

# Astronomy Orientation (Sept 2013)

## Suggested Timeline for Completion of PhD Degree

### Tips on a Successful Career

#### General comments:

The following is offered as a template for students who are aiming very high---for elite postdocs and professorial and staff appointments at the most elite universities and observatories. These are the things that you must do in order to position yourself competitively at the end of your graduate program here. This timeline and checklist are *very challenging* and might not fit you if your goals and/or talents are different. However: take heart---the vast majority of our PhDs have in fact continued on in astronomy in some capacity, and even those who have not have never the less found their PhD training very valuable and relevant to their final careers. For examples showing the wide diversity of careers our graduates have pursued, see the Alumni page on the Astronomy Department website <http://www.astro.ucsc.edu/academics/alumni.html>.

With that aside, we now make some general observations:

1) Your formal faculty advisors are of two types:

- **First-year academic advisor:** Graduate Advisory Committee. They will make appointments to meet with you privately once per quarter. They are a general resource, provide an independent perspective, and are the people you should turn to if problems arise that your regular faculty advisors cannot or do not fix. In the latter case, you should also always feel free to see the Chair and/or Associate Chair. We are here for you. It would be good to schedule a get acquainted meeting soon. The Graduate Advisory Committee for the 2013-14 academic year will be: Graeme Smith (Chair), Greg Laughlin, Charlie Conroy, Jonathan Fortney
- **Research supervisor:** this is the faculty member who will advise you on your first-year research project and/or thesis. This is the first faculty member here who will get to know you well. You may well want to use your first year project research supervisor for a letter of recommendation later. This is the time to *make a very favorable impression*, so work very hard on this first project and be aggressive in contacting your advisor and working together closely. *Visiting once per week is a minimum*. Agree on milestones for the next week and follow through faithfully. Quarters in which you have fellowship funding provide particularly valuable research time.
- Visits with the above advisors are of two types. The most frequent is the regular conference on the progress of a research project. The second occurs less frequently but is crucial and that is stepping back from the day-to-day activities of research and considering your future plans. This second type is easy to overlook in the press of day-to-day business. Consider using this timeline as a template checklist for the second type of visit. The once-per-quarter required visits with advisors to fill out the Quarterly Advising Forms are intended to be used for the second purpose.
- Have one of the Graduate Advisory Committee members fill out your Quarterly Advising Form until you have found a First Year Project. After that have the form filled out by your research supervisor.

2) A major message of this document is that **advance planning** is a key element of a successful graduate career. You always have to be thinking several steps (and years) ahead.

3) To position yourself well for competitive jobs, you need to obtain *visibility outside of UCSC*

while still a graduate student. The following are tips designed to help you do that:

a) We recommend that for job applications you have *four* letters of recommendation and that *two* be from outside of Santa Cruz. Your advisor will of course be one of these, but all advisors strongly support their students so their letters are somewhat predictable. To get the second UCSC letter you need to establish a meaningful relationship with *at least one other UCSC professor*. That could be the person you do your first research project with, so take this project very seriously with a view to getting a super letter. The outside letters are more difficult, and there are a variety of strategies. As noted below, the outside member of your Qual Exam committee is one possibility. Think about bringing that person in from off campus. Another key strategy is to collaborate closely with off-campus astronomers. Talk these things over with your research supervisor.

b) Going to conferences and giving talks and posters is a second opportunity. You have to go to these events *actively* with a plan on who you want to meet and impress. Your advisor has the obligation to finance such trips and to help you schedule them. Don't be shy about asking and if you are having trouble with this, see the Chair.

c) The very best thing is if you are independent enough to establish research collaborations and connections *on your own* (under your advisor's guidance, of course). Showing maximum independence and initiative at an early stage is noticed and wins admiration.

**4) We are often asked how first and second-year graduate students should prioritize their time, to coursework or to research. Our advice is that research is vital, and making real progress on that must come first. So, in order of priority, we would recommend putting the first-year project first, then classes that seem most relevant to your chosen field, and finally other classes. Of course, you also have to do enough to pass the classes and also the Preliminary Exam, but this gives you a guide. Think of it this way: what will look best in your letters of recommendation? Your grade in Astro XXX will not mean much, but your contribution to and talent for research will mean a lot. NOTE: In recent years, we feel the pendulum has swing too far towards research and that classes are getting neglected. A 50-50 division between research and classes is about the right balance.**

### **First year:**

Enter fall quarter.

