants (P.A.’s) work under the supervision of a doctor to provide medical care to patients. P.A.’s can do about 80% of the work that an M.D. does and can even write prescriptions in many states. P.A.’s can work in both primary care and specialty settings and usually enjoy quite a bit of independence in their work. Training to become a P.A. usually takes about two years and passing a certification exam. I know a P.A. who works in a hospital setting providing care to patients. She performs most of the same tasks as medical residents training in a sub-specialty and has several patients that she cares for quite independently, though still under the supervision of the attending physician. She really enjoys caring for patients and deciding on the best course of treatment for their disease.

Registered Nurse
Nursing is the largest health care occupation. Registered nurses (R.N.’s) work with doctors to provide care and support to patients, doing tasks such as observing progress in patients and administering medication under a doctor's supervision. Nurses usually have either two-year associate degrees or a four-year bachelor's degree. Often, a nurse provides the most direct care to patients and is the health care professional that a patient will see most often during a hospital stay. Their observations of how a patient is faring are often a crucial part of providing the best medical care. I know one nurse who has worked in a hospital setting for thirty years and feels privileged to be able to help patients in what may be one of the most stressful times of their lives. The care that she provides helps to make the best of a bad situation.

Advanced Registered Nurse Practitioner

Interviews

1. Nurse Practitioner: Mary Heffernan
2. Registered Nurse: Sara Dreitzler
3. Clinical Scientist: David Fredricks

Additional Resources

4. American Medical Association (Careers)
5. American Medical Association (Medical School)
An advanced registered nurse practitioner (A.R.N.P.) is a registered nurse who has received additional education and clinical training, usually obtaining a master's degree. Similar to R.N.'s and P.A.'s, they work under the supervision of an M.D., but work independently within that setting. They can diagnose and treat diseases, and write prescriptions. They can do about 60–80% of the work involved in primary and preventive care. I know a nurse practitioner who works in a rheumatology office, providing care to patients with autoimmune diseases. She works very independently within this setting, seeking the advice of the M.D. in the practice when needed. She really enjoys interacting with patients and the ability to be flexible in the hours she works while her children are young.

Unit 3: Exploring Careers

Now that you have a general idea about the field you want to pursue, you need to test your choice by getting some concrete experience in that field. Sometimes the reality of a profession is different from what it seems like, and it is far better for you to find this out when you still have time to change your mind than once you are locked into a job! In this unit, we will discuss several ways that you can get a better understanding of the various life-science professions.

3.1 Informational Interviews and Job Shadowing

Two of the best ways to gather real-world information about your chosen field are informational interviews and job shadows.

Informational Interviews

Informational interviews are just what they sound like: interviewing a person who does a job that you might like to pursue in order to find out more about the job — you're gathering information to help you make a more informed decision. There are several steps to an informational interview:

1. Figuring out whom and how to ask for an interview;
2. Conducting the interview;
3. Last but not least: Sending a thank-you note.
Whom and How to Ask for an Interview

If you've worked on building your network of contacts, this should be pretty easy. Another way to find people to interview is to go to a professional development event for the field that you wish to pursue. Interested in teaching? Attend a National Science Teachers Association conference. Interested in science writing? Go to a National Association of Science Writers meeting. Once there, introduce yourself to people and when you meet someone whose job seems interesting, ask if you could meet them for an informational interview. It's that easy.

Conducting the Interview

Okay, you've got the interview scheduled, now what? There are many questions that you can ask during an informational interview. Just about the only question that you shouldn't ask is: "Do you have a job open?" Remember that you are there to gather information, not to find a job. The following is a list of potential informational interview questions, but you should really tailor your list to the person and the type of position:

4. What type of training did you pursue for your job?
5. What is a typical day like for you?
6. What do you like about your job?
7. What do you dislike about your job?
8. Were there any surprises about your job?
9. What type of professional development do you want?
10. What advice would you give someone interested in your line of work?
11. How do you see your field changing in the next five to ten years?
12. Perhaps the most important question, asked at the end of the interview: Is there anyone else you can recommend that I talk with?

