Thinking about Graduate School?

Graduate Opportunities
(These are specific announcements, with a strong bias toward ecology. For more general announcements, click on Biology Related Graduate Programs.htm).

Summer Research Opportunities

Types of Graduate Programs

Professional degrees--These give you highly specialized skills needed to carry out a particular type of profession. Examples would be an MD (medical school), a JD (law school) and a DVD (veterinary school). These programs have advisors at NKU and will not be dealt with further here.

Masters degrees--These programs range from 1 to 3 years. Some are *research degrees*, meaning that you will carry out a research project, as well as take some courses. Most programs require 30 semester credit hours. Most research degrees are usually the master of science (MS) in the physical and some of the social sciences and the master of arts (MA) in the humanities and some of the social sciences. Recipients usually write a thesis. This degree is sometimes used as a final step for people who need some research skills, but not the extensive training received in the PhD. Sometimes the MS/MA is used as a step before getting a PhD. There are also MA degrees offered in the sciences that do not typically require a research project.

The other kind of masters degree is actually a *professional or quasi-professional degree*. There is usually an "M" somewhere in the degree, but it may be something like "MFS" (Master of Forest Science). These degrees are sometimes called "in-course," and they are a sequence of courses. They are similar to an undergraduate degree, although usually more high-powered. These masters degrees often serve as certification for professionals in various fields of biology.

Masters degrees are often the most appropriate degree for someone interested in working for a government agency or industry where some research ability is required, but the majority of the work is standard procedures, such as monitoring. These degrees are often required as a terminal degree in most K-12 education systems.

Doctoral degrees--This is usually the PhD (Doctor of Philosophy), although sometimes they appear under other names (ED for Doctor of Education, DS for Doctor of Science, or DA for Doctoral of Arts). This is a *research degree* that usually takes 4-8 years to complete. This degree is generally required to a) teach in a college or university (a masters degree is sufficient for many community colleges, but even there the PhD is often preferred); b) to train graduate students; and c) conduct independent research in academic settings and in most industrial, non-profit and government settings. Note that the PhD can often ***disqualify*** you from other kinds of work. So make sure you really want to do these kinds of work before you invest the kind of time and effort needed to earn the PhD.

Kinds of Graduate Programs

Both masters and PhD degrees are awarded by schools that emphasize research. But there are research schools, and then there are research schools! Some schools emphasize the PhD, focus on cutting-edge research, and are interested in turning out successors to the Nobel-winning scientists that staff their departments. These are also called "Research I" schools, and these included departments at top private universities like Harvard, Yale, MIT, and Stanford, and large state schools like Berkeley, Wisconsin, Georgia, Ohio State and Kentucky. There are other Research I-like schools at relatively small universities like UC, Miami of Ohio, and Ohio University.

Can NKU students succeed in these environments? Sure, some of you certainly can, but make sure you want to do that. That's an important thing to do, but recognize that most working PhDs don't work at those kinds of institutions. Most work at schools with more emphasis on teaching and less on research (like NKU). Research I schools will certainly give you the tools you need to succeed at those kinds of institutions.

You may want to consider "Research II" schools. Most of these confer both the PhD and MS, although some only grant the MS. Many of these programs have more of an emphasis on masters degrees, which may be attractive for students who are not certain they want to pursue research-based careers and intending to end their education with the masters. These can be highly appropriate programs for students considering a PhD. First, you may find someone who is top in their field that you really would like to work with, and the individual advisor is much more important when earning a graduate degree than earning a bachelor's degree. Second, these programs may give you a better preparation in teaching than Research I schools, especially if they have a "Preparing Future Faculty" program or something similar.

Why Go to Graduate School?

Maybe this section should be called, "Why *not* to go to graduate school." You shouldn't go to avoid looking for a job, because you like being in school, because it looks like professors have a cushy job (they don't), etc. You *should* go because you enjoy learning about new topics, through your research and that of others, and sharing that knowledge with others through writing and teaching. You should also go if you are self-motivated and like planning out your work day, and you like to be continually learning new things.

