

2009 The Redbook

T H E
redbook
S T A N F O R D C S 2 0 0 9

Computer Science Graduate Students
2009

Published 2007, 2008, 2009

Printed by CafePress.com in the United States of America

Typeset with \LaTeX in Utopia, originally by Austen McDonald

<http://austenmcdonald.com>

Dedicated to...

...the incoming class of 2009. Best of luck!

ACKNOWLEDGMENTS

2007

Ioannis Antonellis
Billy Chen
Mike Houston
Jeff Klingner
Austen McDonald
Adam Oliner
Doantam Phan
Ron Yeh

2008

Chand John
Austen McDonald
Adam Oliner
Rachel Weinstein
Leslie Wu

2009

Kathi DiTommaso
Chand John
Austen McDonald
Adam Oliner
Verna Wong
Leslie Wu

TABLE OF CONTENTS

0.1	What is This?	1
The Basics		3
1.1	Three Things to Know	3
1.2	Your First Quarter	3
1.3	Advisors	4
1.3.1	Choosing an Advisor	4
1.3.2	Switching Advisors	7
1.3.3	Talking with your Advisor	8
1.4	Funding	9
1.4.1	Grants	10
1.4.2	50% vs. 25% CA	10
1.4.3	50% vs. 25% RA	11
1.4.4	Fellowships	11
1.4.5	Consulting	11
1.4.6	Summer Internships	12
1.4.7	Unrestricted Funds	12
1.4.8	TGR	12
1.4.9	Graduation Quarter	12
1.5	Comps	13
1.5.1	Study for Comps	13
1.5.2	Take the Class	14
1.5.3	Watch the Lectures	14
1.5.4	Read the Book and Take Practice Ex- ams	14
1.5.5	Form a Study Group	14
1.5.6	Take the Comp Anyway	15
1.6	How to do Research	15
1.6.1	Read Papers	15
1.6.2	Talk With People	15
1.6.3	Be Goal Oriented	16
1.6.4	Set Deliverables and Discuss with your Advisor	16

1.6.5	Time Management and Procrastination	16
1.7	Quals	17
1.8	The Thesis	17
1.8.1	Committee	18
1.8.2	Defense	18
1.8.3	Writing	18
Health and Happiness		19
2.1	You Are An Asset	19
2.2	Mental Health	19
2.3	Physical Health	20
2.3.1	RSI	20
2.4	Activities and Social Life	21
Department		23
3.1	Paperwork and Pitfalls	23
3.2	Lounge	23
Life After Grad School		25
4.1	Doing Something Else	25
4.2	Working in Industry	25
4.3	Becoming Faculty	26
4.3.1	Kinds of Faculty Positions	26
4.3.2	Preparing	27
4.3.3	Readings	28
References		29
About this Document		31
6.1	Philosophy and Style	31
6.2	Maintenance	31

0.1 WHAT IS THIS?

The Redbook is the attempt of a few PhD students to pass on bits of wisdom and frank advice to newer students in the hope that the next generation avoids their missteps. It lives online at <http://theredbook.pbwiki.com>.

THE BASICS

1.1 THREE THINGS TO KNOW

1. Academia is a business, and graduate student is a job title. From Azuma: “Academia is not the Real World and does not work in the same way that the ordinary corporate world does. However, it is a business nonetheless and as a graduate student, you must treat it that way. Graduate school made a lot more sense and became much easier for me after I realized this. If you think of graduate school as an ‘Ivory Tower’ free of politics, money problems, and real-world concerns, you will be severely disappointed.”
2. Remember you’re here to get a PhD. Especially if you come straight from college, the apparent lack of requirements may cause you to not take school seriously. Have fun, just don’t have *too much fun*. Have a plan for completing your degree in a timely fashion.
3. Acquire good advice by chatting with senior graduate students behind closed doors; they will be more open and honest.

1.2 YOUR FIRST QUARTER

What should I be doing in my first few months at Stanford?

In your first quarter, *don’t drift*. Study for comps and find an advisor. You may hear that comps are “trivial” and you should not waste time studying for them because you’re

so smart you'll just pass them without effort. Regardless of the veracity of such a claim, getting comps done sooner is better. As time passes, you'll have commitments to research projects and paper deadlines. At that point, studying for comps or taking classes to pass them will take time away from what's important.

