

**UNIVERSITY OF DENVER
DEPARTMENT OF PHYSICS AND ASTRONOMY**

**GENERAL INFORMATION FOR GRADUATE STUDENTS IN PHYSICS AND
ASTRONOMY**

The Department of Physics and Astronomy Graduate Program Committee has compiled the following information to guide you through the process of earning graduate degrees in physics. The information given in this document may be changed at any time. The most current information is posted at the Physics & Astronomy Department web pages. If you have any questions, you should consult your advisor.

I. BULLETIN

The University of Denver Graduate Bulletin contains detailed information about the requirements for graduate degrees. The Office of Graduate Studies has the most current version: <http://bulletin.du.edu/graduate/gradpolicy/>
You should read carefully the relevant parts and thoroughly acquaint yourself with the procedures and requirements pertaining to the degree you seek. Your advisor will assist you in every way; however, it is your responsibility to make sure that all the requirements are met in timely fashion.

II. ADVISING

The department is eager to help you to go through the formalities of earning degrees. It is to your advantage to complete course work and general examinations as early in your program as you can and to select a research area in which to do your thesis and dissertation work. To assist you in this, the department has established the following advising procedure.

A. INITIAL ADVISOR

Your initial advisor will be Dr. Mercedes Calbi (303.871.3547, mcalbi@du.edu).

You must see your advisor each quarter before registration to plan the courses you will take. If you wish to add or drop any of these courses for any reason, you must get your advisor's signature. Your advisor can help you better if he or she is knowledgeable about your goals, your work, and the progress you are making in your degree program.

B. INTRODUCTION TO RESEARCH

During your first year, you will register in a 3-course sequence, *Introduction to Research* (PHYS 4001-3). This sequence is designed to provide incoming graduate students with the basic tools and advisement to conduct independent research and practice your oral and written communication skills. In the fall (PHYS 4001), by the end of the second week of classes, you will be required to choose a faculty member to work on your first research project. This faculty member may not necessarily be your final dissertation research advisor as described below.

C. RESEARCH ADVISOR

After you pass the written part of the Comprehensive Examination, the department encourages you to select a thesis or dissertation research area, unless you are seeking an M.S. degree without thesis. You should plan to see several faculty members and find a professor who will agree to accept you to do research in a mutually agreeable area. You should try to complete this process within one quarter after you pass the written part of the Comprehensive Examination. This faculty member will then become your advisor. (A non-thesis M.S. student may remain with his or her initial advisor.) You and your advisor must then form a Research Advisory Committee who will guide you to the completion of your remaining degree requirements.

III. REGISTRATION

You are normally required to register for a full load (minimum of 8 quarter hours) every quarter in consultation with your advisor.

IV. DEPARTMENTAL EXAMINATIONS

A. COMPREHENSIVE EXAMINATION

All graduate students are required to take the Graduate Comprehensive Exam during the Winter Quarter of their second year. Incoming graduate students with graduate credits that have been transferred from another institution may petition the Graduate Committee to take the Graduate Comprehensive Exam during their first year as a graduate student. The Exam has two components, one Written and one Oral. Further guidelines are as follows:

I. Choosing the Topic:

The topic for the Exam is proposed by the student and must be approved by the Graduate Committee. The topic for the Exam is clearly distinct from that of the primary research of the student. The Topic Proposal consists of a one-paragraph overview of the topic that briefly describes its importance to Physics and Astronomy and the elements of core graduate-level topics that it entails. Before the final submission of the topic, consultation with the Graduate Committee Chair and the research advisor to guide the choice of the topic is strongly advised. The deadline for submission of the Topic Proposal is the end of the 8th week of class of the Autumn Quarter.

II. Written Part:

For the Written component, the student will prepare a summary paper of >2500 words in length, due by March 31st. The paper should describe in detail the key elements of core graduate-level topics within the topic and how they are manifested and integrated into the particular field of study. The paper should specifically address a particular aspect of the chosen topic.

III. Oral Part:

The Oral component is based on the Written component, but may also address related topics in the student's Core graduate coursework. It consists of a ~30 minute presentation on the topic by the student, followed by questions from the Committee. All revisions of the Written component and the Oral component must be completed by the end of the second week of May.

IV. Possible Outcomes:

The possible outcomes of the Exam, as decided by the Comprehensive Exam Committee, are: Pass at PhD level, Pass at MS level, and Fail. The outcome of the Exam and a written analysis of the performance will be provided to the student.

If the outcome of the Exam is not satisfactory, a second and final attempt can be undertaken. This would normally take place during the following year's Exam sequence. Administration of the Exam at an earlier date is possible if extenuating circumstances exist and if approved by the Graduate Committee.

B. MASTER'S FINAL EXAMINATION

Students seeking the Master of Science degree in physics must pass the M.S. Final Examination. This examination is oral. For thesis-option students, the examination is primarily a thesis defense (see below). For non-thesis option students, the examination will primarily cover your course work.

C. DISSERTATION RESEARCH PROPOSAL

Students who hold the preliminary Ph.D. candidacy (after passing the comprehensive examination at the PhD level) are required to give an oral presentation on his or her

proposed Dissertation research in front of the Dissertation Committee so that the Dissertation Committee can assess if the proposed research is appropriate to grant a Ph.D. degree when completed as proposed.

This examination is based on the content of the proposed Dissertation research of the Candidate. At the presentation, the Dissertation Committee may ask any questions, particularly those relating to the proposed Dissertation research areas of the candidate.