Take courses; arrange First Year Research Project topic and faculty research sponsor by end of fall quarter; line up research supervisor and GSR support for first summer and second year. You will most likely need support for at least the first summer, so consider this when choosing a project/faculty supervisor. Faculty know their projects are supposed to come with GSR support funds.

GSRs are at Step V.

Start to get your required one-quarter of TA out of the way this year. If you will not qualify as a California resident in your second year, you **MUST** TA in your first year. Arrange TA's with the Graduate Student Advisor. (You can also TA more later if you want to).

Please get started on writing your own web page. Get in the habit of posting interesting information about your research there as time goes on. Advertise your accomplishments here. Virtually all UCSC grad students have web pages by the beginning of the second year. There are links to your web page on our People Directory and Graduate Student Research page, and so it is very noticeable if you don't have one!

Meet at least quarterly with your academic advisor and fill out the required Quarterly Advising Form. As noted your first advisor is the Graduate Advisory Committee until you have made arrangements and selected your first year project.

End of year: your first try on the Preliminary Exam. This exam tests astronomy course material, grad/undergraduate Physics relevant to Astronomy, and general astronomical knowledge. There are two parts, Core and Elective, both written. Prior exam examples may be found here: <http://www.astro.ucsc.edu/exams>.

This is a no-lose opportunity; no penalties for not passing anything. Good experience, for the real try after second year. Any sections you pass this year do not have to be repeated next year.

First summer: intensive work on research project. *Daily* meetings with your research supervisor are highly recommended! Line up support for second year if you have not already done so.

## **Second year:**

Fall quarter: start second-year courses; give departmental research talk on research project. Submit first paper (spring quarter is deadline).

GSRs are at Step V.

By fall quarter we hope you have switched over to the UCO/Lick Computer Network from the Astro network. Computer support and available software are better there. This depends on your being employed as a GSR, which automatically carries this support.

Winter quarter: submit first paper to journal (you are lead author or at least a major player). This is a very big milestone and hard to meet.

Spring quarter: complete course and TA requirements; line up thesis supervisor and start discussing thesis topic.

Meet quarterly with your advisor, who by this time is your research supervisor. These quarterly meetings are devoted to filling out the Quarterly Advising Form, which takes a "big-picture" look at your progress and career plans.

If you cannot qualify for resident tuition (e.g., international students), we will work carefully with you to take the thesis Qualifying Exam in spring or summer quarter of second year, even though you may not be quite ready. Your tuition and fees drop hugely at that point, and your faculty supervisor may insist on your taking this exam early in order to save grant money (faculty grants pay for your GSR tuition and fees in addition to your living expenses).

End of year: second try on Preliminary Exam, if needed.

Second summer in July: Board Review: held by the faculty in July to review second-year students. The Board Review discusses each student's performance over the whole first two years as judged by the Preliminary Exam scores, course evaluations, performance on the second-year department talk, submission of a lead-author paper to a referred journal, evaluations of research work by research supervisors that the students may have had, comments by the first and second year faculty advisors, and performance as a TA.

There are three possible outcomes from the Board Review. Students with poor results may be asked to leave the program, usually with a terminal Masters degree. Students with excellent results are passed unconditionally and are permitted to pursue thesis research with no other requirements. Students may also be passed conditionally, in which case additional requirements may be imposed to fill in course deficiencies and/or knowledge deficiencies that were apparent on the Preliminary Exam. Another possible reason for a conditional pass applies to students who have not yet located thesis supervisors or who have done poorly in research. Any imposed requirements must be resolved by June 1 of the following academic year or else the student will be discharged.

The Board Review is a comprehensive review of student performance and potential to do the Ph.D. As such, it is larger than and distinct from the Preliminary Exam. Passing one does not necessarily mean passing the other. Students need to focus on their efforts on the broad requirements of the first and second year program, not just passing the Preliminary Exam.

The top student(s) on the Board Review are awarded the Whitford Prize (cash prize of \$500) for all around outstanding performance during the first and second years.