Form study groups with other new students. You may want to take a class the first quarter. Searching for an advisor won't take all your time, and taking a class will help you meet new people. If you have weak comp areas, taking a class or two can help you pass out of them.

If you're not sure what area you want to be in, work with a professor for a trial quarter. Don't just attend meetings: work on an existing project with more senior grad students for a chance to be mentored and learn by their example. (Try to pick a good project!) Take a lesson from other fields, which have students rotate through different labs in their first year. Even if you don't end up with that advisor, you've gotten research experience, perhaps credit on a paper, and a professor in the department who knows you. If you have difficulties later in the program, for whatever reason, it is crucial to have a professor who knows you and who will go to bat for you.

1.3 ADVISORS

1.3.1 *Choosing an Advisor*

The choice of advisor is by far the most important decision you'll make, by an order of magnitude.

It will completely control your grad school experience and will affect your post-grad-school career, especially if you

want to continue in academia.

OTHER STUDENTS' EXPERIENCES. The best way to learn about an advisor is to chat with current members of that professor's group behind closed doors. They'll give you the real information about a professor, from inspiring tales to horror stories. Both exist. Ask them about the topics below.

FUNDING. When choosing an advisor, you need to understand their funding situation. Don't be afraid to discuss this candidly—it's the only way to avoid misunderstandings. Without funding, you will be supported by the department, which means you have to be a course assistant (CA). You don't want this to happen because CASHips take a considerable amount of time away from research. A 50% CASHip covers your tuition and stipend, but generally requires ≈ 20 hours per week of work from you. Although 25% CASHips exist, the common wisdom is that you will be working almost as much as the 50% CA for less money. Another source of funding is industrial fellowships (Microsoft, IBM, NVIDIA, ATI). The department usually controls who gets to apply for these fellowships or it is limited to one applicant per professor.

Keep in mind the following questions: Are there active grants that can support your specific research project as a 50% RA? How many quarters of support are these grants? Are they renewable? What is the criteria under which they can be renewed? Are your professors actively writing more grants for the future? If not, will they help you write a grant (it's good practice, in any case)?

Have a candid talk with your advisor to avoid being forced to CA quarter after quarter while struggling to produce research. If this does happen to you and you still graduate,

however, turn those lemons into lemonade by earning a Distinction in Teaching.

ADVISOR AGE. A young (pre-tenure) advisor will be hungry for results and will be closely involved with your work. They are likely to closely monitor the relevant conferences and will be well aware of related work. This may appeal to you. The downside is that they may fail to make tenure, which could screw up your grad school career.

An old advisor will have fame, experience, and contacts. They are a safer bet than a pre-tenure professor since they aren't going anywhere, and many have reliable funding. On the other hand, older, successful professors sometimes aren't hungry for success anymore, and may be only superficially engaged in the research of their students, leaving them feeling adrift.

RECENT PUBLISHING RECORD. If you want to pursue an academic career at a top-tier school, you'll need several high-quality first-author papers. Look at how many papers the professor's current students have published in the past few years, and at what conferences. This is an indicator of where the professor stands with respect to the earlier point: are they still hungry to achieve success, or are they resting on their laurels?

Aside from this question of hunger, professors also differ from each other with respect to how they approach conferences; some publish papers three times more often than others. Of course, paper quality matters more than quantity, so use Citeseer, ACM Digital Library, or Google Scholar to see how often the professor's recent papers are cited, as an indicator of how well their work is received by their research community.

ADVISING STYLE. Many will suggest you ask if a professor is “hands-on” or “hands-off.” Unless you lean strongly toward one or the other, stick to other metrics when picking an advisor. Be wary of professors at either extreme (talk to senior grad students).

GROUP COMPOSITION. Find an advisor with several current students, since their body of knowledge and experience will be of great benefit. Many groups work like an apprenticeship: young students join existing projects to learn from the older students, and, as they get more experience, they will strike out in their own directions.

If all the current students are near graduation and there are no younger current students in the pipeline, this could be a problem.

Be wary of advisors with large groups (15+ students), because you’ll get much less face-time than with only 5–10 students.

INDUSTRY CONTACTS. Industry contacts are key in systems-related fields. It is often hard to do compelling research in a systems area without collaboration with industry partners. Do the professor’s students work for companies that excite you? Do the advisor’s current students often do consulting or summer internships in industry?

