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## Graduate Student Survival Manual\*\*\*

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The authors of this guide are all graduate students in chemistry at Iowa State University. Our aim is to pass down some of the knowledge that we and others have amassed. It is not an officially sanctioned Chemistry Department document. It is meant to help you in your first few years, with an emphasis on guiding you through some of your most important decisions.

‡ Jenks Group  
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™ Gordon Group  
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# (1) Your First Semester

## A. Choosing a Research Advisor:

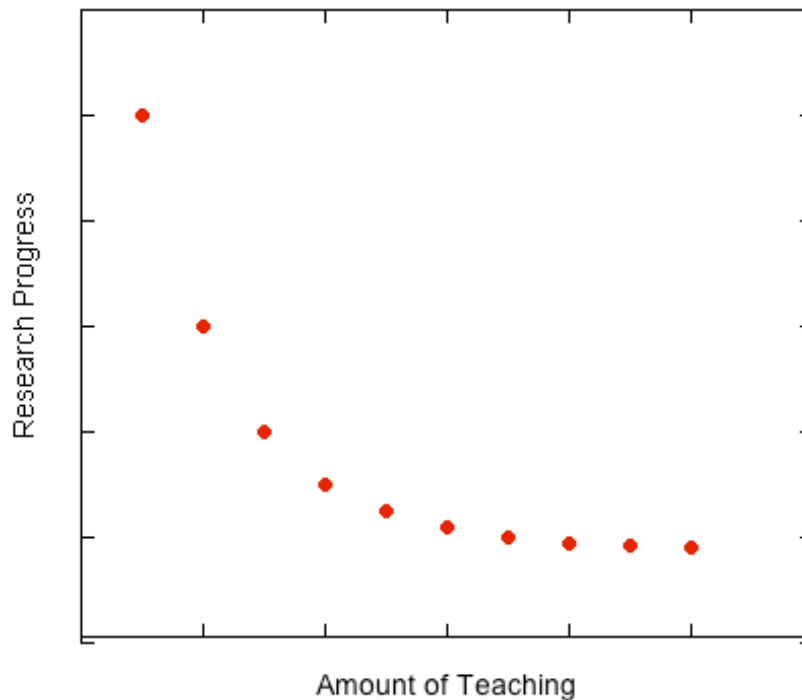
Ask a lot of questions. Such as...

### 1. Financial backing

As in almost every other aspect of life, money has a non-trivial impact on your graduate progress.

How often or for how long are you expected to teach? Every semester, once a year, or whenever the group may fall upon financial hard times? If you can get into the lab right away, obviously this will help you to complete your work sooner (Fig. 1).

Figure 1. The effect of teaching on research productivity.



Will he/she sponsor your trip to scientific meetings? Meetings are important for making professional contacts as well as learning of other efforts in your area.

### 2. Creativity

How much flexibility will you have with your research project? Will you create your own project or assume a current one?

### **3. Tenure**

Different people have different philosophies on what it takes to get a Ph.D. The national average is about six years; however, at Iowa State, pay deductions begin if you have not earned your Ph. D. by the end of your fifth year.

Generally, there are many factors that influence how long it will take you to complete your Ph.D. work. Will you have to learn a new technique or build a new piece of equipment before you can begin your research? Are there extra courses you will have to take to help you understand your work? Don't forget to factor in teaching. These are not necessarily negatives; in fact such activities often serve as valuable learning experiences, resulting in a deeper understanding of your project. Also, keep in mind that shorter isn't necessarily better. When you leave here you should be an independently thinking researcher. The bottom line is that it takes a lot of work to get a Ph. D.

### **4. Expectations for quantity of work**

Are there a certain number of hours per week that your research advisor will expect you to work? Are those hours expected to fall during a certain period of the day? Does it matter what time you come to work in the morning?

### **5. When are you expected to begin research?**

In some groups you will begin doing research your second (or even first) semester, while in other groups you will not begin until your first summer. It is important to understand what is expected of you.

