

University of Wyoming  
Physics & Astronomy  
Graduate Student Handbook  
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Approved by the Faculty

## 1 Preliminary Introduction

This handbook is intended as a supplement to the Graduate Bulletin and the UW Graduate Student Handbook available at [uwyo.edu/UWGrad](http://uwyo.edu/UWGrad). This document summarizes Physics & Astronomy graduate degree requirements and answers frequently asked questions about student goals and student-faculty relations. Although every effort has been made to maintain accuracy, you should always defer to the Graduate Bulletin in the event of any conflict with that document.

The M.S. and Ph.D. programs in Physics & Astronomy are designed primarily to train individuals for careers in modern physics, astrophysics, or related research. Increasingly, Ph.D.s in the physical sciences are pursuing a broader range of careers, bringing to them both their technical knowledge as well as their skills and experience in research and problem-solving. All of these careers are very demanding and competitive. Hence, independent of what career path you follow, your principal goal throughout your graduate career should be to learn and get first-hand experience with the broad range of tools of a research scientist.

For many scientists, teaching is a critical component of their job. In the Physics & Astronomy program, most students will receive training and experience in teaching. There are also a growing number of opportunities for enhancing this training and documenting your experience for help in your future employment.

This handbook should serve as a handy reference guide, and a place to start. However, it cannot replace the invaluable information you can obtain by talking with your advisor, other faculty members, or other students. This handbook is also an evolving document, and your comments and suggestions for its improvement are always welcome.

### 1.1 Graduate Students and Faculty - Mutual Expectations

The purpose of this section is to provide graduate students with an idea of what is expected of them and also what they might reasonably expect from the faculty. In general terms, the faculty expect all graduate students to be working hard and making no less than “satisfactory progress”, as described further below, toward their intended degree. Graduate students can reasonably expect that the faculty provide them with instruction, advice, and access to resources which allow them to make reasonable progress.

Due to the highly competitive nature of the job market in astronomy and physics, there are multiple, sometimes competing Department goals for the graduate program. While not all of our graduates proceed on to employment in physics or astronomy, all of the goals of our program are designed to best prepare a graduate student for such a career. This is based, in part, on the expectation that all entering graduates students have the long range goal of a career in physics or astronomy. However, it is also the aim of the faculty to help the graduate students develop skills which are “transferable” (e.g., problem solving skills, communication skills, computing expertise, etc.) with the goal to enhance their prospects for future employment, regardless of field.

### 1.2 What is “Satisfactory Progress”?

The guidelines and requirements spelled out in Section 2 describe the timelines for various goals to be accomplished. Graduate students should be familiar with these. The Graduate Faculty will conduct an Annual Review each spring in May to review the progress of each graduate student. Before this review, all graduate students submit a self-evaluation to the **Director of Graduate Studies** (DGS; see next section). The DGS is then responsible for providing to each graduate student a short written summary of the faculty’s discussion. This should not replace continuing discussions between faculty and advisees concerning the student’s progress. Any questions should be directed to your adviser and/or the DGS.

Satisfactory progress entails consistent progress in coursework and research toward the Ph.D. degree. The UW Graduate Bulletin is the final authority on rules and regulations. Students are responsible for knowing its contents

which are not listed in detail here. At a minimum, the University requires that students maintain a 3.0 GPA at all times. Students with a GPA below 3.0 will be placed on probation.<sup>1</sup> If after one semester on probation a student fails to raise their GPA to 3.0 or higher, the student is placed on suspension. In order for a student on suspension to register for classes, the Graduate School must receive a letter from the Department Head requesting permission for the student to register, otherwise the student is not allowed to continue in the program. In Physics & Astronomy, the faculty as a whole shall decide whether the student shall be allowed to continue in the program and make a recommendation to the department head.

Satisfactory progress also entails, as described in the Graduate Bulletin, continuous enrollment in at least two of every three semesters. If, for personal reasons, it becomes necessary for a student to temporarily discontinue graduate study for longer than one semester, a petition for a “leave of absence” should be filed with the graduate school after consultation with the **Director of Graduate Studies** (DGS) and Department Head.