1.3.2 Switching Advisors

We do not recommend switching advisors after your second year, but it has been done. Do not be afraid to switch during or immediately after your first year. If you want to switch, simply have a candid conversation with your advisor; be honest and try to leave on peaceful terms. Notify the PhD Program Office if you switch advisors.

1.3.3 Talking with your Advisor

The role of your advisor is to provide ‘advice’. If you disagree, talk about it. Disagreements may arise regarding research direction, summer plans, or even funding.

Talk to your advisor often, at least once a week. There are several topics you may need to discuss during your PhD:

- *Be explicit about expectations.* How often does your advisor expect you to publish? Specifically, what about the upcoming FOO-BAR conference? If you know your advisor’s expectations, you are less likely to disappoint.
- *Make meetings count.* Come to meetings prepared with a plan of what to talk about, questions, etc., and leave with a clear idea of what you’ll do before the next meeting.
- *Paper author order.* Credit for a research paper is determined by author order; some groups encounter strife because there is no clear ordering policy. Discuss it with your advisor ahead of time, rather than waiting until the paper is complete. Likewise, beware of working on projects with students on the same graduation schedule as you, as you may both want first authorship on the same paper. When you are a senior student, work with junior students to avoid these problems.
- *Theses from large projects.* Large, multi-year projects can involve an unknown number of graduate students, but usually produce a finite number of theses. If you get involved in one of these projects, discuss what part of the project can be used for your

thesis. If that can't be determined within the first few quarters, you may want to find a new project.

1.4 FUNDING

Funding is vital. Have candid talks with your advisor about it so you can ensure support through your entire graduate career with minimal distraction from your research. Your happiness and progress are correlated with funding. Grad students with funding tend to be pretty happy, but, without funding, grad life can be pretty miserable. Most students find their thesis topic by working in an area or project that provides them funding.

Every quarter you need 50% of support. Funding comes in percent units, usually 50% or 25%. Ideally, you are a 50% Research Assistant (RA), funded under a grant from a government agency (DOE, DOD, NSF) or a private organization, and working on an interesting topic.

You may be lucky and have a fellowship from Stanford, NSF, NDSEG, Hertz, or some other group that covers you for three to five years. If you're really lucky, you have two fellowships, one deferrable, like NSF and NDSEG: defer NSF for two years, and get five years of coverage. If it's your first year and you don't have a fellowship, you should apply for NSF, which is still open to graduate students in their first and second year. There are also one year fellowships from companies like Microsoft, Intel, ATI, NVIDIA, and Yahoo. Other fellowships are offered by IBM, the Ford Foundation, NPSC, NASA, LLNL, and AAUW.

If you're not on a grant or fellowship, then you're a Course Assistant (CA). Unless you're going for the Distinction in Teaching, this can be a bad situation. Being a CA requires

\approx 20 hours a week of work before you've done a single minute of research. Do not be a long-term CA. You will be unable to do enough research to keep your advisor happy, and so you continue on as a CA in a negatively reinforcing cycle. If you have to CA, ask the senior grad students which courses require less than 20 hours of work. A rule of thumb might be to avoid intensive programming project courses like Operating Systems.

1.4.1 Grants

Grants are given to your advisor and your advisor employs you as a RA. It is rare, but not unheard of, for a professor to cut a student's funding. (I believe they are required to give a one quarter notice so that you have time to scramble to find other funding.) This is something that should not happen if you are having candid talks with your advisor about your progress.

You should know what grant you are on, if it is renewable, and what the criteria are for renewal. You should also know if your advisor is applying for other grants from the NSF, DOD, DOE, or whomever. Try to help write the grant. If you want to be faculty in the future you should know how to write a grant. If your advisor is not writing a grant, you should be concerned. In this case, ask your advisor if they will help you write a grant. You can go to the NSF website and look at the calls.

1.4.2 50% vs. 25% CA

Avoid a 25% CA (Course Assistantship). You usually do nearly the same amount of work as a 50% CA, which fully funds you for the quarter. As a 25% CA, you'll need to find another source of 25% funding (possibly a 25% RA with a

professor who is not your advisor).

1.4.3 50% vs. 25% RA

Most RASHips are 50% (except in the summer, when they are 90%, which is $1.8\times$ your normal salary). You are usually an RA under your advisor. Sometimes, people take an RA position with someone else to have support. If this happens to you, minimize the impact on your research by finding an RA position that is somewhat related to your research (e.g., kickstart a collaboration between your advisor and another professor). Sometimes, an RA under another professor may have you writing code for some group in the university that needs it. Students in the EE department tend to know a little more about doing RASHips not for your advisor, so try asking one of them.

