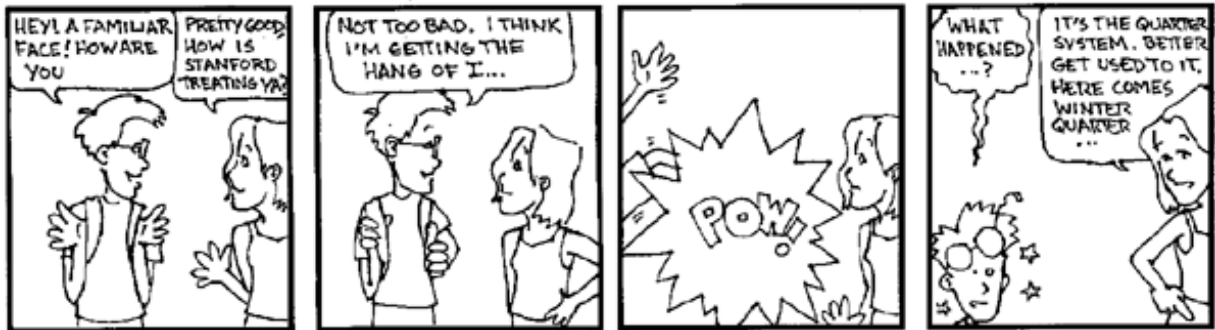


# IF I WERE STARTING OVER...



JORGE CHAM © THE STANFORD DAILY

## STANFORD PHYSICS

2009

Dear first-year graduate students,

The Federalist Papers. Poor Richard's Almanac. The PDG Particle Physics Handbook. And now this.

Many great works started life as simple pamphlets. Contained in these pages is the collective advice of many generations of Stanford physicists-in-training, garnered at great cost through many years of toil (research) and tribulations (quals). These are their answers to the question: "What would you tell yourself if you were starting graduate school over again?" Heed their words, and when the time comes, remember to pass on your wisdom to the next generation.

Best wishes,

*Chihway Chang*

*Christian Perez*

*Kyle Watters*

*Wells Wulsin*

*2009 Starting Over committee*

## **STUDENTS**

If I were starting over, I wouldn't worry as much about little things. We are all here because we are hard workers and diligent students.

Also, you shouldn't be ashamed or embarrassed to ask questions in a graduate class. We are here to learn, and if something doesn't make sense, ask.

If you can, TA as much as possible. Yes, it takes you out of the lab and you have to deal with some crap and grading exams, but TAing is a great way to help keep your sanity while in grad school. It's nice to get to work one on one with students.

California is a beautiful state and there is so much to explore. Grad school is (probably) the last time that your schedule is as flexible as it is, so get out as much as you can. Go to San Francisco on the weekends, take a week-long backpacking trip to Yosemite, go skiing at Tahoe or visit LA.

-- 3<sup>rd</sup> year, High Energy Theory

I would think more thoroughly about what kind of research really interested me before joining a research group. I would try to develop personal relationships with professors in classes.

-- 4<sup>th</sup> year, Condensed Matter/Alternative Energy

Make sure to enjoy your first year and get to know people in your class, since once classes, quals, etc. are over and you get busier with research, you won't see everyone as much. Similarly, it's a good idea to branch out socially and get to know people from other departments.

Go to the beach whenever possible. Make any necessary excuses. A rough rule of thumb is it must be at least 90 at Stanford for it to be 70 at Half Moon Bay.

When choosing a research advisor, talk to other students and postdocs from the lab to see what he or she is really like in order to avoid any personality clashes or related difficulties. Also be blunt in asking what your first project will be, how long it's expected to take, how exactly you'll be funded, how long the Ph.D. will take, and anything else that's important to you.

If you did extracurricular stuff in college (or want to try something new) but are worried you won't have time for it here, just do it anyway and don't worry. You'll soon realize you can make time, and you can set your own schedule. Doing things outside of lab keeps you at worst, sane, and at best, happy.

-- 3<sup>rd</sup> year, Biophysics Experiment

Start your dissertation as soon as possible. It is way more work than you would think. Even if you don't know the exact details of your research project, you can always start with writing some of the background material. Doing nothing but writing is really boring, so spread it out.

-- Just graduated, Accelerator/Plasma Physics

In your first year, you will juggle many competing responsibilities: classes, teaching, the qual, research. But try to stay focused on your most important job of the first year: choosing a research group. Everything else can slide a bit without great harm, but the group you choose will impact the rest of your graduate experience.

