

Graduate Curriculum and Guidelines

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This document serves as a guideline for graduate (M.S. and Ph.D.) students in the Physics and Astronomy department at DU. It lays out the basic structure of the graduate curriculum, including examinations, coursework, and other degree requirements. It is not meant to be exhaustive, as there is no exact path in one's graduate career: many factors contribute to a student's success. The faculty intend that each student will be continuously mentored throughout his or her graduate career so that his or her achievements can be recognized and any potential difficulties predicted and avoided. If you have any questions about this document, please discuss them with your adviser or any other faculty member.

Diagnostic Examination

Diagnostic Examination is a scholastic aptitude placement test only to assess students' scholarly readiness upon joining the program and will not enter into their grades. All incoming students are required to take this examination before their first Autumn quarter registration, regardless of their prior undergraduate and graduate (if transferring) work. Because the results of this examination will shape the first few years of their graduate career, students are advised to take this examination seriously.

Content:

The examination is based on undergraduate physics material (Mechanics, E&M, Thermal Physics & Modern Physics). Problems in this examination are based on material in the corresponding undergraduate level courses that were taught at DU in the previous academic year. Therefore, the problems in this examination are prepared by the current instructors for approval by the Graduate Committee.

Administered:

The examination is administered on the first day of business in September by the Graduate Committee.

Possible Outcome:

None. This examination is solely for informational purposes and will not enter into students' grades. The Graduate Committee will inform the outcome of the examination to students immediately after the examination and the Graduate advisor will discuss options with students individually in order to design academic plans during their first few years in the program.

Special Cases:

The graduate committee may recommend students who performed exceptionally well on Diagnostic Examination to take Comprehensive Examination immediately after joining the Graduate Program for a possible waiver from the Core Course requirements (also see Special Cases under Comprehensive Exam).

Graduate Core Courses

Physics & Astronomy Graduate Core Courses are the following 12 courses (27 qtr hrs) that all students are expected to take during the first year in the program:

PHYS 4511	Advanced Dynamics	4 qtr hrs
PHYS 4611, 4612	Advanced Electricity and Magnetism I, II	3 qtr hrs for 2 qtrs
PHYS 4111, 4112	Quantum Mechanics I, II	3 qtr hrs for 2 qtrs
PHYS 4811	Statistical Mechanics	4 qtr hrs
PHYS 4011	Introduction to Research I	2 qtr hrs (nominally)
	Students will review essential material in mathematical physics and learn basic research skills, including literature search, programming and scientific writing. Towards the end of the quarter students select a faculty member with whom to take on a Winter Research Project to be conducted during the Winter Interterm and Winter quarter. A research proposal for the Winter Research Project has to be prepared by students.	
PHYS 4012	Introduction to Research II	1 - 3 qtr hrs
	Students continue their research training with a faculty member of their choosing.	
PHYS 4013	Introduction to Research III	2 qtr hrs (nominally)
	Students will develop scientific communication skills further by presenting results of the Winter Research Project at the Departmental Colloquia and writing a term paper.	

Core Course Sequence

Autumn	Winter Interterm	Winter	Spring
Adv. Dynamics (4 qtr hrs)		E&M 1 (3 qtr hrs)	E&M 2 (3 qtr hrs)
QM 1 (3 qtr hrs)		QM 2 (3 qtr hrs)	Stat. Mech. (4 qtr hrs)
Intro Research 1 (2 qtr hr)	Winter Research	Intro Research 2 (3 qtr hrs)	Intro Research 3 (2 qtr hr)

Graduate Courses beyond the Core

Each student and his or her advisor (and/or his or her Master's/Dissertation Committee, once formed) have the responsibility of establishing a course of study for the advanced degree sought. The particular series of courses will vary depending on desired goals. However, normally the core courses may be followed by advanced core courses (e.g. QM III, E&M III), introductory courses to specialized topics (e.g. Astrophysics/Biophysics/Condensed Matter sequences) and independent study/research to further one's specialization and complete Master's Thesis/Dissertation.