At a broader level, what constitutes “satisfactory progress” depends on the goals of the individual graduate student, and can be far more complex than the single characterization of an M.S. or Ph.D. degree. If eventual employment as a research scientist is the desired goal (as is often assumed), the job market can be much more demanding than the formal university requirements for a Ph.D. (successful post-doctoral candidates generally have research accomplishments in addition to their required thesis work). Thus, it is reasonable for the graduate students to discuss their goals with faculty members and ask them for informal evaluations not only on the progress of their research, but also on their employment prospects.

### 1.3 The Faculty Roles

Faculty members have many different responsibilities for the graduate program; these fall within three main categories. For the most part, it is the faculty’s responsibility to provide access to first-rate physical resources for learning and research. Whether this is in the form of observing time on the world’s best telescopes, in-house laboratories, state-of-the-art computing facilities, library facilities, or adequate office space, this is where the faculty spend a great deal of effort. Clearly, it is in the best interest of the graduate students to help in this effort, when possible. It is also the faculty’s responsibility to provide a curriculum which includes a large range of exposure to fundamental concepts, areas of important current research, and experiences with methods of research and problem solving.

Finally, it is the faculty’s responsibility to provide feedback to the student. Formally, this is achieved through the **Spring Annual Review** of all graduate students by the faculty. Here all students’ progress is reviewed and goals are identified for the next year (i.e., “satisfactory progress” is defined). Graduate students participate directly in this evaluation by submitting a self-evaluation to the DGS (the date will be designated by the **Director of Graduate Studies**); senior graduate students who have passed the Preliminary Exam will additionally present progress on their dissertation to their Ph.D. committee. The self-evaluation consists of answering several questions which serve as an overview of the last year’s progress (see Appendix B). It is not expected that all graduate students will have accomplishments in every category, (especially true for students in their first year), but the evaluation should be seen as a list of what types of accomplishments the faculty are looking for. This self-evaluation also allows the graduate student an opportunity to define what they believe are reasonable goals for the next year. Since satisfactory progress is a pre-requisite for Departmental employment, the graduate student’s qualification for departmental support is part of this review process.

For first and second-year graduate students, some feedback is also available in the form of grades in graduate course work. However, graduate students should be aware that grades of A and B are common in graduate courses; a grade of C should be considered unsatisfactory. To be competitive for fellowships later on, students usually need a GPA of no less than 3.5.

To get the most out of graduate school, graduate students need to go beyond these formal feedback mechanisms, and to work with their faculty advisor(s) to establish well-defined goals and evaluate progress on a regular basis. Getting feedback on academic, technical, communications, and research skills are all of value for the student. Since, by definition, the results of research are unpredictable, a frequent review of progress and the re-evaluation of goals in this area is critical. Informal feedback from other faculty members, and even from fellow students, can help a student identify strengths and areas that need improvement. The graduate students can also look to the faculty for evaluation of their work and professional development. When possible, the faculty attempt to provide the financial support necessary for this progress.

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<sup>1</sup>If a Physics & Astronomy graduate student receives a grade of ‘C’ or lower in a particular course, the instructor can require the student to retake and pass that course.

## 2 Formal Requirements for Ph.D.

Both the Physics & Astronomy Department and the University have formal requirements for completion of the Ph.D. Graduate students are responsible for being familiar with and completing both of these sets of requirements.

At this time, the department admits students to two degree programs: the Ph.D. in physics and the Master's of Science in Physics with Emphasis on Teaching. Students in the physics Ph.D. program may choose to specialize either in physics (*physics-track*) or astronomy (*astronomy-track*). Although the degree requirements are very similar, this choice will determine which set of physics core courses are required, which research advisor you may elect to work with, and what type of research your dissertation will involve.