### **Considering your research advisor's personality**

For most people, there are more things to life than a research project. When choosing a research advisor, it is important to consider how his/her personality fits with yours. Remember that you will be working closely with this person for the next 4-5 years. Any significant personality conflicts will only be magnified over time. How does your work ethic compare with his/hers? Are you expected to work independently and ask few questions? Will your advisor be willing to go to bat for you? Do you want a research advisor who is friendly and outgoing, who organizes the occasional social event (i.e. the group goes out for drinks after an important event like a seminar given by a group member, or just goes out for the occasional Friday night after work)? Are you less interested in that, and more interested in someone who will be serious about your work and push you to get research done, and papers out right away? Probably you want a little bit of both, and it will be up to you to decide what ratio is best for you. This is not a matter to be trivialized; it will undoubtedly have a significant impact upon the nature of your time as a graduate student at Iowa State University. As noted elsewhere in this manual, your happiness is closely related to how productive you are and subsequently how long it will take you to complete your graduate degree.

The above statement applies to the rest of the members of a research group, but to a lesser degree. Consider how the group members work together. Are they competitive and spiteful or are they eager to lend their assistance? No matter how great of a researcher you are or how independently you prefer to work, there will come a time when you will want or need help from someone else in your group (or vice versa). It's important to be professional and friendly to all fellow graduate students; you don't know when you will need their help one day!

### **Have a backup choice**

There is no guarantee that the person you choose will be able to take you as their student. Sometimes there are too many students and not enough room in a research group. In this case you will have to join a different group. This is more common in some divisions than others, but you can get an idea of whether or not this will be an issue by talking about it with the people whose groups you are considering.

### **Attend the research talks by professors, Chem 579 (and this means going to the 8:00 a.m. talks)**

Even if you are not even remotely considering joining a professor's group, go to the research talk anyway. You should be exposed to the work that is going on in all of the research groups at Iowa State. Material from these talks has been known to come up in orals.

### **Talk to possible research advisors early**

Not only does it bother professors when people talk to them at the last minute, but it will also help you to have more time to think about your options. Maybe you will need to follow up with more specific questions once you've met with everyone you're interested in. If you already know whose group you plan to join, then it is an especially good idea to start the interview process early.

### **Talk with graduate students**

Speak with students in the groups that you are considering joining and with students outside those groups. Find out what their impressions of the different groups are. What do they like and dislike about the group they're in?

### **Go to group meetings**

Almost every research group meets regularly, and you are usually welcome to attend these meetings. This is a great way to get a feel for how the group interacts, and also the extent of the professor's involvement in each student's project. In group meetings, you will be exposed to the research that is being conducted from the point of view of the graduate students who are performing it. Check with the professor for the time and location.

## **B. Choosing a Major:**

### **Introduction**

There are five major disciplines or "Majors" from which to choose: Analytical, Inorganic, Organic, Physical, and Chemistry. The first four are the "traditional" majors, whereas choosing a major in Chemistry offers interdisciplinary flexibility. In addition, you can choose to minor in any one of the three non-major, traditional disciplines. When you first arrive, each of you is asked in which discipline(s) you are most interested. This choice is by no means binding. It only serves to guide the student and their temporary advisor when deciding which classes to take and where to begin looking for a permanent advisor at the end of the semester.

### **Major vs. Major Professor**

The choice of a Major, by nature, is very much related to the choice of a Major Professor. However, there is a great deal of flexibility, so keep an open mind when deciding. Many professors accept students in different majors, so don't worry if you want to, for example, major in Organic but work someone who primarily does research in Inorganic chemistry. If you are interested in their research, go talk to them. Find out who is working for them. In most cases, a multidisciplinary group provides a wonderful chance to be exposed to many different areas of chemistry and makes you more valuable to employers. Above all, remember that you can always switch majors. It could cause you to have to start over with research and classes, so choose carefully and talk it over with your advisor and other students who have gone through it before.

Below is a web address of the Chemistry faculty and disciplines in which they are involved. We don't know everything! Additional information can be found on the department's website at <http://www.chem.iastate.edu/faculty/>

### **Co-Majoring**

You have the option of majoring in two subjects at once. This is not really a double major because a co-major generally involves doing half of the requirements of each major (e.g. coursework, seminars, and oral exams). This option typically involves choosing two Major professors (one from each co-major discipline) who must decide how the programs will be divided to form the co-major. The extra hassle and confusion involved tend to outweigh the benefits; so few students take this option. Again, if you are interested, talk to your advisor and other students (especially co-majors) to find out if it would be good for your situation.

