

**Mutual Expectations:
Working and Living as a Graduate Student in the
Department of Physics and Astronomy, Vanderbilt University**

The contributions of many people are needed to ensure a successful graduate school career. Thus, it is essential to understand what one can reasonably expect from an advisor, a teacher, a department chair and, ultimately, from oneself. This document provides a guide through the many relationships that form the structure needed to support graduate students through the long hours from entering graduate school to the dissertation defense.

Role of the Graduate Student

From the beginning of a student's graduate education, he or she is a scientist. The student should behave in a professional manner and treat his or her colleagues with respect. In their training, students must learn the necessary skills for a successful career as a scientist. These skills include searching the literature, designing experiments, constructing and applying theories, collecting and analyzing data, understanding the relationship between hypothesis and observation, and presenting results by giving talks at conferences, writing papers, and, ultimately, writing a Ph.D. thesis. Some of these skills will be learned from the thesis advisor, but many will also be learned from other students, postdocs, members of the Ph.D. committee, or from other physicists in the community at large. It is imperative that a student understands that he or she has the ultimate responsibility for his or her professional development and may need to seek out opportunities independently. It is equally important to understand that no advisor is perfect and thus will probably not be able to fulfill all of the educational needs of every student. Finally, the student as scientist should be aware of the ethical considerations inherent in scientific work, including issues of fraud, plagiarism, and apportioning credit for work done. This will serve to protect the student from ethical violations, guide his or her behavior, and ensure a healthy community of scientists for the future.

A graduate student must learn not only how to do science, but how to be a scientist. Science is about collaboration and working within the scientific community. In order to succeed, a student must learn the rules, mostly unwritten, by which the community of scientists functions. A student cannot learn this in isolation or from a textbook, but only by working within the community.

The role of a classroom student is probably the most familiar role for a new graduate student and will be an important one for the first few years of graduate school. A high level of effort in undergraduate classes was necessary for a student to be admitted into graduate school. An even higher level of effort is necessary and expected of students in graduate classes. Students should always attend class unless exceptional circumstances occur. Graduate classes are fast-paced and it is more difficult to make up for lost time than it is in undergraduate classes. Students are frequently encouraged to work together more collaboratively than in undergraduate classes, but are nevertheless responsible for

understanding and adhering to the standards of independence required by the professor. Finally, students are responsible for knowing the academic standards required of them by the department and graduate school and for doing their best to meet these standards.

A research assistant is scientist, student, and apprentice. Having outlined the first two of these roles, the third must also be made explicit. The student should make sure that he or she understands the expectations that the advisor has for students working in his or her research group. Details to be clarified include number of hours to be worked weekly, how much time needs to be spent in the office or lab (as opposed to working at home), and which particular hours one needs to be at work. Scientific work is rarely a 9-to-5 job, and students should understand that graduate school training will entail extra effort beyond these hours. Time and effort necessary to achieve acceptable progress will vary depending on circumstances, often resulting in long, but usually rewarding, hours. While it may be acceptable to work at home, it is also important to realize the value in having peers with whom to talk and share ideas. Many important interactions can take place only in the office or laboratory setting.

At some point during graduate education, a student may hold a position as a teaching assistant (TA). As a TA, a student might be assigned as a grader for an upper-level undergraduate course or staff a “help desk” where he or she will assist students with problem-solving, but the most common assignment is to supervise laboratory sections. A TA is an apprentice teacher, with certain responsibilities to both the students and the faculty instructor in the course. For example, lab TAs are expected to be on time for meetings with their sections, to be well-prepared to assist the students in carrying out the lab, to have grading done prior to the next lab meeting, and to attend a weekly meeting with the instructor and other TAs in the lab course.

The faculty instructor of the course for which a student is a TA also has responsibilities. Faculty should set clear expectations; define roles and responsibilities in the course including what may or may not be changed (e.g., syllabi, course policies, help desk staffing times, etc.); clarify priorities; provide textbooks or other materials needed for the course; provide training as necessary in course content, teaching methods, and grading; and provide feedback on the student’s performance as a TA.

Role of the Advisor

Graduate students entering our Ph.D. program are strongly encouraged to become involved with research groups as early as possible. It is expected that by the summer following the first academic year, students will be actively involved in a research area with a specific professor or research group in the Department. Students may try out several areas before deciding on a dissertation research area. Soon after the student has decided on a specific research area, he or she will be choosing an advisor.

