

Department of Physics – NIU – Graduate Manual  
April 2009

This manual covers procedures and guidelines for graduate students in the Department of Physics at Northern Illinois University. It is a supplement to the physics section of the Graduate Catalog. It includes catalog changes which were approved last year but are not yet in the Graduate Catalog.

I. Course Offerings

A. Core

PHYS 600 Classical Mechanics – every fall  
PHYS 660 Quantum Mechanics I – every fall  
PHYS 661 Quantum Mechanics II – every spring  
PHYS 663 Statistical Physics – every spring or summer  
PHYS 670 Electromagnetic Theory I – every spring  
PHYS 671 Electromagnetic Theory II – every fall

B. Distribution

PHYS 666 Solid State Physics I – at least every other year  
PHYS 667 Solid State Physics II – at least every other year  
PHYS 673 Beam Physics I – at least every other year  
PHYS 680 Introduction to Nanophysics – probably every year  
PHYS 683 Beam Physics II – every other year as needed  
PHYS 684 Introduction to High Energy Physics – at least every other year  
PHYS 686 Phenomenology of Particle Physics – every third year  
PHYS 790 Special Topics in Physics – many times each year

The core courses will be scheduled so that each is in the late afternoon or evening every other year, staggered so two or three are so available each year. Other courses will be offered when appropriate with the distribution courses listed above scheduled more regularly. The PHYS 790 sequence are “technique” courses covering (A) solid state physics, (B) particle physics, (C) nanophysics, (D) beams physics, and (E) other topics such as medical physics. Usually 1-3 sections of PHYS 790 are offered each year and are at a level such that both first year and more advanced students will benefit from taking the class. PHYS 790 can be taken more than once.

Course requirements for different programs are given in the Graduate Catalog. The Ph.D. requirements require that a student take at least five out of the six core courses noted in the list above. Ph.D. students are also required to take at least 12 hours of distribution courses from those listed above and others approved by their thesis advisor. This can include up to 9 hours in courses from engineering, biology, chemistry or geology. The course requirements for the specialization in nanoscience are a subset with the core course requirement essentially the same (660, 661, 663, 670, and either 600 or 671). For the distribution, 680 is required and then three from (PHYS 600, PHYS 666, PHYS 667, PHYS 671, PHYS 768, PHYS 790A, CHEM 600, CHEM 641, CHEM 642, MEE 611, MEE 634, MEE 650, MEE 692). The courses for the M.S. specialization in Applied Physics

have also been changed. They now require three from (530, 563, 574, 575, 580, 680, 790) and two from (600, 660, 663, 666, 673).

## II. Assistantships

Students accepted into the program without a masters degree and offered a full-time assistantship by the Department will receive two academic years (9 months each) of support from the Department provided they remain in good standing. Summer support is typically provided through research assistantships funded through individual faculty support. A limited amount of summer support is sometimes available through departmental funds. Students entering with a M.S. degree in physics need to establish a research program during their first year. A second year of departmental support will be offered only if the student receives a strong recommendation from their research advisor.

Support beyond the first two years is usually provided by research assistantships through the student's thesis advisor. A limited amount of departmental support will sometimes be available for the third year and beyond; requests for such support must be made by a student's advisor. There are also non-departmental sources of funding with the Graduate School providing some information on where a student (and their advisor) can apply.

Research assistant support is primarily left to the discretion of the student's advisor and the availability of funding. However, a student must remain in good standing within the Department to receive RA support.

Most students receive full-time assistantships. The graduate school lists both TAs and RAs as 20 hour/week appointments. In the case of TAs, their TA-related responsibilities will be 20 hours per week or less leaving the remainder of their time to their own course work and research. For RAs, the combination of course work and research is their full-time responsibility. In general, students with full-time assistantships should not have additional employment. Any additional NIU employment will need to be approved by both the Graduate School and Department. It is the student's responsibility to inform the Department about employment outside NIU and work with the Department on how best to accommodate this. The usual procedure will be a reduction in the TA or RA appointment.

