

# Academics

## 2.1 Degree Requirements

*Effective Fall 2011*

The physics and astronomy Master of Science degrees are offered with either thesis or, critical essay options. The degrees may be terminal or an intermediate step toward a Ph.D. In all cases, the final examination is oral, conducted by a committee of three members of the graduate faculty approved by the dean of the Graduate College.

The program for the M.S. with thesis requires a thesis based on an original experimental or theoretical investigation by the candidate. The program for the M.S. with critical essay requires an independent study of the literature on a chosen topic, and preparation of a critical essay on that topic.

### **Master of Science in Physics**

1. For the M.S. with thesis or with critical essay, the candidate must complete a minimum of 30 semester hours of graduate work in courses number 170 or above, of which at least 15 semester hours must be at the 200 level, with an average GPA of 3.0. For the M.S. with thesis no more than 6 of the minimum 30 semester hours may be in 29:220 and 29:281, and for the M.S. with critical essay or by examination no more than 4 hours. Seminars do not count toward the 30 semester-hour requirement. Up to one-third of the coursework may be in graduate courses in related scientific fields other than physics and mathematics.
2. Prepare a thesis or critical essay and pass the Final Examination; by examination, pass the Final Examination.

### **Master of Science in Astronomy**

1. Candidate must complete a minimum of 30 semester hours of graduate work in courses numbered 170 or above with at least 15 semester hours at the 200 level, and an average of B (3.00) or better. The 30 semester hours must include at least 6 semester hours chosen from 29:232, 29:233, 29:234, and 29:235. For the M.S. with thesis no more than 6 of the minimum 30 semester hours may be in 29:220 and 29:282 and for the M.S. with critical essay no more than 4 hours. Seminars do not count for credit toward the 30 semester-hour requirement. Up to one-third of the coursework may be in graduate courses in related fields such as meteorology and electrical engineering.
2. Prepare a thesis or critical essay and pass the Final Examination.

## Ph.D. in Physics

Graduate students who wish to pursue a Ph.D. in physics must pass a qualifying examination in all principal areas of physics at the level of first-year graduate work. The examination, which may be repeated only once, is given each year before the beginning of the fall semester and is normally taken before the beginning of the second year of graduate study. **[It must be taken (for the first time) by the beginning of the third year.]**

All Ph.D. candidates must take comprehensive examinations; participate in advanced seminars; do original research in experimental physics, theoretical physics or astrophysics; and prepare and defend a written dissertation based on this work.

The program of study for the Ph.D. with emphasis in physics includes thorough coursework in both classical and quantum physics for all candidates, whether their specialized research is to be in an experimental or a theoretical area.

Students must take at least 24 hours of 200-level courses in the department, excluding 029:220, 029:281, 029:282, and seminars. The following courses are required.

*029:171-172	Mathematical Methods of Physics	6 s.h.
029:205	Classical Mechanics	3 s.h.
029:212	Statistical Mechanics I	3 s.h.
029:213-214	Classical Electrodynamics I-II	6 s.h.
029:245-246	Quantum Mechanics I-II	6 s.h.

\*Students who pass a written examination are exempt from being required to take 029:171-172 Mathematical Methods of Physics.

Advanced mathematics, such as complex variables and tensor analysis, is used freely in these courses. An introduction is given in 029:171-172 Mathematical Methods of Physics. The selection of less advanced coursework depends on the adequacy of the student's preparation for graduate work; the student's choice of more advanced and specialized courses depends on the direction in which the student's interest develops.

Because not all specialty courses are offered every year, students may wish to enroll in these courses in the first year to ensure adequate preparation for research in the subsequent year.

After a student has chosen a research specialty, he or she must submit a formal thesis proposal and defend the proposal in an oral comprehensive exam. The appropriate thesis adviser then becomes the candidate's general adviser and the chair of the comprehensive and final examination committee. The comprehensive exam must be taken prior to the beginning of the fourth year of graduate study.

Ph.D. candidates are recommended for the degree when they have written the dissertation and have prepared the results in proper form for formal publication and have submitted it for publication, with the approval of the research adviser, to a widely distributed, refereed scientific journal.







## **2.3 Expectation for Enrollment as Full-Time Student**

## **2.4 Time to Degree**

## 2.5 Qualifying Exam

### **Faculty resolution concerning the timing of graduate student progress toward the Ph.D.**

*October 7, 1997*

#### **1. Comprehensive exam**

We emphasize the nature of the comprehensive exam, which requires the student in the early stage of research to present and defend a thesis proposal. It is not necessary for the student to guarantee that all aspects of the proposal will work, because that would require the research to be essentially done. It is also not necessary for the dissertation to be on the same topic that he/she defends at the comprehensive exam, should research take a different, but justifiable, direction. It is required that the student exhibit understanding of the literature in the specific area and the underlying physics principles related to research in that area.

In addition we establish the following new requirements for the comprehensive exam:

- A student must pass the comprehensive exam before the date the qualifier is given at the beginning of his/her fourth year.
- Students who have been here for more than one year must pass the comprehensive exam before the date the qualifier is given at the beginning of the 1999-2000 academic year.
- Students who fail to pass the comprehensive exam by those dates must retake and pass the qualifier immediately thereafter to remain in the graduate program.
- Exceptions/extensions can only be granted by the EO committee (or during a full faculty meeting) after a petition by the supervising faculty member is submitted.