If you like doing all of those things, then going to graduate school is an excellent choice. Otherwise, it is not. Graduate school and a career with a graduate degree is tremendously rewarding, but it is not without costs. Many of your classmates with a bachelors degree will end up making much more money than you with a masters or doctorate. They will be able to get on with some of the "adult" things in life--having kids, buying a house, etc.--while you will still be in graduate school. At reunions, if you didn't have kids while you were at NKU, you may find that your kids are 10 years younger than your classmates! If you are female and interested in starting a family, going to graduate school in your 20s and 30s can put a real crimp in your plans. If you go on to a postdoc and then an assistant professorship, you may find yourself in your 40s before you feel ready to have kids, and your body may not be as cooperative as it was when you were younger. As Emily Toth, the author of *Ms. Mentor's Impeccable Advice for Women in Academia* states, most successful academic women have 0 or 1 kids. (By the way, all women and most men will benefit from reading this book if they are considering a career in academia). Unfair and not right, but academia has still not completely gotten used to the idea of women as students and professors yet.

How to Choose a Graduate Program

Selecting a graduate program is completely different from selecting an undergraduate program. When you looked at colleges for your bachelors, you probably considered the reputation of the school, costs, proximity and whether they had the appropriate majors. You then earned your degree by taking many courses with many different faculty, both in and out of your program.

In graduate school, you will not be taking a lot of courses, in most cases. You will be working primarily with one faculty member, your advisor. You will be conducting research on either a topic that he or she is considered an expert, or at least something they consider themselves to be highly competent to supervise. So, the first thing you need to ask yourself is, "What am I interested in doing research on?" Then you need to find out who is considered the tops in their field or is currently doing research on that topic. Most students review the scientific literature for the topic(s) that most appeal to them and select potential graduate advisors from those authors. The faculty here at

NKU can help you in that regard. Check out their web pages, and read some of their recent papers.

Don't confine yourself to schools in the area, like UC, UK and MU. All of these schools have programs with top people, but they may not do what you are interested in. The top person may be at the University of Maine; they may be at the University of Hawaii; they may be anyplace in between. Don't be afraid to look at all parts of the country. If you go into academia, you are likely to end up living someplace where you didn't grow up. Note that currently only two tenure-track members of the Department of Biological Sciences were born in Kentucky!

Don't confine yourself to just biology departments. For one thing, there usually is no such department at most Ph.D.-granting institutions; biology is usually broken up into 2 or more programs. But don't just look at programs with the name "Biology" in there. Biology is a very interdisciplinary field. Working biologists are found in quite a number of other departments and programs, such as medicine, nursing, and public health (biomedical areas), engineering (biomechanics), geography, fisheries, range science and forestry (applied ecology), and mathematics, statistics and computer science (genomics, biostatistics and biocomputing). Remember, the type of degree you get will matter much less than who you worked with.

Once you've found someone, look around and see who else is in their department, and who else has related interests elsewhere in the university or at least nearby. There are 2 reasons for this: 1) your interests may change slightly while you are in graduate school, and you will want some other advisors to fall back on if that occurs; and 2) you will need to put together a committee to guide your research. It will be a lot more helpful to your progress if you have committee members that can actually be helpful!

In most PhD and masters programs, you should not expect to pay for the degree (some professional/quasi-professional masters degrees are an exception). Most programs have a nominal tuition, but you should expect to get a at least a partial tuition waiver. You should also be paid a stipend in the sciences. Stipends usually come in two forms: teaching assistantships (TA) and research assistantships (RA).