If you decide to do this, make your decision early in your first semester or expect to exceed five years in completing your Ph.D. You and your co-advisors set up the program

for your coursework. Your POS committee will offer advice on your chosen program. Most important --get your program set up early so you don't waste time taking unnecessary classes.

### **Minors and Areas of Specialization**

These two options offer a more hassle-free alternative to a co-major. They are designed to make a student more marketable after graduation by giving them a broader base of experience. Look in your Department of Chemistry Graduate Manual for a list of minors and areas of specialization and the corresponding requirements. As always, consult with your advisor and other students if one of these options sounds appealing.

### **Coursework**

To complete your degree in a timely fashion you should complete your coursework as soon as possible. Research can be completed more quickly when you can focus your efforts. Each discipline has coursework requirements, but some advisors recommend/mandate that you take additional classes. Graduate level coursework is significantly more intense than undergraduate courses. It is important to stay focused and manage your time wisely, especially when your responsibilities begin to multiply (classes, teaching, and research). Keep in mind that if a 3.0 grade point average is not maintained you may be placed on academic probation.

## **(2) Communication in the Workplace:**

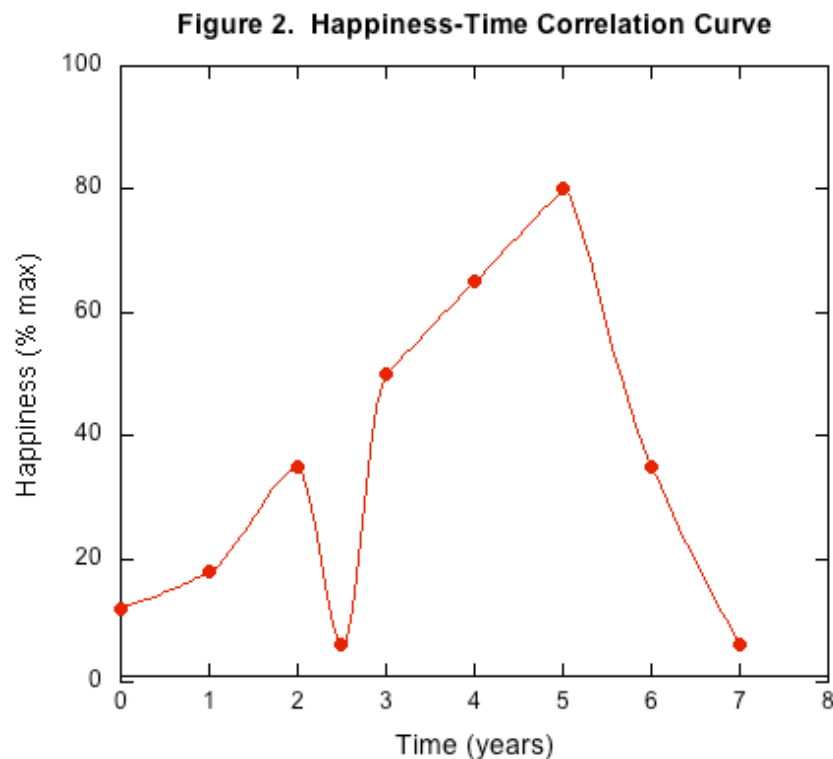
It is imperative to have an open line of communication with your research advisor, as well as with any coworkers in the laboratory. As you will soon see, your workplace will be composed of many types of people. From differing nationalities to differences in opinion, everyone will see the world with a unique point of view. To ensure that your research is performed in an environment comfortable to you and your colleagues, we suggest following a few guidelines.

