NEW YORK UNIVERSITY
DEPARTMENT OF PHYSICS

Advanced Degree Programs

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1. **Ph.D. PROGRAM**

The Ph.D. program is aimed at enabling a student to prepare for and carry out research in physics at the frontier of knowledge. The Department encourages entry into dissertation research under the supervision of a faculty member as soon as one has attained sufficient mastery of the fundamental principles and techniques of physics. Depth and breadth within the larger context of contemporary physics are promoted by a flexible set of course requirements. Numerous seminars and the weekly Physics Colloquium provide an excellent opportunity for students to keep abreast of recent developments across the full spectrum of physics research. Special talks by faculty members describing their research programs help students learn about research activities in the department.

Entering students who qualify for admission to the Ph.D. program are offered a five-year departmental financial aid package with a commitment of at least 2 semesters of part-time teaching duties. Departmental support may be withdrawn if a student is deemed not to be making adequate progress toward fulfilling the degree requirements. Students who need more than 5 years to complete their degree requirements can apply for research assistantships and a limited number of fellowships without teaching duties.

2. **Ph.D. REQUIREMENTS**

2.1 **Core course requirements**

The aim is to certify the student's mastery of a traditional body of basic principles and problem-solving techniques generally considered to be an essential part of a research physicist's training. To this end, a student in the Ph.D. program is required to get a B or better in each part of 5 core subjects:

- Dynamics
- Statistical Mechanics
- Electromagnetism
- Quantum Mechanics (Parts I and II)
- Computational Physics

2.2 **Options for satisfying core course requirements**

A student who has taken a course elsewhere which is equivalent to one of our core courses need not enroll in that course. He or she may satisfy the relevant requirement in either of two ways:

- by achieving an average grade B or better based on the midterm and final examinations of the course, or

- by achieving a grade of B or better in the relevant preliminary examination given just before the start of the fall term. Each examination is designed to be completed in approximately 2 hours (3 hours are allowed, to avoid time pressure), and covers the material of the corresponding course at the level of the midterm and final examinations.
2.3 Deadline for core course requirements

To be considered to be making satisfactory progress toward the Ph.D., a student must complete all core course requirements by the beginning of his/her second year. If a student fails to get a B or better in a core course (or in one of the alternative options) during his/her first academic year, he/she is obliged to take the relevant preliminary examination just prior to the start of his/her second year. If one or more of the core course requirements are not satisfied at the start of the student's second year, the Ph.D. Qualification Committee will review the student's entire record and will decide what action to take. Such action might include a recommendation to the faculty that the student be discontinued from the Ph.D. program. Termination of student from the program requires a vote of the faculty.

2.4 Experimental Physics requirement

Students are required to have experience in experimental physics. This requirement may be satisfied by taking the course G85.2075 Experimental Physics. Alternatively, a student may conduct an independent project under physics faculty supervision, involving lab work or data analysis. More information on this latter option will be available and distributed in the near future.

2.5 Course requirements beyond the core

A student is required to take at least 6 courses (not including reading and research courses or the Practicum) in the Physics Department beyond the core level. At least 2 of these courses must be outside the student's research area. For the purpose of satisfying this requirement, the Experimental Physics course counts as one of the outside-the-area courses.

2.6 Requirements of the Graduate School

A student must also satisfy the following requirements of the Graduate School of Arts and Science: completion of 72 points of graduate credit (at least 32 in residence at the Graduate School) and a cumulative GPA of B (3.0) or better.

2.7 Formation of a Thesis Committee

By the beginning of May of the student's second year, the student is expected to have arranged for thesis supervision with a member of the Physics faculty.

A four-person Thesis Committee, chaired by the thesis advisor, is set up at this time. The membership of the Thesis Committee is proposed by the advisor in consultation with his/her student, and must be approved in writing by the DGS to insure breadth and level of expertise.

At the time of its formation, the Thesis Committee will meet with the student and discuss his/her course of study, preliminary research plans, and the timing and scope of the Oral Qualifying Examination (see below). The committee will conduct an annual review of the student's progress, normally in January.
2.8 Oral Qualifying Examination

The Qualifying Examination marks the student's formal entry into dissertation research under the supervision of a particular faculty member. It takes place after the student has already embarked on some sort of preliminary research with his or her advisor, and is administered by the student's Thesis Committee. The deadline for taking the Oral Qualifying Examination is January of a student's third year, prior to the annual review.

The examination itself consists of a prepared talk by the candidate followed by a question period. The aim is to examine the student's mastery not only of the specific area of the student's intended research, but also of related areas of physics, and of (relevant) general principles of physics. The committee decides whether the evidence, taken all together, presents a convincing picture of a person with the preparation and skills needed to do original scientific research in the proposed area.

2.9 Annual review, progress report, thesis proposal

There is an annual review of each student's progress toward the Ph.D. This includes a progress report submitted by the student. Prior to the formation of a Thesis Committee, the review is conducted by the Ph.D. Qualification Committee. Afterwards, the student's Thesis Committee conducts the review. The first annual progress report following the Qualifying Exam includes a formal proposal for the student's thesis research and the report of the Qualifying Exam Committee. Subsequent progress reports inform the committee on progress toward completion of the thesis, as well as on any significant modifications of the original proposal.

2.10 Oral Thesis Defense

The final approval of the student's thesis, and the oral thesis defense, is conducted by the student's Thesis Committee, augmented by one additional faculty member. Three members of the examining committee, including the student's advisor, serve as readers of the dissertation.