### 2.1 Registration and Student Status

For many reasons, such as deferment of student loans, eligibility for University employment, health benefits, access to University facilities, it is important for graduate students to maintain their full-time registration. Students must register each semester. The Graduate School requires continuous enrollment, excluding summer session. Master's students must register for a minimum of one credit. Dissertators must register for a minimum of two credits. You must register for at least nine credits to be considered a full-time student and receive the student health insurance if you are not yet a doctoral candidate (passed both written and preliminary exams). Students needing one additional credit to reach nine hours (full-time status) should typically take Independent Study (PHYS 5860 or ASTR 5860) for one credit on an S/U basis. To earn credit for 5860, regular weekly participation in a journal club shall be expected, or suitable other research work by prior arrangement with a member of the faculty. Doctoral candidates taking less than 9 credits must fill out a petition with the graduate school to have their fees package paid by the university (see "Full-time student status vs. full-fee-paying student status" section of the UW Graduate Bulletin). Doctoral candidates may utilize this optional fee package in their last 2 semesters (but may be extended to a 3rd semester).

Advising: All students are expected to register for classes after having obtained the signature of the appropriate Director of Graduate Studies. The thesis advisor, if applicable, should also be involved in the discussion of course planning and registration.

### 2.2 Tuition

Students on TA or RA appointments of at least 45% get tuition waivers. For students who must pay, the tuition structure can be complicated; you should obtain the official policies from the Graduate School in Ross Hall.

### 2.3 General University & Department Requirements

1. **Program of Study:** Each student must submit a **Program of Study** to the Graduate School no later than the beginning of the student's second semester. If a student enrolled in the Ph.D. program wishes to obtain an optional M.S. degree, they must file a Program of Study opting for a 'dual' degree program for both a Master's and a Ph.D. Forms are available at [uwo.edu/uwgrad](http://uwo.edu/uwgrad).
2. **Courses:** UW requires at least 72 credits, with at most 12 credits at the 4000 level. At least 42 of these must be in formal course work, with a 'B' (3.0) average or better. The remaining credits are typically for doing research.
3. **Research Credits:** Plan A Master's students must take four credits of 5960 (Thesis Research); there are no research credit requirements for Plan B Master's students. For students on the Ph.D. track, any research credits taken before passing the **Preliminary Exam** should be registered under 5860 (Independent Study), whereas upon successful completion of the **Preliminary Exam** you will begin taking 5980 (Dissertation Research). These credits are taken on a Pass/Fail basis.
4. **Written Examination:** The faculty are committed to promoting the professional development and success of each student by ensuring a solid background in physics and astronomy through the opportunity to synthesize this material in preparation for a career as a practicing scientist. The primary purpose of the exam is to help students synthesize material from the core of the physics and astronomy curriculum. The exam will cover general undergraduate physics as defined by the exam committee, concentrating on, but not limited to: classical mechanics, electricity & magnetism, quantum mechanics and thermodynamics. The exam will be constructed

by a committee of faculty assembled specifically to construct the exam. All faculty will be invited to submit questions (with solutions!) and participate on the committee. The faculty will grade the exam on a name-blind basis. The evaluation of each student's performance will ideally coincide with the annual review of student progress.

Each student will be given two chances to pass the exam. Students are expected to take the exam for the first time in January of the first year of graduate study, then again the following January (if necessary). Students entering UW in the spring term should take the exam in January of their second year, on the same schedule as the next entering fall class. Failure to take the exam at the expected times shall constitute a "no pass" for that attempt. Exceptions to the standard schedule must be pre-arranged with the Department Head, in consultation with the Graduate Director, during the student's first semester of study. The faculty committee reserves the right to pass a student "with conditions," such as the requirement to complete or retake a particular course if there is determined to be a significant weakness in only one subject area. Students who do not pass the written exam will complete the program with a Plan B (non-thesis) Master's Degree. It is a requirement of the university that students receiving a Plan B Master's must pass a capstone oral exam.

5. **Preliminary Exam:** The University requires a **Preliminary Exam** to candidacy after at least 30 hours of coursework. This **Preliminary Exam** will be conducted by a committee of five graduate faculty. At least three and not more than four must be from the student's major area. At least one member must be from outside the major department. A member from outside the university may be appointed. It is your responsibility to assemble this committee, with guidance from the DGS. The Department expects that this committee will be assembled at the time the student completes the **Program of Study**. Students will typically be expected to take the **Preliminary Exam** within nine months after passing the **Written Exam**.