One of the first tasks of an advisor is to help a student get started in his or her chosen research field, to assist in the selection of the Ph.D. committee, and to help with the preparation for the Qualifying Exam which, by Department rule, should be taken no later

than by the end of the fifth semester. In this context, the advisor will make suggestions regarding the scientific literature to be surveyed by the student (textbooks, research journals, Websites, etc.), discuss experimental and / or computational methods used in the field, and answer questions. The advisor will also provide the student with instructions on how to effectively communicate technical material through both writing and presentations. A rehearsal meeting with the advisor prior to the Qualifying Exam is highly recommended.

After the student has passed the Qualifying Exam, he or she will meet with the advisor on a regular basis to discuss the research plan and to decide on a specific dissertation topic which must be approved by the Ph.D. committee. Advisors may suggest conferences where students can present papers and / or host poster sessions. They may encourage leading discussions during group meetings or journal clubs. The advisor also serves as a role model, leading through example and suggestion to teach students how to become productive and respected scientists in their field of study. In cases where an advisor is unable to meet on a regular basis because of a research leave or extended travel, he or she should appoint a postdoc or senior student to assist the advisee. Advisors should keep their students informed of availability and travel schedule, including during the summer. Special arrangements need to be made if an advisor takes a sabbatical.

Advisors should not be expected to answer every question posed by their students, but rather should be able to assist students in finding answers and making progress in the research. Each advisor should ensure his or her students are prepared for the qualifying exam, the yearly Ph.D. committee meetings and thesis defense. If a student is unlikely to perform well during any of these exams or meetings his or her advisor should tell the student so.

In natural science departments at research universities, professors are expected to apply for and receive research grants. Most of these grants are funded by agencies of the federal government (e.g. DOE, DOD, NSF, NIH). Some areas may also receive additional funding from private companies or foundations. Principal investigators are expected to make funding decisions and guide the overall direction of any research supported by the grant.

Advisors are expected to find research funding for their students when possible, including research computers and lab equipment, as well as travel funds to attend scientific conferences. On average, experimental programs receive more funding than theoretical programs, but details vary widely between subfields. Often students do not realize how much it actually costs to support a student on a 12-month Research Assistantship, because the only benefit directly visible to the student is the stipend (\$22,620 for AY 2006/07). However, the research grant also has to pay \$9,111 for tuition and \$2,281 for health insurance plus an additional 50% in overhead to the university, i.e. the total cost to the research grant for one RA is about \$50,000 per year, much higher than the stipend would indicate!

In a situation where advisors provide funding for their students, they have a vested

interest in ensuring their students are sufficiently productive and working enough hours. An advisor needs to have an honest, open and realistic discussion about current and future funding for the academic year and for the summer *before* taking on a student.

Role of the classroom teacher

In general, graduate students should expect that all of their course instructors provide to them at the beginning of the semester a course syllabus, a brief explanation of the course policy, and a statement of how the course grade will be assigned. Students should realize that professors have a lot of discretion in this regard: usually there are homework sets, several tests and a final exam, but in particular in high-level graduate courses most of the course grade may be assigned on the basis of active course participation and a written term paper and/or presentation. When in doubt, students should ask their professors about the grading policy during the first week of class. Students may also expect from their classroom teachers periodic updates on their progress during the semester. All course instructors have an obligation to meet their classes on time and to be well-prepared for the lecture. Students should also expect that professors be available for questions during office hours.

At research universities, classroom teaching represents only one of many forms in which teaching and learning takes place. In addition, students learn by attending colloquia, research seminars, group meetings, and through active participation in research projects. Teaching and research are intertwined and reinforce each other. This "teaching through research" component is what sets research universities apart from teaching colleges. Students should realize that this has also important consequences for classroom teaching: it would be unrealistic to expect that professors will teach their assigned classes every single day throughout the semester. From time to time, research-related travel (e.g. off-campus experiments, research conferences) necessitate that a professor will be absent from class. In such cases, it is the course instructor's obligation to either find a colleague to substitute for him/her or to reschedule the class at another time. In the latter case, students need to be reasonable about available times.