Comprehensive Examination

Comprehensive Examination is given to assess whether students have attained the standards set by the Department to continue their pursuit of the degrees sought. All students are required to pass Comprehensive Examination at an appropriate level (M.S. or Ph.D.) upon completing the Core Course Requirements in order to advance their candidacy status, as described in the University Policies and Procedures.

Content:

Comprehensive Examination consists of four modules, each of which is based on each of the four Core Courses (Dynamics, E&M, QM & Stat. Mech.). Problems in Comprehensive Examination are prepared by the instructors of the corresponding Core Courses that were taught in the previous academic year for approval by the Graduate Committee. Students are encouraged to obtain copies of past examinations from the Department Office so that the nature and level of problems in the examination may be understood.

Administered:

Comprehensive Examination is administered on two consecutive days in early September. This examination is modular and students are required to pass all four modules by the beginning of their third year in the program. Pass/Fail is determined for each module, and all modules must be passed at the desired Candidacy level. Students have no more than two chances to take this examination, and petition is required for the second try. The Graduate Committee will inform the outcome of the examination to students immediately after the examination and the Graduate advisor will discuss options with students individually.

Possible Outcome:

- (1) Fail
- (2) Pass at the M.S. level: Advancement to Candidacy
- (3) Pass at the Ph.D. level: Advancement to Preliminary Candidacy

Upon passing the exam, students at the M.S. level must decide the track to pursue (Non-Thesis or Thesis). In addition, the Master's Committee (at the M.S. level) or the Dissertation Committee (at the Ph.D. level) needs to be formed and be approved by the Graduate Committee.

Special Cases:

If an incoming student (who elected to take Comprehensive Examination upon joining the Graduate Program) passes Comprehensive Examination at the Ph.D. level, he or she will be waived from the Core Course requirements except for the Introduction to Research Sequence. When an incoming student elects to take Comprehensive Examination upon joining the Graduate Program, it will not count as one of the two chances that students nominally have to take Comprehensive Examination.

However, an incoming student who is transferring from other graduate program is required to take Comprehensive Examination upon joining the Graduate Program and it will be counted as one of the two chances to take Comprehensive Examination.

If a student earns a 4.0 GPA after completing the Core Course requirement, Comprehensive Examination may be waived upon approval by the Graduate Committee.

Dissertation Research Proposal

Students who hold the preliminary Ph.D. candidacy 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.

Content:

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.

Administered:

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.

Possible Outcome:

- (1) Fail
- (2) Pass: Advancement to Candidacy

Thesis/Dissertation Defense

Students who hold the M.S./Ph.D. Candidacy are required to give an oral presentation on his or her Thesis/Dissertation research in front of the Dissertation Committee so that the Dissertation Committee can assess if the Thesis/Dissertation research has attained appropriate qualities for the degree being sought.

Content:

This examination is based on the content of Thesis/Dissertation presented by the Candidate. The Candidate gives a presentation on his or her Thesis/Dissertation in front of the Master's (for the M.S. level Thesis Track) or Dissertation (for the Ph.D. level) Committee. At the Defense, the Master's/Dissertation Committee may ask any questions, particularly those relating to the Thesis/Dissertation research areas of the candidate. For the Ph.D. level, a first-author paper by the Candidate should have been published or accepted for publication (including preliminary acceptance with revision) in a peer-reviewed journal by the scheduled examination.

Administered:

This examination is administered by the Master's (for the M.S. level Thesis Track) or Dissertation (for the Ph.D. level) Committee at least three weeks before the end of the term in which the degree is to be granted. A copy of the Candidates Thesis/Dissertation has to be provided to all members of the Committee at least two weeks prior to the scheduled examination.