The **Preliminary Exam** will consist of an oral defense of the **Dissertation Proposal** and related physics. The first portion of the exam will be an open presentation by the student. The second portion of the exam will be a closed question-and-answer session involving the student and the committee. The **Dissertation Proposal** shall be presented to committee members in written form at least two weeks before the **Preliminary Exam**. The proposal shall be 6-10 pages in length, and include a detailed timeline for the completion of each phase of the dissertation research, including intended funding mechanisms, proposals to be written, datasets to be collected, etc. Upon successful completion of the **Preliminary Exam** your committee will sign the form advancing you to official Ph.D. candidate status. The committee may choose to pass a student unconditionally or conditionally. Such conditions may require you to make up perceived deficiencies either in your physics background or research performance. The committee may also fail the candidate. In such a case, a student may complete the degree requirements for a Master's (M.S.) in Physics but must leave the program, generally by the following summer.

6. **Dissertation:** The most significant requirement is the completion of original scientific research under the direction of a faculty member. It is up to you to initiate contact with a faculty member to arrange a suitable dissertation project. Sometimes a student develops an interest in an area of research not directly performed by a faculty member in the department, or finds an opportunity at a national facility. In these cases, it may be in your best interest to finish your thesis *in absentia* so you can directly work with a scientist at another institution or use the equipment and expertise located at a research institute. In any case, the completed written dissertation must be orally defended before the committee at the **Final Exam**, in accordance with Graduate School standards. The Department requires a public presentation of the dissertation results, followed by a private, closed-door period with the committee. Upon successful defense of the dissertation, the committee will recommend that the University confer the Ph.D.

Link to the registrar's page of graduate student forms:

<http://www.uwyo.edu/registrar/Students/Graduate.Student.Forms.html>

which is also available from the department one-stop webpage for information on UW life, graduation, careers in academia and industry, and more:

<http://physics.uwyo.edu/~ddale/grads/> .

## 2.4 Astronomy-Track Ph.D. Students (changes made in 2012 still need to be formally approved by the faculty)

The following courses are required:

- ASTR 5150** Astronomical Techniques (4)
- ASTR 5420** Stellar Structure and Evolution (4)
- ASTR 5460** Cosmology (4)
- ASTR 5470** Interstellar Medium and Diffuse Matter (4)
- ASTR 5465** Galaxies (4)

Two of the following physics courses must be taken:

- PHYS 5310** Quantum Theory I (4)
- PHYS 5410** Electromagnetic Theory I (4)
- PHYS 5510** Statistical Mechanics (4)

Elective courses:

- ASTR 5160** Data Mining in Large Astronomical Surveys (4)
- ASTR 5430** Radiative Processes & Stellar Atmospheres (4)
- ASTR 5440** Stars & the Milky Way (4)
- ASTR 5480** Planetary Astronomy (4)
- ASTR 5490** Planets and Their Stars (4)
- ASTR 5870** Special Topics in Astrophysics (3)
- GRAD 5910** College Teaching (3)

## 2.5 Physics-Track Ph.D. Students

The following courses are required:

- PHYS 5310** Quantum Theory I (4)
- PHYS 5410** Electromagnetic Theory I (4)
- PHYS 5510** Statistical Mechanics (4)
- PHYS 5720** Advanced Solid State (3)
- PHYS 5750** Optical Properties of Solids (4)
- PHYS 5730** Condensed Matter Magnetism (4)
- PHYS 5740** Transport Properties of Solids (4)

A minimum of 10 credit hours must be taken from the following electives:

- PHYS 5110** Methods of Theoretical Physics I (4)
- PHYS 5120** Methods of Theoretical Physics II (4)
- PHYS 5210** Classical Mechanics I (4)
- PHYS 5220** Classical Mechanics II (4)
- PHYS 5320** Quantum Theory II (4)
- PHYS 5550** Advanced Statistical Mechanics (3)
- PHYS 5770** Nanotechnology: Nanophysics and Nanosystems (4)
- PHYS 5780** Modern Computational Methods in Solids (4)
- PHYS 5820** Plasma Physics (4)
- PHYS 5830** Physics and Chemistry of Solar Cells (4)
- PHYS 5840** Experimental Methods (4)
- PHYS 5870** Special Topics: Physics of Semiconductors and Electronic Devices (4)
- PHYS 5870** Special Topics: Advanced Solid State II (4)
- PHYS 5870** Special Topics: Group Theory (4)
- PHYS 5870** Special Topics: Introduction to Spintronics (4)
- PHYS 5870** Special Topics: Nonlinear Dynamics (4)
- PHYS 5870** Special Topics: Surface Physics (4)
- PHYS 5870** Special Topics: Introduction to Solid State Physics (4)
- GEOL 5200** Special Topics: Applied SEM (1)
- CHEM 5150** Special Topics: Nanotechnology (1)
- CHEM 5100** Special Topics: Applied TEM (1)
- CHEM 5500** Special Topics: Physical Chemistry-Surface Science and Catalysis (3)
- CHEM 5560** Molecular Modeling (3)
- GRAD 5910** College Teaching (3)