Role of the Ph.D. committee

In general, the role of the Ph.D. committee is to ensure that the student is ready to begin thesis research, is making good progress towards completion of the degree, and that the standards for a Vanderbilt Ph.D. thesis are met. The Ph.D. committee also provides additional resources for advising, recommendation letters, etc.

The Bulletin of the Graduate School states that "the purpose of the Qualifying Examination is to test the student's knowledge of the field of specialization, to assess familiarity with the published research in the field, and to determine whether the student possesses those critical and analytical skills needed for a scholarly career". This statement clarifies that the Qualifier is not meant to be a "mini-Ph.D. defense" and it does not require that students already have identified a precise thesis topic. Rather the purpose is to help the student focus, as early as possible, on a particular research area and to

demonstrate that he/she is qualified to engage in Ph.D. research in a particular subfield of physics or astronomy. After passing the Qualifying Examination, each student will meet with his or her committee typically once per year to report on progress and to receive advice from the committee members. Students should realize that these yearly meetings are for their benefit. The primary responsibility for Ph.D. research supervision rests with the Ph.D. advisor; students will meet informally with their advisor on a regular basis throughout the year.

Research is an indispensable component of the Ph.D. requirements. Good grades in courses do not guarantee the particular abilities that are required in research. Progress in research is often slow and difficult even for those who have a natural talent for it. Research requires energy and commitment as well as various talents; it may involve designing, building, using, and repairing equipment, computer programming, analysis of data, imaginative formulation and testing of hypotheses, deriving and solving equations, communication of results and the assessment of their significance. The quality of a student's research must be high enough to merit publication in a major research journal.

Role of administrators

The Director of Graduate Studies (DGS) has the primary responsibility for recruiting the best possible students into the graduate program in Physics and Astronomy, shaping the graduate program, including curriculum revisions and changes in departmental procedures and requirements, advising students both academically and professionally, and monitoring the progress of all students. The DGS recommends students for admission into the graduate program. The DGS approves and submits all requests to the Graduate School, including requests for transfer credit, to appoint or revise a Ph.D. committee, to schedule a Qualifying Exam, to request extensions or leaves of absence, to schedule a dissertation defense, and to approve applications for Travel Awards and Dissertation Enhancement Grants.

The assistant to the DGS provides essential help to all graduate students, assisting with registration, all paperwork, including requests for transfer credit, formation of the Ph.D. committee, scheduling the qualifying exam and the dissertation defense, and general advice when you are not sure where to start.

The Graduate Program Committee (GPC) consists of members of the physics faculty who work with the DGS on recruiting and admissions; program and curriculum revisions, and on concerns brought to the attention of the DGS or other faculty. Both the DGS and the members of the GPC are appointed by the Department Chair.

The Department Chair oversees all aspects of the department, including the graduate program. The chair also acts as liaison between the department and the Dean of the College of Arts and Sciences. If an issue cannot first be resolved by the DGS, it may be taken to the department chair.

There are three deans whose decisions can affect graduate students in Physics and

Astronomy. The first of these is the Associate Dean for Graduate Studies of the College of Arts and Science (A&S). The primary role of this dean is to oversee graduate aid and admissions for students in A&S, which includes students in Physics and Astronomy. The associate dean also is a source for new initiatives to improve graduate education within the College of Arts and Science. The second of these is the Associate Provost for Research and Graduate Education, serving in the capacity of the Dean of the Graduate School. The role of this dean is to administer the policies outlined in the Graduate School Bulletin, including academic standing and composition of Ph.D. committees. Finally, the Dean of Arts and Sciences is responsible for the entire college, including the oversight of individual departments, usually through each Department Chair, and the Graduate School.

What if something goes wrong?

Students in the Department of Physics have several avenues available to them by which to address grievances. In general, it is suggested that students first attempt to address grievances to the offending party. If appropriate, consultation with one's advisor is the next step. Assistance may then be pursued from any one of the following bodies.