1.4.4 Fellowships

A fellowship can be a double-edged sword. It's great to have long-term funding with few or no strings attached, but the lack of quarter-to-quarter accountability for funding can often lead to drift, especially in the case of a hands-off advisor. Celebrate, but beware! A fellowship can enable you to work with the advisor you want to work with, because advisors tend to welcome a student who comes with funding.

1.4.5 Consulting

Officially, you may consult for other companies for one day a week. It's a nice way to make money and may not require too much time on your part.

1.4.6 Summer Internships

Internships are a great source of extra spending money, a valuable way to hook into industry research, and a way to get ideas for a thesis. Spend at least one summer at an industry research lab early in your graduate career. Students have taken their summer internship at an industry research lab (e.g., Microsoft Research) and turned it into a thesis. Your advisor may have contacts and be able to recommend internships. Some good places are Microsoft Research, Microsoft Research Asia, Yahoo Research, Intel Research, HP Labs, PARC, or your advisor's company.

1.4.7 Unrestricted Funds

Grants are reserved for particular purposes and projects. So, you (usually) can't get money from the FOO pot unless you work on the FOO project. If you are lucky, however, your advisor may have some unrestricted funds to cover you. Unrestricted funds are often coveted, so don't rely on this.

1.4.8 TGR

If you're in your last year, you can make your fellowship money stretch further by going TGR, which reduces the amount of tuition. You can technically only stay on TGR for a year, but this rule is probably flexible.

1.4.9 Graduation Quarter

If you need just one more quarter, the University Registrar's Office allows you to register for a graduation quar-

ter which costs very little (\$100). If you've saved up some money and really are on your last quarter, you can take this option. Be absolutely positive it is your last quarter, or you (or your advisor if they are gracious enough) will have to pay a penalty to the University.

1.5 COMPS

The main repository of material related to the Comps is Comps Central:

<http://www-cs-students.stanford.edu/phd/comps.php>

1.5.1 *Study for Comps*

Form study groups to get to know other first-years and study as hard as you can for Comps so you can get them out of the way. You don't really want to re-take those undergraduate classes again. Leaving them for later simply means that next fall, when you're working on research, you're going to have to take time to study for them again.

On the other hand, Comps are not nearly as important as finding an advisor. Focus on Comps only if you know who you are working with and are confident you will have funding and an advisor next quarter. Do not spend all your time on Comps at the expense of research unless you have an outside fellowship or you have already convinced a professor to take you.

1.5.2 Take the Class

If you know you have a slight chance of passing a comp, try to take the class in the fall. If you are enrolled in the class when you pass the corresponding comp, you may drop the class (even after the official drop date—although this will appear as a withdrawal on your transcript). If you fail the test, be sure to achieve an A-minus or better in the course to pass the comp.

1.5.3 Watch the Lectures

Alternatively, if you don't want to take the class, watch the online lectures. This is especially useful if the person writing the comp is actually teaching the course that quarter. For example, if Prof. Koller is writing the AI comp and teaching 121 that quarter, it may be useful to watch the online version of her lectures.

<http://scpd.stanford.edu/scpd/default.htm>

1.5.4 Read the Book and Take Practice Exams

It is entirely possible to pass some Comps by just reading the associated book. One great example is reading Michael Sipser's short book and passing Automata.

1.5.5 Form a Study Group

This is a great way to meet other first-years. The 2006–2007 class formed study groups, met weekly to keep each other motivated, and posted relevant materials on a wiki:

<http://phdcomp.pbwiki.com/>

1.5.6 *Take the Comp Anyway*

There is no penalty for failing a comp. Furthermore, the exams are graded on a ‘curve’ such that you may benefit your colleagues by doing poorly. In other words, study for those you expect to pass but take all of them, regardless.

1.6 HOW TO DO RESEARCH

An undergraduate degree is about doing well in classes: someone tells you what to do and how to do it. In graduate school, you are solely responsible for setting your daily schedule, finding the right project to work on, and figuring out how to accomplish it. This uncertainty may contribute to a stressful existence while you adjust. There may be long stretches of time when you doubt whether your work will be fruitful.

What follows are tips on how to avoid this uncertainty.