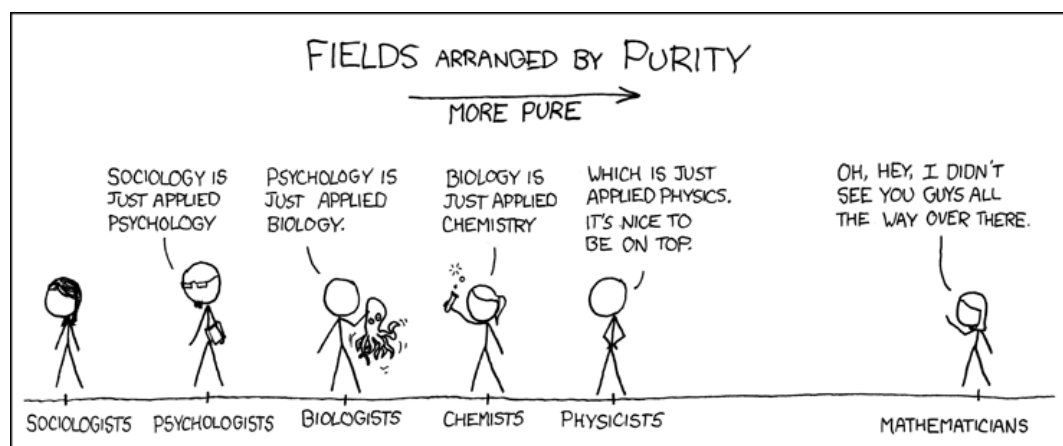
-- 6<sup>th</sup> year, High Energy Experiment

Rotations with a theorist often start as a reading course -- of course a little background is necessary to know the lay of the land, but try to get involved in a calculation as quickly as possible. It will give you a much better idea of what it's really like to work for that person. It will give you something to talk about, and will give the professor an idea of how you learn and whether you weather well.

On waiving classes: get it in writing, or find out from the Chair of Graduate Studies that you can't actually waive it, as soon as possible.

Get a bicycle! Get a helmet! Low-speed collisions (or even just falling over from a standstill) can hurt you more than you think, and as you hit your mid-twenties you're going to be a little less rubbery and indestructible.

-- 3<sup>rd</sup> year High Energy



Don't let the qual get the best of you. You do need to work extremely hard for it, but push it out of your mind when you're not studying for it. Don't neglect the other important aspects of your life, such as friends, hobbies, and physical fitness.

Don't let your classmates at Stanford intimidate you. Use them as a support system. They are just as freaked out about classes and the qual as you are, and you were admitted into the physics department for a reason.

Break out of your physics shell! You're given a great opportunity your first year to explore research you've never even considered. Take advantage of the research rotations and get involved in a field you have little or no experience in. You never know what you will find.

-- 2<sup>nd</sup> year, Nanophysics

Classes matter little, if at all. Just get them over with and focus on research! It is difficult to fail the qual if you've studied, and difficult to pass the qual if you haven't.

-- 2<sup>nd</sup> year, High Energy

I'd ask potential advisors how long it'll take me to graduate... and then ask the average... and then ask if anything will change. I joined a group two years ago, and now we haven't graduated anyone since.

I would not even try to get real work done while on rotations: I'd make rotations a three-month-long interview process to make sure that the people in the group were personable and cool. Everybody: professors, postdocs, and other grad students.

--3<sup>rd</sup> year, High Energy Experiment

A good way to know if you've found the right research group is if, when you read the research papers in the field, you find them interesting and you want to read more of them.

-- 3<sup>rd</sup> year, Optics/Condensed Matter

I would tell myself to take fewer classes, focus on my long-term career, and explore many options outside of my current interests. Your priority should always be finding a group; classes won't help you, and probably will monopolize all of your time. This means finding, setting up, and attending meetings with around 5 professors, visiting their labs, looking at their research, and talking with their grad students and peers and *can take upwards of 40 hours!* Once you find a permanent group, everything else will fall into place, and you will be a better student, researcher, TA, and grad student in general -- and you will be happier!

-- 2<sup>nd</sup> year, Biophysics

Know where you are starting from in your field -- read a lot of literature at the start. Make some sort of plan for how you're going to progress in your research. Keep track of where you are, don't try to do too much all at once, then re-visit your plan from time to time and adjust your goals if needed.

