

A Graduate Student Primer

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1 Introduction

These notes represent a subjective interpretation of AOS traditions and policies, co-written by Grant Petty and Ankur Desai. They are distributed in written form for your convenience. The following sources *always* take precedence over anything in this document: 1) the official AOS Graduate Program policy documents (found at www.aos.wisc.edu), 2) the policies and determinations of your own major advisor and/or Advisory Committee.

2 General Planning

Be sure you are familiar with AOS Graduate Program policies:
<http://www.aos.wisc.edu>.

Reread the appropriate sections at regular intervals so that you are not caught by surprise by a forgotten requirement or deadline!

It is impossible for your advisor to keep track of all relevant deadlines and administrative requirements for each of his/her students. It is therefore up to you, in consultation with our Graduate Program Coordinator to keep tabs on your own progress toward meeting requirements.

If you are uncertain about any aspect of how the graduate program works, ask questions! The Graduate Coordinator will be best prepared to answer questions of an administrative nature (credit requirements, timelines, warrants, etc.); the Graduate Chair will generally be better prepared to discuss academic issues.

3 Courses

You will probably meet soon with your advisor to begin drawing up an informal plan of study which will specify which lecture courses you should take as part of your degree program.

Most students are advised to take all of the so-called "core courses" (see web page) if they didn't already complete comparable coursework before coming here.

While the number and type of additional courses will depend on your background, your research project, and whether you are pursuing an M.S. or Ph.D., there are certain minimums that must be met. See the AOS web page for details.

If you are pursuing the Ph.D. option, start thinking about how you will satisfy the Minor Requirement and Supplemental Requirement.

4 On the Distinction between a Ph.D. and an M.S. degree

Here I summarize our general expectations of graduate students, and how those expectations differ depending on whether you are a Ph.D. or M.S. student:

4.1 M.S. degree

Most M.S. students in our department have recently completed a B.S. degree and are now undertaking their first graduate-level work. Completion of an M.S. degree entails additional course work and, for the thesis option, submission of a satisfactory thesis.

An M.S. degree basically indicates that a student has successfully completed a program of advanced training beyond the B.S. degree, presumably with some degree of specialization, as indicated by the thesis topic or course selection.

An M.S. is a desirable qualification for most modern meteorological occupations (including NWS) and many non-meteorological careers as well.

A student's M.S. thesis research will normally be completed with significant direct supervision by the major advisor.

4.2 Ph.D. degree

The awarding of a Ph.D. from our program certifies that the student has demonstrated the *intellectual ability, scientific maturity, personal initiative* and *independence* necessary to produce and publish original and significant scientific research with at most limited supervision. Our Ph.D. program is specifically designed to prepare a student for a career as an independent researcher and/or scientific leader in academia, industry or a government lab.

Key qualities expected of Ph.D. students to demonstrate by the time they defend their dissertation include ALL of the following:

- expert-level mastery of the fundamental principles and knowledge in the student's area of specialization,
- excellent understanding of how that area of specialization fits into the "big picture",
- excellent analytical and critical thinking skills,
- the ability to independently recognize and pursue potentially fruitful lines of research (and to recognize and avoid obviously pointless or uninteresting lines of inquiry!)

IMPORTANT: It is neither in the student's interest nor in the interest of this department to award a Ph.D. degree to someone who is not destined for a career as *independent* researcher. In particular, a student could end up over-qualified (on paper at least) for most M.S.-level employment opportunities and yet unable to compete for, or perform satisfactorily in, most Ph.D.-level research positions. You should therefore be fairly certain that your own career goals will actually be furthered by a Ph.D. before embarking on that time-consuming path.

In summary, we pay close attention to maintaining high academic and intellectual standards for our Ph.D. program. This implies that not everyone who starts down this path will necessarily finish it.

5 Time Line

5.1 M.S. Students

The typical M.S. student should finish in about two to two-and-a-half years. Unless there are mitigating circumstances, a full-time M.S. student who has not completed the degree within three years may (after consultation with the student's advisor) be considered to be making unsatisfactory progress and could be placed on academic probation.

Those taking the thesis option are therefore advised to get going on a well-defined project with as little delay as possible and plan on using the fourth or fifth semester for completing and writing up their thesis work.

Usually it is a good strategy for (thesis) M.S. students to take a full load ~9 course credits a semester (excluding research and seminars) in the first year and complete the remaining in the second year, leaving time in the second year for thesis work. Your own advisor may have another opinion.

If you are taking the non-thesis option, completing the degree is merely a matter of satisfying the course and credit requirements, as spelled out on the AOS web page.

If you are taking the thesis option, completing the degrees not only means satisfying course requirements (fewer than for the non-thesis option) but also submitting a satisfactory thesis, which must be approved not only by your advisor but also by two other faculty readers that form your M.S. committee.

5.2 Ph.D. Students

It should be the goal of a Ph.D. student to complete the degree in four years or even less, if possible, especially if you already have an M.S. degree. Variations from this length of time are common; however, there is a problem if the student has already been here 4–5 years and still there is no end in sight. Both the student and his/her Advisory Committee have the responsibility to ensure that the student continues to make forward progress toward completing an acceptable dissertation.