This final question is crucial because it allows you to expand your network further, and you never know where that may lead.

Sending a Thank-You Note

The importance of the thank-you note can't be emphasized enough. Almost no one sends written thank-you notes these days, so sending one to the person you interviewed will instantly make you stand out from the crowd, and the person is more likely to remember you. The note doesn't have to be long; a few sentences thanking the person for taking the time to meet with you is sufficient. The note will be appreciated.

Job Shadows

A job shadow is when you accompany a person while she does her jobs. It can last anywhere from an hour to an entire day. You can ask for a job shadow towards the end of an informational interview, if you feel that the interview has gone well. A job shadow is a great way to find out what an hour or a day on that job is like. Job shadows are especially good for jobs that are highly active, such as nursing, teaching, or research. Other jobs, such as science writing, are best scheduled for specific times, such as when the writer is interviewing someone.

3.2 Internships and Post-Baccalaureates
Internships

An internship is an arrangement to work temporarily in a field with the goal of learning more about that field. Many undergraduates do summer internships to learn about and gain experience in a field, to help them decide whether they want to pursue that field as a career, or to try out a location to see whether they want to move there to work or to further their education (e.g., apply to graduate school). Most internships are found through formal programs at an institution, although informal internships can also be found through networking.

Interviews

1  Internships: Danielle Miranda
2  Internships: Noah Espinoza

Doing an internship allows you to get a taste of the work. For example, some people do brief internships and find out that it definitely is not the kind of work they want to pursue. This brief experience saves these people a lot of time and energy. For example, Danielle (interview) did an internship that helped her decide that graduate school was the best career choice for her, and she's now earning her Ph.D. at the Mayo Clinic.

Most internships last six to ten weeks and often occur in the summer. It is important to know the application deadline. The deadline is often many months before the internship starts. When looking for an internship, find out whether you will have actual, hands-on experience. The best internships also offer additional training in writing, presenting, and putting together an application for graduate school.

Post-Baccalaureates

Additional Resources

3  NIH Internship and Postbac Programs
4  US Internship Opportunities in Cancer Research
5  AAMC's List of Postbac Premedical Programs
6  Susan Komen Foundation Postbac Training
7  Dana-Farber Cancer Institute Postbac Program
8  Fred Hutchinson Cancer Research Center Postbac Program
A growing trend in academia is the development of post-baccalaureate programs, through which recent university graduates work at an institution for up to a year after they graduate to help them gain experience in a field. The goal of the postbac program is to help the participant consider the next steps in their career and increase their chances of successfully transitioning to graduate or medical school. The participants develop a range of skills over the course of a year and get an in-depth experience in performing research.

3.3 Career Options: How to Choose

There are two common mistakes that students sometimes make when deciding upon one of many career options: choosing a career based on the work environment rather than the work itself, and neglecting to investigate opportunities for career advancement before making a decision.

Do You Love the Work or the Environment?

I know a person who is now a successful educator, but she initially made her choice to attend graduate school in the life sciences because the lab environment where she did undergraduate research was a lot of fun. Once she went on to graduate school, she never found the same type of environment again, and the nature of the actual work turned out not to be a good fit for her. She completed graduate school but then felt the need to explore other careers during her postdoc. It took several years to rebuild her career, and now she's very happy, but it probably would have been best if she had more carefully considered her reasons for attending graduate school to begin with. So when you are in your internships or other opportunities, make sure you objectively evaluate how well you enjoy the actual work, not just the people around you.

Are There Opportunities for Career Advancement?