#### **2. Progress toward a degree after the comprehensive exam**

In order to assure that students make timely progress toward their degrees we resolve to use the student's advisory committee to establish some oversight over the student's progress toward a degree. Specifically,

- The student should meet with the internal (Department of Physics and Astronomy) members of his/her thesis committee once every academic year to present the status of his/her dissertation research.
- Through the sixth year this meeting is intended only as a status check for the student, advisor, and committee.
- During the seventh and subsequent years this meeting should be viewed as an application by the student for permission to continue his/her research in the graduate program. Depending on the student's progress this application may be granted or denied; however, barring exceptional circumstances, the request should be expected to be denied after meeting in the eighth or subsequent years.

## 2.6 Comprehensive Exam Guidelines

### Scheduling the Comprehensive Examination

- It is expected that the Comprehensive Examination will be taken approximately one year after successful completion of the Ph. D. Qualifying Examination.
- The student must pass the comprehensive exam before the date the qualifier is given at the beginning of his/her fourth year.
- A copy of the written proposal should be given to each committee member at least two weeks prior to the scheduled oral examination.

### Selection of the Comprehensive Examination Committee

The Comprehensive Examination Committee will be determined by the advisor, in consultation with the student. This committee must be approved by the Departmental Executive Officer and will also serve as the student's Final Examination Committee.

The Comprehensive Examination Committee will consist of five members as follows:

- the student's advisor, who will serve as chair of the committee;
- three additional members from the Department of Physics and Astronomy;
- one member from outside the Department.

Once the Committee has been approved by the DEO and at least two weeks prior to the exam, the following information is provided to Debbie Foreman:

- names and titles of committee members;
- date, time and location of exam (the location is scheduled with Heather Mineart in 203 VAN);
- completed Doctoral Plan of Study (form obtained from Debbie).

### Format of the Comprehensive Examination

The comprehensive examination is an evaluation of the prospective thesis topic and the student's mastery of subjects in the research area of the proposed thesis. The examination will consist of a written thesis proposal and an oral defense of the proposal to the Comprehensive Examination Committee.

The proposal, which should be prepared in close consultation with the student's advisor, must demonstrate significant and thoughtful consideration of the thesis problem and clear evidence that the student is prepared to embark on research in the proposed area.

While the details of the proposal format are intended to be flexible, it is strongly suggested that the student include the following elements:

- 1) an overview of the proposed research
- 2) a clear statement of why the problem addressed by the research is important
- 3) a survey of related literature
- 4) a discussion of the placement of the proposed research in context with previous related research
- 5) an outline of methodology to be used, and
- 6) an overview of any progress to date.

The general guidelines of the Graduate College apply to all other aspects of the examination.

## 2.7. Review of Requirements for the PhD degree

Complete the departmental course requirements/find an advisor/do research/write thesis/complete 72 hours of credit and handle all of the paperwork to satisfy these requirements. The [UI Catalog](#) has all of these requirements listed. Please be sure that Debbie Foreman, Graduate Records Secretary, has copies of everything you do for this.

### **Comprehensive Exam**

Prepare for comprehensive exam, ideally by the end of the third year, in consultation with your research advisor. Note, the comprehensive exam cannot be taken in the same semester as the thesis defense, and you must be registered during the semester you do the comprehensive exam. (Usually you'd be enrolled, but you may not always be enrolled in the summer semester. If you do your comps in the summer, you must be enrolled.) Complete a plan of study: <http://www.grad.uiowa.edu/sites/default/files/DPos.pdf> and send with a copy of student record, current registration and Request for Doctoral Comprehensive Examination <http://www.grad.uiowa.edu/sites/default/files/CompExam.pdf>

After passing the comprehensive exam, the exam report must be filed (copy to Debbie Foreman) and continue research under supervision of the research advisor.

### **Prepare PhD Thesis and Thesis Defense**

You and your advisor will decide when to plan for the final thesis defense. One of the first deadlines is the "first deposit" to the Graduate College (see below for deadlines) in which a substantially complete draft of your thesis is due. It must follow various formatting rules, see, <http://www.grad.uiowa.edu/theses-and-dissertations/graduate-college-thesis-manual> for details. A latex style file is available to those interested at <http://www-hep.physics.uiowa.edu/~reno/dissertation/>

Note that you must be a registered student in the semester in which you graduate (register for 0-2 or more sh of credit). In fact, students must have continuous registration after completing the comprehensive exam (summers excepted, unless you wish to graduate in the summer).

Generally, the complete PhD thesis is sent to committee members at least two weeks in advance of the thesis defense date. Requesting the thesis defense is done with <http://www.grad.uiowa.edu/sites/default/files/AdvancedDegreeForms.pdf>  
See deadlines for when this final exam report is due. Please be sure that Debbie Foreman gets a copy.

Sometimes the final exam is passed, but the thesis needs revisions before the thesis is signed. To graduate in a given semester, the thesis final deposit needs to be turned in before the final deposit deadline. Sometimes the final deposit is done in a subsequent semester. Summer degrees are awarded, but no summer graduation ceremonies are held. If you make your final thesis deposit after the final deposit deadline, but before the first day of classes in the new semester, you may register "Postcomprehensive registration" which has minimal fees.

### **Graduate College Deadlines**

<http://www.grad.uiowa.edu/deadlines> for graduation applications, final exam requests, thesis first deposit, final exam report and thesis final deposit.

Fees <http://www.grad.uiowa.edu/theses-and-dissertations/graduation-thesis-related-fees>