This examination is administered by the Dissertation Committee at least one year prior to the expected term of graduation. However, it is recommended to have this examination done as soon as the outline of the research is formulated by the Candidate and his or her Research Advisor and preliminary results have been obtained.

After passing this examination successfully, the student is advanced to the final PhD Candidacy, and the Office of Graduate Studies must receive the Dissertation Oral Defense Committee Recommendation Form within 30 calendar days.

D. M.S. THESIS AND Ph.D. DISSERTATION DEFENSE

This is an oral examination, given by your research committee. The examination is chaired by a faculty member outside the Physics and Astronomy Department who is appointed by the Vice Provost for Graduate Studies. Your committee decides whether your thesis or dissertation is acceptable as submitted or requires revisions. Information regarding the preparation of theses and dissertations can be obtained from the Department of Physics and Astronomy Assistant or Secretary. See the Graduate Bulletin for further details regarding theses and dissertations.

V. COURSES REQUIRED FOR THE M.S. and Ph.D. DEGREES

You and your advisor (or advisory committee, once formed) have the responsibility of establishing a course of study for the advanced degree sought. The particular series of courses will vary somewhat with your interests, background, and desired goals.

Your committee may require you to satisfy a foreign language or other tool requirements, such as computer programming competence, as described in the Graduate Bulletin.

PH.D. DEGREE

Degree Requirements:

- 90 graduate-level quarter hours, of which a minimum of 60 must be in Physics and Astronomy
- Maximum of 60 hours of transfer work (45 for earned masters + 15 hours after the masters was earned)
- Minimum GPA: 3.0
- Minimum grade for individual courses counted toward degree: C-. No more than one-fourth of the hours accepted toward the degree may be of C+, C, or C- grade.

Non-Course Requirements:

- Regular attendance at Physics and Astronomy colloquia
- Present a colloquium each year based on student's current research
- Qualifying Examination
- Preliminary Doctoral Advancement to Candidacy
- Formation of a Doctoral Advisory Committee
- Comprehensive Examination
- Final Doctoral Advancement to Candidacy
- Dissertation
- Oral Examination in defense of dissertation

Course Requirements:

A minimum of 90 credit hours beyond the baccalaureate including:

PHYS 4611, 4612 Quantum Mechanics I, II
PHYS 4511 Advanced Dynamics
PHYS 4551, 4552 Mathematical Physics I, II
PHYS 4611, 4612 Advanced Electricity and Magnetism I, II
PHYS 4811 Statistical Mechanics

Students may omit one or more of these courses if content mastery is demonstrated by transfer credit or individual examinations. PHYS 3111, 3112, 3113 Quantum Physics I, II, III and PHYS 3711 Optics I may be applied to the degree. Other 3000-level PHYS courses and graduate-level courses in other departments may be applied to the degree, with the approval of the departmental Graduate Committee or the student's Doctoral Advisory Committee.

M.S. DEGREE

Track: **THESIS TRACK**

Degree Requirements:

- 45 graduate-level quarter hours in an approved course of study, of which a minimum of 30 must be in Physics and Astronomy
- Maximum of 10 hours of transfer work
- Minimum GPA: 3.0
- Minimum grade for individual courses counted toward degree: C-. No more than one-fourth of the hours accepted toward the degree may be of C+, C, or C- grade.

Non-Course Requirements:

- Regular attendance at Physics and Astronomy colloquia
- Present a colloquium each year based on student's current research
- Qualifying Examination
- Advancement to Candidacy
- Formation of a Masters Advisory Committee
- Thesis
- Oral Examination in defense of thesis

Course Requirements:

A minimum of 45 credit hours beyond the baccalaureate, including:

PHYS 4511 Advanced Dynamics
PHYS 4551 Mathematical Physics I
PHYS 4611 Advanced Electricity and Magnetism I
PHYS 4811 Statistical Mechanics

Students may omit one or more of these courses if content mastery is demonstrated by transfer credit or individual examinations. PHYS 3111, 3112, 3113 Quantum Physics I, II, III and PHYS 3711 Optics I may be applied to the degree. Other 3000-level PHYS courses and graduate-level courses in other departments may be applied to the degree, with the approval of the departmental Graduate Committee or the student's Masters Advisory Committee.

Track: **NON-THESIS TRACK**

Degree Requirements:

- 45 graduate-level quarter hours in an approved course of study, of which a minimum of 30 must be in Physics and Astronomy
- Maximum of 10 hours of transfer work
- Minimum GPA: 3.0
- Minimum grade for individual courses counted toward degree: C-. No more than one-fourth of the hours accepted toward the degree may be of C+, C, or C- grade.

Non-Course Requirements:

- Regular attendance at Physics and Astronomy colloquia
- Qualifying Examination
- Advancement to Candidacy
- Formation of a Masters Advisory Committee

- Oral Examination

Course Requirements:

A minimum of 45 credit hours beyond the baccalaureate, including:

PHYS 4511 Advanced Dynamics

PHYS 4551 Mathematical Physics I

PHYS 4611 Advanced Electricity and Magnetism I

PHYS 4811 Statistical Mechanics

Students may omit one or more of these courses if content mastery is demonstrated by transfer credit or individual examinations. PHYS 3111, 3112, 3113 Quantum Physics I, II, III and PHYS 3711 Optics I may be applied to the degree. Other 3000-level PHYS courses and graduate-level courses in other departments may be applied to the degree, with the approval of the departmental Graduate Committee or the student's Masters Advisory Committee.

By signing below, I acknowledge that I have read and understood this document.

Signature

Date