Another common mistake that people make is choosing a career but not considering the opportunities for advancement within that career. I know another person who worked as a lab technician for ten years and enjoyed the work, but realized after about five years that she wanted to do more with her life than be a lab tech. However, the chances for career advancement were extremely limited in research unless she were to go to graduate school, which she wasn't really interested in. She networked and applied for jobs for two years before getting a job as a program manager for HIV vaccine trials. She's happy in her current position, but sometimes wishes she hadn't stayed as a lab tech for so long. So, while you are in your internship, look around and ask colleagues about potential advancement paths in the field.

Unit 4: Laying the Groundwork for Your Career

Once you are settled on which career you'd like, it's time to start setting yourself up for a successful transition. Don't delay! The earlier you begin, the better the chance that you'll have more options; the more options you have, the better chance that you'll make the best decision. Depending on the field, the groundwork for your career could involve networking, building up concrete work experience, or applying for advanced degrees. It also involves building up a personal reputation as a reliable person with integrity and professionalism.

4.1 Networking
Networking isn't rocket science. Many people think that there is some big secret to networking, or that networking feels fake. The fact is you already have a network. A network is simply the people you know, and then the contacts of the people whom you know. Think "six degrees of separation" in which, the theory goes, no more than six people separate anyone on the face of the earth. For example, I am two degrees of separation away from Barack Obama, because I know someone who was a health policy analyst in his office when he was a senator.

How to Build Your Network

Your immediate network consists of your friends, family, co-workers, classmates, and everyone else you know. So, how do you use the network you have to investigate career choices? Let's say that you're interested in a career in science writing, but you don't know any science writers. How do you go about meeting one? Start by talking to people you know about wanting to talk to a science writer. If none of them know a science writer, ask them if they know someone who might know one, and if they do, would they mind informally introducing you to that contact of theirs. For example, you might ask if they know any sort of writer, or if they know a scientist who might know a writer.

Okay, let's say that using your own network of contacts didn't get you anywhere. What next? Look for trade organizations that have meetings where people in that profession gather. In many cases, you can attend as well, and have conversations with people who can give you advice. In keeping with the science writing example, there are two major science writing organizations in the US: The National Association of Science Writers and the American Medical Writers Association. Check to see if there is a local branch in your region that holds meetings open to the public, and then go to one. Ask questions of people there and ask if you can do an informational interview with them. If you feel very shy about approaching people, you can start a conversation at a social event by admitting feeling awkward at these things and that you never know what to say to people. Ask people questions about themselves and try to find commonalities. The most important thing is to be yourself and be inquisitive.

Building a network takes time. It does not happen overnight. I know a scientist who wanted to move into science education who built his network over a two-year period before he got a job that was a great fit for him. He did it by starting with his own network to find additional contacts in science education, attending meetings that science educators attended, doing informational interviews, and making it very clear that he was interested in pursuing this field as a career. He did all of this despite being a very shy and introverted person, but he knew what he wanted and overcame his shyness to meet the people he knew he needed to meet in order to find a position he really wanted.

Using Online Social Networks

A note on social networking: It is best to make personal connections first, and then connect with your personal connections online. You can also use social networking to identify contacts that you and a person you'd like to meet have in common, or to research commonalities between you and the person you will be meeting. I personally prefer LinkedIn to Facebook because it's more professional-based, although the lines between personal and professional are becoming increasingly blurred. However, you probably don't want the person who might be your contact for
a future job to know about the massive partying you did last weekend, so keeping your professional and personal lives separate online is probably the best thing to do.

4.2 Résumé Building

Once you know what career path you wish to pursue, you should start to gain concrete work experience in that field, so that you can build your résumé. Remember that your résumé is one of your biggest differentiators; therefore, résumé building should be a major priority for you. Hiring managers receive hundreds of résumés from students who got good grades at good schools; those who already have concrete work experience in the fields they're applying for easily stand out.

Finding Opportunities

The first step in gaining experience is finding opportunities. You can do this by using your network or searching online. For example, let's say you wish to do a summer internship in a molecular biology lab. Ask your network of professors and other contacts whether they know of any opportunities for summer internships. Supervisors like to hire people that they or their colleagues know, so this approach can give you an edge. There are also many formal summer internship programs that are advertised online, so do plenty of online research. Once you find a position you're interested in, submit the best application you can and submit it on time, as there are usually far more applicants than internship spots, and the competition is quite stiff. Keep in mind that many of the deadlines occur up to six months before summer, so start your search as far in advance as possible.