- First and foremost, try to resolve the disagreement with your coworker face to face. This may offer the quickest resolution to the problem at hand. It may simply be a difference of opinion or miscommunication that has resulted in this situation, and voicing your displeasure may not only resolve the problem for both parties, but may prevent future problems from arising as well.
- If problems do arise in the workplace, try not to discuss them with colleagues who are not directly involved. This can result in the isolation of other individuals and simply make the current situation worse.
- If you feel that you cannot confront a colleague directly, you should consider speaking with your research advisor or group supervisor. This may seem

intimidating but remember that your success as a graduate student hinges on your success within your research group. This includes, but is not limited to, your ability to communicate and work with a diverse group of individuals in the laboratory.

- Should you find that you have a disagreement with your research advisor, the best choice for resolving this conflict is to speak face to face with him/her. It is not only to your advantage but also to your advisor's advantage as well to have an open line of communication within the research group. A conscientious advisor should be open to your opinions and concerns, and will work with you to improve your experience as a graduate student.
- Finally, you may find that you have a concern with your major advisor that cannot be voiced directly with him/her. In this case, you should consider speaking with a member of your POS committee. They may be able to offer advice, which will aid in resolving your concerns.

In conclusion, your happiness is, for the most part, directly correlated with the length of time you will spend as a graduate student. The unhappy student is often the student who leaves prematurely or does not graduate on time, neither of which results in the student realizing his/her full potential (Fig. 2). (Please note that the drop in happiness around two and a half years is when the Preliminary Oral Examination occurs.)



### **(3) Getting Assistance as a Graduate Student:**

#### **1. Your major professor**

Really, he or she wants you to succeed. You are a big investment. Create and maintain a good relationship with this person and he/she will smooth a lot of ground ahead of you.

#### **2. Your POS committee**

If the trouble is with the major professor or it's something you don't feel comfortable discussing with him/her, or you just want another opinion, try one of these people. They should all be willing to listen and help. It's to your advantage if they know you better before your Oral or Defense!

#### **3. Other faculty or staff**

Maybe you need to learn a new technique or want to find out how to use some library resources. There are people, for example, at instrument services and in the PSRR to help. If the problem is not chemistry-related, try anyone you feel comfortable talking to. Believe it or not, the secretaries know nearly everything and will be some of your best resources.

#### **4. Graduate students and post-docs**

Many times these people can offer support and encouragement when you need it. They can tell uplifting stories of their own experiences. They don't always have all the answers, but they are often useful. Get to know some; at the very least, you might need help moving furniture.

#### **5. In the Chemistry Office:**

a) Beverly Nutt  
Chemistry Graduate Records Secretary  
1605 Gilman, 4-9410  
bnutt@iastate.edu

See Bev for registration forms and codes, add/drop/audit slips, locator cards, changes of address and most Graduate College Forms.

b) Renee Harris  
Graduate Program Coordinator  
1605-D Gilman, 4-6343  
rmharris@iastate.edu

Renee can help with graduate records. In general, Renee seems to know pretty much everything. Therefore, if you are lost and confused, see Renee.

c) Bill Britton  
Business Manager  
1605-E Gilman, 4-7809  
britton@iastate.edu

Bill is the person you will talk to about your paycheck. You need to see him to sign Letters of Intent periodically (unless you work in Ames Lab) and he'll help you with any problems you have getting paid.

d) Nancy Olsen  
Assistant Business Manager  
1605-C Gilman, 4-9414

Nancy handles the departmental accounts. If you need to buy office supplies from the MU, you would give the departmental sales form to her (which needs to be signed by Nancy, Bill Britton, or Renee Harris prior to purchases).

e) Lynette Edsall  
Graduate Admissions Specialist  
1605-B Gilman, 4-7810  
rmharris@iastate.edu

Lynette sets up prospective students' visits and keeps lists of the incoming graduate students. She may ask you to take some of them out for meals. Remember to get an ITEMIZED receipt so she can reimburse you!

f) Carlene Enderson  
Assistant Business Manager  
1605 Gilman, 4-7813

Any form that Bev does not have will most likely be found with Carlene. She is also the person to go to if you are trying to use a travel grant/money from your professor towards a conference.

g) Mary Dau  
Secretary  
1605 Gilman, 4-7812

Mary is the secretary to the Department Chair. She also has schedules for professors, which she can give you when you are trying to schedule your oral or defense. Keys to conference rooms are located by her desk.