Many incoming students get the TA. Here you are paid for assisting a professor in a usually freshman- or sophomore-level course. Responsibilities vary widely, so find out about that. If you are interested in a teaching career, you should be a TA for at least part of you time in graduate school. An RA, on the other hand, pays you to do research. Some students may spend most or all of their graduate career as an RA, especially if your advisor is well-funded. The amount of stipends is quite variable. You should think about whether it's sufficient to live on, as you want to avoid working at other jobs--that will only lengthen the time you are a poor graduate student. Whether the funds are sufficient often depends on the location of the campus. A stipend of $20,000 may be impressive at a rural Midwestern or Southern campus, but it may be inadequate in San Francisco or Boston. Yet another reason why you should visit the campus.

Don't forget about nationally competitive graduate fellowships. The National Science Foundation, the National Institutes of Health, the Department of Defense, and the National Academy of Science all have graduate fellowships. These pay well and can usually be used anywhere. They really strengthen your curriculum vitae (CV; the academic equivalent of a résumé) for future employment, too. Even if you don't get one, you will have gained the experience of writing a research proposal, which you will need in the future. So apply! Deadlines are usually in the fall of the year before they begin.

VISIT THE CAMPUS! VISIT THE CAMPUS! VISIT THE CAMPUS! The importance of this cannot be overstated. Even if you have to hock the family heirlooms, do it. Some advisors will fly you in and put you up; make sure you ask. You are quite literally going to be entering into a relationship like that of a medieval apprentice for the next several years. You want to be sure that you can work effectively with your advisor, his or her colleagues and other students, and the surroundings. Otherwise your life may turn into a living hell.

1) Visit the advisor. Find out what he or she is currently doing, which may be different from their latest publications (but make sure you've read their latest publications!). Find out what areas they are excited about. If they have other students, ask them about their students' research. Pay close attention to body language, subtext, connotations, etc. Remember, this person is going to have a great deal of control over your life for the next few years, and you want to make sure you don't start entertaining horror film-like fantasies about them. They will usually have a good deal of say as to whether you are admitted in the first place, too.

2) Visit the other students. Preferably your advisor's students, but if there aren't any, talk with other students in the same program. They will usually give you a no-holds-barred description of the program and the advisor. Take what they say with a grain of salt; grad students usually aren't happy unless they have something to complain about. But if they are excited about what they are doing, that is a very good sign. If they are mostly negative, that is a danger sign, and you may want to reconsider that program. Ask them about stipends and living expenses, as they will have experience in living on whatever the university pays (the faculty are often oblivious).

What You Need to Apply to Graduate School

GRE: The Graduate Record Exam is like the ACT or SAT, except more high-powered. There are different GRE tests; the general and the subject area. Almost every graduate program requires the general. Many require the subject area, usually Biology. You don't have to take both parts the same day. In fact, it's probably best not to, unless you enjoy the feeling of your brain draining down your spinal cord! You should have at least glanced at the web page during your junior year. This test is offered at several times and in many places in the area; unfortunately, one of those places is not NKU.

Application: The materials needed here vary widely. Most schools require:

- **Transcripts**: All of your college transcripts, from NKU and any place previous you may have attended. The college's registrar's web page usually tells you how to order them.
- **Letters of Recommendation**: This is probably the most important part of your application. Ask faculty who know you fairly well, either through courses or projects, to write these. Ask them well in advance of the deadline, and make sure they have addressed envelopes with the right forms & proper postage, if appropriate. Then ask them if they can write you a **good** one. Lukewarm letters are worse than useless, and graduate advisors are usually expert at reading between the lines. If you have done any kind of research at NKU, make sure whoever supervised you writes one of your letters. Research experience will give you a real boost. Almost everyone who applies to graduate school has decent grades and a reasonable GRE score. But most of what you do in grad school will be research, and experience in this area shows that you can do it. Here's a very helpful article on this topic.
- **Cover Letter**: This letter serves several functions. It introduces yourself to the review committee and allows you to highlight specific aspects of you want the committee to notice. Mention any research and teaching experiences you have as an undergraduate. These experiences show the reviewers that you won't be starting from scratch in their program. Also, highlight specific experiences and projects from student organizations that will be useful in their graduate program (e.g., directed a service project, organized a new program, etc.). Mention if you've already met with specific faculty in the department and that how their interests overlap yours. Review committees like to see that you've done your homework and have made some investment in getting into their program. Finally, tie your background and the department's graduate program together with specific career goals. You're more likely to get an acceptance letter if you show that you've thought out how the department will benefit from admitting you, as well as how your goals will benefit from being admitted.