### 3 Sample Astronomy-Track Graduate Student Timeline

The following timeline assumes a student with full undergraduate preparation. Some students may elect to take certain 4000-level courses in the first year as additional preparation. These students will register for ASTR courses, but will generally delay 5000-level PHYS courses for one year.

Items in roman or sans serif font are required activities. *Items in italic font are suggested benchmarks for progression through the program.*

#### Year 1

##### Fall

2-3 graduate courses

Independent Study (N credits of PHYS 5860, as needed to get up to a total of 9 credits)  
assemble (preliminary) committee as described in Section 2

submit (preliminary) **Program of Study** for approval by Graduate School and faculty committee

##### Spring

take Written Exam in January

2-3 graduate courses

Independent Study (N credits of PHYS 5860, as needed to get up to a total of 9 credits)

##### Summer

Independent Study (PHYS 5860, 1 cr)

#### Year 2

##### Fall

2-3 graduate courses

Independent Study (N credits of PHYS 5860, as needed to get up to a total of 9 credits)

*apply for national fellowships such as NASA GSRP, Zonta, etc..., and university fellowships*

##### Spring

take Written Exam in January, if not already passed

Submit self-evaluation for Annual Review

2-3 graduate courses

Independent Study (N credits of PHYS 5860, as needed to get up to a total of 9 credits)

##### Summer

Independent Study (PHYS 5860, 1 cr)

#### Year 3

##### Fall

Dissertation Research (PHYS 5980, 9 cr)

any additional coursework to achieve 42 credits in graduate coursework

select thesis advisor; revise committee as necessary

Present **Dissertation Proposal** to faculty prior to **Preliminary Exam**

Take Preliminary Exam over thesis proposal

*Begin observing & fellowship proposals for thesis*

##### Spring

Submit self-evaluation for Annual Review

Present progress on dissertation to Ph.D. committee

Dissertation Research (PHYS 5980, 9 cr)

*begin data collection/proposals for thesis*

*publish 1st paper on 2nd-year research project*

##### Summer

Dissertation Research (PHYS 5980, 1 cr)

*consider graduate pre-doc at national lab or observatory*

*or teach summer astronomy course for teaching experience*

#### Year 4

##### **Fall**

Dissertation Research (PHYS 5980, 9 cr)

*continue full-time thesis research, data collection & analysis*

*attend scientific conference*

*publish 2nd paper*

##### **Spring**

Submit self-evaluation for Annual Review

Present progress on dissertation to Ph.D. committee

Dissertation Research (PHYS 5980, 1 cr; submit Optional Student Fee Package Petition)

*continue full-time thesis research, data collection & analysis*

*attend scientific conference*

*start snooping for job postings and working on CV & research statement*

*publish 3rd paper*

##### **Summer**

Dissertation Research (PHYS 5980, 1 cr; submit Optional Student Fee Package Petition)

*consider graduate pre-doc at national lab or observatory*

#### Year 5

##### **Fall**

Dissertation Research (PHYS 5980, 1 cr; submit Optional Student Fee Package Petition)

*continue full-time thesis research, data collection & analysis*

*apply for jobs*

*publish 4th paper*

##### **Spring**

Submit self-evaluation for Annual Review

Present progress on dissertation to Ph.D. committee

Dissertation Research (PHYS 5980, 1 cr; submit Optional Student Fee Package Petition)

Pick up Graduation Packet from Graduate School (109 Knight Hall)

Finish thesis work and set defense

*Begin submitting chapters of Dissertation to Committee*

*interview for jobs*

##### **Summer**

Final oral defense over dissertation; graduate!!