## 6. Other University Offices

Dean of Students Office.....	4-1020
1010 Student Services	
Employee Assistance Program.....	1-800-830-7009
Richmond Center	
Office of International Students and Scholars.....	4-1120
4 Hamilton Hall	
Office of Equal Opportunity and Diversity.....	4-7612
3210 Beardshear	
Student Health Center.....	4-5801
Sheldon and Union Drive	
Student Legal Services.....	4-0978
B11 Memorial Union	
Student Counseling Services.....	4-5056
Student Services Building, 3rd floor	
Women's Center.....	4-4154
Sloss House	

## (4) How to Conduct a Literature Search

There are several search engines available for conducting literature searches and each has pros and cons. Some search engines can be used free of charge but only allow a limited number of simultaneous users while others are pay services that can be used by appointment only. This brief overview of commonly used search engines is not meant to be complete, but is intended to provide students with a place to begin to access the scientific literature.

**SciFinder Scholar (a flavor of CAS online).** This is one of the easiest and most often utilized search engines. SciFinder Scholar is a service that allows users to conduct searches CAPLUS and MEDLINE\* by key words, author name, chemical symbol or structure and also allows the user to limit the scope of the search to only certain types of documents (i.e. journals, books, conference proceedings, patents, etc). SciFinder Scholar can be used 24 hours a day. Furthermore, the University has a license agreement that allows only 6 people (soon to be 8) throughout the entire campus can use the program simultaneously, making it imperative that users use their time wisely and log off

immediately when finished. This service is free to users, but the university must pay a fee for each seat.

To install the program on your campus computer, follow the instructions located at the following address: <http://www.lib.iastate.edu/collections/db/scifnd2006.html>.

The following instructions are intended to provide a brief overview into a basic SciFinder search. A complete instruction manual for conducting SciFinder Scholar searches can be viewed at the Parks Library Reference Desk.

After starting the program and accepting the license agreement, select the type of search you would like to conduct by double clicking on one of the choices:

- Chemical Substance or Reaction
- Research Topic
- Author Name
- Document Identifier
- Company Name or Organization
- Browse Table of Contents

Search example:

1. Click on "research topic".
2. Enter a short phrase or key words to search for. For example, enter the phrase "Use of liquid chromatography in protein separation". Hit "Search".
3. The search engine will then display the number of hits where key words in the search phrase appeared and how they were related. In this example, 1005 references where the words in the phrase were closely related were found. Click the white box that appears to the left of the candidate that you would like to pursue. Click "get references". SciFinder Scholar then lists the authors' names, title of citation, journal information, etc. Words appearing in blue are those that were included in the search phrase.
4. To narrow the focus of the search, select "Analyze/Refine", then "Refine". This allows the user to limit the selected hits based on research topic, company name, author name, document type (journal, patent, conference proceeding, etc), publication year, language, database, and full text availability. Ex: I only want review articles. Select "document type" and "review" from the list of document options. Click "OK". Now 1005 references have been narrowed down to 52. However, I am only interested in publications from 2000 until the present date. Select "Analyze/Refine" and "Refine" again. Then select "Publication Year" and enter "2000-". 29 references are given.
5. To see the abstract for any item, double-click on the microscope icon that appears to the right of each entry.
6. To print item(s), first make your selection by checking the white box located to the left of each entry. Select as many as you want. Then click on the "printer icon" from the upper icon toolbar. Now you can select how you would like the information. Common

choices are “standard” or “summary”. These print the full citation of the reference, as well as the abstract if summary is chosen. Click "OK".

\*If you are interested in only MEDLINE results, please use the PubMed search engine (described below) since it is a completely free source.

**Beilstein Crossfire Databases.** This is located on the computers in the Physical Science reading Room (PSRR). You can also install Beilstein on a separate computer. Two databases provide worldwide coverage of the literature relating to the preparation and properties of compounds. One database deals with organic compounds and the other deals with inorganic compounds and materials. Beilstein is searchable in multiple ways, including chemical structure, formula, and physical property parameters. It will also return numerous properties about the compounds ranging from color to magnetic properties to quantum mechanical calculations. Beilstein indexes periodicals, books, dissertations, and patents dated 1800 to present. It also includes a chemical reactions database. To learn how to access Beilstein, go to the PSRR and the librarians will be very helpful in showing you how to get into the database.