After the Board Review, start to focus full-time on developing your thesis topic, aiming for second paper in winter quarter of third year. Possible conference/poster-paper this summer. Start noticing conferences in your field (see CADC website) and asking your faculty supervisor to send you. You can help! Many conferences have travel grants for students, and the AAS has a travel grant program for airfare.

### **Third year:**

Now you are full-time research.

By spring quarter it is a strong goal that you take the thesis Qualifying Exam. Advance to GSR Step VI on passing. As noted above, tuition for non-resident students is now greatly reduced; your advisor will push you to take this exam ASAP as their research grants are paying your tuition.

You must have an "external member" on your Qual committee, but University regulations require only that this person comes from outside your department (i.e. from Physics) We urge that you not take this easy route but instead use the urge to contact a person from outside UCSC. This person is a likely better writer for you, for job applications. Choose this person carefully with this in mind and cultivate them from this point on by keeping them constantly in touch with your research. Your thesis advisor may chair the Exam Committee as allowed by department policy. Nominations for committee members must be forwarded to the Graduate Dean at least one month prior to the date of the examination for approval. It is important to note that the Qualifying Exam may not be held unless the Graduate Dean has approved the exam committee.

*Note: because of the reduction in tuition, international students are strongly encouraged to take the Qualifying Exam in their second year and will be guided and supported to so.*

Winter quarter: submit second paper to journal (you are lead author); this is also preferably a chapter of your thesis.

Have an honest talk with your faculty supervisor and decide whether you can manage to finish in five years or whether it will take you six. If five, make a schedule now.

Third summer: Attend conference and give talk/poster paper. Talks give you much more exposure than posters. Aim for this, with help from your faculty supervisor, who should pay for most of your travel and also help you get talk invitations. Be firm in asking for this support.

#### **Fourth year:**

Fall quarter: submit third paper to journal, definitely a chapter of thesis.

Advance to GSR Step VII after one year at VI.

Fall quarter for advanced/lucky students: apply for jobs, travel to departments to give job colloquia. Job applications take an enormous amount of time. You will not get a lot of research done during this period, so plan on this.

Everyone: angle for talk invitations at other departments and conferences. Apply to conferences for travel funds. Many have special help for grads.

Have another talk with your advisor to decide if you will take five or six years. The goal is five. If five, you will be spending most of next fall applying for jobs. In most cases, you look like a stronger postdoc candidate if you get through faster, but there are sometimes factors on the other side, depending on your work and other opportunities. You and your advisor need to strategize.

Fourth summer: Attending conferences is a must for all students applying for jobs in fall.

#### **Fifth year:**

Fall quarter: submit fourth paper to journal, second chapter of thesis. Note: the papers you have completed to this date are the ones that you will be judged on for your job applications. Papers that come later don't count for this.

Fall quarter (everyone): apply for jobs, travel to departments to give job colloquia. Many jobs ask for research proposals, so by this time you have to have ideas for future research.

Spring/summer: complete thesis and pass Thesis Defense. Once you have written your thesis, a committee of readers will read it. The majority of this committee must be comprised of UCSC faculty (from any department) but may contain some readers from off campus. The thesis defense must be held at least two weeks before the end of the quarter in which the thesis is to be submitted and the completed draft of the thesis must be submitted to the dissertation

committee at least two weeks before the thesis defense to give your committee adequate time to read your thesis and get it back to you with comments and requested revisions. Thesis deadlines are firm; a Department Review Committee consisting of the Department Chair, Associate Chair and Graduate Advising Committee will adjudicate cases of students who fail to meet them.

More detailed requirements on both the Qualifying Exam and Defense may be found on the Graduate Division website: <http://graddiv.ucsc.edu/regulations/handbook/index.php>

Late summer: travel to new position.

This plan gets you four lead papers in time for your job applications, plus one or two more final papers from the completion of your thesis. This is ideal, but consider three lead papers by fall of your last year as a minimum requirement. Hopefully you will also have participated in other collaborative work, which will net you other co-authorships. However, the lead papers that are genuinely your work carry more weight, and the difference is readily apparent to readers of your job applications.

Note: the median number of total publications upon graduation for OSU students has been 10 in recent years, and the median number of first-authored papers has been 6. This is also typical of the best UCSC students who have gone on to the best postdoctoral positions.