## 4 What about a Master's?

The Department primarily admits students to the Ph.D. program which is a research-based program. En route to a Ph.D., a student may elect to obtain a Master's degree by fulfilling the University requirements.

The Department may choose to accept self-funded master's students to pursue a Plan B (coursework only) masters degree in physics/astronomy. The master's degree requires 30 hours of formal graded coursework beyond the bachelors. The master's degree may involve all PHYS 5000-level coursework or may include an emphasis in astronomy. In the latter case, the coursework must include three PHYS 5xxx courses (approximately 12 hours) and the remainder may be ASTR 5xxx courses.

For students admitted to the M.S. program, there is no expectation of Graduate Assistantship support, no expectation of research involvement, and no expectation of office space. Students who are in a M.S.-only degree may apply for admission for the Ph.D. program and will be considered on the same criteria as all other applicants. In this case, students will be required to take the qualifying exam as per the Ph.D. requirement.

### 4.1 Plan A Master's (Thesis)

1. **Program of Study:** Each student must submit a Program of Study for approval.
2. **Courses:** 26 credits, 20 of which must be in PHYS/ASTR at the 5000 level
3. **Research Credits:** 4 hours of research credits (5960)
4. **Thesis:** An original research paper, suitable, but not necessarily destined for publication, conducted under one of the members of the Physics & Astronomy faculty. The thesis shall be approved by the committee.
5. **Final Oral Exam:** You shall defend the thesis before your committee, as described in Section 2 under Ph.D. guidelines.

### 4.2 Plan B Masters (Non-Thesis)

1. **Program of Study:** Each student must submit a Program of Study for approval.
2. **Courses:** 30 credits, 24 of which must be in PHYS/ASTR at the 5000 level
3. **Research Credits:** None required

### 4.3 Master's of Science in Teaching (M.S.T.)

The Master of Science in Physics with emphasis in Teaching is designed for graduate students preparing to teach in private secondary schools or in community colleges. It includes a small, carefully designed component in psychology and education, and includes experience as a teaching assistant. Students interested in this program should contact the current advisor, Prof. Tim Slater.

1. **Plan of Study:** Each student must submit a Program of Study for approval.
2. **Courses:**  
18 credits from PHYS or ASTR at the 5000 level (*typically required to teach at the community college level*)  
12 credits from PSYC or College of Ed at the 4000 or 5000 level
3. **Thesis:** An original research paper must be prepared under the direction of a faculty advisor.
4. **Final Oral Exam:** You shall defend the thesis before your committee.



## 5 Life in the Physics & Astronomy Department

In addition to all the formal requirements for graduate degrees in Physics & Astronomy, graduate students are encouraged and expected to become a full part of our professional community. This means participating in a variety of informal activities, like joining discussions about the department's programs and facilities, helping out where it is needed, and receiving help from other students and faculty.

### 5.1 Seminars and Journal Club

Graduate students are expected to be active participants in these programs. Seminars, scheduled for Friday afternoons, feature mostly outside speakers presenting current research on a wide variety of topics. These form a critical part of the continuing professional development of both faculty and students. Often, a separate time is set aside for graduate students to meet with the speaker; you are encouraged to participate in these sessions. Dinner arrangements for speakers may be made with that week's host. Typically, graduate students are welcome to attend.

Journal Clubs, currently at Thursday lunchtimes, are a key opportunity for faculty and graduate students to hear about interesting research around the world, either through reviews of preprints, or meeting reports, etc. They also present an important opportunity for graduate students to practice their communication skills in front of a supportive audience, but one that can provide critical feedback for improvement. Graduate students are expected to make at least one Journal Club presentation each year and to attend each weekly session.

### 5.2 Getting Involved in Research

Most beginning graduate students have only vague notions of the area of research they wish to pursue seriously. Some have had extensive exposure to active research as undergraduates, but many have not. It is important for each of you to become familiar with serious research in the Department from the very beginning of your career. You are expected to participate in weekly colloquia and journal clubs. In addition you should be reading current journals and preprints regularly (e.g., arXiv.org) and discuss research activities with other graduate students and faculty. Most important, you should take initiatives to become directly involved in meaningful research.