**Quantum Chemistry Literature Data Base (QCLDB).** QCLDB is a database of quantum chemistry references that have significant relevance to ab initio calculations. A web-based version, QCLDB II, is now available at <http://qcldb2.ims.ac.jp>><http://qcldb2.ims.ac.jp>. Creating a login is free of charge. It is searchable by substance (chemical formula), method (HF, MP2, etc.), and basis set (6-31G, cc-PVTZ, etc.), in addition to the usual fields like author, journal, date etc. This is a quick and comprehensive way to find out the extent of computational work on a particular compound. To search, enter the molecular formula alphabetically with a period after any atomic symbol with two letters: i.e. PBr.5.

**PubMed.** Produced by the National Library of Medicine, PubMed is an easy to use search engine that is particularly useful for searching the biological sciences literature, as it offers direct access to the MEDLINE database. The database is updated monthly and provides access to articles and abstracts contained in 4,000 international biomedical journals. Searches can be conducted by several search terms, such as topics, authors or journals. It can be accessed 24 hours a day free of charge and anyone can conduct a search, making it a flexible and powerful tool for those studying biologically relevant topics.

PubMed can be accessed via the ISU library web page at [http://www.lib.iastate.edu/collections/db/indexabst\\_name.html#p](http://www.lib.iastate.edu/collections/db/indexabst_name.html#p) and scrolling to PubMed-ISU Affiliate. At the top of the page, enter your search criteria.

**Indexes and Abstracts Available through ISU's Library Website.** There are several useful indexes and abstracts available through ISU's online library system. These resources can be accessed free of charge 24 hours a day through ISU's library website. While not always the most complete source of information, some indexes and abstracts are very popular with chemistry graduate students. An alphabetical list of available indexes and abstracts can be viewed at:

[http://www.lib.iastate.edu/collections/db/indexabst\\_name.html](http://www.lib.iastate.edu/collections/db/indexabst_name.html).

Some useful scientific indexes and abstracts are:

Applied Science and Technology Abstracts (ASTI): Contains more than 625,000 citations (1983 to the present) in the areas of materials science and engineering.

Current Contents Connect: Users can view abstracts and table of contents for current journals and conference proceedings. Allows users to alter the search depth from the last week, last two weeks, up to the last six month's literature in the numerous scientific areas including the physical, chemical, and earth sciences (PSES), engineering, computing, and technology (ECT), as well as the life sciences (LS).

CHEMnetBASE: Lets users search a number of major chemical references (like the Handbook of Chemistry and Physics) online.

If you are in need of further assistance, you may contact the subject librarian:  
Heather Lewin, Assistant Professor, Science and Technology Librarian  
152 Parks Library, 4-1004  
[hslewin@iastate.edu](mailto:hslewin@iastate.edu)

Heather is the subject librarian for chemistry. She can assist you with literature searches, or any other problems you may encounter while trying to obtain chemistry references.

### **A Couple Other Options:**

**Google Scholar.** Google Scholar is a freely-accessible search engine worth mentioning. It provides indexes for a broad array of disciplines. However, it cannot access certain titles, specifically most Elsevier titles and recent ACS journals.

The Chemistry Department Website also provides a list of chemistry resources at <http://www.chem.iastate.edu/students/>. This list provides access to search engines such as Chmoogle.

## **(5) Student involvement in the Department**

There are many opportunities to get involved with the department. These include activities with visitors, both prospective students and speakers, serving on committees that help shape department policy, and helping out with department organized activities, like the Gilman Lecture and the Open House weekend. The Chemistry Department also has a summer softball league and sponsors biannual department socials.

While this is certainly not a requirement, becoming involved in the department is an excellent opportunity to get to know both students and faculty in the department and those visiting from other universities. In many cases you are also helping to make the department a better place from an academic point of view, and that helps everyone who has ISU on her or his resume.