Be pro-active about finding out opportunities for professional development outside of your immediate research environment (e.g. teaching, leadership positions, professional societies).

Stay on top of the department requirements and milestones for the PhD program. You get big brownie points from Maria for knowing what you need to do when and handing in required forms on time. On a related note, get to know the main office staff, and be friendly with them -- they will help you a lot if they a) remember who you are, and b) like you. :)

-- 8<sup>th</sup> year, Astrophysics

Where to live:

EV: If you like roommates and a quieter environment.

Rains: If you like roommates and parties.

Studio: If roommates always drink your milk and never do dishes, in other words, if you don't like roommates.

Lyman: If proximity to Varian and SLAC is more important than proximity to your friends.

Munger: Get real. You're a physics grad student.

Off campus: If you want to live with your significant other.

Get to know older grad students and postdocs. They will often help you if you get stuck, and they might even collaborate with you. It's often best to start by talking to them casually at a seminar, group meeting, or social event. It's easier to ask for help when someone already knows you.

For cheap and varied produce and for more cheeses than you can shake a stick at, check out Milk Pail in the San Antonio Shopping Center. 99 Ranch Market is a chain Asian supermarket with tons of stuff you can't find at Safeway.

It's a good idea to ask multiple people the same questions about faculty and research groups. Almost everyone is biased in some way (for better or for worse), so you have to take everything with a grain of salt.

Ask grad students about the personality or style of the professors with whom you might work. Some faculty see their students once a week or less. Others will give daily surprise visits and call you on weekends. Some don't want you to TA and pay you extra in the summers of your later years (yes, this can happen); others still act like stingy grad students. If you happen to forget to sign up for classes, pay your Stanford bill, or something like that, don't expect a reminder email until you owe them a late fee.

-- 3<sup>rd</sup> year, Astrophysics.

Grad school is like a marathon. If you sprint at the start, you'll be out of breath half way through. Once you find your own pace, you'll be okay for a while. By the end, your confidence in coming this far will guide you to the finish.

-- 7<sup>th</sup> year, Experimental Particle Physics

Be wary of getting stuck on projects that you are not absolutely excited about; it is easy and tempting to do so. Immediately after your second year, preferably after having at least one publication, start working independently.

-- 4<sup>th</sup> year, High Energy Theory

Don't base your decision to do research on what experiment or project you think is going to lead to a PhD in the shortest amount of time, because that can change.

However, finishing your PhD earlier is better, all other things being equal, so pick an experiment or project that has a good chance of coming to fruition soon.

Secondly (and perhaps more practically) make an impact in your research. Get in contact with people, go to meetings, speak your mind, and work hard, but not too hard.

Take TAing seriously. You can have a huge impact in these people's academic career, and some of them need it.

Also, install an HD projector in your apt.

-- 4<sup>th</sup> year, High Energy Experiment

Make boundaries on how much time you devote to your studies because there is no schedule in grad school unless you make one for yourself. There is always more to do than can possibly be done and so there comes the question of how to reach the end of the day and feel satisfied that you did your best.

Make time for activities that you love and people that you love outside of physics. For me, I'd go crazy if I don't spend some time outside every day. It is so easy to slip into the thinking that everyone has a PhD because most of the people we see on a daily basis do, so I think it is healthy to develop other interests in parallel.

-- 3<sup>rd</sup> year, Astrophysics

Your research interests may evolve considerably in the beginning of grad school. Try to work on something new for you!

-- 4<sup>th</sup> year, Solar Physics

SLAC and Stanford have groups that work in fields you've probably never even considered, don't do 3 rotations on the exact same thing.

-- 2<sup>nd</sup> year, High Energy Experiment

Always rotate in at least 2 groups, even if you are 99% sure you like where you at. Two reasons: explore other research interests, and experience other group dynamics and advisor management styles.

