

WISE Guide to Graduate School



AUBURN UNIVERSITY

OFFICE OF DIVERSITY AND
MULTICULTURAL AFFAIRS

Women in Science and Engineering Institute

Introduction

Women, who constitute about half of the total workforce in the United States and half of the degree recipients in a number of scientific fields, still make up only one-fifth of the nation's scientific and technical workers. Science and engineering education and research are increasingly global endeavors. Identifying the best, brightest and most innovative science and engineering talent will be crucial if the nation's industries and the nation itself are to maintain their competitive edge.

In an effort to demystify the graduate school process, the Women in Science and Engineering (WISE) Institute has compiled a the WISE Guide to Graduate School to assist prospective graduate students in making an informed decision regarding their academic futures. It is notable that issues facing graduate student women are of interest to all graduate students. Topics addressed in this guide are:

1. Choosing a Graduate Degree
2. Taking the GRE
3. Characteristics to look for in a good advisor, mentor, boss, or committee member
4. Getting the most out of the relationship with your research advisor
5. Finding a thesis topic or formulating a research plan
6. Getting the most out of what you read
7. Making continual progress on your research
8. Avoiding the research blues
9. Financing your graduate education

Graduate school is unstructured by nature and experiences within the same university, college and department are often varied. While this guide offers general, practical information, it is important to network with other students, ask questions and pursue healthy mentoring relationships.

1. Choosing a Graduate Degree

Information from the Bureau of Labor Statistics shows that salary levels tend to increase with the level of college or university degree an individual holds. The Forbes article shows that students with master's degrees who enter some of the highest paying in-demand fields for that type of graduate degree earn as much as \$111,000 at their mid career stage. The Bureau of Labor Statistics also reports that the higher an individual's education level, the less likely they are to be unemployed even during a slow economy.

Graduate school opens doors, whether you plan on a successful career in business, government, or as a University professor or researcher. Graduate students gain experience in higher level problem solving, work on research projects that interest them and have a higher earning power. Faculty careers are also very rewarding. Faculty teach and work with students, develop and direct research in areas they choose and they become experts in their chosen areas.

Your graduate options are not limited by your college major, but you will have to work hard to demonstrate that you're a good candidate for graduate programs in your chosen field. Admittance to graduate school is all about match: How well do you match the program? In other words, do your interests, preparation, and career goals match the graduate program's orientation? Do you have the experiences and competencies to succeed?

2. Taking the GRE

You can increase your chances of getting into graduate school by getting good grades, especially in undergraduate upper division classes in your area of interest, having a broad background in your field and in related fields, getting a high score on the GRE, developing good relationships with your professors and work managers, working on a research project, and having a clear sense of what you want to work on.

Graduate programs use GRE scores to evaluate your readiness for graduate-level work. The GRE General Test measures verbal reasoning, quantitative reasoning, critical thinking and analytical writing skills that are not related to any specific field of study. Below are tips for taking the GRE.

1. Learn the section directions now. Use the time saved during the test to work on questions.

2. Be especially careful in the first portion of every section. Successful answers to the earliest questions will lead to higher scores.
3. You can write on the scratch paper provided. You can also remember to bring some extra scratch paper. Use the process of elimination to cross out wrong answers; do scratch work.
4. Easy questions usually precede hard ones.
5. Double check your work and answer before you click on the screen bubble. You cannot skip any question and you cannot go back after you've answered a question.
6. Answer every question, making educated guesses if you have to. Just try to eliminate one or more choices before guessing.
7. Don't spend too much time on any one question. You should spend only seconds on the easiest questions, and hesitate to spend more than 1-2 minutes on even the hardest ones.
8. Practice, practice, practice!
9. Bring a watch to the test center. You can't be guaranteed that there'll be a working clock there.
10. Don't bring a calculator since you're not allowed to use one.
11. Bring a couple of IDs to the test center. Make sure at least one of the pictures actually looks like you. Also bring any authorization voucher you may have received from the Educational Testing Service.
12. Read the words in the question carefully. Be sure to answer the question asked and not the question you recall from a practice test.
13. Know the Question Types to Expect on the GRE: * analogies * sentence completion * reading comprehension * math multiple-choices * quantitative comparisons

3. Characteristics to look for in a good advisor, mentor, boss, or committee member

Selecting a major professor to mentor you through your studies is one of the most vital steps in the graduate school process. Your major professor will help you plan your courses, guide you with your research, and serve as one of your committee members.

There are several places you can search for a major professor. One is to contact people on current faculty list who appear to have interests similar to yours. Another is to search for people conducting research in your area of interest.

As you contact professors let them know that you will be applying to the Graduate Program. When you contact professors let them know what you are interested in studying and how your interests and their research are related. It is also good to ask if they know of other professors working in your area of interest that you might contact.

When you find professors that you would like to work with you will probably discuss funding sources.