Expanding your Resume

When you are evaluating opportunities, it is important to keep an open mind, because each opportunity leads to another one. When I was searching for a permanent job in education, I became the yes-woman to all opportunities that came my way. As a result, my contacts started to think of me as a reliable go-to person when they needed extra help in a pinch, which ultimately led to the expansion of my network of contacts. This in turn led to many people recommending me as someone who does a good job, which ultimately was crucial in landing a permanent position.

The Importance of Integrity and Reputation

Having integrity is the most important component of your professional reputation. Wikipedia defines integrity as "of actions, values, methods, measures, principles, expectations and outcomes." In the workplace, this means doing your job with consistently high quality and ensuring that your deliverables are always on time; being scrupulously honest; maintaining clear and professional communication; and being courteous to everyone, regardless of their rank or position. Being known as a person of integrity is earned over time; there are no shortcuts. Integrity leads to respect from your colleagues, which you will need in order to be offered positions of leadership within your field. On the other hand, a reputation for being frivolous, easily distracted, late, or rude can cripple your career early. Reputation can be your best friend or your worst enemy, so please make the decision to approach all of your jobs with complete seriousness, dedication, and professionalism. I know of one talented young science student who worked hard at the bench but had a little too much fun going out for drinks after a long day in the lab with his fellow students. His behavior changed quite drastically after a few drinks (his friends described his drunken phases as "verbose-bellicose-comatose"), and he even once set his bed on fire with a lit
candle from passing out after a night on the town. Eventually, he developed a reputation for being unreliable and intimidating. His lab leader lost confidence in him, and this affected his future opportunities. On the other hand, I know of many young students who approached internships with such dedication and inquisitiveness that they were offered permanent jobs at the companies.

4.3 Coursework and Training

Just as the educational groundwork that you laid in high school contributed to being accepted into university, and to how well you do in university, the coursework you sign up for now will have a major influence on your long-term career success. Coursework in university builds a foundation of knowledge that you will use throughout your career, so once you identify what kind of career you're looking for, you should start to tailor your classes to suit it. Are you interested in becoming a science journalist, editor, or fundraiser? If so, then make sure you taking writing and English classes in addition to your science classes. Are you interested in the idea of interdisciplinary research? If so, then make sure you take courses from a range of science departments, not just those in your major. Do you want to teach at the college or high school level? Find out whether you can enroll in education courses at your university.

Remember that in addition to technical skills, there are interpersonal skills that you need to learn in order to have a successful career. These include:

- how to get along well with others, even those who can be difficult;
- how to communicate your work well both verbally and in writing;
- how to be reliable as a worker, showing up on time, working hard, and doing your work well;
- knowing how and when to ask for help;
- knowing how to build a network or contacts and supporters in your field.

All of these skills are important in the workplace, and can make or break a career depending on how well they are mastered. For example, I know a scientist who couldn't communicate well verbally because of some quirks in his speech patterns. He will probably never be perfect in his speech, but because he was aware of this challenge and sought training to address it, he did improve his speech and was successful in obtaining a faculty position that includes teaching students. So make sure you are honest with yourself about your non-technical weaknesses, and take advantage of the great resources your institution has to help you work on them.

4.4 Graduate School and Further Training

In many cases, the career you have chosen may require further training beyond the undergraduate level, whether attending graduate school, medical school, law school, or some other training. One of the most important questions to ask yourself is: Exactly how much training do I need to get? Do I need a Ph.D.?