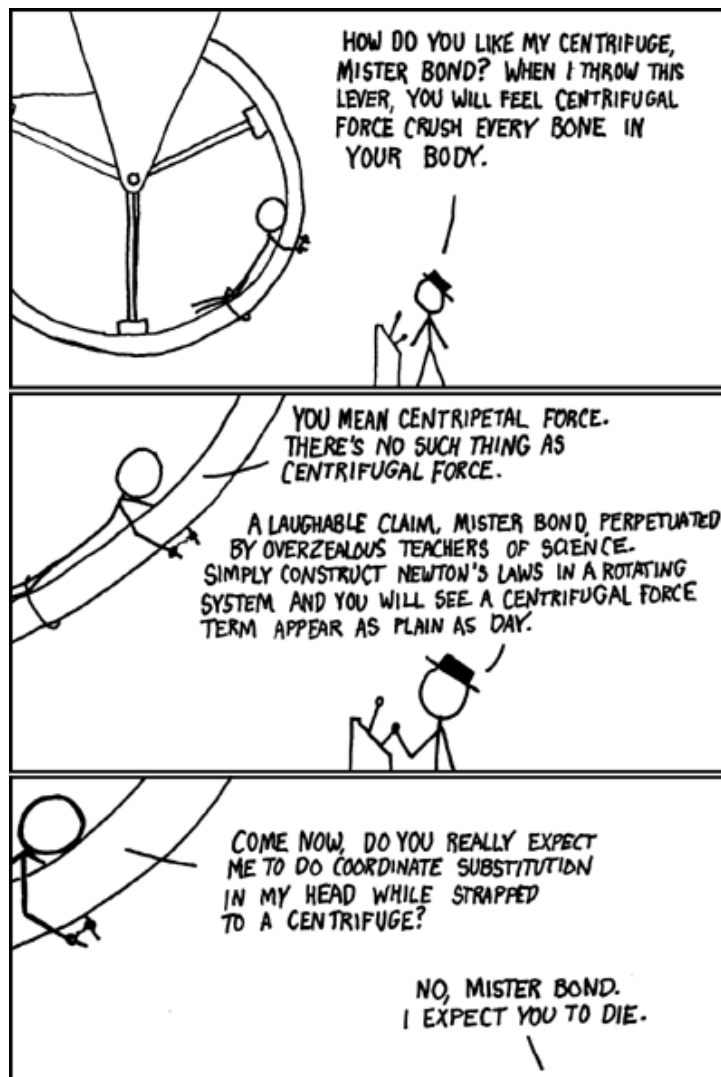
Also, don't forget to ask about vacation policies...

--4<sup>th</sup> year, Biophysics

1) Make an effort to make friends within the physics department (even outside your research group) and outside the department. The physics students will help you with your physics and get your physics jokes, and your outside friends will remind you that the world isn't just physics and you can remind them that the world isn't just linguistics or whatever they do.

2) Purposely set aside a day every set period of time (each week or each month) to do absolutely nothing.

-- 6<sup>th</sup> year, High Energy Experiment



## **FACULTY / STAFF**

Of course I would not change a thing. I met my wife in graduate school and we have now been happily married for 39 years, and my PhD thesis turned out to be a Nobel Prize winning discovery.

I think that grad students need to understand that graduate 'training' is vastly different from their undergraduate experience. While they will experience coursework for most of their first year, Ph.D. programs are mostly about research, either experimental or theoretical.

Graduate school, particularly for those who wish to do experimental research, is an important opportunity to not just learn new skills, but to demonstrate your proficiency in performing research. It is a time to focus, not to kick back and relax. It is also a time for you to learn how to optimize your effectiveness in research. This includes how to focus on the challenges at hand and overcome them by creatively applying what you know to a set of complex problems. However, it is also important to know when to back away from a problem to get a better perspective on the task at hand. The primary goal is not to spend lots of hours in the lab or office, but to be productive!

Best wishes to you all.

-- Prof. Doug Osheroff

Spread your required three quarters of teaching over your time at Stanford. Your perspective on teaching will likely change over the course of the next five years. At the beginning of your graduate career, serving as a teaching assistant is a good way to become more connected with undergraduates, other teaching assistants, faculty and teaching staff.

Toward the end of your graduate career, you will likely view your TAship as more of a 'test case' for whether you want to pursue a career that involves teaching.

-- Prof. Pat Burchat, Physics Department Chair

- 1) Stay sharp, healthy, and happy: Daily exercise, enough sleep, and one day off per week.
- 2) Develop physical intuition: Take Back-of-the-Envelope Physics (216).
- 3) Explore: Learn about all areas of physics before deciding on your research direction.

-- Prof. Bob Wagoner

There is always excitement in creating one's own path and exploring (what one thinks is) the unknown. At the end of the day, what is the right path and what is the wrong way is less clear. For some, the joy is in the learning and less so on the outcome. Ideally whatever path one takes is the one that brings hope and satisfaction.

-- Rosenna Yau, Physics Department Administrator