Prospective Ph.D. students should start by taking most or all of the AOS “core” courses during the first year, since students are assumed to have the background from these courses for the purposes of the Qualifying Exam.

The Qualifying Exam is offered in the early Fall semester, though it has sometimes been offered before the summer break. It is an intensive two-day written exam designed to test (1) breadth of knowledge, and (2) your ability to think independently, critically, and analytically when confronted with possibly unfamiliar problems. Prospective Ph.D. students *must* take it *no later* than two years after entering the program, and we *strongly urge* prospective Ph.D. students to take it after *one year*, especially if you earned your M.S. here. Keep in mind that delaying the Qual delays the determination of whether you will be allowed to continue in our PhD program.

The Qualifying Exam is scored on a scale of pass, marginal pass, or fail. The faculty will be cautious about agreeing to serve on the committee of a student with a marginal Qualifying Exam score. In such cases, the prospective committee may use its first meeting to orally question you or suggest additional courses before agreeing to formally establish the committee.

If you don’t do well on the Qual, you may elect to re-take it in one year. However,

before you invest another year of your life in pursuing the Ph.D. track, you might want to discuss your educational and career goals with your advisor, the Grad Chair, and/or another faculty member whose judgement you trust. It is neither in the student’s interest nor the department’s interest for a student to barely “squeak through” with a Ph.D., especially in view of the highly competitive job market at that level.

Assuming a reasonably successful outcome from the Qual, students then proceed to try to recruit a Ph.D. advisory committee. **This is *the single most important step toward establishing your viability as a prospective Ph.D. student.***

The committee typically consists of four AOS faculty plus one faculty member from outside AOS. Successful establishment of a committee, which occurs at the end of its first formal meeting, must occur within one semester of the Qualifying Exam.

In deciding whether to serve on a student’s Ph.D. advisory committee, prospective members generally try to judge whether a student exhibits the potential to develop the qualities expected of a Ph.D. (see above). That judgment is made based on

- course grades
- results of the Qualifying Exam
- the professor’s personal impression of the student as a developing scientist

If you are unable to form a Ph.D. committee, or if your committee subsequently determines that you are going to have difficulty meeting the expectations for a Ph.D. as outlined earlier, you will be asked to drop back into the M.S. track or else leave the program.

Once you have established a committee, *you are required to meet* at least *annually with the committee* to review your progress. A written summary of the meeting must then be filed with the Graduate Program Coordinator. **Important:** The Coordinator will not file for an examination or degree

warrant unless/until an up-to-date status report has been filed within the previous year. Annual report forms are also provided for you to discuss progress with your advisor and should be filed each year.

Within a year or so of passing the Qual, the next step is to prepare a research prospectus for your committee. This prospectus, which typically takes the form of a 10-20 page proposal, is given to your committee a week or two in advance of your Preliminary Examination. During your Prelim, you will be examined orally by your committee. They will probe both the depth and breadth of your understanding of the general field you are working in and, more specifically, the area of your proposed research.

Following a successful Prelim, you will probably apply for Dissertator status and focus thereafter exclusively on completing, and preparing to orally defend, your dissertation research. Once you are a dissertator, you are not allowed to take additional courses (outside of seminars up to 3 credits) without a waiver. If you wish to take additional courses after your Prelim, you may wish to delay becoming a dissertator.

6 RA/TA Responsibilities

6.1 Research Assistantships

The awarding of a Research Assistantship (RA) is a decision made by an *individual* faculty or staff member having a research project, *not* by the department. The project supervisor is exclusively responsible for the decision whether to continue your RA support from one year to the next. He/she may terminate support for any of a number of reasons, including (1) lack of funding, or (2) failure of the student to make satisfactory progress on his/her research and/or toward his/her degree. Normally, every attempt is made to continue RA support for students

making satisfactory progress, but such continuity cannot always be guaranteed.

Please note that an RA position is not *employment* but rather a *stipend*. It does not translate to a particular number of hours per week. The percentage value of the RA is simply a measure of the size of the stipend. It is in your own interest, and most likely the expectation of your advisor, that you maintain research productivity and progress toward your degree at the greatest rate allowed by your other responsibilities (e.g., coursework, teaching assistantship) regardless of the nominal RA appointment level. This means that you should not expect to have lots of free time for hobbies or socializing just because you have a 50% RA appointment and no courses.

6.2 Teaching Assistantships

When available, teaching experience is a very desirable component of the training of our students, especially Ph.D. students who might be destined for academia. TA positions entail considerable responsibility, excellent knowledge of the material, and the ability to communicate the material clearly to students both in and out of the classroom.

The awarding of a Teaching Assistantship (TA) is generally made by the AOS administrator in consultation with those faculty who will teach the courses requiring a TA.

Because TA support is contingent on the department's needs and on the budget imposed from above, no guarantee can be made of continuity from one semester to the next. Nevertheless, it is our policy to give preference in the awarding of TAs to current students who (1) have no other support AND (2) who are making satisfactory progress toward completing their degree.