## III. Masters and Ph.D. examinations

Two graduate examinations are administered by the Department. Study guides for both examinations are available in the Department's main office and (partially) on the department's web page.

A masters proficiency examination (also called the masters comprehensive examination and the Ph.D. qualifying examination) is required for all students in the masters program, and for all students in the Ph.D. program who have not received a masters degree in physics. The Department will administer an examination at least once per year, and typically twice per year. The student may substitute an outstanding performance (the present standard is 50th percentile or higher, but may be adjusted in the future) on the GRE physics subject examination, taken either prior to NIU or while at NIU, for the departmental masters proficiency exam. Students in the physics teaching emphasis may substitute course work in a related science for one area on the examination. Graduate

School regulations allow only two attempts to pass this examination. However, examinations taken during the student's first year are considered by the Department to be "practice" and a failing score does not count against the two attempts, but a passing grade can be awarded. A full-time student is required to pass the examination within their first two years in the program.

A Ph.D. candidacy examination (also called the preliminary examination) is required for all students in the Ph.D. program. The Department will typically administer an examination twice a year. The examination consists of four sections (classical mechanics, quantum mechanics, electricity and magnetism, and modern and statistical physics) and a syllabus of possible topics is given on the department's web page. Student may take the examination as many times as it is offered during the time periods described below. Full-time students entering the program without a masters degree in physics are first required to pass the masters proficiency examination before the end of their second year in the program and are then required to pass the Ph.D. examination before the end of their third year in the program. Full-time students entering the program with a masters degree in physics do not have to take the masters proficiency examination but are required to take the Ph.D. examination during their first year, and are then required to pass the Ph.D. examination before the end of their second year in the program. Students with a M.S. degree in a related field enrolled in the Ph.D. program follow the same regulations as those entering with a B.S. in physics and are required to take the masters proficiency examination unless they receive permission from the department. All Ph.D. students are required to take the examination at least once per year per the above statements, and make a good-faith effort to pass the examination, until they have passed the examination. A good-faith effort is defined as trying to do well on all four sections of the exam. Passes of individual sections may be granted, provided that at least two sections are passed and that the Department is convinced that a good-faith effort was made to pass all four sections. In that case, the student must pass the remaining section(s) simultaneously in a future administration of the exam.

Full-time students who have not passed the relevant examinations during the time periods described above may only take the examinations in succeeding years if they have written permission from the Chair of the Department or Director of Graduate Studies. Part-time students must pass the same examinations but the requirements for how long they are given to do this are handled on an individual basis.

#### IV. Advising and Thesis Advisor

All incoming students have as their initial advisor the current director of graduate studies. Each student should try and find their own advisor as soon as possible, ideally by their second semester in the department. This advisor should be the person the student wants to primarily work with while a student in physics at NIU. Their advisor can give guidance on both course selection and how a student should proceed to complete the other aspects of their degree.

All courses have prerequisites and it is primarily the student's responsibility to be sure they have the background to take a particular course. If they are uncertain, they can discuss this with a professor who has recently taught the course (or look at their web pages), their advisor, the department chair, or the director of graduate studies. Students who are lacking some undergraduate physics skills may need to take PHYS 260, 300 and 370 without receiving graduate credit.

## V. Program of Courses and Degree Completion

Beginning in Fall 2008 a program of courses does not need to be submitted to the graduate school. However it is strongly recommended that a student confer with the Dir. of Graduate Studies prior to the end of their second semester at NIU for students in the masters program , and upon the completion of the core courses for Ph.D. students. If a student wishes to substitute for required courses, this can occasionally be allowed with permission of the DGS and the Graduate School.

Students planning on completing their degrees should contact the department office a semester prior to the anticipated graduation term and obtain a list of the items needed for this. Requests for graduation must be made to the Graduate School a semester prior to graduation.