3. M.S. REQUIREMENTS

All candidates for the M.S. degree must achieve 32 points of credit, at least 24 in residence at the Graduate School, at least 16 points in the Physics Department, and a GPA of B (3.0) or better. They are further required to pass at least 5 of the following 7 courses:

- Dynamics (G85.2001)
- Statistical Mechanics (G85.2002)
- Electromagnetism (G85.2005)
- Quantum Mechanics I and II (G85.2011,2012)
- Experimental Physics (G85.2075)
- Computational Physics (G85.2000)
M.S. candidates are permitted to take at most 2 courses outside the Department, with permission of the Director of graduate Studies. In addition to the above course requirements, M.S. candidates complete their degree requirements via one of three options:

**Option A: Report**

The report is essentially a comprehensive review article based on the literature in a specialized field of physics, prepared under supervision of a faculty advisor. In addition to submitting the report, students choosing this option must receive credit for 9 regular courses (one-semester, 4-point courses, not including reading and research).

**Option B: Thesis**

The thesis is based on physics research (experimental or theoretical) supervised by a faculty advisor, at a level of originality and comprehensiveness less than that of Ph.D. research. In addition to the standard course requirements, the student is expected to enroll in one semester of a research course (G85.3301-4 or G85.2091-4).

**Option C: Examination**

In addition to receiving credit for 8 regular courses (one-semester, 4-point courses, not including reading and research), a student choosing this option must complete the core courses (those listed in Section 2.1) with an average grade of B or better. For each course the student has the option of

- enrolling in the course
- taking the midterm and final examination of the course if the student is not enrolled
- taking the relevant preliminary examination, given just before the start of the Fall term

4. **TEACHING REQUIREMENT AND THE PRACTICUM**

As part of the standard financial aid package, every Ph.D. student is committed to at least 2 semesters of part-time teaching. Prior to commencing their teaching duties, students are required to enroll in the Department's preparatory non-credit course, the Practicum.

5. **COLLOQUIA, SEMINARS, AND OTHER MEETINGS**

All full-time graduate students are expected to attend the weekly Physics Department Colloquium on a regular basis as part of their graduate studies. Part-time students should also try to arrange their schedules so as to be able to attend. The Colloquium meets Thursday afternoons at 4 p.m., with refreshments served at 3:30 p.m.

The speakers at the Colloquium are usually experts in some field of physics from outside the Physics Department. They are asked to present a general talk on their work that, if at all possible, is understandable to a diverse audience of graduate students and faculty. Even if the colloquium is only partly understandable to the student, there is really no better way for a person
interested in physics to keep abreast of, or at least to begin to learn about, recent developments than by regular attendance at the Colloquium.

Students will also want to attend one or more of the specialized seminars. The announcements of all seminars and the Colloquium are made by way of the Physics Department Bulletin, which is posted throughout the building, as well as on the Department's web site.

Through a series of Physics, Beer and Pizza Seminars, members of the Physics Department share with each other, in an informal setting, some of the flavor and excitement of our current research. Speakers are Physics Department faculty, postdocs and advanced grad students (and, on occasion, visitors or alumni). These seminars give graduate students a good idea of the ongoing research in the department, which often helps in the choice of a research advisor. Talks are strictly limited to 30 minutes plus questions (so that there is time for informal conversation over pizza, soft drinks and beer) and are pitched to the level of a first-year grad student.

Annually or biennially the Physics Department hosts the James Arthur and Stanley H. Klosk lectures. The endowed lectures bring to the Department particularly prominent people from this country and abroad. Graduate students can profit greatly from these special lectures.

There is a coffee/tea hour every afternoon in the Physics department. The location and hour can be learned in the Physics department office. These informal meetings provide an opportunity to meet faculty and staff of the Physics department as well as other graduate students.

A full time student who has never been a member of the American Physical Society (APS) can join free for one year, and order one journal at the reduced student rate. This one year free membership includes Physics Today and APS NEWS. See the Graduate Secretary for details and forms.

6. FULL-TIME STATUS

To allow students to begin their research soon after admission, full-time status will require at least 8 credits of course work per semester for the first two years. Thereafter, full-time status is assigned when courses, research, or examination preparation combine to require at least 40 hours per week.

7. MAINTAINING MATRICULATION

A student who has completed course and language requirements may remain registered either by the payment of the Maintenance of Matriculation fee each semester (2 times a year) or by registering for a single course in any semester (once a year). (Note: A summer session course is considered to be part of the school year begun the previous September).

Students maintaining matriculation, if they qualify, may be certified as "full-time" or "half-time" for a limited period by completing a "full-time/half-time" maintaining matriculation form, and having the approval of the appropriate department and Graduate School officers. Students who wish further information on this point should consult the Director of Graduate Studies.
8. DEPARTMENT WEB SITE

The web site, www.physics.nyu.edu, provides a storehouse of information concerning the life of the Physics Department. Some of the features to be found there are:

a) Most of the information in this booklet
b) Additional information about the graduate program
c) Information and course syllabi concerning upcoming preliminary examinations
d) Directory of faculty, students, research personnel, staff, including office locations, phone numbers, e-mail addresses
e) Information about the Department's research groups
f) Schedule of events: colloquia, seminars, etc.
g) Information concerning the university, neighborhood, city of New York
h) Links to useful research resources, including library databases, electronic journals
i) Tutorials, online manuals, helpful hints concerning the Department's computer resources and scientific computing in general.