1.6.1 *Read Papers*

It is critical to read *lots* of papers in your area, and specifically on your research topic. What if you don’t like to read papers? Then, at the very least, *skim* lots of papers.

1.6.2 *Talk With People*

Conversations make you smarter. They help you look at problems from different perspectives, hone your arguments, refine your terminology, explore alternative solutions, and uncover existing approaches. Chat with professors, other graduate students (even outside your area),

and anyone else who will give you the time of day. Not only will this improve your research, but more people will know you and what you are doing. Make sure you are listening at least as much as you are talking.

Bounce your ideas off other colleagues. If they like your work, great. If not, ask them why and improve your work based on their feedback.

1.6.3 Be Goal Oriented

When deciding on research projects, be goal oriented. Do not waste your time working on projects that lead nowhere. Ask yourself, “Will this project lead to a paper? Which conference will I submit it to? Is it a chapter in my thesis?” Do not work on a project simply because it’s cool.

1.6.4 Set Deliverables and Discuss with your Advisor

A project will span weeks, if not months or years. It is easy to become distracted or discouraged. Set weekly goals. Turn these goals into deliverables that you can share with your advisor and colleagues. If you’re going the wrong direction, the early feedback will help you get back on track.

1.6.5 Time Management and Procrastination

Some (read: many) of us find it challenging to manage our schedules. If you really need to get work done, consider techniques to avoid wasting time. If you close your office door or wear headphones, fewer folks will bother you. If your office is too loud, consider switching offices or working in the campus libraries.

1.7 QUALS

Quals is the milestone exam that tests the “depth” of your knowledge in your area. Some folks take it their second year, some take it their third. Ideally, you should pass quals on your first attempt. Officially, it’s 100% OK to fail your first time and then pass your second. It’s possible but rare to take quals three times, but your advisor better be loving your research, and you will go through a petition process. In the past ten years, no one has taken quals more than three times, and roughly two students have taken quals exactly three times. Students have left with a Masters after failing twice; other students have passed on the third try, generally based on whether their advisor likes what they are doing. See the PhD Program Bible (<http://www-cs-students.stanford.edu/phd/>) for more information.

In general, orals are “better” than written exams; the questioner can tease out the answers, whereas on a written exam there is no back-and-forth. Form study groups and try your best to pass on the first try.

1.8 THE THESIS

Theses vary between disciplines and even advisors. Your thesis should be modeled after others in your area; grab some examples and discuss the structure with your advisor. One rule of thumb (in Graphics or HCI) is to have about 3 papers on a single topic, which then become the 3 main chapters of your thesis. One strategy for pushing ahead on your thesis is to present your advisor with a proposed outline. This allows the both of you to discuss what, if anything, may be missing from your research and

can allow you to target your work so that you can graduate in a timely manner.

1.8.1 Committee

You will need a thesis committee. Make sure your reading committee will have time to read and sign your thesis. Pick committee members who will provide timely feedback and meet with them somewhat regularly to update them on your progress. You don't want them to be surprised at your defense about the direction you are taking for your thesis! It is better to hear objections 12 months before your defense than the day of. See the PHD Bible or other source for composition and forms.

1.8.2 Defense

Your advisor shouldn't let you schedule a defense until you are ready, but some students still fail the orals. Most people defend after having written some (but not all) of their thesis. Schedule your orals two to three months in advance. Don't forget to bring food. Catering means one less thing to worry about.

1.8.3 Writing

Thesis lengths vary from under a hundred pages to as long as several hundred pages. Some advisors are comfortable with a "stapled thesis," which is merely the papers you've written with transition paragraphs between them. Other advisors want the thesis to stand on its own as a treatise on a subject; this requires rewriting.

HEALTH AND HAPPINESS

2.1 YOU ARE AN ASSET

A graduate student costs more than \$100K/YR to fund, including tuition, stipend, office space, computing equipment, and travel expenses. You are an enormous investment. A graduate student who is unable to do research (due to RSI, depression, or other physical or mental health issues) is a waste of that money. Your advisor is likely to accommodate your needs where your well-being is at stake. Recognize your value, and put your health above all else.

2.2 MENTAL HEALTH

A PHD can be a high-stress, low-social interaction environment that can lead to a variety of mental issues, including anxiety and depression.

Keep in mind that if you're stressed or feeling worried about the uncertainty of grad school, other students are as well. You're not alone. Talk to other students about it, it will make you feel better. Counseling and Psychological Services (CAPS), an arm of Vaden Health Center, can provide additional help with mental health.