Many science students feel that they have to get their Ph.D. in order to have any kind of career in science. It is certainly true that you'll need a Ph.D. to teach at the college level or to do independent research, but there are many fulfilling careers you can have without getting a Ph.D. Ph.D.’s can take years, so it's worth delving into whether it makes sense to get a Ph.D. for your chosen field.
The Ph.D. Path
Graduate School: Pros and Cons
Graduate school can be a transformative and rewarding experience. Graduate school will train you not only to have certain specific research skills in your field but also, more generally, to think scientifically about problems and ask important questions. A Ph.D. is required in order to be a faculty member or independent researcher at most universities, institutions, or biotech companies. The skill sets that are learned during graduate school and the credibility that a Ph.D. gives you are also transferable to many other careers, so you are not limited to doing research. In many countries, including the US, graduate programs provide small stipends (enough to live on if you are very frugal) to graduate students and cover their tuition, so you are paid while earning your Ph.D.

On the other hand, a Ph.D. typically involves attending graduate school for four to seven years. This is a long period of time in which you will be expected to work very hard and immerse yourself in your studies. It is important to really like what you do during this time because it would otherwise become a great burden.

Graduate School: Should I Attend or Wait?
Many people ask whether they should attend graduate school right after they graduate from university or whether they should wait a few years. Graduate school is not an experience to be undertaken lightly; as I noted earlier, it requires a significant investment of time and energy. I'm a big proponent of waiting a few years and working in research before deciding whether to attend graduate school. It will give you time to talk to lots of people who have Ph.D.'s and truly assess what you want to study, where you want to apply, and whether this is a path that you truly wish to take.

Grad School to Postdoc to Permanent Job
The vast majority of life science Ph.D.'s spend three to six years as postdoctoral fellows immediately after their Ph.D., doing research and publishing papers while they are searching for a permanent job. Postdocs earn a larger stipend than graduate students, but still not a large salary. This can be frustrating, especially if you compare it to your friends who didn't go to graduate school and have seen their salaries far surpass yours while you were still in training. It can also be frustrating because many postdocs are in their early thirties and wish to start a family, but discover that it's hard to make ends meet when childcare is factored into the family budget. The take-home message here is that a large salary can't be a driving definition of success for you if you go to graduate school, as you will spend up to thirteen years earning very little salary.

Ph.D. Career Options
One of the most important things to know about pursuing a Ph.D. is that there are a large number of career options available to you. Another is that you may need them. A third is that you may want them.

Many Ph.D.'s go on to faculty positions in academia or research scientist positions in industry, and these positions are often viewed as the pinnacle of success for a Ph.D. But there are not enough of these jobs for everyone who applies. This leads to intense competition for the few jobs that are
available. Networking to increase the chance of getting such a job is extremely important, but the reality is that not everyone will become a professor or get the job they want in industry.

You might have noticed that many of the people interviewed in this course who have Ph.D.'s are using the skills that they learned in graduate school, but are no longer doing research. In many cases, this is because there are not enough jobs in academia and industry for all who want such a position. But there are many other reasons why these people have their careers. Many academic and industry jobs involve long hours of work, including evenings and weekends. Many people wish to achieve a greater work-life balance by changing careers to one that places fewer demands on their time. In addition, some people come to the realization that changing careers will simply make them happier. For example, in research, more hours worked do not necessarily correlate with more or better results. A common joke among scientists when their experiment fails . . . again . . . is "that's why they call it re-search." A lack of good results despite great effort can become discouraging, and some people find that they are happier in fields in which, if they work harder, they have an excellent chance of yielding good results.

The Non-Ph.D. Path
Remember that there are many career options for those without Ph.D.'s. In industry and academia, people with a bachelor's or master's in the life sciences can work as laboratory technicians, shared resources specialists, administrators, writers, regulatory affairs specialists, clinical trial support personnel, and recruiters, just to name a few. Other options include sales and management. People with bachelor's degrees who love to write can work in public relations, marketing, and journalism. People who love science education can teach at the K–12 level and sometimes teach at the community college level. If you are interested in a particular career, it's best to talk to people in that career before deciding how much training you will need to reach your goals.