If you would like to get involved in the department, contact Renee Harris, your advisor, or any of us (The Student/Faculty Liaison Committee).

## **(6) In case we forgot something:**

These are a few additional resources that address the same topic and may be of interest:

1. "The Ph.D. Process: A Student's Guide to Graduate School in the Sciences". Dale F. Bloom, Jonatha D. Karp, and Nicholas Cohen, Authors. New York: Oxford University Press, 1998. Contains chapters on how to select an advisor, deciding on research projects for your dissertation, as well as the unique problems and stresses that face foreign students. Can be found at the Parks Library

2. Another useful book for later in your graduate career:  
Guide to Nontraditional Careers in Science. Karen Young Kreeger, Author. Philadelphia: Taylor and Francis, 1999. Discusses careers in scientific and medical illustration and technical writing and publishing sectors and highlights the technology transfer and business areas as potential fields for science-minded people. Also available at the Parks Library.

## **(7) Graduate Student Testimonials (note to authors'/editors' research advisors: none of the following comments were written by us):**

1. Choose an advisor that you respect, but also one that respects you. Four - five years is an impossibly long time to work for someone when you are miserable.

2. If you're torn between two advisors, choose the one that has a history of letting his or her students graduate in 5 years or less. That seems to be a good indicator of a more successful group.

3. The one thing that I believe CAN NOT BE SAID ENOUGH is that the choice of a major professor is one of the most important, if not the most important decision a graduate student will make in his/her whole graduate career....Knowing the profs, asking questions, and talking to others is extremely important.

4. Pick a major professor ASAP and certainly don't delay it even though they do allow you to do that. Also, get into research ASAP. Being a TA is nice and you might even enjoy it, but it doesn't get you the degree.

5. Don't let your temporary adviser pressure you to take or drop classes in your first semester. He's only your temporary adviser and you know what's best for you. Ask another professor for advice if you disagree with your temporary adviser.

6. In my first week of lab research I was bustling around trying to find lab supplies. Three of the other guys in my lab were standing around talking and watching me work. I had been trying to find a stir bar for a reaction. I started to ask the other lab members if they knew where one was located. Unfortunately, I couldn't remember whether they referred to it as a magnetic strip or as a stir bar. What came out was, "Hey, guys, do you know where I can find a strip bar around here?"

7. When you get into your graduate work, be sure to write your work up as you go. Collect all of the spectra, etc. that you will need to have in your dissertation as you go. If you do, your thesis/dissertation will be much easier to write.

8. Cross-group interaction is good. It's practice for networking later on in life. Every group and group member has their own little specialties and they're often willing to help you if you are willing to help them later on.

9. Don't be too optimistic or too pessimistic about the job market, but be honest.

10. LIVE NEAR A BUS ROUTE:

11. Graduate coursework is a great deal more difficult than undergraduate coursework. You have to find a balance between teaching and studying for your own classes. It is amazing how hard it can be to catch up if you find yourself falling behind. The professors and the graduate advisor will stress this, but it doesn't always sink in unless you hear it from a fellow graduate student.

12. As a female grad student, the last thing I ever wanted to do was to cry in front of a professor, let alone my major professor. However, to this date and despite my best efforts, I've cried in front of three professors, and so far, I'm still here. Crying may suck, but don't worry, they're probably more used to it than we would expect, and actually, it almost seems to amuse them. So don't freak out if it happens, you're not alone.

13. When leaving for vacation make sure all of your glassware is dirty, so no one will take it.

14. The first six years go by pretty quickly, so enjoy them while you can.

15. Be efficient in the lab. Long hours mean nothing if you are not getting anything done.

16. Getting your research done and being friendly are not mutually exclusive.

\*\*\*The first edition of this document was written by Andrew Chubb, Jerry Cubbage, Elizabeth Jensen, Janese O'Brien, Jamie Rintleman, and Conrad Stold.

\*\*\*The second edition of this document was written by Andrew M. Chubb, Jerry Cubbage, Viken Djerdjian, Tony Layson, Jamie M. Rintelman, Xiaopeng Shan, and Ying Wang.