The PHD Comic Strip has a forum populated with graduate students from around the world, which can be a great source of support:

<http://www.phdcomics.com/proceedings/>

2.3 PHYSICAL HEALTH

Although we aren't medical doctors, we think that regular exercise is great for reducing stress (and much more!). Take advantage of the Stanford athletic facilities; apart from the gym, there are classes in tennis, swimming, climbing, yoga, golf, volleyball. You also happen to be in the Bay Area: there is skiing a few hours away, surfing in Santa Cruz, hiking and climbing in Yosemite, and good weather year round.

Eat well. The free food around Gates is not the healthiest.

Speaking of free food, you should certainly subscribe to the `gates-food@lists` email list. Whenever free food is laying around Gates, someone emails this list with a description. Remember to bring your own plate.

2.3.1 *RSI*

You probably do a lot of typing, and you may develop RSI. Educate yourself about ergonomics. Consider getting an ergonomic keyboard (Kinesis Maxim or Goldtouch). Some students use Workrave which monitors typing and mousing behavior and reminds you to take breaks every once in a while. Students report that this has significantly improved their RSI. The default settings are appropriate if you're already experiencing pain (obey the limits set by the program). If you just want to be preventative, set it to be less strict.

2.4 ACTIVITIES AND SOCIAL LIFE

Join activities to meet people, gain life experiences, add structure to your life, and maintain good physical and mental health. At Stanford, there are student-run organizations for just about every interest (e.g., swing dancing, juggling, hiking). Top-notch instructors teach classes like golf, languages, social dance, music, photography, and art. Some students play intramural sports, join larger clubs like Taekwondo or Wushu, join Stanford Outdoors clubs, or do various kinds of dance, including Viennese Ball or the SBDT.

If you live on campus, your residence has Community Associates (CAs) whose main job is to provide social activities for you. Rains has the most events, Lyman has many, and Escondido Village has some.

Stanford is located near a huge variety of off-campus destinations including San Francisco, Yosemite, and Napa Valley. The Graduate Life Office (<http://glo.stanford.edu>) can help you find information on specific activities.

Get to know people in your research lab and department. You will spend a lot of time with them. When your code is broken right before your thesis is due, these people will both want to help you and know how to help you. Studying for Comps together serves this purpose, as well.

Start meeting people early: you will only grow busier.

DEPARTMENT

3.1 PAPERWORK AND PITFALLS

There are several types of paperwork that matter. They generally deal with getting paid and completing your PhD milestones.

When you pass enough Comps, file your candidacy form so you get a pay increase. If you have some strange advising situation (e.g., your advisor is not natively CS or has a joint appointment with another department), make sure it goes through.

Before each quarter, secure funding. If you are RAing, sign a form with your advisor's admin.

When you near the end of your PhD, fill out a form for your Reading Committee, and one to schedule your Oral Examination.

During the last year, you can go TGR to save your lab money.

Many of the forms are at the address below:

<http://registrar.stanford.edu/shared/forms.htm#GradStud>

3.2 LOUNGE

The lounge committee members are an elected position worth noting. *You*, the student body, are in charge of the lounge. Make sure there are ping-pong balls and foosballs (money is available from the department) and that the lounge stays tidy.

LIFE AFTER GRAD SCHOOL

4.1 DOING SOMETHING ELSE

About 10% of PHD students drop out to pursue other interests, although we don't know the official statistics. Some leave with a Master's degree, others without. There are legitimate reasons for each decision. If you want to be faculty, or if you want to do research in the future, you need a PHD. However, you may be unable to work with your advisor, unable to find an advisor to work with, or disillusioned with the research process. There is an opportunity cost to staying in graduate school: we can make very good salaries working in industry. (If you estimate a salary as \$100k and a graduate student stipend as \$30k, \$70k is what you're "giving up" annually to be here.) There is also a cost to leaving graduate school. Be clear with yourself about why you are still in the program or why you want to leave. If you do leave, try not to burn any bridges.

4.2 WORKING IN INDUSTRY

The Computer Forum (forum.stanford.edu) is a great in-house resource for finding a job in industry. The Forum is a group of businesses interested in supporting the CS department, probably because they get primo access to hires from Stanford. Every year, they host career fairs, hold informative lunches with local and global companies, and sponsor career-building events.