Finding a major professor can be a lengthy process. It is unreasonable to expect one person to have all the qualities you desire. You should choose committee members who are strong in the areas where your advisor is weak. You have a better idea of your education interests and passions and can better communicate your strengths to a potential major professor, so you are the best representative for yourself.

Ask Questions Before Choosing a Major Professor

The following list of questions was created by Dr. Ann Matheny, Center for Naval Analysis, Alexandria, VA, in conjunction with the Central Illinois Chapter of AWIS. PI is comparable to major professor.

Questions to ask yourself

1. Where do I want to be in five years? In ten years?
2. What is most important to me-my work environment or my intellectual interest in a field?
3. Do I need direction and motivation from an advisor, or do I prefer to work independently?
4. Do I need to feel comfortable talking to my advisor?
5. Is the field I choose easily adaptable to other fields?
6. Do I prefer to work in a group or on my own?
7. Do I want to work primarily with computers?
8. Will the project be purely theoretical, experimental, or a combination of both?
9. Do I want to start a family in the next five years?

Questions to ask members of the group or the prospective advisor

1. How stable is the advisor's funding? (Does the advisor have funding?)
2. Do students help to write grant proposals?
3. Do I get to choose my own project or do I work on the Principal Investigator's (PI) project?
4. How involved is the PI in the research?
5. Does the PI have favorites? Does the PI neglect or give very little attention to some members of the groups?
6. Are students backed by the PI when they run into departmental politics?
7. Does the PI treat male and female students with the same respect as far as their intellectual abilities are concerned?
8. Does the PI promote your work or claim it as her/his own?
9. Does the PI work with you towards your career, or are you on your own?

10. Where have previous students gone?
11. How long does it typically take to get a Ph.D. in the group?
12. What kind of work can I expect to find after graduation if I specialize in this PI's area of research?
13. Do students publish and attend conferences all along, or only at the end of their research?
14. Does the PI give you tools or are you on your own to develop research capabilities?
15. Does the group meet regularly for group meetings or lunches?
16. Are the group members competitive or cooperative?
17. Does the group collaborate with other groups?
18. Will I need to travel to do my research? How will that affect my lifestyle?
19. Does the PI have tenure?
20. What amount of course work is expected/discouraged after joining the group?

Suggestion: Do a literature search of the prospective advisor's publications. Do they seem interesting to you? Also find papers from the group's graduate students. Meet with other graduate students and ask them about their experiences. Take note of the jobs former graduate students have taken. Are they getting the kinds of jobs you would like?

4. Getting the most out of the relationship with your research advisor

Meet regularly- you should insist on meeting once a week or at least every other week because it gives you motivation to make regular progress and it keeps your advisor aware of your work

Prepare for your meetings- come to each meeting with a list of topics to discuss including a plan for what you hope to get out of the meeting and a summary of what you have done since your last meeting. List any upcoming deadlines and have notes from your previous meeting with you. Email him/her a brief summary of every meeting- this helps avoid misunderstandings and provides a great record of your research progress. Include: a new summary of what you think you are doing, a to do list for yourself, a to do list for your advisor, list of related work to read, list of major topics discussed, list of what you agreed on, list of advice that you may not follow.

Show your advisor the results of your work as soon as possible- this will help your advisor understand your research and identify potential points of conflict early in the process. Share summaries of related work including anything you write about your research and experimental results.

Communicate clearly. If you disagree with your advisor, state your objections or concerns clearly and calmly. If you feel something about your relationship is not working well, discuss it with him or her. Whenever possible, suggest steps they could take to address your concerns. Take the initiative. You do not need to clear every activity with your advisor. S/he has a lot of work to do. You must be responsible for your own research ideas and progress.

5. Finding a thesis topic or formulating a research plan

Pick something you find interesting. If you work on something solely because your advisor wants you to, it will be difficult to stay motivated.

Pick something your advisor finds interesting. If your advisor doesn't find it interesting s/he is unlikely to devote much time to your research. S/he will be even more motivated to help you if your project is on their critical path.

Pick something the research community finds interesting. This will make you more marketable when you complete your project.

Make sure it addresses a real problem. Remember that your topic will evolve as you work on it.

Pick something that is narrow enough that it can be done in a reasonable time frame.

Have realistic expectations.

Don't worry that you will be stuck in this area for the rest of your career. It is likely that you will be doing very different research when you graduate.

6. Getting the most out of what you read

Be organized. Keep an electronic bibliography with notes and pointers to the paper files. Keep and file all the papers you have read or skimmed.

Be efficient. Read only what you need to read. Start by reading only the conclusions, scanning figures and tables, and looking at references. Read the other sections only if the paper seems relevant or you think it may help you get a different perspective. Skip the sections that you already understand- often the background and motivation sections.

Take notes on every paper you find worth reading. What problem are they trying to solve? What is their approach? How is it different from other approaches? After you

have read several papers summarize what you have read on each topic. Note the key problems, various formulations of the problem they are addressing, relationship among the various approaches and alternative approaches.