Personal involvement may develop in several ways. For example, in the fall after you arrive the Director of Graduate Studies can discuss your research leanings with you and help you make arrangements with a faculty member to work on a research project. In addition, be alert for possibilities such as a scientific argument over tea which suggests a short, but critical observation, lab experiment, or calculation that you can perform. Sometimes, new students are invited to accompany faculty members on trips to WIRO or some other lab facility or observatory.

Other observing projects develop that are suitable for Red Buttes Observatory, as well. These observational opportunities are valuable even if you hope to become a theorist because of the insights they provide into observational methods and limitations. Of course, other activities around the Department include instrument development and computing. Ask around. Don't be afraid to propose projects of your own. Many good research projects are initiated by graduate students. The faculty will assist you in developing projects and preparing proposals.

When your academic and teaching responsibilities are going smoothly, and definitely by the summer after your first year, you should be getting involved with small research projects.

### 5.3 Financial Aid

The Department tries as best it can to provide financial support for all graduate students who are making satisfactory progress toward a degree, so that they can concentrate on their studies and research. This support comes in several forms: Teaching Assistantships (TAs) awarded by the Department; Research Assistantships (RAs) arranged with individual faculty members using research grant funds; and Fellowships such as those provided through the WY/NASA Space Grant Consortium, the UW School of Energy Resources, the UW Science Posse, the National Science Foundation, NASA, the Department of Defense, and the Hertz Foundation.

Most graduate students will be supported initially through teaching assistantships. Provided you make satisfactory progress toward your degree, and provided your teaching is satisfactory, the Department will make every effort to supply TA support for two academic years. Our ability to provide this support depends, of course, upon the department's ability to obtain sufficient funding for TAs from the College. Beyond the second year you should try to obtain support from faculty as an RA or from fellowships.

The funding guidelines are

1. First–Second year students making satisfactory progress
2. Third–fifth year students making satisfactory progress
3. Sixth–year students

he Graduate Assistant rates for a 9-month academic appointment are

- GA for dissertator: \$16,785/academic year — \$1865/mo

Some summer TA support has been available to graduate students who were not yet supported full time as RAs. However, its nature and extent are variable, so you should discuss this with the DGS early in the spring. Every effort will be made to find you support for at least part of the summer (faculty members must also find salary money during the summer, since they are paid only nine months by the University).

As part of the Ph.D. program, you are required to participate in research projects. Some of these can be supported through external research grants, but others may not. By your third year you should ordinarily plan on finding support as an RA. You should expect to establish yourself as a “good risk” through an informal work arrangement with a faculty member before any long-term financial commitments are made.

It is important to realize that all RA support in the Department comes through externally funded research grants (primarily through the NSF and NASA). Faculty members must write proposals every one to three years; this involves a large amount of effort, and must be done eight months to one year in advance. The actual cost of an RA to a grant is approximately twice what a student receives in salary, because it includes University overhead and fringe benefit costs for health care, tuition, etc. Funding is very competitive, and RA support for students must be justified to the funding agencies based upon their real scientific value to the proposed research.

## 5.4 Advising

By default, graduate advising will be done by the Director of Graduate Studies. When you get ready to register for courses, if you have questions or issues about the graduate program and its expectations, if you have issues about your teaching assignment or loads, the DGS the first point of contact. For students who are becoming involved in research and have chosen a graduate research advisor (usually in the second or third year), the first point of contact becomes your graduate advisor who will help you think about your overall course program and plan of study. At any time, you are welcome to informally seek advice from other faculty members. You may also have another faculty member officially designated as your advisor at any time by informing the DGS and your desired advisor of your choice. All changes in advisor must be done officially through the DGS.

Before beginning M.S. or Ph.D. thesis work, you must obtain a ‘thesis advisor’ who will supervise your thesis work and serve as your official academic advisor.

## 5.5 Travel Support

Support for student travel may be available through the Department or the College. See the DGS or Department Head for current information.