## VI. Ph.D. Committee

Masters and Ph.D. degree candidates have a thesis committee appointed at the time of their thesis defense per the regulations in the Graduate Catalog. In addition, Ph.D. students can have a Ph.D. committee to monitor their progress.

All full-time students in the Ph.D. program are required to have identified a thesis advisor by the end of their third year (if entering the program without a masters in physics) or the end of their second year (if entering the program with a masters in physics). At any following time, the advisor may form a student's Ph.D. committee which consists of at least two additional faculty members and is approved by the Department. The student may also request that a committee be formed. The committee is responsible for monitoring the progress of the student and can make an evaluation to the department chair and director of graduate studies once or twice per year. The result of any review is either satisfactory or unsatisfactory. Unsatisfactory reviews need a written explanation of how that result was determined, and automatically require another review after six months.

## VII. Good Standing

A student is in good standing in the Department of Physics using the standards of the Graduate School supplemented by departmental requirements. For the Department of Physics's purposes, being in good standing is one of the conditions for receiving an assistantship; it is not used for other reasons. The following criteria are used to determine if a student is in good standing.

- The Graduate School will place a student on probation if their GPA falls below 3.00 and have one term (9 credit hours) to raise their GPA to 3.00 or be academically dismissed. The Department of Physics has the same 3.00 requirement for graduate courses taken in physics with a similar one semester period should it fall below 3.00. Students who do not raise their physics GPA to 3.00 after nine credit hours will not be considered to be in good standing.
- For a full-time student to remain in good standing in the Department, the student must also make a good-faith effort to pass any relevant qualifying examinations at least once per year after their first year (for students entering without a masters degree). Students unable to meet this requirement must have written approval from the Department to remain in good standing.

- For Ph.D. students only, the Ph.D. committee can determine that a student is not in good standing due to lack of progress. This is initiated by having two consecutive unsatisfactory reviews. Before losing good standing status, a student will be given a written explanation from the Ph.D. committee and then allowed to respond to the explanation either in writing or in a meeting (or both) within a one month period. A determination that a student is not in good standing must be agreed upon by all members of the committee, the Department Chair and the Director of Graduate Studies.
- Students taking courses outside the Department without approval can lose their good standing in the Department if it is felt to be detrimental to their progress in their degree program.

## VIII. Courses Outside the Department

Students may elect to take courses outside the Department. Such coursework must be approved by the student's thesis advisor and by the Department.

## IX. Departmental Colloquium

Students in the M.S. program are required to take PHYS 798, Physics Seminar, each semester (as an audit after the first semester) unless they receive written permission from the Department. All Ph.D. students are required to register for PHYS 798 for two semesters. A passing grade is given for attendance of at least 75% of the semester's colloquia.

## X. Course Load

Graduate school policy on academic load is described in the graduate catalog. The normal full-time load for students is 9-12 credit hours for the academic year and six hours for the summer. Students with a TA or RA appointment must register for this or receive permission as described below for an underload. Students without a TA or RA may register for fewer hours with permission. Students wishing to register for more hours need department approval for an overload.

International students are required to be registered for nine hours during the academic year except for the semester they are graduating. They are allowed to reduce their summer enrollment in the same manner as domestic students. See the graduate catalog for additional information. Domestic students may reduce their load as described below.

Students taking only research credits in the summer may reduce their load to three credits with departmental permission. After obtaining at least 18 credit hours at NIU, students may reduce their load to six credits for the Fall or Spring term with department permission.

Any reduction to lower than six credits for the Fall or Spring term or three credits for the summer term requires the permission of both the department and the graduate school. Students must submit requests for this to the department prior to the start of the semester. The department will approve requests for two conditions. If a M.S. student is graduating in a given term, they may request that they take one credit (of PHYS 699) provided they have satisfied all other requirements. For both Ph.D. and M.S. students, once they have 90 credits including transfer credits, they may reduce their load to one credit of PHYS 699 or PHYS 799 per term. It is then up to the graduate school to approve such requests.