4.3 BECOMING FACULTY

At most 40–50% of Stanford PhD graduates go on to faculty careers. This is a lower percentage than at other schools because of Stanford's strong industry ties. As with much of grad school, successfully preparing for and landing a faculty position won't just happen: you must take the initiative.

4.3.1 *Kinds of Faculty Positions*

Only about 5% of Stanford PhDs (one or two students in your entering class) will end up in a job that resembles their advisor's tenure track position at a top-5 CS department. Others will end up lower on the ranking totem-pole or in other kinds of academic jobs. If you are interested in academia, you should think about the basis for your interest. Is it doing research? Freedom to follow your interests? Advising students? Teaching? Working with smart people? Or just the university environment?

There is a pecking-order of prestige in academia:

1. tenure-track faculty at a top research school
2. tenure-track faculty at other research universities
3. teaching-centered academic jobs
 - teaching faculty at a research school (non-tenure)
 - tenure-track faculty at a liberal arts college
4. non-faculty research staff
5. adjunct faculty

Higher up in this pecking order, the jobs are more demanding, harder to get, and pay better. You also get bet-

ter students and have an easier time getting funding. Different positions also emphasize different aspects of the job. Consider how hard you want to work and what kind of work you want to do. If you are unsure what you want, aim high. It is generally easy to switch from a research-centered career to a teaching-centered career, and to slide down the totem pole within either domain, but it is extremely hard to move the other way once your career has begun. Most academia-bound Stanford PhDs end up at number 2, with a few stars hitting number 1 and a few deciding to focus on teaching. Avoid an adjunct career.

4.3.2 Preparing

Whatever sort of academic career you're heading for, think of your time in grad school as an apprenticeship. Seek out chances to do what faculty do. There are many such opportunities:

- Help your advisor write grants. Learn how funding works.
- Recruit junior grad students or undergrads for your project and act as a mentor for them. Participate in CURIS, which pairs undergrads with graduate students during the summer. If you get a good undergrad and you have a well-defined project, they can be extremely helpful.
- Submit papers, attend conferences, and give lots of talks.
- Network with other researchers at conferences and when they come to give talks at Stanford.
- Choose TAs where you can help write tests or assignments and give lectures.

- Be a teaching fellow and teach a whole class.
- Earn the department's Distinction in Teaching.

There are several specific resources available at Stanford:

- The Future Faculty Seminar (CTL 231), offered each fall, is a set of talks on all aspects of an engineering academic career, mostly given by Stanford faculty.
- The Career Development Center offers a series of talks on academic careers.
- The Center for Teaching and Learning has lots of talks and resources for becoming a better teacher.

4.3.3 Readings

Tomorrow's Professor, by Rick Reis. A very good book on what to do while you're in grad school in order to land a faculty job.

The Elements of Style, by William Strunk, Jr., and E. B. White. A concise and prescriptive bible of English composition and grammar. Buy a copy and consult it frequently.

REFERENCES

The Redbook Wiki

<http://theredbook.pbwiki.com>

Ron Azuma. "So Long, and thanks for the Phd!"

<http://www.cs.unc.edu/~azuma/hitch4.html>

Jason Hong. "Grad School Advice"

<http://www.cs.cmu.edu/~jasonh/advice.html>

PHD Bible

<http://www-cs-students.stanford.edu/phd/>

ABOUT THIS DOCUMENT

Every 5–6 years, a panel of visiting faculty conducts an evaluation of the Stanford CS department. In Spring of 2007, one such visitor mentioned that Purdue students distribute a manual of learned wisdom and advice, called the Blue Book, to incoming students. Not to be outdone, we created the Redbook.

6.1 PHILOSOPHY AND STYLE

The Redbook should be concise to encourage complete reading and facilitate future updates. It should offer advice instead of listing facts about the program, because those facts are available elsewhere.

6.2 MAINTENANCE

Please maintain the Redbook: add to it, edit it, correct it, and distribute it to first-year students in the Fall. The 2007-2009 printings were supported by the Computer Forum, although the content was created independently.

Please append a dedication and add to the acknowledgments page.

The Redbook has an email. Use it to communicate with publishers and advertisers.

`stanfordredbook@gmail.com / ask a student`

This edition was printed by CafePress.com:

`http://www.cafepress.com/theredbook`

Find source materials at

`http://www.austenmcdonald.com/projects/redbook`