## 5.6 Access to Computers

The Department, in conjunction with individual faculty, is expected to provide a computer for each student. Special-needs computing is available on campus by arrangement with individual faculty or campus computing units.

## 5.7 Public Outreach Programs

Part of the mission of the Department is to serve the citizens of Wyoming through various public outreach programs. All professional members of the Department — faculty, post-docs, graduate students — are expected to participate in these activities. Some of these responsibilities are also folded into the Teaching Assistant positions. Current activities in outreach may include:

Astro Camp  
Classroom visits to local schools for slide and other presentations  
Public evenings at the telescope or planetarium  
Visits from Girl Scouts and other groups  
Talks to other local organizations as requested  
Mentoring programs with local school children  
Answering questions on the phone  
UW Discovery Days/Resource Fair  
Host alumni at WIRO on homecoming weekend

## 5.8 When Problems Arise

Graduate student life should be both challenging and enjoyable, in varying combinations. If either of these elements is missing for an extended period of time, it's time to talk to your advisor or the DGS.<sup>2</sup>

It is not uncommon for stresses, academic, personal, financial, etc., to reach a level where they affect a student's work. It is very important that you do not let such problems reach a critical stage — instead, you should address them promptly when they're easiest to deal with. You may feel embarrassed or uncomfortable raising these issues; please be assured that you are not alone — many other students have dealt with difficult problems, and we can help with discretion and confidentiality. The faculty certainly remember such times in their own graduate school and postdoc days. It is in the interests of the Department and University to have its students be successful and well, so please ask for help when you need it. One resource is the University Counseling Center in 340 Knight Hall: 766-2187

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<sup>2</sup>The author, CK, is indebted to the Astrophysics faculty at the University of Minnesota for developing a similar document for the graduate students there. This Handbook has borrowed considerably from the language and structure of that document.

## 6 Appendix A: Graduate Faculty

**Mike Brotherton**– Multi-wavelength observations of quasars and active galaxies; issues of quasar/galaxy mutual evolution

**Yuri Dahnovsky**– Biological electron transfer reactions; theoretical chemical physics and biophysics; molecular electronic devices; nonlinear optical properties of quantum heterostructures; physics of glasses; femtosecond processes; photon-assisted tunneling

**TeYu Chien**– Electronic properties and many-body effects of low dimensional materials and devices, such as metal surfaces and the interfaces of complex oxide systems.

**Daniel Dale**– Ground- and space-based infrared studies of galaxies; clusters of galaxies; cosmology

**Hannah Jang-Condell**– Theoretical astrophysics; extrasolar planet formation

**Chip Kobulnicky**– Ground and space-based studies of dynamics & chemical abundances in galaxies; radio, optical, and infrared spectroscopy; young star clusters; massive star formation; astronomical instrumentation

**Rudi Michalak**– Experimental condensed matter physics; nuclear magnetic resonance; science education

**Adam Myers**– Quasars; cosmology; astronomical surveys

**Mike Pierce**– Galaxies; clusters of galaxies; large-scale structure of the universe; observational cosmology; astronomical instrumentation

**Ed Seidel**– Numerical relativity; black holes

**Ed Synakowski**– Experimental fusion; plasma physics

**Jinke Tang**– Experimental condensed matter physics; materials science

**David Thayer**– Plasma physics: fusion physics; turbulence theory and nonlinear dynamics applied to plasmas, fluids, and global change research; research on quantum mechanical foundations and interpretations

**Jifa Tian**– Experimental condensed matter physics and materials science

**Wenyong Wang**– Experimental condensed matter physics and materials science

## 7 Appendix B: Student Annual Self-Evaluation

- 1.) List of courses taken.
- 2.) Brief description of research projects in which you participated.
- 3.) List of papers published or submitted.
- 4.) List of presentations made at meetings.
- 5.) List of observing runs or lab experiments in which you participated.
- 6.) Journal club presentations.
- 7a.) Assigned teaching
- 7b.) Outreach activities
- 7c.) Other teaching/curricular activities
- 8.) Other activities (referee papers, build instruments, mentor summer students, Apply for fellowships, etc.).
- 9.) Brief self-evaluation (1 paragraph) of your progress this past year.
- 10.) Brief statement of objectives for next year.