6.3 Enrollment and Tuition

RAs and TAs must carry a full load (8–12 credits) during the academic year in order to

receive the stipend. This can be a mix of course credit and research credit. During the summer, they must have a minimum of 2 research credits if they are non-dissertators, or 3 credits if they are in dissertator status. Since these rules are subject to change, check with the Graduate Coordinator for the latest details. *Tuition waiver is only granted if your total combined appointments (RA, TA and PA) exceed 33%.*

6.4 Time management

If you are an RA or TA, you will inevitably experience conflicting demands on your time and energy. On the one hand, your primary purpose in being here is to earn an advanced degree, and if you're like most people, you would like to accomplish this task as quickly and efficiently as possible. On the other hand, your financial support is conditioned on a) your active contribution to fulfilling the specific research objectives spelled out in the advisor's grant proposal (if you are an RA), or b) your assistance with the teaching of one or more courses. Both types of work can potentially distract you from your academic objectives, especially if you are not very careful about managing your time.

It's important to understand some distinctions between time commitments of TAs versus those of RAs. A TA appointment is considered *employment*, and a 50% appointment is tied to a specific expectation of 20 hours per week (on average) of assistance with the teaching mission of the University. An RA appointment, on the other hand, is considered a *stipend* with no fixed hourly obligation. The percentage appointment determines the size of the stipend, but it is not associated with a specific number of hours. The assumption with an RA appointment is that you will be conducting research in support of your degree objectives regardless. Most RAs will be putting in full-time work on their research

and their studies regardless of the size of their appointment.

7 Regular meetings

Regular interaction with faculty, staff, and your fellow students provides intellectual stimulation, helps keep the research on track, promotes the free exchange and discussion of new ideas, and keeps your advisor informed as to your academic and research progress. If your advisor hasn't already suggested a regular time for meeting with you, either individually or together with other students in your research group, then feel free to raise the subject yourself.

In addition, Ph.D. students are required to meet with their Advisory Committees a minimum of once per year, typically during the Spring Semester. A simple form documenting the occurrence of the meeting and any recommendations by the Committee is forwarded to the Graduate Coordinator, to be placed in your file. This form *must* be submitted each year in order for you to be considered to be in a Ph.D. candidate in good standing.

8 Departmental seminars and other activities

This department, in conjunction with the Cooperative Institute for Meteorological Satellite Studies (CIMSS) and the Center for Climate Research (CCR) and other affiliates, has one of the best known and most active atmospheric/climatic research programs in the world. A benefit of being a student in such a department is the opportunity to interact with, and learn from, other students, staff, and faculty conducting cutting-edge research. The public colloquia and seminars offered in AOS, CIMSS, and CCR provide one important opportunity for doing this.

We are fortunate to be able to regularly bring in well-known, exciting outside speakers for our Monday colloquia. The

scheduling of speakers, by the way, is looked after in part by our students, so you can have considerable influence over who is invited to visit the department! Ph.D. students are expected to present the public portion of their Ph.D. defense at a colloquium.

Seeing how experienced scientists present their research, and having regular exposure to the scientific issues and methods arising in other subdisciplines, is tremendously helpful to your own professional development.

Also, it is surprisingly common to discover that a guest speaker is working on a problem, or using methods, that hold the key to a problem of interest to you, even if it's not in the same general area.

Finally, having a large, engaged turn-out at seminars is good for the department, both because of the interaction it fosters among us and because of the favorable impression it makes on our visitors!

In view of all of the above benefits, students engaged in research are expected to regularly attend AOS and other scientific seminars and colloquia and to take advantage of other opportunities to interact with other researchers in the building. It is also expected of Ph.D. students that they will occasionally present progress reports on their research via informal seminars.

The Wednesday AOS seminar series is designed to further foster this kind of interaction, as well as giving students (and faculty and research staff) valuable experience presenting their research to a diverse audience. This is a great place to hash out an idea, arrange a professional development discussion, or present your findings. M.S. thesis students are expected to present their thesis findings in a seminar in their final semester prior to graduation.

9 Concluding Remarks

At any time, if you have questions or problems of any kind — whether academic, scientific, or personal — you can always find someone to talk to:

Kathy Kruger, our Graduate Program Coordinator (Main Office, 8th floor), is the first person to turn to with administrative questions or problems, such as degree requirements, course registration, requests for degree warrants, etc.

Your faculty advisor is the one you should talk to first about anything relating to academics or research, course selection, the formation of your advisory committee, etc.

If you should ever need to take your question or problem to the next level, you are welcome to stop by **my office (1549)** or make an appointment by e-mail (desai@aos.wisc.edu). If you are having difficulty with your research advisor, for example, I will try to be an impartial intermediary. Even when you're not having having problems (and I hope this will be true most of the time!), I am always happy to talk to students.

Finally, the Department Chair, **Grant Petty**, takes a strong interest in the welfare of our students and in the intellectual and academic quality of the department. I know he also welcomes the chance to talk to students about anything of concern to them, whether academic or not.

Good luck with your graduate studies!