Read Ph.D. theses. Even though they are long they can be very helpful in quickly learning about what has been done in some fields. Especially focus on background sections, method sections and read your advisor's thesis. It will give you an idea of what s/he expects from you.

7. Making continual progress on your research

Keep a journal of your research activities and ideas. Write down everything you are thinking about even if you think it is irrelevant including speculations, interesting problems, possible solutions, random ideas, references to look up and interesting quotes. It will help you keep track of your progress and keep you from going in circles. Do not plan to share it with anyone so you can write freely. Read back through it periodically.

Set reasonable goals with deadlines. Identify tasks that need to be completed. Set a reasonable date for completing them (on the order of weeks or months). Share these with your advisor or enlist your advisor's help in creating the goals and deadlines. Set some deadlines that you must keep (e.g., volunteer to give a student seminar on your research, work toward a conference paper submission deadline, etc.)

Keep a to do list. Checking off things on a to do list can feel very rewarding when you are working on a long-term project. List the small tasks that can be done in about an hour. Pick at least one that has to be completed each day.

Continually update your problem statement, goals, approach (or a list of possible approaches), one-minute version of your research (the elevator ride summary), and the five minute version of your research.

Discuss your research with anyone who will listen. Use your fellow students, friends, family, etc. to practice discussing your research on various levels. They may have useful insights or you may find that verbalizing your ideas clarifies them for you.

Write about your work. Early stage- write short idea papers and share them with you advisor and colleagues. Intermediate stage- find workshops and conferences for submitting preliminary results- this can also help you set deadlines. Advanced stage- target relevant journals for publication.

Avoid distractions. It is easy to ignore your research in favor of more structured tasks such as taking classes, teaching classes, organizing student activities, creating web pages and the like. Minimize these kinds of activities and outside commitments.

Confront your fears and weaknesses. If you are afraid of public speaking, volunteer to give talks. If you are in a creative slump, discuss your ideas with someone. If you are afraid of writing, write something about your research every day. Record advice that you did not follow so you can reference it in the future.

The divide-and-conquer strategy works on a day-to-day level. Instead of writing an entire thesis focus on the goal of writing a chapter, section, or outline. Instead of implementing a large system, break off pieces and implement one module at a time. Identify tasks that you can do in an hour or less; then you can come up with a realistic daily schedule. If you have doubts, don't let them stop you from accomplishing something—take it one day at a time. Remember every task you complete gets you closer to finishing.

Balance reading, thinking, writing and hacking- often research needs to be an iterative process across all of those tasks.

8. Avoiding the research blues

Finding balance between work, play, and other activities isn't easy. Different people will give you difference advice but it is important to find a balance to maintain mental and physical well being and to participate in activities outside the research lab. If you have a family, it is critical to save time and energy to focus on the people who matter to you.

One of the keys to balancing your life is to develop a schedule that's more or less consistent. You may decide that you will only work during the days, reserving evenings for your hobbies. Or you might decide that afternoons are for socializing and exercise, and work late at night. Perhaps you will work during the week and reserve weekends for extracurricular activities.

In addition to hobbies, look for opportunities for professional development. Often, there are student organizations that offer workshops and seminars that will enhance your graduate school experience. In addition, they provide the opportunity to network with graduate students in different departments but that share interests.

When you meet goals, reward yourself. Don't compare yourself to senior researchers who have many more years of work and publication experience. Don't be afraid to leave part of your research problem for future work. Get plenty of exercise. Use the student counseling services. Occasionally do something fun without feeling guilty!

9. Financing your graduate education

When considering graduate school it is important to look into the cost of attending. In addition to tuition, living expenses, etc it is important to consider that many graduate schools have additional fees, require medical insurance and textbooks and supplies can be especially expensive. The fees required to apply to graduate school can add up rather quickly. In the long term, additional earnings that a graduate degree will earn far outweigh the cost of attendance but one cannot survive on ramen noodles forever.

There are a number of ways to finance your graduate education including Graduate Teaching Assistantships (GTA), Research Assistantships (RA), scholarships, fellowships, loans, grants, personal funds, etc. Most graduate school funding is not need-dependent, but merit-dependent. Some forms of aid have a work requirement while others do not. Different programs award funding for different durations so there is not a simple answer. Some include out-of-state tuition waivers, some full tuition and some none at all.

When seeking funding, it is important to ask a lot of questions and to explore a variety of options. MinorityGradStudent.com is a wonderful resource that in addition to ethnic minorities identifies funding opportunities for women and individuals with disabilities. There are student loan forgiveness programs that will repay your loans for you if you meet certain criteria. The options are limitless but it is important that you do your research, ask questions of those that have gone before you, ask professors, potential employers, the most important thing is that you ask and continue to ask throughout your graduate career.