The examination is chaired by a faculty member outside the Physics and Astronomy Department who is appointed by the Vice Provost for Graduate Studies. The committee decides whether the Candidate's thesis or dissertation is acceptable as submitted or requires revisions. Information regarding the preparation of theses and dissertations can be obtained from the research advisor. All Candidates are expected to familiarize themselves with all the requirements by consulting the Graduate Bulletin and University Policies and Procedures regarding theses and dissertations.

Possible Outcome:

- (1) Fail
- (2) Pass: M.S./Ph.D. degree to be granted upon request

M.S. level Non-Thesis Track Exit Examination

Students on the M.S. level Non-Thesis Track are required to pass this oral examination as an exit examination upon completion of the required course work.

Content:

This examination is an exit exam, in which the Master's Committee may ask the Candidate any questions relating to the material covered in the Graduate Program. In general, the nature and level of problems in the examination are similar to Comprehensive Examination.

Administered:

This examination is administered by the Master's Committee and has to be administered at least three weeks before the end of the term in which the degree is to be granted.

Possible Outcome:

- (1) Fail
- (2) Pass: M.S. degree to be granted upon request

Major: PHYSICS AND ASTRONOMY

Degree: PhD

Degree Requirements:

- 90 graduate-level quarter hours, of which a minimum of 60 must be in Physics and Astronomy
- Good academic standing: a GPA of 3.0 or higher
- No grades lower than C- are accepted toward the degree
- 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 the Physics and Astronomy Colloquia
- Presentation at the Physics and Astronomy Colloquia
- Comprehensive Examination
- Advancement to Preliminary Candidacy at the Ph.D. level
- Formation of the Dissertation Committee
- Dissertation Research Proposal
- Advancement to Candidacy at the Ph.D. level
- Dissertation
- Publication (or acceptance for publication) of a First-Author Paper in a Peer-Reviewed Journal
- Dissertation Defense

Course Requirements:

A minimum of 90 quarter hours including the Graduate Core Courses, which constitute 27 quarter hours.

Both 4000 (Graduate) and 3000 (Advanced Undergraduate) level courses may be applied toward the degree, with the approval of the Graduate Committee or the Master's/Dissertation Committee.

Major: PHYSICS AND ASTRONOMY

Degree: M.S.

Track: THESIS TRACK

Degree Requirements:

- 45 graduate-level quarter hours, of which a minimum of 30 must be in Physics and Astronomy
- Good academic standing: a GPA of 3.0 or higher
- No grades lower than C- are accepted toward the degree
- 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 the Physics and Astronomy Colloquia
- Presentation at the Physics and Astronomy Colloquia
- Comprehensive Examination
- Advancement to Candidacy at the M.S. level
- Formation of the Master's Committee
- Selection of a Master's Thesis Topic
- Master's Thesis
- Thesis Defense

Course Requirements:

A minimum of 45 quarter hours including the Graduate Core Courses, which constitute 27 quarter hours.

Both 4000 (Graduate) and 3000 (Advanced Undergraduate) level courses may be applied toward the degree, with the approval of the Graduate Committee or the Master's/Dissertation Committee.

Major: PHYSICS AND ASTRONOMY

Degree: M.S.

Track: NON-THESIS TRACK

Degree Requirements:

- 45 graduate-level quarter hours, of which a minimum of 30 must be in Physics and Astronomy
- Good academic standing: a GPA of 3.0 or higher
- No grades lower than C- are accepted toward the degree
- 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 the Physics and Astronomy Colloquia
- Presentation at the Physics and Astronomy Colloquia
- Comprehensive Examination
- Advancement to Candidacy at the M.S. level
- Formation of the Master's Committee
- Exit Examination - Oral Part

Course Requirements:

A minimum of 45 quarter hours including the Graduate Core Courses, which constitute 27 quarter hours.

Both 4000 (Graduate) and 3000 (Advanced Undergraduate) level courses may be applied toward the degree, with the approval of the Graduate Committee or the Master's/Dissertation Committee.