How the Graduate Advisor Will Look at You

While you are considering how the graduate advisor will benefit you, he or she is also thinking about how you can benefit *them*. Training a graduate student is much more time-intensive than training undergraduates. In many ways, graduate students are the intellectual progeny of the advisor, and he or she wants to be proud of their kids. But also, their success is partially contingent on *your* success. Your research also advances their research. When you publish the results of your research, they will almost always be co-authors, so it will be a publication for them, too. Your findings will allow them to apply for their next grant. If you are funded off of an existing grant, the successful completion of the work is partially dependent on you.

For those reasons, most graduate advisors are less concerned about your grades than about your abilities to work hard and well. If they pay attention to grades, it will probably be mainly the upper-division courses in their area. They are not going to worry too much about that D you got in Art History as a freshman! There is usually a minimum GPA they like to see, but that is about it. Your score on the GRE is not weighted as heavily as you might think, either. There is usually a minimum, but most graduate advisors are aware that about the only thing the GRE score does is predict success in the 1st year of graduate school only. What the advisors are most interested in is your potential to design and execute a project in a reasonable amount of time and your abilities to write and talk about it coherently. That is why the letters of recommendation and your cover letter are so important. Your letter writers will be assessing you on precisely these kinds of abilities. That is also why research experience is so important, because you have a track record, not just a potential.

Here are some good tips for finding a good graduate advisor: https://mcewanlab.org/2018/11/10/path-to-grad-school-finding-a-fit-with-a-future-mentor/

What the First Year of Graduate School Will Be Like

You may have thought you worked hard at NKU, and you certainly have. But you will work *much* harder in grad school. During the 1st year or two, you will probably be taking some classwork, and you may be TA-ing a course, too. But you will also be doing a ton of reading, in preparation for your project and the comprehensive (usually oral and/or written) exam that most programs require in the 1st year. If you don't know the abbreviations of the leading journals in your field, as well as the closing hours of the library, you haven't been working hard enough. Expect to be short on sleep. Don't expect to see much of your spouse and/or kids if you have them. Early universities were modeled on monasteries, and the traces of the monastic disciplines are still part of modern universities. On the positive side, you will be embarking on an intellectual adventure where you absolutely immerse yourself in the field. You will become an expert in your chosen area. You will also have interesting colleagues--your fellow graduate students--to talk to, commiserate with, cry on their shoulders, etc. It will be intense but rewarding.

After you get through the first year, it gets better. With most or all your coursework and your comprehensive exams behind you, you can focus on the research. There will still be periods of intense activity, but it won't be quite relentless. Eventually (2nd year of masters degree, later for doctoral degree), you will be at the point where you can start writing your thesis. That presents its own challenges, but we won't address that here in this web page.

A good resource: Should you go to graduate school?

Another good resource: The Undergraduate Researcher's Graduate School Registry. The purpose of this registry is to facilitate connections between undergraduates and graduate schools seeking high quality students who are well prepared for research. More information and the submission form are available at: http://www.cur.org/projects_and_services/registry/

And yet another good perspective: http://www.slate.com/blogs/quora/2015/08/22/stem_advanced_degree_what_s_it_like_to_get_a_ph_d_in_science.html

An extremely funny but oh-so-true look at graduate school, in the form of comics: http://www.phdcomics.com/

Is a Ph.D. worth it? This writer thinks so.

A more general guide to careers in science, put out by the American Association for the Advancement of Science (AAAS). You need to sign up for a jobseeker account on www.sciencemag.org/careers, but chances are you will at some point anyway. Go to https://www.sciencemag.org/booklets to get the booklets related to science careers.

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