However, note that as more and more Ph.D.'s enter careers that were once dominated by non-Ph.D.'s, they have inadvertently increased the competition for those without Ph.D.'s. The fields of patent law and intellectual property are excellent examples of areas in which a Ph.D. was once not necessary to successfully obtain a position, but a Ph.D. is now almost a requirement.

This state of affairs has an impact on your planning for science careers. Precisely because there are so many Ph.D.'s who move outside of research to take jobs in journalism, fundraising and so on, you can be at a disadvantage when applying for those fields if you do not have a Ph.D.

Information Gathering and Graduate School

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Whether pursuing a Ph.D. is the right thing for you to do is a choice that only you can make. It is best if you can gather as much information as possible and go in with your eyes open, and keep an open mind. The more clearly you know what your career will ultimately be, the stronger position you will be in to make the decision. It is also important to choose an advisor who is willing and able to help you think through your options. You definitely do not want to keep your career plans a secret from your advisor.
Ultimately, the question of whether to get a Ph.D. depends on several factors. For example, if you know you want to be a researcher or a college teacher, then you must get your Ph.D. But for most other professions in science, it can go either way. The Ph.D. will help you, but will delay the start of your career by several years; on the other hand, without the Ph.D., you might need to be twice as aggressive in networking, accepting internships, and so on. It comes down to what you feel most comfortable doing; using an advanced degree to give you an edge on your résumé, or using your interpersonal skills and ambition to build up your odds in a different way.

4.5 Applications

If you are going to apply for advanced training, as soon as possible start investigating the requirements for a successful application. Applications can require the results of standardized tests like the GRE or MCAT, personal statements, financial information, transcripts, letters of reference, a CV or résumé, and filling out several standard forms. Read through the application instructions very carefully and make a checklist of all the parts required to complete your application. If you're not clear what is required, is there contact information on the application form that you can call or e-mail to inquire about this? If you know of someone who has successfully been admitted into a similar program, talk with them about what they did, what they would do differently, and ask for any advice they can give to help you be successful.

Standardized Tests

If standardized test results are required, you must take the test well in advance of the deadline as it takes time for the exam to be scored and sent to the university. Test preparation workbooks and courses are available to help you prepare and possibly improve your score.

If you don't like your first score, you generally can take the test multiple times, and often just taking the test twice improves your score. If you do this, you want to make sure you take the test for the first time very early, to allow you several months afterwards to receive your score, and assess whether you want to take it second time.

English-Language Skills

Writing is a key part of most applications. If English is your second language, you may need help in making sure the grammar and spelling are correct. It is best to have several people who are proficient in writing English read your personal statement and suggest edits before you submit it. There are also companies in many countries that will specifically edit documents to make them more grammatically correct. It may be well worth the fee to ensure that your statement is the best that it can be.

It is also extremely important that you are able to speak and write English well before accepting a training position at an English-speaking university. Many schools require students from other countries to take exams that test their proficiency in spoken and written English and will give a short period of time for that person to improve their skills if they are deficient. I recommend you start working on your English as early as possible, rather than waiting for the university to require it of you. I know one graduate student who had enormous trouble passing the spoken part of the exam, and was almost expelled from graduate school because of this. In the end, he received intensive one-on-one tutoring and passed the exam on his very last try, but it would have been less stressful for all involved if he had received more training and achieved greater proficiency in
spoken English before coming to the US.

Taking Care of the Details

Filling out even the simplest application form takes some care because any mistakes and/or typos can completely undermine the way you come across. Most professionals, especially admissions officials, are sticklers for correct grammar and spelling. If the form is electronic, I recommend you print and fill out in writing an exact copy of the form, check and fix any errors, have at least one more person proofread it, and then copy the whole thing onto the real form before submitting. If the application is not electronic, then make a photocopy and write in all the details on the copied page before writing on the original. Your application has a higher chance of appearing professional if you follow these steps.