Role of the Climate Committee, Department of Physics

The Climate Committee of the Department of Physics was formed by the Chair of the department to identify areas in which working conditions for students in the department may be improved. Its goals are twofold: (1) to initiate means of fostering interaction between faculty, staff, and students and assist students in preparing for scientific work beyond graduate school; and (2) to hear concerns and suggestions by students as to how climate conditions may be improved and identify actions to help improve the conditions. The committee consists of the Director of Graduate Studies and at least three other members appointed by the chair of the department. The membership will be drawn from the faculty, research faculty, postdocs, and graduate students. Each committee member is available to hear concerns and suggestions, and all conversations will be kept confidential.

The committee has set up a resources page at

http://www.vanderbilt.edu/A&S/physics/volker/dept_climate/

which includes contact information for the committee members, links to resources available to students regarding gender and minority matters, and scientific employment-related information.

Role of the Graduate Honor Council

The Graduate Honor Council of Vanderbilt University was established to "to protect the honor of all graduate students by vindicating those falsely suspected of dishonesty and penalizing those guilty of dishonest acts." It is organized for graduate students, by graduate students. The council has a document available at

http://www.vanderbilt.edu/gradschool/current_students/pdf/GSHC.pdf

which lists the duties of the members of the honor council, along with procedures to follow when one perceives a violation of the honor code. The first step is to notify the council of a violation, after which the council will endeavor to collect information regarding the situation, hold hearings, and assess for appropriate action.

Violations that fall under the honor council's jurisdiction include

- (1) falsifying or cheating on any material submitted to meet course requirements;
- (2) plagiarizing on any assigned material;
- (3) failing to report a known violation of the Code;
- (4) taking actions to deceive a member of the faculty, staff or fellow student regarding principles contained in the Honor Code;
- (5) submitting work prepared for another course without specific prior authorization of the instructors in both courses;
- (6) using text or papers prepared by commercial or noncommercial agents and submitting as one's own work;
- (7) falsifying results of study and research.

Role of the ODC

The Opportunity Development Center (ODC) was formed in 1977 to be Vanderbilt University's equal opportunity, affirmative action, and disability services office. The Center's core values include diversity, equity, accessibility, inclusiveness, and accommodation. The ODC's website at

<http://www.vanderbilt.edu/odc/index.htm>

has many resources for assistance such as university policies on affirmative action, information on how to identify sexual harassment, and instructions for filing complaints with the university.

Complaint and Grievance Procedure

Of relevance to students is the ODC's complaint procedure recommendations, which can be found online at

<http://www.vanderbilt.edu/odc/studcom.htm> .

The ODC recommends that complaints first be brought to the person or persons giving rise to the complaint, and resolution first be sought at this level. If satisfactory resolution is not reached, the grievance procedure may be followed, whereby the student may file an official complaint with the Office of the Chancellor, which may refer the grievance to the Faculty Senate Committee on Student Affairs. The committee will assess the situation and perform an investigation if deemed necessary.

Allegations of Unlawful Discrimination (from the ODC website)

If a student believes that he or she has been discriminated against on the basis of race, sex (including sexual harassment), religion, color, national or ethnic origin, age, disability, or military service, that student should report the matter to the Opportunity Development Center, which will seek to assist the student with the resolution of the complaint as described above in the Complaint Procedure.

Graduate students working in interdisciplinary laboratories

As science becomes more and more interdisciplinary, students may find opportunities for research in laboratories that span different departments or schools. In this situation, it is important to outline the course of action one must take in achieving the Ph.D. degree.

A graduate student in the department of physics must complete all requirements for graduation as stated in the Graduate Student Handbook. It is the student's responsibility to maintain communication with the physics department to ensure that requirements are being met. It is the advisor's responsibility to be familiar with the requirements of the student's department, and to ensure that the standards of the department are followed in such graduate program milestones such as the qualifying exam and dissertation defense.

A last word

Graduate School in Physics and Astronomy marks the real beginning of your career as a scientist. One of the main goals is to develop the knowledge and skills necessary to complete the significant independent work on which you will base your dissertation. This is done through classes and research within your advisor's research group. Another, equally important goal is to develop your reputation as a member of the scientific community. You should consider yourself as a professional scientist and act accordingly. You and your fellow students as well as the postdocs and members of the faculty are your colleagues. As such, you should treat them with due consideration and respect. The relationships you form now can have a significant impact on your career in the future. Developing the habit of professional behavior in the department, in using departmental email lists, at conferences, while visiting other institutions, and in internet postings will help you to preserve a reputation that will enhance your work and your career.